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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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Cover Page Photograph - "Yap State Public Service Corporation's (YSPSC) Colonia PowerStation, Colonia, Yap Proper, FSM"

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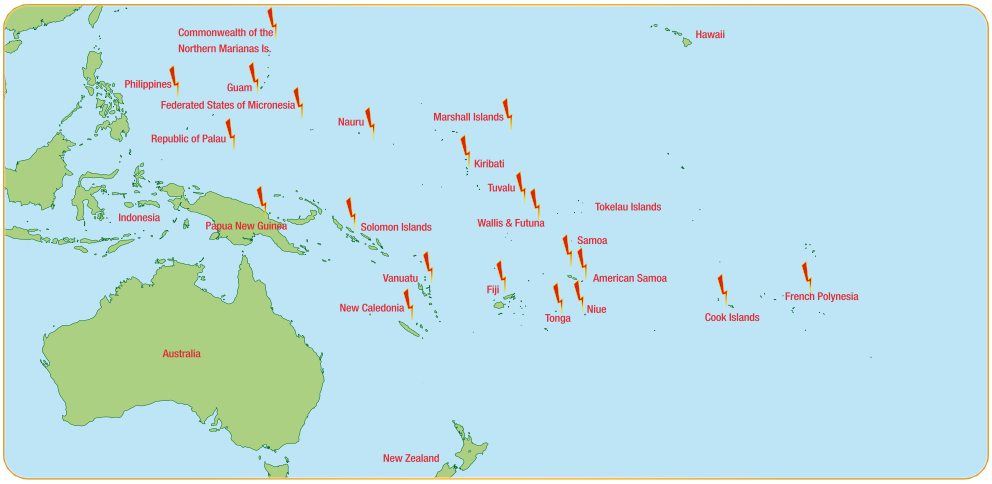

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Editor's Note

Andrew D. Daka
Executive Director

Bula vinaka

As we go to print the world is going through very trying times with the impacts of the Corona virus (COVID- 19) starting to have major effect on our daily lives and businesses. Travel has been largely restricted with governments placing stringent entry requirements for travellers coming into the countries as well as airlines reducing the number of flights to and from their respective countries all in an effort to slow down the spread of the virus.

The spread of the virus has been slow in the Pacific to date but there have been reported cases in French Polynesia, Guam, PNG and now Fiji.

This event has certainly affected the progress in the implementation of the Association's' Sustainable Energy Industry Development Project. It also highlights the fact that when considering disaster resilience and preparedness, organizations will need to look beyond the typical types of disasters we have encountered before; cyclones, Typhoons, floods, sea-level rise, fires etc.

The COVID -19 virus has also affected the holding of the 2020 Annual PPA Conference scheduled for 6 - 10 July, in Kolonia, Pohnpei with the Executive Committee making the call to cancel the conference in light of the uncertainty of how long the situation will last, the stringent entry requirement into countries for international travelers and reduced number of flights.

When utilities or countries explore options for energy security and being more sustainable, they would normally look for opportunities for indigenous energy sources (renewable Energy) or making better use of the energy sources that are already available (Energy Efficiency). For utilities, heat recovery from existing plant for electricity generation presents an ideal opportunity for improving the overall efficiency of current plants as you are capturing energy that would have been dissipated into the atmosphere.

A trend in renewable energy we are seeing in the region now are the projects that have both renewable energy and energy storage components given the variable nature of renewable energy sources.

I have been very pleasantly surprised over the years by how far Nauru Utilities Corporation has come under Abe Simpson's stewardship. You can read about the challenges NUC faced, the changes and the processes they have had to go through in the article to achieve the results that we see today; better operational and staff performance, improved reliability and a declining on government subsidy. A big part of being able to transition to where NUC is now being able to measure performance, identify areas to address and track performance; i.e. Benchmarking!

In this issue you can also read about Southern Cook Islands mini-grids and the importance of social sustainability of projects. Community engagement in the project from design to operations maintenance is of paramount importance.

You can also read about the Republic of Marshall Islands Sustainable Energy Development Project (SEDeP).

SEDeP is RMI's World Bank financed project aimed at achieving sustainability of electricity supply, increasing the share of renewable energy and improving system reliability.

Lastly but not the least, let me welcome to the Allied Membership, EMACS Electrical & Mechanical Repairs based in Queensland, Australia. Their primary activity is repair & service of rotating equipment

Vinaka Vakalevu.

The Future is Energy Efficiency - Heat to Power Generation

Robert Emrich
Managing Director - Electra Therm Inc

Many countries have set ambitious emissions reduction targets in line with the United Nations Framework Convention on Climate Change 2015 Paris Agreement. Countries, particularly in the Pacific, have typically targeted the supply of renewable energy from utility scale Solar PV/ Battery and Wind Power Generation both of which provide intermittent power and require land for installation. There is however, a third compact option to generate base load renewable energy, achieve emission reductions and equally important improve Energy Efficiency through heat to power generation.

ElectraTherm are proudly a renewable energy company focused on the development of practical solutions that achieve Energy Efficiency through the generation of base load power from low temperature heat sources. The company was formed in 2005 and spent several years developing the Power+Generator, a modular Heat to Power Generator based on Organic Rankine Cycle (ORC) technology.

The Power+Generator is a commercially proven robust modular ORC Heat to Power system with an output up to 120 kWe in operation at 70+ installations in 10 countries on 3 continents.

In 2016 ElectraTherm was acquired by BITZER, an internationally recognized specialist for refrigeration and air conditioning technology with operations in 34 countries and direct representation in more than 90 countries. As part of the BITZER GROUP the ongoing development and support of the Power+Generator is guaranteed providing confidence to our clients to continue their investment in energy efficiency/ renewable power generation projects incorporating the Power+Generator.

It is recognised that for reliable distributed power systems there remains a requirement for a source of base load power generation, particularly for island systems with commercial and industrial load requirements. This generally involves the provision of engine based power generation. All engines, regardless of fuel type, produce waste heat from engine cooling and exhaust systems which can amount up to more than 35% of the energy input. The Power+Generator converts this waste heat into additional high value electricity adding to the overall efficiency of the generating asset and providing additional income/ fuel savings for the power utility.

To further our commitment for improved energy efficiency of engine based systems, ElectraTherm, in association with our partners, have developed a new Energy Efficient Engine Cooling System based on their proven heat to power technology. The Engine Cooler replaces the traditional energy consuming radiator/ cooling tower with a self powered engine cooler.

The ElectraTherm Engine Cooler uses the waste heat to be rejected to provide the energy to operate the cooler and generate additional electricity. The system has been designed to meet the cooling requirements for diesel/gas engines with options available for cooling both HT and LT circuits.

Again by producing additional electrical power and offsetting parasitic loading of cooling systems for the same fuel consumption, the overall energy efficiency of the generating assets is increased providing financial benefits to the power utilities as well as contributing to each countries overall emission reduction/ renewable energy generation targets.

It is noted that it is internationally recognised that the generation of electrical power from waste heat sources is considered to be renewable energy and contributes to meeting emission reduction and renewable energy commitments.

The versatility of the Power+Generator has also been proven as a cost effective generating unit for Biomass and Biogas energy systems, waste to energy, industrial waste heat, flare gas reduction, solar thermal and Micro Geothermal.

The use of waste products to generate electrical power improves the energy efficiency of the total system and results in reductions in a nations

energy intensity rating, contributes to emission reductions, adds to renewable energy generation targets and forms part of the circular economy all achieved within a small footprint.

ElectraTherm and BITZER are committed to the future development of Heat to Power Generation and undertake a full program of research and development. Recent developments have included:

- Integration of the successful BITZER expander as the power generation unit
- Upgraded control systems
- Compliance with latest European grid connection standards
- Improved performance including CHP capabilities
- Integration of the Power+Generator with global partners for specific applications

The ongoing long term development pathway includes a larger capacity BITZER expander to maximise outputs for higher thermal inputs, a flexible micro-grid capability and new generation working fluids with lower GWP and lower temperature capabilities.

ElectraTherm's continued involvement within the Pacific Region and in particular to PPA Members, is targeted to provide practical solutions for improved efficiency of existing generating assets (Power+Generator/ Engine Cooler) and to provide alternative solutions in a small footprint for the generation of base load renewable energy utilizing municipal wastes, organic biomass/ biogas resources and low temperature geothermal fluids.

For turnkey projects, ElectraTherm, in association with our integration partners, will deliver successful projects to PPA Members that provide long term benefits based on the three core principals of;

- Supply and Installation of reliable and efficient generating equipment incorporating the latest technology,
- Provision of long term maintenance and product support,
- Capacity building of PPA Members workforce through knowledge and skills transfer.

The important component of capacity building will be based on the training and transfer of skills to PPA members workforce in all aspects of the project including Project Management, Component Manufacture, onsite installation and commissioning. This approach to contract performance is based on the belief that all investments in infrastructure project should provide Sustainable, Reliable and Affordable Renewable Energy together with a legacy of workforce skills growth that will serve our clients into the future.

In conclusion we confirm that ElectraTherm are committed to provide long term support for the development of affordable and reliable renewable energy for the Pacific, and will continue to develop and provide solutions as energy generating systems evolve with the introduction of new technologies and different fuels.

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Romblon Wind Power Generation and Mobile Battery Project

Development and demonstration of surplus electric power utilization system of wind power generator and multi-purpose battery for a small isolate island in the Philippines

Leiko Toyoda
Planning Manager Renewables & Overseas Department - Komaihaltec Inc.

Abstract
Due to the intermittent nature of renewable energy, storage is always a key for an efficient renewable energy integrated system. KOMAI HALTEC Inc., and Honda Motor Co. Ltd., has recently launched a demonstration project for a remote island of the Philippines where 3 units of 300kW Komaihaltec's wind turbines are virtually connected via communication network to battery exchanging stations for electric motorcycles of Honda Motor so that whenever wind turbines generate excess power compared to the power demand of the island, battery packs of electric motorcycles stored in the battery charging stations will be charged to absorb such excess power.

This model has three meanings; one is that the system enables more efficient use of renewable energy by absorbing excess power from the wind turbines, second is the that the battery packs can create two values, renewable energy storage and energy for mobility, and third is that the gasoline powered mobility is replaced by green mobility.

1. Introduction

Romblon is a small island located about 300km southeast of Manila, the Philippines. 38,000 plus people are living within the area of 86.87 km2 , many of whom are engaged in the local marble industry. Like most other small islands in the Philippines, the power system of Romblon is not connected to the main or any regional grid systems of the country and has been solely relying on diesel generators.

High electricity cost of isolated grid islands is one of the big challenges for the Philippines power industry. Power generation in isolated islands has been bleeding deficits and has been compensated by the universal charge which all consumers pay for each unit. High GHG emission from small diesel power generators is also a pressing issue to be addressed.

2. Renewable energy in the Philippines

The Philippines is rich in renewable energy sources, such as wind, solar, small hydro, biomass and geothermal. As a volcanic archipelago, it has a relatively long history of using geothermal power, while other renewable sources have started to develop in recent years. Until 2017, there was practically only one utility scale wind farm in the Philippines, Burgos wind farm, developed located in the north end of Luzon island which commissioned in 2014.

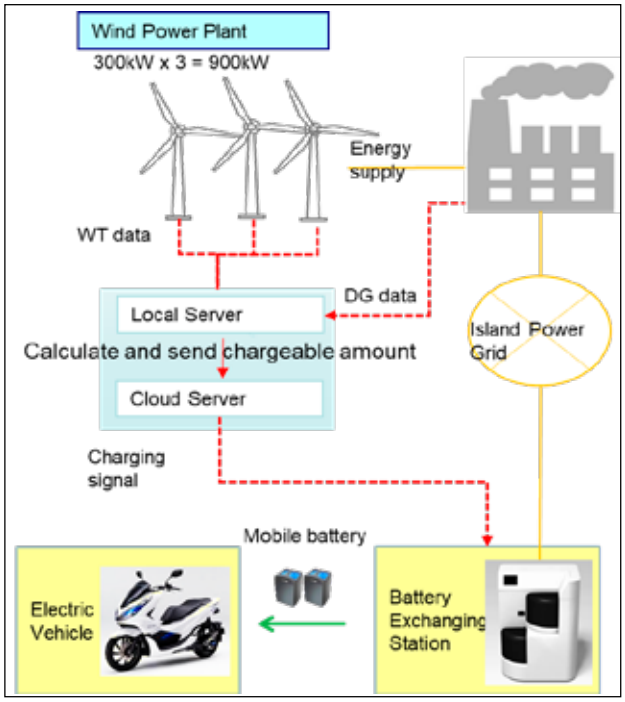
In 2017, Feed in tariff program was enacted by the Philippines Government for the first time, which boosted the wind farm development in the country; nearly 400MW capacity of wind farms were developed soon after the enactment of the law. However, it must be noted that isolated grid islands had been kept out of the scope of the private wind farm developers, who were the main drive force of the wind power development, mainly due to the limited size of the project in such areas.

3. Linking EV batteries with wind turbines

While renewable energy could offer a solution for isolated power grids, by reducing dependency on diesel fuels and lowering the electricity cost and GHG emission, its intermittent nature must be carefully considered in the system design. There is always a certain level of frustration in such system design where the capacity of renewable energy facility will be limited by the grid capacity without storage system, or excess power from renewable sources is wasted due to mismatch of the renewable energy output to the power demand of the community. A system which could stores excess power from renewable sources with

the least cost addition to the electricity cost is something we seek for.

Figure 1: Overall design of the system

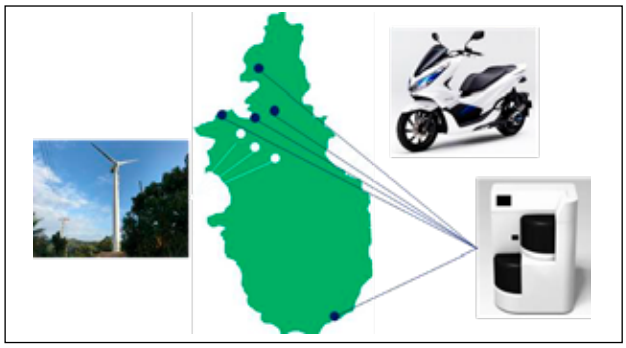


In this case of Romblon Island, the Philippines, the system to absorb excess power from wind power station to batteries of electric motorcycles is introduced as a pilot project. Three units of Komaihaltec 300kW wind turbines are introduced. At the same time, Honda motors brought in 100units of newly developed electric motorcycle to the island with 17 units of battery station units. This new electric motorcycle uses two units of multipurpose battery, each amounts 1kWh, which is detachable from the motorcycle itself. The extra batteries are always stored at battery changing station so that motorcyclist goes to the station to take out the used battery from their motorcycle and replace with fully charged ones. As batteries are always ready for charging at battery changing stations, it increases the further convenience as excess power absorber of wind energy negating system.

Figure2: System outline

Project Outline	
Project participants	Komaihaltec Inc / Honda Motor Co., Ltd. Romblon Electric Cooperatives
System components	3 units of 300kW wind turbines (Komaihaltec) Mobile Power Packs, 17 Battery Charging station units and 100 electric vehicles (Honda Motor) Control system for charging surplus energy to battery packs
Period	Design and Build: September 2017 to February 2019 Demonstration: February 2019 to 2023 Jan

Figure 3: Location of the system



In this system as shown in Figure 1, the system monitors the power output from the diesel generators, output from wind turbines as well as wind speed at the nacelle tops of each wind turbines, which data are all collected and calculated in the local server. When the DG output goes below the preset value, the local server sends the signal to wind turbines to curve the output, at the same time, the server calculates the excess amount and send the signal to the cloud server who dominates the EV battery system so that the battery charging station unit can starts charging the batteries. When the batteries start charging, it means that the demand of the grid increases and the output from DGs also increase, then the limitation of the wind turbine output will be released or loosened.

Figure 4: Image of excess power absorption by batteries

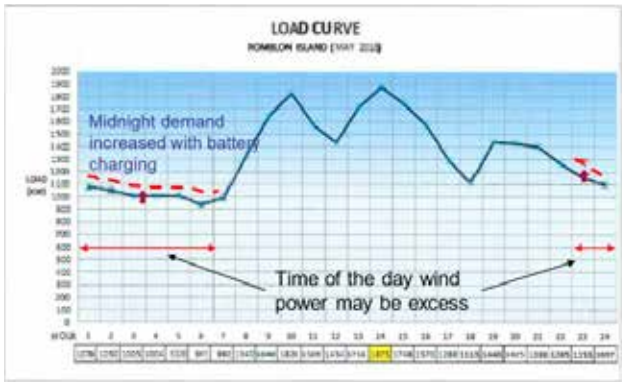


Figure 4 shows an image of excess power absorption by motorcycle batteries. At this stage of the project with only 100units of electric motorcycles, the capacity for these batteries are not large enough to absorb all excess power from wind generating system, however, it will contribute in some portion to reduce the waste of wind energy. When the number of electric motorcycle increases, it is calculated that most of the excess power will

be absorbed by their batteries.

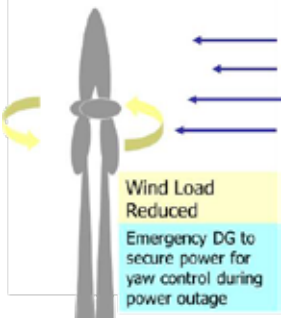
Figure 5: Wind turbine on the hill and electric motorcycle in town

4. Typhoon resistant system

The 300kW wind turbine adopted in this island project includes the typhoon resistant system to be durable with fierce typhoons recently observed all over the globe.

With the typhoon resistant system, the wind turbine turn the nacelle position from upwind to downwind when it is under typhoon mode and the wind speed exceeds certain limitation. The nacelle downwind position will be kept until the wind speed goes down. This will dramatically reduce the wind load that the wind turbine receives. For the case of power outage, each wind turbines is equipped with emergency generators to secure the power supply for wind turbine control.

Figure 6: Image of typhoon resistant syste



A Corporate Journey of Change

Abraham Simpson
CEO - Nauru Utilities Corporation

Nauru is a tear drop like pearl shaped single island nation 40 kilometres south of the equator, on latitude 0° 31' and longitude 166° 56'. The nearest neighbour is Banaba or Ocean Island to the west.

Nauru was a prosperous nation built on the back of the rich phosphate deposits on the island. Once considered the richest nation on earth on a per capita basis, the investment in the electricity and water infrastructure was reflective of that status.

In the early 2000s Nauru's economy went into a deep recession. The lack of available finance resulted in under investment in the maintenance of assets. Parts could not be afforded and the short-term struggle to keep the machines and equipment running took its toll.

In 2005, the Nauru Utilities Authority was formed. In August of 2011 it became the Nauru Utilities Corporation under an Act of Parliament. Despite all this the reliability of electricity supply remain extremely poor.

In September of 2014, NUC developed its Strategic Plan 2014 to 2020. The strategy was developed in-house. In a series of workshop and consultations involving all staff and various stakeholders the vision, mission and values were developed.
Vision: "Mukur Dogin Naoero" (Work for Nauru)
Mission: "For Nauru we will achieve, with a united effort and doing things Right first time Utopia"
Values: Honesty, Customer Focus, Teamwork, Safety, Environment.

The following list of issues that needed to be confronted, while not exhaustive, portray the challenge.

1. NUC as an organization was very reactive. Rather than address issues before they develop, NUC was responding to issues as they happened generally with short term fixes that addressed the symptoms rather than the root cause.
2. Power supply was extremely unreliable. SAIFI and SAIDI for the financial year 2015 (1st July 2014 to 30th July 2015) was 490 and 67,476 minutes respectively. In effect every customer experienced a power outage on average 1.4 times a day and around 47 days of power outages in one year.
3. Inefficient operations of which the worst example was around 100,000 litres of fuel per month could be saved if fuel efficiency was improved to benchmark.
4. The lack of generating capacity meant load shedding was frequently resorted to whenever a generator was taken out of service.
5. The generators poorly maintained resulting in frequent breakdowns.
6. The network is in a pathetic state. Steel poles were almost rusted through at the base the conductors were beyond useful life. As a result there were frequent breakdowns and prolonged power outages.
7. Customer service was virtually non-existent and this only added to the frustration caused by the unreliable service.
8. Poor supply chain/ inventory management. Being a remote pacific island nation, shipping services was infrequent averaging about one visit every six weeks. This coupled with the inefficient business processes and lethargy in its execution often resulted in the lack of materials and parts for repair and maintenance. A case in point: A line refurbishment project was undertaken under the European Union's EDF 10 program for Nauru. Major materials and equipment and the contractors arrived to commence the actual work in November 2013. At that time orders were placed for additional parts that were required for the work. The contractor was scheduled to be on island for ten months to complete the project. The parts arrived twelve months later after the contractor had left the island. NUC has to complete the work with its own funds.
   Also, relationships with key suppliers were poor and supplies could not be purchased on credit.
9. Faced with all these challenges and the ire of the public because of the poor service, worker moral was low. The author at times would be with the workers on the field when members

on the public would shout profanities at the workers while driving past.
10. Workers knowledge and skill levels was very low.

In summary, the strategic plan set out the following objectives:

1. To reform the business culture to become more proactive, accountable and efficient based on the core values adopted in the strategic plan.
2. To improve the security of power production adopting the criteria of N-2 where sufficient firm capacity is maintained to supply the system demand while the two largest generators are unavailable.
3. To improve the reliability of power supply by refurbishing the production and distribution assets and improving the maintenance of the assets.
4. To improve critical supplier relationship, supply chain and inventory management.
5. Expose employees to best practise through work attachments and capacity building programs.
6. Embed leadership by example in the work culture of NUC.
7. Improve human resources and financial management.

To monitor and incentivise the execution of the business strategy, the Balances Score Card and three sixty Degree frameworks were adopted.

The balanced scorecard comprised some 33 indicators selected from the perspective of Customers, Finance, Process or Operations and People and Learning (Organisational Capacity). The indicators comprised a selection of standard indicators as used in the PPA's benchmarking manual and specifically developed indicators that are unique to the operations. For example, delivery of water is done by water tankers after payment. A customer service indicator was developed to measure the percentage of deliveries made within two days of payment.

The 360 degree process was designed to ascertain adherence of behaviour to the NUC's core values and incentivise change in the corporate culture. This evaluation was restricted to the leadership team who are responsible for setting the example.

After almost five years of implementing the strategic plan the following indicators best illustrate the results obtained. These indicators are summarized in Table 1

Table 1: Indicators that best illustrate corporate change

Figure	Indicator	Explanation
Figure 1	SAIDI	System Average Interruption Duration Indicator – measured in minutes SAIDI indicates the average duration of power outage per customer per annum.
Figure 1	SAIFI	System Average Interruption Frequency Indicator = average number of power outages per customer per annum.
Figure 2	System Losses	Power loss as measured by total energy generated less energy sales, non-revenue energy and employee energy benefits.
Figure 3	Generator Availability	Availability of the generators for operations. Duration of unavailability for fault rectification and maintenance reduces this indicator
Figure 4	Generator Maintenance Compliance	Measure adherence to the annual maintenance plan based on machine running hours. Non-compliance includes not carrying out the maintenance when due.
Figure 5	Specific Fuel Consumption	Diesel Fuel burnt to produce energy in kwh per litre.
Figure 6	Specific Lubrication Oil Consumption	Lubricating oil used to produce energy in kwh per litre.
Figure 7	Financial Performance	Rather than present financial indicators this figure presents Income, Government subsidy, Donor Income, Operational Expenses and Depreciation from 2015 to 2018. These are audited figures.

Figure 8	On Time Attendance	Measure the number of times workers report to work prior to start time and depart after knock off time.
Figure 9	Business Culture Change	This uses a tool called Missing Links where employees, Management the Board and external stakeholders rated the symptoms as per their perception of the organisation. The symptoms indicate an organisational performance attribute. This toll is best done after several years as culture change and perception take time to happen. Done in 2014 and again in 2018 the results indicate a major change in perceptions indicating a cultural shift towards the desired business culture.

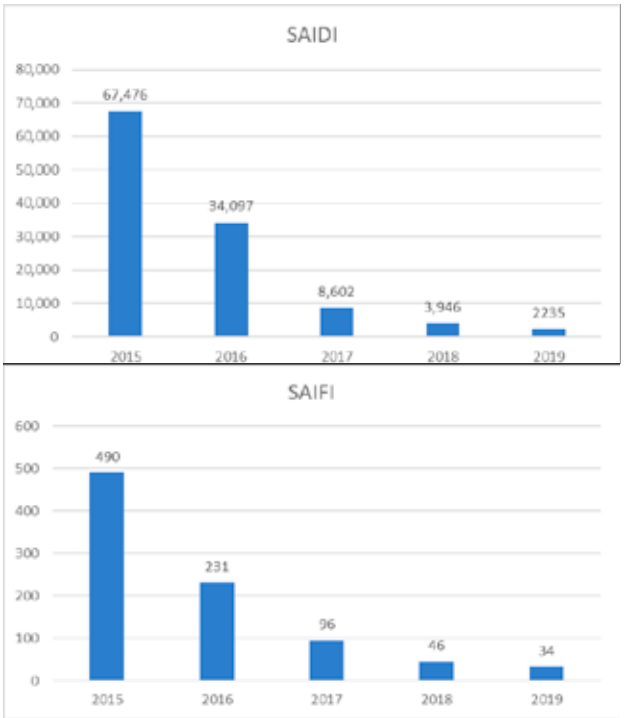


Figure 1: Power Outage Indicators

Figure 2: Power System Losses

Figure 3: Generator Availability

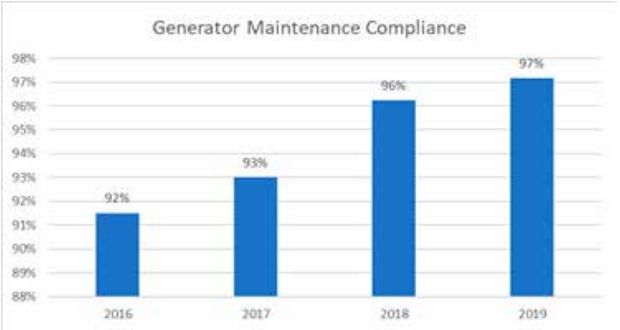


Figure 4: Generator Maintenance Compliance - measure of adherence to maintenance schedule based on running hours

Figure 5: Specific Fuel Consumption (Litres per kwh)

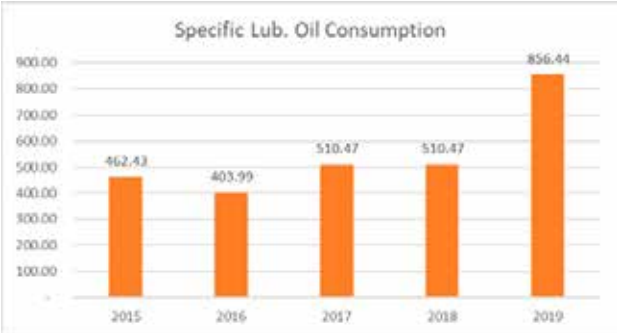


Figure 6:Specific Lubricating Oil Consumption (Litres per kwh)

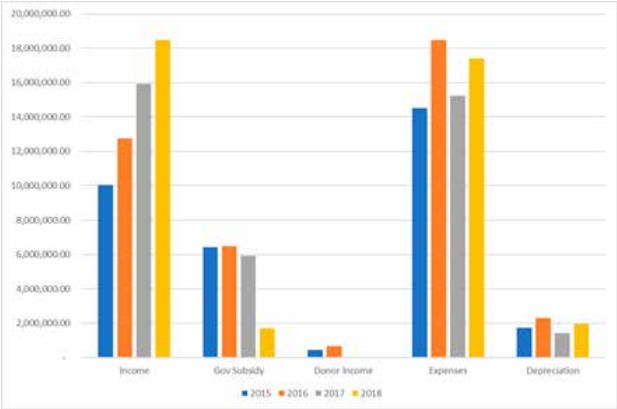


Figure 7: Financial Performance

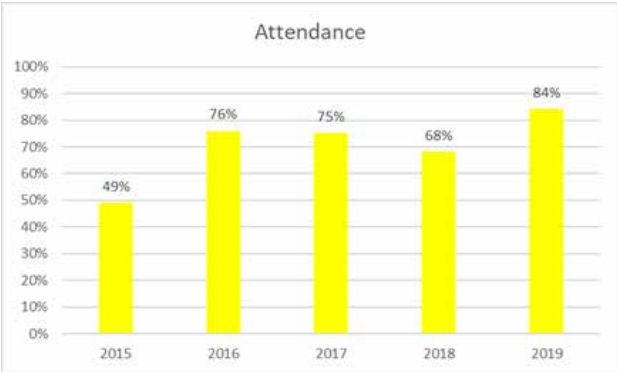


Figure 8: On Time Attendance

Figure 9: Business Culture Change

Transitioning an organization involves the changing the paradigms, business culture, business processes, renewal and reconditioning of assets, improving business relationships with the public, business objectives.

Major paradigms that needed to be dealt with are summarized in Table 2.

Table 2: Summary of Key Paradigms that needed to be addressed:

Paradigm	Response
Nauru can't change	Start with "quick win" changes to build confidence that changes can be made.
If we fix the system overtime will be reduced	If you fix the system you will get more money, vis a vis the performance management system
Nauru = No Action Until Really Urgent	Mission statement, Accountability, Follow up, weekly progress meetings.
Nauruans can't work	Promote, reward and praise Nauruan who work hard as examples to follow. Annual NUC day awards.
Favouritism dominates all worker decisions	Transparent disciplinary process, training decisions, and promotions.
The nation/ government does not need support– strong sense of entitlement.	The nation needs your support and contribution – Mukur Dogin Naoero (Work for Nauru)

Implementation of the Business Strategy:
While having a strategic plan is essential, the implementation of the plan is never simple following of the plan. Often, assumptions adopted when formulating the plan do not hold to be exactly as expected and unforeseen and unexpected events and situations do occur. These may require adjustment of the plan to respond to these situations, nevertheless having clear business objectives ensure adjustments are made with the outcomes in mind. The objectives are your guiding principle even as you adapt to situations.

The support of the donor community was critical to funding of the strategic plan. Without their support the strategic plan would never have been implemented. Key donors were the Government of Australia, the Asian Development Bank, the European Union, The UAE, the Republic of China (Taiwan), the Government of Japan, The United States of America, The Government of New Zealand, the South Pacific Commission and the International Union for the Conservation of Nature.

Having a management team in place that fully supports the effort and are prepared to put in the hard yards is critical. The buy in from the employees has also contributed greatly to the achievements.

The rehabilitation efforts focus was on restoring reliability of power supply by acquiring high speed containerized diesel gensets. These were the less expensive capacity with high operating cost. They however, brought almost immediate improvements. It also bought time to acquire two new medium speed diesel generators and refurbish the old diesel generators. While medium speed diesel generators were more expensive capacity, the operating costs were significantly lower than for high speed diesels.

The grid refurbishment focused on the rehabilitation of the high voltage lines first.

During the course of the implementation of the strategy we discovered that major issued existed with the quality of the wiring. Two teams of qualified electrical inspector were set up to inspect every installation on Nauru and to correct wiring defects. While the safety of installation was the primary goal, the other benefit of this program was the reduction in electricity thefts which is reflected in the reduction of power system loss.

The grid and power station is now ready for the connection of large scale solar power systems. The current renewable contribution is to the grid energy is around 6%. A 6MW solar panel project funded by the ADB is in progress and is expected to increase the renewal energy contribution to almost 50%. A 5 MW/2.5 MW battery is included in the project.

Conclusion
A clear strategy, meaningful vision, shared mission and values, motivated employees, good supplier relationships together with a supportive donor community are ingredients for a successful corporate change effort. Small Pacific island utilities can dramatically improve their reliability and quality of service and yes we do have it within us to help ourselves. Tubwa Kor.

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Social Sustainability in Southern Cooks solar mini-grids

Chris Service
Business Development Manager – Pacific, Infratec

In June 2019, Infratec joined the Prime Minister Henry Puna and other delegates in celebrating the official inauguration of the solar-mini grid on Mauke Island. The system was one of the four delivered as part of a Cook Islands Government and Asian Development Bank (ADB) project to design and deliver solar/battery mini grids and new underground network distribution systems on the islands of Atiu, Mangaia, Mauke and Mitiaro in the Southern Group of the Cook Islands.

The project presented an excellent case study of how such projects can be considered sustainable across the three key pillars of Sustainability; Environmental, Economic and Social.

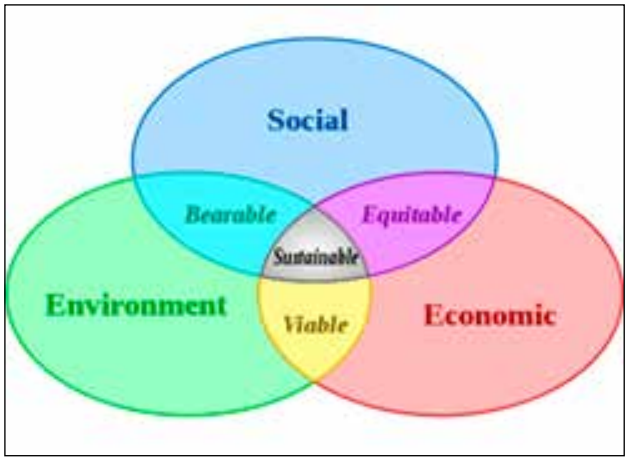

Figure 1: Three pillars of sustainability

The Economic and Environmental pillars of the project are well recognised, and often those most referenced when considering project success. For example:

- Economic Sustainability: With an installed capacity of 1.3MWh of solar and 7.3MWh of battery storage, the project will reduce diesel consumption by about 360,000 litres/year, saving the Cook Islands Government the significant burden of imported fuel costs. Further, the project has brought clean, affordable and reliable power to almost 1,500 people - or about 9% of the Cook Islands' population.
- Environmental Sustainability: the project is expected to remove 960 tonnes of CO2 emissions/year as a result of displaced diesel fuel consumption.
- However, Social Sustainability, or the 'missing pillar' is often under-represented in the media, but which is essential to ensure the project's long term success. In this project, Infratec along with its partners, Cook Islands Renewable Energy Development Division (REDD) and the Asian Development Bank, placed great attention to ensuring Social Sustainability, via the Community Engagement model.

Community Engagement

Community engagement by definition is a means to foster mutually beneficial and sustainable relationships between the developer and the community, with continuous feedback loops. Here at Infratec, we take this into our delivery ethos: **we view the local community, not a beneficiary or a stakeholder, but as a key project partner.**

- Key principles of Community Engagement include:
  - Proactive Consultation & Feedback loops
  - Collaboration & shared purpose
  - Inclusive participation
  - Learning and accountability
  - Cultural appropriateness
  - Gender equality / female empowerment
  - Integrity, Transparency
  - Sustained engagement

Key Steps of Community Engagement

Figure 2: Community Engagement model:

Source: Guide To Community Engagement For Power Projects In Kenya, Power Africa 2018

Project examples of Community Engagement in action:

1. INFORM: The ground work was led by the Cook Islands Government (REDD), by local MPs and community leaders. This included meeting with community leaders (Ariki, Island Administrators, Priests), to understanding local response and needs to electricity and present the project overview & approach. A joint approach including all project partners (REDD, community, Infratec) was highlighted as a key factor for success.

2. CONSULT: Infratec worked closely with the CI Government, including REDD, the Ministry of Health and local leaders regarding cultural norms and best engagement methods for the project. Interviews were held with local leaders and village representatives – setting expectations & gathering feedback on project implementation.

3. INVOLVE: Infratec employed a local Community Engagement Manager to spearhead the design and implementation of the project. This included; identifying local workers with skills and/or potential to play an active role in the project build; a focus on employing women directly and in project support services; and celebrating key events with the community & local leaders, such as ground-breaking ceremonies.

4. COLLABORATE: Throughout the project, Infratec employed 40 local people - including more than 10 women - and sought to provide all of the local workers with knowledge and skills that would serve them and their communities after the project finished. We also provided support (financial and staff) to a youth conference an Mauke, and supported Mitiaro with electricity supply during the Islands Games.

5. EMPOWER: Infratec teamed up with the Cook Islands Red Cross, to provide First Aid training to women & children. Within the project team, we trained local staff on worksite HSE and setting HSE standards. The project team received practical training and skills development in construction, which as seen several locals develop careers in this industry.

Infratec has been proud to play an active role in this project and leave a lasting legacy on the islands of Atiu, Mangaia, Mauke and Mitiaro. We've learnt a lot, make great friends and helped set a standard on how to work together with local communities in future projects.

We also have some advice for future project to developers:

- Treat community engagement as a budget line within the project - resource for it and it will pay off in the project.
- View community engagement as an effective risk mitigation strategy to project delivery. Large projects in small communities require close cooperation between contractors and the community. Flexibility is needed on both sides and a close relationship is essential to achieve project success.

Sustainable Energy Development Project

The Journey to 50 by 2025: Sustainable Energy Development Project

Marshalls Energy Company
Republic of Marshall Islands

The initial stages of an ambitious and innovative journey to a sustainable and climate resilient energy supply for the Republic of the Marshall Islands (RMI) is underway with the Sustainable Energy Development Project (SEDeP).

Like most Pacific island nations, RMI relies heavily on imported diesel for its energy supply, with more than 90 percent of diesel energy generation produced and distributed with aging infrastructure. The remote island country has small and disparate land area and limited natural resources. Energy costs run high and are susceptible to changes in external markets that can cut off an already tenuous supply chain.

The World Bank funded project was developed to improve the sustainability of energy supply for RMI and aims to add 7–9 percent renewables by 2022. This is a vital step in meeting RMI's goal of 50 percent renewable energy production by 2025. SEDeP will reinforce RMI's energy infrastructure by "increasing renewable energy generation and enhancing the reliability of electricity supply and improve energy efficiency in the country". The estimated International Development Association (IDA) grant for the proposed operation is US$34 million.

SEDeP's "Triple Threat" Approach

The SEDeP focuses on the production and implementation of three components to fortifying RMI's energy sovereignty – the ability to control, regulate, and manage their own energy supply.

The first component involves the **investments in renewable energy** including new solar photovoltaic (PV) systems, a Battery-Energy Storage System (BESS) at MEC, and grid-management equipment. 4 MW of solar is expected to be added to the grid, retiring some old diesel generators. Two of the remaining generators will be replaced with newer ones to provide energy for Ebeye and Majuro. The aggressive plan to ramp up with solar power and BESS means that the existing grid and power plant needs a significant upgrade to its existing control systems and refurbishment of the power plant to accommodate the new equipment.

The second component is the design of an **energy efficiency (EE) promotion program** to provide recommendations on loss reduction and EE awareness campaigns and training for MEC staff and RMI residents. MEC and KAJUR will execute the programs on the ground and facilitate higher-level policies and regulations for energy efficiency. This program also includes the supply and installation of EE investments to reduce losses on the supply side as well as demand side management. These improved efficiency investments include LED lightbulbs, more efficient water and sewer pumps, airport lighting and lighting at the International Convention Center (ICC) building in Majuro, and replacement of diesel generators and air handing units at Ebeye hospital.

To ensure the long-term success of these initiatives, a robust and skilled task force is necessary to optimize these new technologies, including project management and implementation, coordination, monitoring and evaluation, and operations and maintenance (O&M) strategies. Rounding out the project, the final component of SEDeP includes the development of programs for **Technical Assistance, Capacity Building and Project Management** to enhance the capacity of MEC, KAJUR, and Energy Planning Division (EPD). The subsequent phases of the project will include the preparation of safeguard instruments for RE projects for Ebeye and the Outer Islands (Wotje, Jaluit, Rongrong and Santo).

Who's Involved?

As the boots-on-the-ground champions of SEDeP, MEC was deeply involved with the project development and will remain as the project implementation unit (PIU) to ensure the long-term success of the project. With the PIU consisting of the locally-based MEC executive team the personal investment in the success of SEDeP holds deep roots for them.

MEC Chief Executive Officer (CEO) Jack Chong Gum expressed the importance of the SEDeP project not only to RMI's renewable energy goals but for the betterment of the RMI community, "This is a very large-scale project for the country with major impacts that meeting the national targets heavily rely on. We

are very excited to be part of this movement and lead by example."

Project stakeholders recognize the importance of recruiting and training a local team. The SEDeP emphasizes Technical Assistance, Capacity Building and Project Management as a major objective and output of the project. A local Project Implementation Officer will be trained with project management skills and assist in the management of the project. MEC and KAJUR staff will also be trained to effectively operate and maintain the new Solar PV plants and upgraded generation and distribution systems. These capacity building exercises are key to the long-term success and sustainability of the project.

RMI takes on Climate Change

SEDeP balances the approach of reducing greenhouse gas emissions at the core by adding RE investments and ramping up infrastructure to adapt to the challenges of climate change.

Kamalesh Doshi, Project Manager, SEDeP describes the role of SEDeP in reducing GHG emission: "The project approaches the GHG reduction targets of RMI from all three directions. This will be the first major step towards achieving ambitious targets of RMI in terms of GHG reduction. The contribution of renewable energy-based power will be increased from existing level of 2% to 9%"

Upgrades to the existing grid and power plant will strengthen Majuro and Ebeye's ability to control, regulate, and manage their own energy supply. The remote island nation will be more resilient to climate change induced fluctuations in energy prices.

With SEDeP as one of many climate resiliency projects, RMI is providing a blueprint for how to innovatively apply known technologies in remote and challenging locales.

Palau – RE/EE Guidelines Training Workshop

Pacific Power Association

Figure 1: Participants Group Photo

Koror, Palau, 10 February 2020

A four day training workshop on the SEIDP RE/EE Guidelines. The workshop was the first of the second round of workshops for the Northern Utilities under the World Bank funded Sustainable Energy Industry Development Project (SEIDP) and runs from 10 -14 February 2020 at the Palau International Coral Reef Research Centre.

The workshop was conducted by Dr Herbert Wade of Global Sustainable Energy System who has been contracted by the PPA to develop the guidelines and carryout the workshops.

A total of 19 participants from the utility, Palau Public Utilities Corporation and the Palau Community College attended the Workshop.

The workshops covered the following guidelines:

- How to determine maximum demand in an off-grid system
- Sizing the array/battery and inverter in an off-grid system (standard controller and MPPT)
- Matching Array/Inverters and energy yield in a grid connect system
- Designing AC Bus Hybrid System
- selecting a solar water pumping system

The workshop also included a field session to inspect existing PV installation

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Yap – RE/EE Guidelines Training Workshop

Pacific Power Association

Colonia, Yap, 24 February 2020.

The second workshop of the RE/EE Guidelines for Yap, FSM, was at the YSPSC training center in Colonia, Yap.

A total of 9 participants attended the workshop with a number of the coming from the outer islands of Ulithir and Fasor with the rest coming from the main operations in Colonia, Yap Proper.

The program for the workshop was the same as that for the workshop held earlier in Palau which covered:

- How to determine maximum demand in an off-grid system –
- Sizing the array/battery and inverter in an off-grid system – (standard controller and MPPT)
- Matching Array/Inverters and energy yield in a grid connect system
- Designing AC Bus Hybrid System
- Selecting a solar water pumping system

These Guidelines can be downloaded using the following link https://www.ppa.org.fj/publications-2/.

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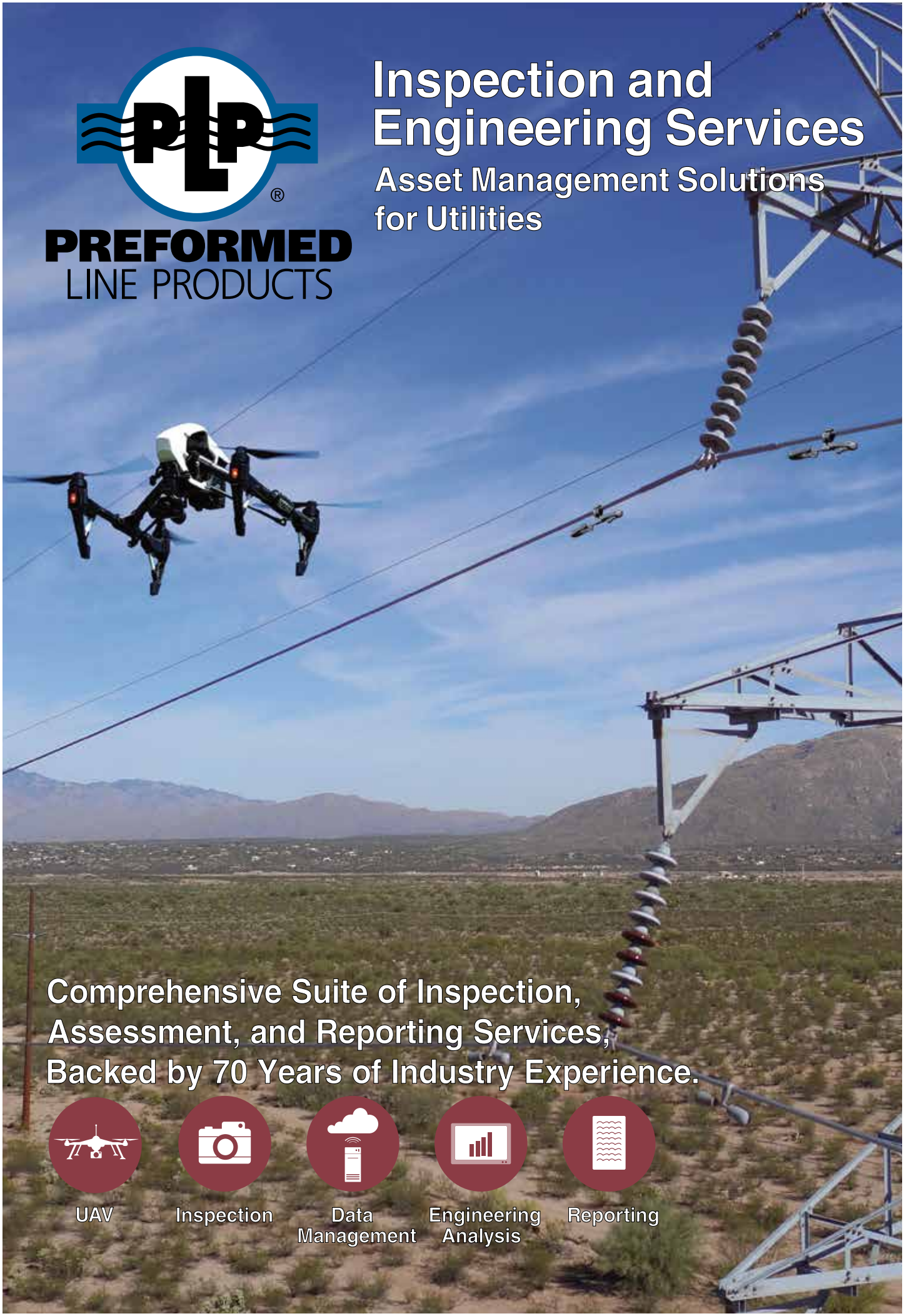

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New Allied Member

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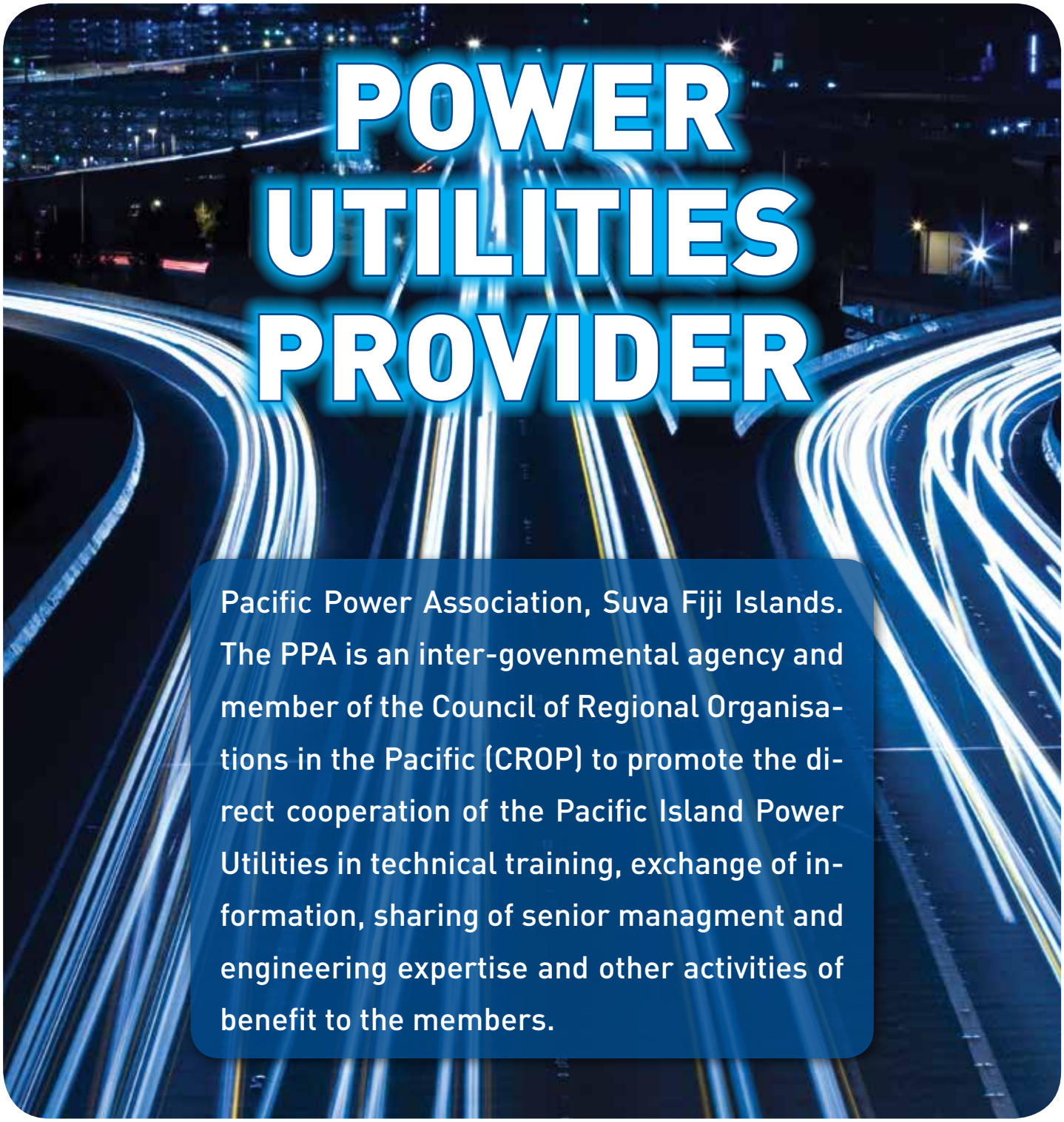
EMACS ELECTRICAL & MECHANICAL REPAIRS: EMACS Electrical & Mechanical Repairs is based in Queensland, Australia. Their primary activity is repair & service of rotating equipment. Their secondary activity is motor/generator rewinding & testing.



Pacific Power Association, Suva Fiji Islands. The PPA is an inter-govenmental 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 managment and engineering expertise and other activities of benefit to the members.

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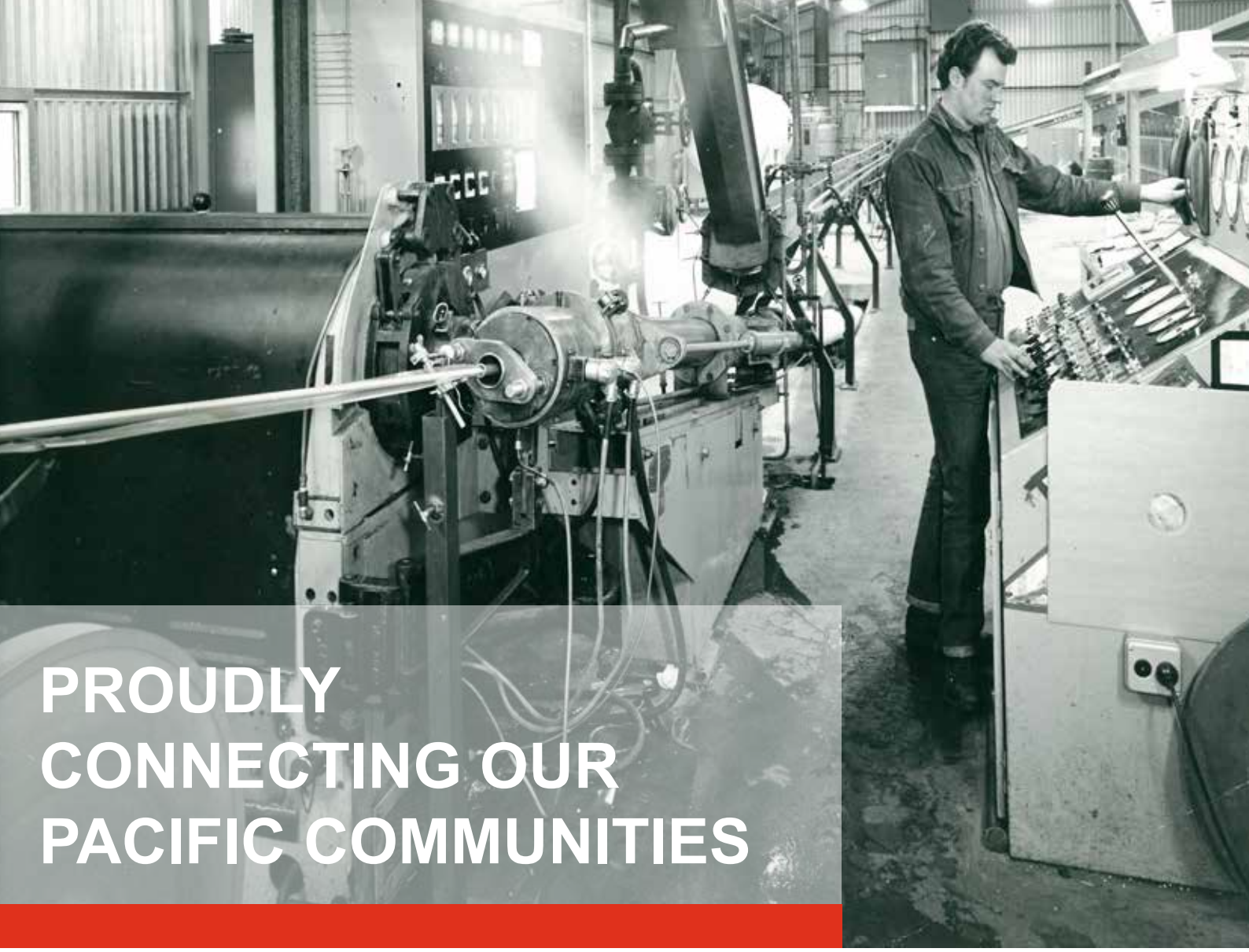

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