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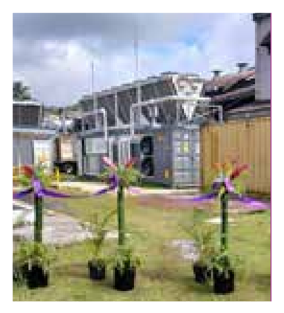

PPA

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Head office: Ground Floor Naibati House, Goodenough Street, Suva, Fiji Islands
Mailing Address: Private Mail Bag, Suva, Fiji Islands.
Telephone: (679) 3306 022
Email: ppa@ppa.org.fj
www.ppa.org.fj

Chairman
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Energy Fiji Limited

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Gordon Chang

Pacific Power Association, Suva, Fiji Islands. The PPA is an inter-governmental agency and member of the Council of Regional Organisations in the Pacific (CROP) established to promote the direct cooperation of the Pacific Island Power Utilities in technical training, exchange of information, sharing of senior managment and engineering expertise and other activities of benefit to the members.

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Reena Suliana
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Correspondence should be addressed to:
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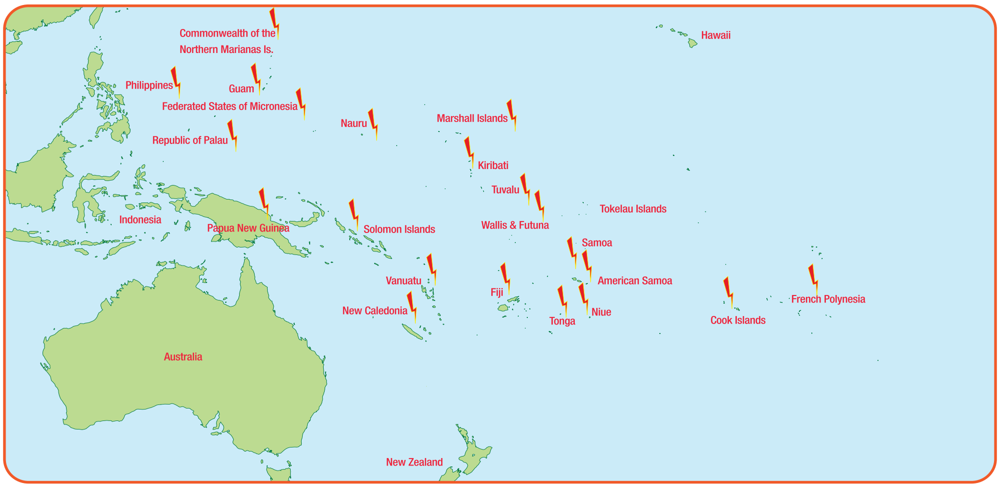

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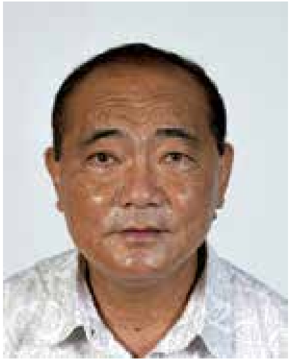

Editor's Note

Gordon Chang
Acting Executive Director

Brisbane 2022 for the 29th Annual PPA Conference was a major success. As a result of excellent contribution and participation from the utility delegates and the Allied Members, together with efficient planning and organizing from the PPA Secretariat staff.

The PPA was honoured to have the First Assistant Secretary, Department of Foreign Affairs & Trade – Australia, Mr. Jamie Isbister, officiate in the official opening of the conference and the Chief Executive Officer of Cordova Electric Cooperative, Mr. Clay Koplin, for delivering the keynote address.

The PPA would like to thank all the delegates who have at a very limited time faithfully arranged for travel from their respective countries to join us in Brisbane, Australia for the PPA Annual Conference.

I would like to conclude by thanking our Allied Members who continue to support the PPA Magazine through their paid advertisements in each issue of the magazine.

On a sad note, we also remember our colleague, the late Mr. John Pirie, former CEO of Energy Fiji Limited, former founding member of the PPA Secretariat. Our condolences to his family.

The 30th Annual PPA Conference will be held in September 25-28 in Saipan, Commonwealth of the Northern Marianas. Preparations are well underway for another successful meeting of our CEOs and it is appropriate to remind those CEOs that have not already registered to book now and avoid any problems with Airline tickets and accommodation. Also many of the Trade Booths involved with our Trade Exhibition have been reserved, so it is important that Allied Members who have not registered to do so and make use of this opportunity to display their goods and services to a captive audience of CEOs and utility engineers.

Finally, let me welcome to the PPA the following organization who has joined recently, Radian Research, USA

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World Class Organic Rankine Cycle Installation Nanpohnmal Power Station Pohnpei Micronesia

David Knight
Business Development Analyst - ElectraTherm

The 200 kW Organic Rankine Cycle (ORC) Waste Heat Power Generation Plant was commissioned and handed over to the Pohnpei Utilities Corporation on 21st March 2023. This world class installation was completed by B:Power a.s in partnership with ElectraTherm and Pohnpei Utilities Corporation (PUC).

The project was initiated by PUC management after a joint presentation by B:Power/ElectraTherm on the opportunity to utilise the waste heat from installed diesel power generation engines to generate fuel free emission free electricity.

Following the presentation, preliminary proposals were prepared with technical information provided to assist in the preparation of a funding request under the United State Department of Agriculture Rural Service High Energy Cost Grant Scheme.

PUC issued an open tender for the design and supply of a 200kW ORC System September 2019. B:Power in association with ElectraTherm were successful in their tender for the supply and installation of 3 off Containerised Power+6500B+ ORC's and associated balance of plant.

The original contract completion date was 30th June 2021 but however due to the Corvid Pandemic and associated travel restrictions access for installation works was not granted until October 2022.

The system delivered and commissioned by B:Power consists of three off ElectraTherm Power+6500B+ ORC's installed inside 40' shipping containers, three modern dry coolers replacing the existing engine radiators which were due for replacement and three off flue gas heat exchangers that transfer the heat from the engine exhaust to a hot water circuit feeding into the ORC's.

Power is generated from a combination of hot water from the flue gas heat exchangers and the engine jacket water system. The engine jacket water is partially cooled within the ORC with final cooling via a secondary heat exchanger connected to the ORC condensing circuit.

During commissioning the installation generated 140 kWe/h after all internal power requirements for the ORC, pumps and dry cooler fans were met with only 75% of the engines running. In addition with a further ongoing saving of 120 kWe/h resulting from the replacement of the engine radiators, the combined additional power generation and savings on engine cooling exceeds the contracted requirements of 200 kWe/h by more than 20% which is a great success.

The contracted works were undertaken in two stages with offsite works consisting of the manufacture of the ORC's and major components and the fit out of the containers with the ORC's electrical cabinets, pumps, jacket water cooling heat exchanger and pipework.

Onsite work consisted of:

- placement of containers onto prepared foundations,
- installation and connection of the dry coolers located on the roof of the containers,
- installation of the flue gas heat exchangers as part of the engine exhaust systems,
- installation of interconnecting pipework, and
- electrical installation.

Onsite installation was undertaken by a six man dedicated B:Power installation team using local contractors as required over a period of three months.

All equipment was tested and commissioned during a six week period with training provided to PUC operators.

There were many challenges to this project including remoteness of Pohnpei and the climatic and technical conditions of the island. These challenges were overcome by precise preparation and planning of each phase of the contract together with the excellent cooperation of all parties.

This project is a milestone in the Pacific for the successful installation of an ORC system using the waste heat from installed diesel powered generators. The ORC's will provide additional power without any increase in fuel consumption adding to the overall efficiency of the Nanpohnmal Power Station.

B:Power and ElectraTherm are proud to have delivered this worldclass facility to the Pohnpei Utilities Corporation and would like to acknowledge the vision of Nixon Anson the CEO of PUC who has championed this project from conception and all the team at PUC who assisted the B:Power team during the onsite works and who contributed to the overall success of the project and made our team so welcome on Pohnpei.

How to Build Network Reliability: A Staged Approach

Martin van der Linde, MIEAust, BE, BBusMgt
General Manager Marketing — NOJA Power

Cost effective and omnipresent, the overhead electricity network is here to stay. Despite the advent of grid scale distributed generation, rooftop solar and asynchronous sources, the distribution network's likely trajectory is the operation of an electricity marketplace, acting as a broker between generators and loads, electron manufacturers and consumers.

The previously feared obsolescence of trillions of dollars of infrastructure is now unlikely to come to fruition, giving engineers an existential liberty in knowing their work towards securing reliability of a distribution network of the future has value, and is very much worth pursuing.

Since the distribution network is here to stay, the key focus remains "how do we maintain network reliability". It's an age-old question, but our modern version includes the additional caveats of "how do we cater for distributed generation" and "how do we make our designs future proof with an upgrade path?".

Through this article we take a generalist approach to review the existing principles of network reliability, with consideration of zeitgeist challenges such as renewable integration and network future proofing. The recipe for reliability becomes a journey, from substation level network protection and automation only, evolving to a fully automated Smart Grid with bidirectional power flow.

We can use a model of Network Reliability Practice Maturity to help clarify the path from beginner, to best practice modelling, then through to experimental innovation for the grid of the future. Reliability rewards are commensurate with graduation through each stage. In our experience in delivering power reliability systems to 104 countries worldwide, we have devised a useful model for building distribution network reliability. We call it The Network Reliability Practice Maturity Model.

This model visualises how it is highly unlikely an organization can leap through from substation-based protection to a fully automated "smart grid", without passing the intermediate stages and learning these competences. Ironically, most utilities don't even have to – the Pareto Principle will yield most reliability rewards with well graded recloser implementation. Nonetheless, this model provides the rails necessary to plan a progressive improvement of your network reliability.

The Principle Concept of Overhead Network Reliability.

The electricity distribution network accounts for 80% of electricity delivery outages [1]–[5]. However, it is a symptom specifically of the challenges of distribution of electricity. For the electricity distribution network, centralized generation and transmission has a much smaller geographic exposure to risk. There are simply more distribution lines and assets than transmission lines or generators, spreading resources thinner over a larger volume of assets. Accordingly, it stands to reason that the majority of failures are assigned to the group with the largest exposure to the elements.

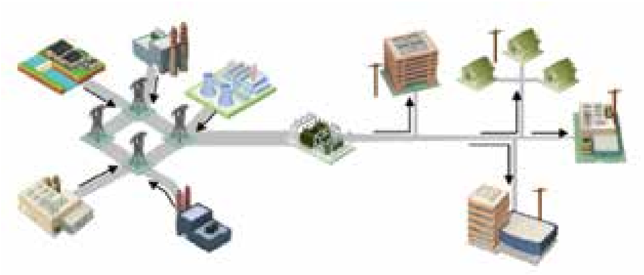


Figure 1 – 20th Century Electricity Network

However, industry experience has precipitated a few best practices for gaining optimum reliability on asset investment. The fundamental principle for overhead network reliability is to use switchgear to break the network up into smaller zones, and then decentralizing protection and implementing automation. By making a massive network into smaller manageable zones, it is possible to improve the reliability for each of the connected areas. Without this form of sectionalization, a single permanent fault would result in an entire feeder, or even substation, being turned off. By breaking the network up into smaller sections, faulted zones can be isolated.

A NOJA Power OSM Recloser used as the point of connection switchgear for a Grid Scale Solar Farm.

Network Reliability Practice Maturity – A Staged Model

The journey towards network reliability requires a staged approach. Figure 2 provides a conceptual overview of this transition, starting from the baseline of substation circuit breakers carrying all protection responsibility, transitioning through to the communications-enabled wide area experimental/innovation-centric protection schemes such as synchrophasors.

With 80% of delivery outages coming from overhead distribution lines, and of those 80%, a further 80% can be classified as momentary. Specifically, these are fault events which are temporary and will clear themselves, provided that the act of clearing the fault does not cause subsequent critical damage to assets leading to permanent faults. Practical examples of these faults include vegetation and fauna contact with overhead lines.

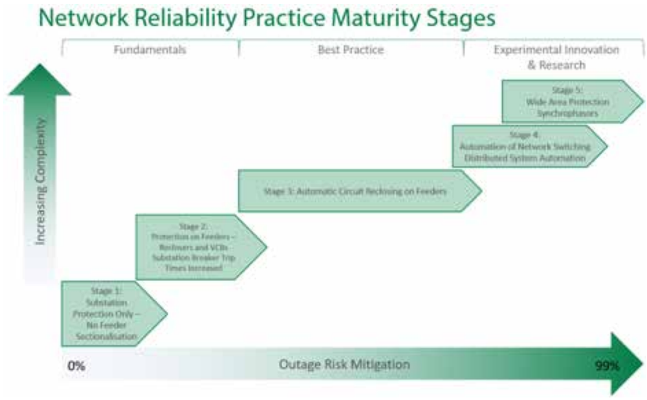


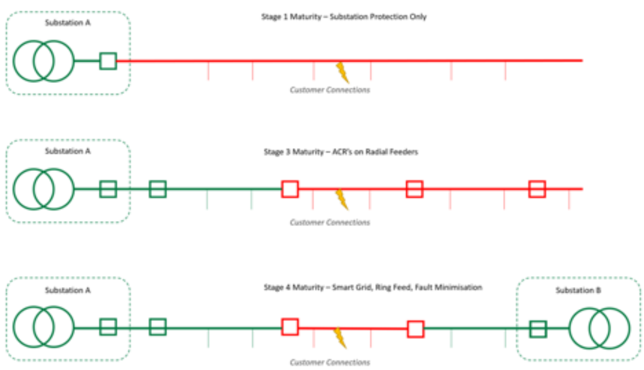
Figure 2 - A staged Visualisation of Network Reliability Practices

As we work through each stage of improved network reliability practice, we build on the expertise built at the previous tier. It is highly unlikely that a Smart Grid automation project with DSA will correctly operate and grade if the utility has not yet mastered distributed grading of protection assets in tiers 2 and 3.

Not all scenarios call for comprehensive smart grid automation either. As with most engineering decisions, there is a cost/return calculation to be made. If you are facing major challenges with significant distributed generation assets, then aspirations to achieve wide area protection is reasonable.

Worldwide however, most distribution networks would benefit greatly from moving from stage 1 to stage 3 or 4 protection, affording 80% of the reliability gains on offer at a fraction of the operational and implementation costs of a stage 5 wide area protection scheme.

Pragmatically, we can visualize the performance of the distribution grid under each of these stages of reliability design as in figure 3.



For the exact same fault scenario, the different stages of network reliability design maturity yield significantly different results. The stage 3 improvement from stage 1 is dramatic, with 80% of all faults being mitigated as temporary, combined with the region impact mitigation by sectionalization. This high-level tour also shows the diminishing returns of network automation investment. There are gains to be made at the higher stages of reliability practice, but these are unlikely to surpass the performance gains seen by deployment of modern Automatic Circuit Reclosers with remote control to ascertain fault location.

Ironically, complexity is the antithesis of reliability. Reaching stage 4 and 5 may actually have a converse reliability impact in the short term as utilities work to grapple with the operational realities of new technology implementations. Network innovation has its rewards, but it is best applied with clear communication and documentation of learnings throughout the aspiring utility organisation.

A NOJA Power OSM Recloser installed close to a Distribution Substation

Reclosers and Sectionalisers

When pursuing a network reliability strategy, protection engineers are armed with the knowledge that 80% of distribution network faults are transient. By implemented Automatic Circuit Reclosing, these 80% of faults are prevented from causing outages, leading to a significant improvement in network reliability. However, when permanent faults occur, their geographic impact is determined by the density of distribution of sectionalising switchgear throughout the network. The more granular the subdivision of the network, the smaller the geographic reach of any particular outage, especially when multiple network feed paths are possible.

How is a Sectionaliser different to a Recloser?

The key difference between a Sectionaliser and a Recloser is fault breaking capacity. Reclosers are protective devices, in they detect and interrupt fault current. Sectionalisers are not able to interrupt fault current, and instead rely on seeing a drop in voltage caused by an upstream device operating, before opening in this dead time to effectively "sectionalize" the fault. Both units succeed in breaking the network up into smaller segments, but Reclosers offer protection to the network, while sectionalisers rely on working with other protective devices.

In years gone by, a sectionaliser device was cheaper than a modern Automatic Circuit Recloser, but with the global scale adoption of ACR's the price has essentially converged. With the cost price differentiator cleared, the only viable reason for using Sectionalisers is for appropriate grading.

With over 30 years of experience in pole mounted equipment, NOJA Power's Group Managing Director Neil O'Sullivan said "If you have a requirement to install sectionalisers on your network today, it is probably because of grading limitations. By installing reclosers with sectionaliser capability you allow these devices to be re-configured as reclosers as other network protection devices particularly substations are upgraded to have digital protection to allow the entire feeder to be graded and protected with reclosers in a step by step approach. "

Grading

As seen in figure 3, to minimize the impact of permanent faults, the objective is to isolate the faulted section of the distribution network with as much precision as possible. Generally, this is achieved through the use of protection grading, a technique which uses either fault magnitude, coordinated protection operating time, or both, to ensure that the protective device closest to the fault is the fastest to open. This allows for predictable fault response. If a substation circuit breaker is set to a 1 second trip time, then devices which are closer to the fault will need to operate faster than 1 second to ensure that only the smallest faulted section is isolated.

When many of the electricity distribution networks of the world were built, engineers had to contend with mechanical relays and spring actuated switchgear, whose variance in time response necessitated significant grading margins between devices. When devices had unpredictable variances, these required larger grading margins to account for the possible deviations. Accordingly, a substation breaker setting of 1 second only allowed for 1 or 2 downstream protection devices, with a grading margin of 500ms or 333ms respectively. This drawback is being mitigated by the advent of microprocessor controlled switchgear.

Modern microcontroller based devices such as the NOJA Power OSM Recloser can be comfortably set with a 150ms margin, leaving room for up to 6 protective devices in series. However, if the replacement of a single unit is done within the context of older equipment, it might be necessary to have the new equipment operate as a sectionaliser until such time that the feeder grading is recalculated, or all legacy equipment is replaced.

To facilitate the piecewise upgrade of a network, NOJA Power's OSM Recloser system can also be used to fulfil the sectionaliser role. It is a standard function of the equipment, which is generally used when there is either insufficient grading to allow for determinant protective response, or simply to replace aging sectionaliser devices with ACRs. The OSM Recloser can be later programmed to act as a conventional recloser when the feeder protection is recalculated, offering an upgrade path for an individual installation without the investment commitment required to redesign an entire network.

For networks that are at stage 1 in our reliability maturity model, a common problem is that substation circuit breakers are set to trip too quickly to allow for protection devices closer to the fault to operate faster. In these scenarios, when the substation has a reclosing function, sectionalisers can be used along the network. In this scenario, these sectionalisers open when the substation does, and when the substation recloses, the faulted zone is minimized. This is better than no reclosing at all, but it performs worse than distributed reclosing as the momentary interruption is seen by the entire feeder.

In our experience, a pragmatic initial step to achieving a reliability improvement is to move the substation breaker response to match the short time current withstand capacity of the substation transformer. This generally provides sufficient grading headroom to include downstream reclosers, allowing for a network progression to stage 3 maturity and the rewards of 80% improved network reliability. Once a grading margin is present for downstream protective devices, the next question arises as to where exactly these units should be placed.

Choosing Recloser Installation Sites

Optimum placement of sectionalising devices such as reclosers or sectionalisers is a challenging problem. In mathematical terms, it is a "Combinatorial constrained problem with a nonlinear and nondifferential objective function"[1], [2], [5]. Essentially, the problem has too many variables to be simply solved, but there are technical ways to execute this optimization problem.

The overall goal is to divide up the distribution customer base into segments, balancing out the fault incidence rate with respect to customer volumes, all while considering voltage should be maintained within 10% of nominal value and load/generation balance should be maintained [6].

On a radial feeder, this is far easier, but for optimum reliability a ring feed is required. Ring network arrangements allow for alternative power sources in the event of a failure in any single section, providing a layer of additional mitigation for permanent faults. Whilst beyond the scope of this article, there are some good academic papers on this subject for further reading [2], [5].

From an asset management perspective, once your "sectionalization" devices are in service, a choice must be made between operational methods. The two primary options are "Run to Failure" and "Proactive replacement", of which the former is the older technique that has been proven to be more expensive [3], [7], [8]. Accordingly, in our experience we generally see distribution network service providers operating on a proactive replacement program, retiring aged technologies such as oil or SF6 based equipment with modern solid dielectric alternatives.

A Single Wire Earth Return network with a NOJA Power OSM Recloser

Conclusions & Designing for a Future Network

As the electricity distribution network transitions to greater levels of distributed generation, the simple reliability gains of achieving radial protective grading will no longer suffice to bring the reliability benefits that it once did. Distributed generation brings new challenges with differentiating load from generation and handling low inertia grids, and forward-looking utilities are experimenting with technologies such as Synchrophasors and wide area protection to provide options for reliability of the future distribution network. Nonetheless, for many utilities worldwide, the staged approach to network improvement allows for significant reliability and revenue rewards. These consistent results can be used to fund the research required to achieve the leading-edge technology goals that are being achieved in the modern distribution grid.

Reclosers which can operate as sectionalisers are an essential tool in providing a future proofed technology option that allows for the progressive upgrade of the network. They can be simply installed at the location of existing load break switches and sectionalisers without much consideration for grading. At the time that the feeder protection studies are reviewed, these devices can be easily reprogrammed to act as reclosers, providing significant reliability gains and mitigating the momentary outages of the distribution network.

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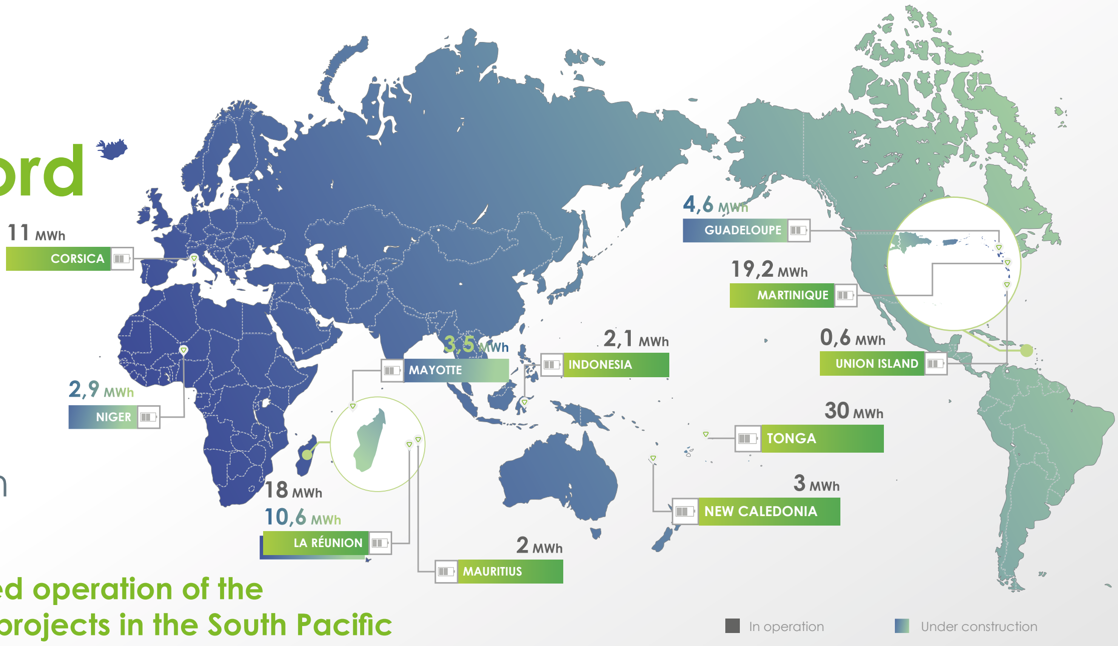

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Challenges with High Penetration of Variable Renewable Energy in Pacific Island Country Utility Grids

Janendra Prasad[1], Associate Professor Anna Bruce[2], Professor Iain Macgill[3],
University of New South Wales

Pacific Island Countries and Territories (PICTs) have set ambitious goals to reduce carbon emissions and as a region have pushed hard for the climate change agenda on the global scene. However, renewable electricity uptake in the PICTs has been far less than required to meet national energy sector objectives despite significant efforts and investments over the past two decades, and countries still rely heavily on fossil fuels, which comprise up to one-third of the value of total imports.

There are many technical challenges associated with integration of high penetration variable renewable energy (VRE) into electricity grids, and there are significant knowledge gaps and a lack of coordinated efforts to support PICT utilities to address these issues. Currently, there are also very few published studies that look at the issues, challenges, and opportunities for grid integration of VRE specifically in this region.

The PRIF's 2021 Performance Indicators report shows that there has been no significant improvement between 2012-13 and 2018-19 on SDG Target 7.2 (RE as a percentage of total energy (electricity)) for some of the higher energy using countries such as Fiji, PNG and Vanuatu, as depicted in Figure 1, despite considerable investments in RE over the same period in these countries.

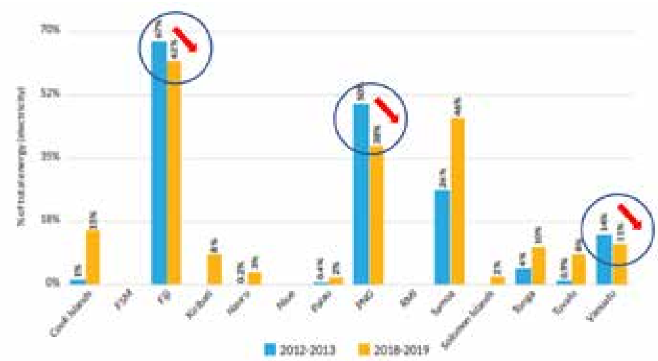


Figure 1. RE as a percentage of total energy (Electricity), Source: PRIF, 2021

The move towards achieving higher RE targets for the power sector and net zero goals will result in more renewable generation technologies connecting to these networks and integration will become more challenging as PICTs scale up VRE. Fluctuating load demand, limited flexibility of conventional power plants, generation capacity issues, and the need to implement more complex systems in order to operate, control, monitor, and manage the variability of VRE will pose challenges for power system operators in the PICT utilities. It is imperative for utilities to assess the operational and stability characteristics of the existing networks and understand the capability of their grid to accommodate renewable, intermittent generation. They will need to identify operational limitations and optimal range of power generation mix between existing and new generation to prevent adverse impacts and explore strategic reinforcements and other methods of increasing VRE penetration such as grid scale BESS for grid firming, peak shifting and spinning reserve capability. Without better long-term capacity expansion planning and subsequently, adequate intervention strategies, it may be difficult to achieve the RE targets set by these countries and may be further exacerbated due to cross sector energy integration such as electrification of land transport, in future.

IRENA's Transforming Energy Scenario for the global scene shows the share of renewable in the power sector would need to increase from 25% in 2017 to 86% by 2050. Of the 85% renewable energy, the dominant technologies are Wind at 36% and Solar PV making up 22%.

Conventional power plants in PICTs include diesel and heavy fuel oil (HFO). Dispatchable renewable energy plants that can contribute to meeting PICTs targets include hydropower and biomass. VRE power generation includes solar PV, onshore and offshore wind.

[1]Jay Prasad Researcher PhD Candidate - School of Photovoltaics and Renewable Energy Engineering, University of New South Wales, Email: jay.prasad@unsw.edu.au

[2]Associate Professor Anna Bruce - School of Photovoltaics and Renewable Energy Engineering, Collaboration on Energy and Environmental Markets www.ceem.unsw.edu.au, UNSW

[3]Professor Ian MacGill - School of Electrical Engineering and Telecommunications www.eet.unsw.edu.au, Collaboration on Energy and Environmental Markets www.ceem.unsw.edu.au, ARC Training Centre for the Global Hydrogen Economy www.globh2e.org.au, UNSW.

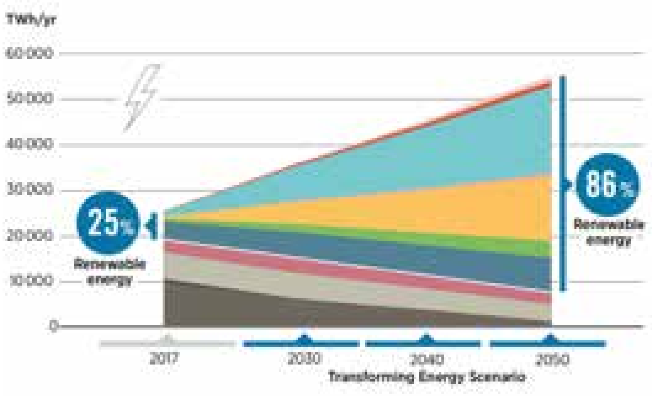


Figure 2. RE Composition in Future (2050), Source: IRENA, 2020

Operating a grid with VRE will be different from one based primarily on conventional power plants due to its variable nature and uncertainty in supply, since the generation depends on the sun shining or the wind blowing. Therefore, VRE is not available on demand ('dispatchable') and remains challenging to predict, despite increasingly accurate weather forecasting tools. Additionally, the generators are typically smaller in scale, often geographically isolated from load centres and distributed broadly across the electricity grid.

Contemporary power systems face uncertainties coming from multiple sources, including forecast errors of load, wind and solar generation in addition to existing generation deviation and outage of generators, and unscheduled loss of transmission and distribution lines. With increasing amounts of wind and solar generation being integrated into the system, if not managed appropriately, increasing variability and uncertainty can increase challenges for system balancing including maintaining reliability through scheduling and load following, regulation of system frequency and maintaining stability over seconds-minutes in the event of sudden loss of a large generator or line.

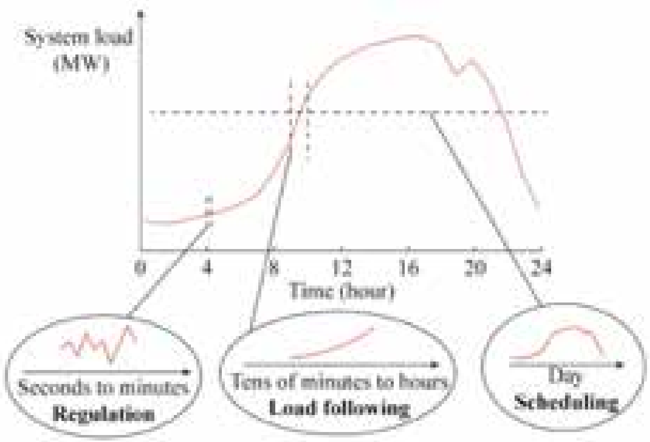


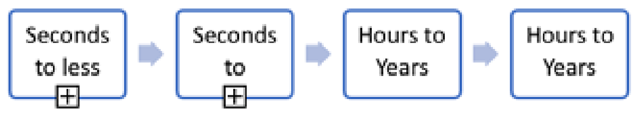
Figure 3. Balancing across different timeframes, Source: IRENA

Many of the PICT utility grids are small, islanded networks with very little inertia and support to maintain system stability and frequency. The generation that is connected to these networks may often lack appropriate controls to manage the system during disturbances which may also impact the overall stability of these grids. It is also not uncommon for the generation plant to run on its own OEM control system rather than be integrated into a centralized SCADA system. New VRE sources that are not integrated into a central SCADA system via appropriate communication using fibre or radio links, may not have the same level of visibility and controllability as the conventional power plant.

The characteristics of VRE generation present new challenges in different areas of grid operation and planning across different timescales:

Voltage Stability	**Frequency Stability**	**Network Adequacy**	**Resource Adequacy**
The voltage waveform and phase angle has to be maintained at all locations in the electricity system following disturbances.	The system frequency must be maintained within acceptable limits by instantly balancing supply and demand.	Adequate grid capacity is needed to transport electricity from generators to load centres.	Having sufficient portfolio of energy sources to match electricity demand with supply is essential for reliable operation of the power system

Timeframes in which system operators and designers need to act in order to meet these requirements.



Several strategies are available to address each of the timescale challenges. For instance, over planning timeframes, optimising the siting of VRE sources considering the available capacity of the network as well as the best location from a generation yield perspective network will address the adequacy challenge. Furthermore, network adequacy can be improved by increasing the grid capacity of the transmission and distribution network, using storage options such as battery energy storage system (BESS), incentivising local balance to match supply and demand locally; and reducing network congestion by curtailing generation from VRE in periods of high generation and low demand. Grid flexibility is defined as the capability of the electrical power system to cope with the variability and uncertainty of the renewable energy generation sources introduced at different (very short to long term) time scales. A power system is considered flexible if it satisfies several operational criteria such as meeting peak loads, maintaining the balance of supply and demand and avoiding curtailment, capability to ramp up and down and mitigate possible events to reliably supply customer demand, across all time scales.

Grid integration studies use available power system data to build and populate power system models for specific utility grids, validate the dynamic characteristics of existing generators, identify grid stability and reliability issues for different VRE penetration levels and various demand scenarios. Grid Integration and evaluation of SCADA and EMS systems has been completed for some of the PICT utility grids including FSM, Marshall Islands, Samoa, Tonga and Tuvalu under a World Bank funded project. These countries have also adopted a Grid Connection Code for Renewable Power Plants and Battery Storage Plants. The grid code stipulates the minimum connection requirements to maintain voltages and the frequency range of the island grids and how renewable energy generators could respond to grid disturbances and provide grid support capabilities. However, to operationalise the outcome of such studies will require interpretation of the recommendations into local context, careful planning, financial investments, and technology intervention which may not have been materialised due to lack of expertise and capacity constraints.

Energy models are useful mathematical tools based on the system approach and the best model should be determined based on the problem that decision makers endeavour to solve. Multiple considerations are used to frame the various power system modelling approaches. Figure 4 provides a summary of the distinguishing characteristics of modelling approaches. Energy planning and modelling needs to consider multi scales aspects (temporal and geographical), as well as the economic, technical, environmental and social criteria.

Type	Time frame and resolution	Size	Network detail	Energy system integration	Example tools[1]
Short-term stability studies	Very short, high resolution	Local to multi-regional	Detailed transmission / distribution	No	PSS*E, OpenDSS
Unit-commitment and economic dispatch (UC-ED)	Medium length (months to years) and resolution (e.g hour)	Regional to multi-regional	Typically low to medium detail	Possible	PLEXOS*, OSeMOSYS, TIMES, Balmorel
Capacity expansion and planning	Long (years to decades)	Regional to multi-regional	Medium to high detail	Possible	PLEXOS*, GE MAPS, OSeMOSYS, TIMES, Balmorel, OptGen, ReEDS
Household demand modelling	Short-medium (days to months)	Very small (e.g. single household or mini/microgrid)	None to moderate	Possible, e.g. household electricity and gas	

Figure 4. Summary of characteristics of modelling approaches Source: Hungerford, 2019

The Fifth Pacific Regional Energy and Transport Ministers' Meeting (PRETMM) with the theme of Accelerating Decarbonization in the Blue Pacific, was held in Port Vila, Vanuatu in May 2023. The meeting was attended by energy ministers, meads of energy departments, delegates from PICTs and representatives of regional and non-governmental organisations, development partners and private sectors. The meeting noted that while deployment of VRE presents important opportunities for PICTs, grid integration of VRE is technically complex and there is a lack of capacity and expertise in the region. The meeting also noted that there are currently only limited regional efforts to support the development of, and data and capacity to use, forward-looking planning frameworks and tools, including Capacity Expansion Modelling (CEM) software, by PICT utilities and other regional stakeholders. Therefore, the Energy Officials called for development and use enhanced and tailored energy planning frameworks and capacity expansion tools for net zero outcomes, with a focus on future demand assessments, universal energy access, transitioning fossil fuel dependent sectors, meeting renewable targets, electrifying road transport/household/commercial uses and securing island grids with high variable renewable penetrations.

UNSW, in partnership with various CROP agencies and other development partners is currently leading a regional study to incorporate a broad set of experiences and perspectives from multiple energy sector stakeholders to enable detailed analysis of the barriers, challenges, and technical issues in the uptake of RE and integration of VRE into the PICT electricity grids. This study will identify current approaches to planning and modelling for capacity expansion in the region and the need for the development of improved planning frameworks and CEM tools to support regional net zero energy transition through higher penetrations of VRE in PICT utility grids. It is anticipated that the study outputs will benefit the region, enabling the PICTs to undertake future demand assessments, better techno-economic assessment, scenario modelling and strategic planning for increasing renewable penetrations towards achieving their 100% renewable energy goals.

Transition from fossil fuels to diversified RE sources will require multifaceted approach and concerted efforts from all stakeholders in the energy sector. Intervention strategies will need to include capacity building and long-term capacity expansion planning for better investment decisions to determine how energy policy can be achieved at least-cost, while maintaining energy security, resilience, and reliability in achieving the ambitious renewable energy goals and target in the Pacific Island region.

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Pacific Women in Power Program Launched to Increase Women's Participation in the Energy Sector.

Mue Bentley Fisher
Senior Communications Consultant - World Bank

The Pacific Power Association (PPA) and the World Bank launched the Pacific Women in Power (PWIP) Program at the 5th Pacific Regional Energy and Transport Ministers Meeting being held 8-12 May 2023 in Port Vila, Vanuatu. In collaboration with the Pacific Community (SPC), the program will support the increase of women's employment as engineers, scientists and leaders in the energy sector.

The Pacific Women in Power Program's objective is to enhance women's employment and economic empowerment across various Pacific Island energy institutions including ministries, utilities and the private sector.

"We know that increasing women's employment in energy, a traditionally male dominated sector, is good for business," Ms. Helle Buchhave, Global Gender Lead with the Social Inclusion Practice of the World Bank, said. "Globally, we see that promoting a gender diverse workforce has resulted in better employee retention, better financial performance, greater innovation, improved service delivery and safer operating environment."

Ms Buchhave added: "The World Bank has estimated that on average, and in the long run, GDP per capita would be around 22% higher for Pacific islands if employment rates for women were to match men."

Pacific Women in Power objectives and partners

The Pacific Women in Power Program objective builds on and compliments the PPA's mission to support its energy utility members to promote and advance gender equality within a diverse and motivated workforce.

"Expanding and modernizing the energy sector is vital since the limited availability of energy constrains human and economic development," PPA Acting Executive Director, Gordon Chang said. "The PPA believes that the investments being made in energy, and increasingly in renewable energy in the Pacific, can be a springboard for promoting gender equality and women's empowerment. The Pacific Women in Power Program is a groundbreaking initiative to support our efforts in this area."

Pacific Women in Power will also align with SPC's Pacific Energy and Gender Strategic Action Plan (PEGSAP - 2020-2030) to mainstream gender in the clean energy sector and to address gender imbalance.

"SPC is greatly encouraged that the Pacific Women in Power Program aligns with the objectives of PEGSAP, as the endorsed blueprint for empowering women in the energy sector," Ms Mereseini Rakuita, SPC's Principal Strategic Lead – Pacific Women and Girls, said. "SPC, as the Secretariat to the Pacific Energy Gender Initiative (PEGI) Regional Steering Committee, which has oversight of the implementation of PEGSAP, looks forward to ongoing and close collaboration with the Word Bank and PPA. This collaboration is key, as it will ensure national ownership and sustainability of such initiatives beyond the life of projects."

Vanuatu's case for change

Commenting on the Pacific Women in Power Program, Vanuatu's Minister for Climate Change and Energy, Hon. Ralph Regenvanu, highlighted the importance of having women participating in the energy sector, particularly in management.

"In our communities, from household level up, women are always the managers and so they need to be encouraged and trained on energy technologies, and also the management aspects of energy," Hon. Regenvanu said. "In fact, as a government, we recognize that where women are involved in institutions' management committees, such as in our water sector where policy and legislation was enacted to support women in leadership, that entity is better managed. I believe we will find this to be the same for the energy sector and welcome this initiative by the World Bank."

Bold renewable energy targets require bold workforce transformation

"Most Pacific nations have impressive and ambitious renewable energy targets that call for large investment and change," Mitsunori Motohashi, Pacific Hub Energy Program Coordinator of the World Bank, said while addressing the Pacific officials and ministers of energy and transport in Vanuatu this week.

"Transformation of the energy sector will also require transformation of the energy workforce," Mr Motohashi said. "Power utilities across the Pacific face major challenges, including retaining a qualified workforce. In this context, women represent an untapped labour pool, and a great opportunity for the energy sector as it evolves, particularly with heightened renewable energy targets."

In the Pacific, less than a quarter of the STEM (Science, Technology, Engineering and Mathematics) workforce is female.

"Under the Pacific Women in Power Program, the World Bank will be gathering data and helping energy institutions design and invest in future and current innovations, partnerships and policies to increase women's participation in the energy sector," Ms Buchhave explained. "The Program will also provide the opportunity to exchange with peers in other regions who also target a more gender diverse energy workforce."

"We want this program to have some really practical outcomes to help shift the dial in the Pacific energy sector to enhance equality for women," Ms Buchhave added.

Geoff Stapleton on the Hall of Fame

Global Sustainable Energy Solutions

On May 3rd at the Australian Smart Energy Council (SEC) annual conference in Sydney, Geoff Stapleton executive officer of SEIAPI was inducted into the Solar Hall of Fame.

The Australian Solar council, now Smart Energy council started the Solar Hall of Fame in 2012 to acknowledge those who have been involved with the solar industry for many decades. It is to acknowledge their passion, guidance and support that has helped the industry grow and mature onto one of the most advanced in the world.

Asked about being inducted into the Solar hall of fame, Geoff responded:

It is a great honour to be inducted into the Solar Hall of Fame. Thank you to SEC and the selection committee. I have had a very long relationship with SEC and its predecessors, Australian Solar Energy Society (AUSES) and the Australian New Zealand Solar Energy society (ANZSES). I presented my UNSW undergraduate thesis, on "solar water pumping" as a poster at the 1981 conference at Macquarie University. I then joined ANZSES in 1982 and have been an individual member of the various organisations ever since. Part of me also feels guilty in being acknowledge with this induction because as far as I am concerned, I have been lucky to have spent over 35 years in an industry that I love. My involvement with the various parts of the industry has been to help grow an industry that would allow me to make a living doing what I love. So again, thank you to SEC and the committee.

This is the second acknowledgement Geoff has received in the last 12 months. Last July at the Clean Energy Council (CEC) Summit in Sydney Geoff won The Outstanding Contribution to Industry Award. In presenting the award the CEC stated: *Geoff Stapleton is one of the pioneers of the Australian rooftop solar industry. After first becoming involved in the sector in the late 1980s, Geoff has been pivotal in the ongoing development and refinement of standards, safety practices and training for the solar industry. He also played a key role in the foundation of the installer accreditation scheme that continues to ensure robust installation practice and training to this day.*

Geoff was not at that dinner to receive his award, his company GSES was hosting 6 people from PNG Power Ltd during that week and training them on inspection of grid connect solar system. At the time that award was announced at the conference formal dinner he was at another dinner hosted by the IFC for the visitors from PNG Power Ltd.

Sunergise Shines with 'Solar-First' Design for Eco-Friendly Plant Retailer

Sunergise

In a groundbreaking collaboration between Sunergise, Cheshire Architects, and New Zealand's eco-friendly retailer, Kings Plant Barn, a visionary project has come to fruition. With a shared belief in the boundless potential of solar energy, these innovative companies embarked on a mission to seamlessly integrate solar power into the very fabric of Kings Plant Barn. Gone are the days when solar panels were seen as mere afterthoughts or add-ons. This project sought to place solar power at the forefront of the design, transforming the building into an energy-efficient masterwork adorned with sleek, black solar panels.

Kings Plant Barn's aspiration was clear: to fully incorporate solar panels into their new building. Sunergise worked hand in hand with Cheshire Architects during the design phase, ensuring that the solar exoskeleton they created not only adhered to building and electrical code requirements but also exuded visual appeal. The result is a bespoke implementation that merges seamlessly with the building's design, boasting a sleek profile that is a first of its kind. Panels were strategically placed to enhance the aesthetic appeal while maintaining a harmonious balance between energy production and design considerations. Even door and window widths were based on individual panel measurements, showcasing the meticulous attention to detail and a commitment to a flawless integration.

Today, the exterior of the Kings Plant Barn Stonefields store stands as a beacon in it's urban environment, adorned with an array of solar panels, harnessing the sun's energy to power the building's daytime needs.

Kings Plant Barn_Sunergise_SEANZ_Best_Grid-Connected

The remarkable success of this solar implementation was further recognised at the prestigious Sustainable Energy Association of New Zealand (SEANZ) Awards. It stands as a testament to the fact that solar power can transcend its traditional role and become an integral part of a building's design, symbolising a major milestone for the solar industry in New Zealand. It shattered the notion that solar energy is an afterthought, proving that it can take center stage as a key feature of sustainable architecture.

During the award ceremony, Lachlan McPherson, co-founder of Sunergise, expressed his gratitude for the shared vision among Kings Plant Barn, Cheshire Architects, and the Sunergise team. He emphasised the exceptional craftsmanship displayed in the installation, showcasing a new milestone for the solar industry in New Zealand, and applauded the moment sustainable solar solutions are integrated not only for their utility but also for their aesthetic appeal.

Sunergise overcame numerous obstacles during the design and installation phases to ensure a flawless execution. Careful optimisation of the roof purlin spacing and thoughtful placement of wall nogs accommodated the solar arrays. Wind-shear forces were reduced or eliminated in red zones with triple rail, wind-skirts and utilising the vertical panels as a parapet. Weight load considerations were seamlessly integrated into the building's structural design. The install and engineering team's unwavering attention to detail and commitment to excellence shone through every step of the process.

The success of the Kings Plant Barn solar exoskeleton project would not have been possible without the shared vision and collaboration of Cheshire Architects and Kings Plant Barn. Their commitment to embracing the power of solar energy has set a remarkable example, paving the way for a greener future.

This exceptional building now stands as a beacon of inspiration, encouraging the integration of renewable energy sources into our built environment. With each project that places solar power at the forefront of design, we draw closer to a future powered by clean, and abundant solar energy.

Kings Plant Barn_Sunergise_SEANZ_Best_Grid-Connected

Kings Plant Barn_Sunergise_SEANZ_Best_Grid-Connected

Smart Meters Training for the Tuvalu Electricity Corporation (TEC)

Tuvalu Electricity Corporation

The World Bank has provided financial assistance of US$9.1million to the Government of Tuvalu. The funding assistance is for the project of Energy Sector Development Project (ESDP). The project consists of 3-components and as follows; (i) Renewable Energy Investment, (ii) Energy Efficiency Investment; and (iii) Technical Assistance and Project Management.

The Smart Meters falls under Component 2 of the ESDP.

For further queries please contact Mr. Mafalu Lotolua, General Manager of TEC, on email address: mafaluloto2@gmail.com; telephone no: (688) 20352/20357

Details of the Project

1) Purpose: Training of TEC Staff on the Installation, Operation and Management of Smart Meters

2) Recipient: Government of Tuvalu through the Tuvalu Electricity Corporation

3) Aim: The activity aims to reduce wastage of energy thus reduce demand and having savings for customers, reduce outstanding arrears and improve TEC cash flow position.

4) Project Detail: Smart Meters is a digital electronic meter that you pay upfront and use electricity. Unlike the current meter each month and issue you with a power bill invoice.

The Meters will be installed to all TEC Customers except some Customers that has been approved by the Government to exempt them from having these meters because of providing the essential service to the Public.

The new meter will have the features that the existing meter do not have: (i) you can prepay for electricity, which helps you budget your income; (ii) able to see daily usage; (iii) prevent doubt from reading errors; (iv) minimize wastage of energy; (iv) recover outstanding arrears; (v) reduce theft of electricity; (vi) improve TEC cash flow position; (vii) reduced monthly power bills; and much more.

As with any new technology, smart meters bring new opportunities, but also new challenges particularly in the early stages of implementation.

The training was conducted for 20-days by Engineers from Holley/EasrWest Pty Ltd from China, and was successfully completed today, Wednesday 31st May 2023. The training ended with the installation of the new meter at one of TEC staff to physically demonstrate and tested the operation of the new meter before rolling it out to all of TEC customers in the month of July 2023.

Welcome!

to the New Allied Member

One (1) new Company has joined the PPA as an Allied Member since our last PPA Magazine.

The new Allied Member is:

RADIAN RESEARCH: Radian Research is based in Indian, United States of America. Their primary activity is metering and automation (reference standards, energy meter testing systems). Their secondary activity is testing service (reference standard calibration lab testing).