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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 management and engineering expertise and other activities of benefit to the members.

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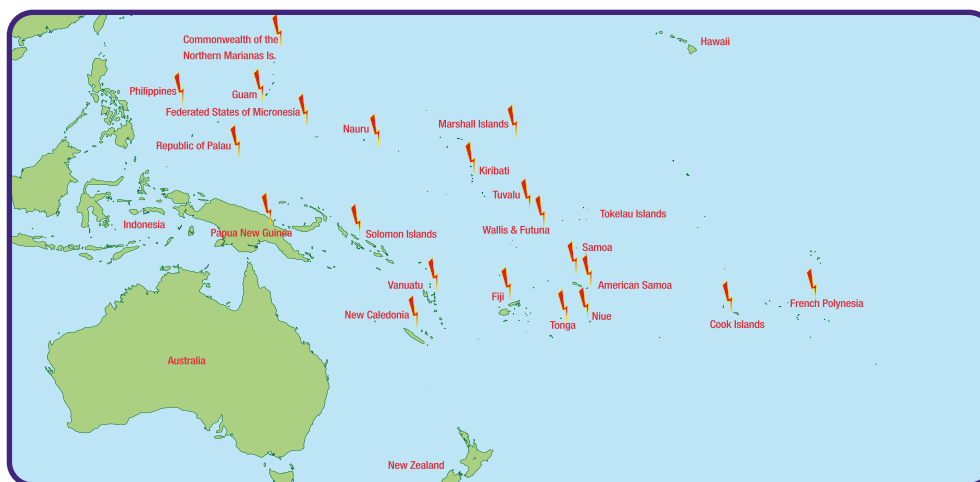
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Cover Page Photograph – 26th Annual PPA Conference and Trade Exhibition Official Opening at Sheraton Aggie Grey's Hotel & Bungalows, Apia, Samoa

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Editor's Notes

Andrew D. Daka
Executive Director

Bula Vinaka and Greetings from Suva.

The energy sector is changing at a very fast pace influenced by decisions and developments taking place at the global level which then trickles to the region. The decisions and agreements signed at the COP22 in Paris in 2015 is having an impact in the region through climate financing and no doubt the upcoming COP23 held in Bonn, Germany, 7 -16 November 2017 will bring in more financing to the region.

Meg Taylor (DBE), Secretary General of the Pacific Islands Forum Secretariat and the Keynote Speaker at the 26th Annual PPA Conference reminded delegates of the region's dependence on fossil fuel being economically and environmentally being unsustainable. The utilities and Governments have demonstrated a desire to learn more about access to "green" finance to support renewable energy and energy efficiency interventions. Furthermore, work has been undertaken at the national and regional levels to ensure board decisions, technical training, procurement and investment are in line with the needs of the stakeholders.

Fortunately, there are readiness mechanisms now available to the region to assist the countries and hence the utilities to access finance to funds for interventions for greater use of renewable energy.

At the 26th Annual Conference the Board was briefed on progress to date on the implementation of the World Bank funded Sustainable Energy Industry Project (SEIDP) implemented by the PPA. Members need to note that there has been some delays in implementing some of the activities under the project. However, the Capacity Building component of the project has begun and schedule of training events based on the training needs assessment will be available later this year.

The 26th Annual Conference has built on last year's success and has again been a very successful one. The attendance has surpassed last years

and a record 59 booths at the Trade Exhibition. The PPA Secretariat on behalf of the Board wishes to thank the Prime Minister and Government of Samoa, Keynote Speaker Meg Taylor (DBE), Board, Management and Staff of the host utility EPC, all the Utility delegates, PIC Government representatives, Allied Members, Exhibitors, Speakers and all who have contributed in one way or another to the success of the event. The PPA looks forward to seeing you all again in Koror, Palau, next year.

On a sad note we also remember our colleague, the late Mark Rushworth, of Aquaduct Trading, who sadly passed away during the conference. Our condolences to his family.

Finally, let me welcome to the PPA the following organizations who have joined recently; Akuo Energy Pacific, Australian Winders, Clean Energy Technologies Inc., ComAp Pty Ltd, Gough CAT Power Systems, IMPS (UK) Ltd, Origin Energy and Siemens Ltd.

Cheers.

PPA Conference Opening Speech by The Prime Minister of Samoa

Honorable Tuilaepa Dr. Sailele Malielegaoi

Susu lau Susuga i le Taitai o le Sauniga, Pastor
Faafetai Fata

Secretary General – Pacific Island Forum

Secretariat, Meg Taylor

Cabinet Ministers

Members of the Diplomatic Corp and

Development Partners

Chairman and Board Members of the Pacific

Power Association

Chief Executive Officer and Members of the

Pacific Power Association Chairman and Allied

Members of the Pacific Power Association

Distinguished Guests

Ladies and Gentlemen

Talofa and welcome to the 26th Pacific Power
Association Annual Conference and
Trade Exhibition here in the harbour of Apia, the
Paradise of the Pacific Islands.

This is the second time the Electric Power
Corporation on behalf of Samoa has hosted
this event. The first time was way back in 1986
when there was very little development with
only 12MW of maximum electricity demand at
evening compared to the current situation of fast
development with a shift of maximum electricity
demand of 25MW from evening to noon. We are
very honoured and proud to have been given this
opportunity again, to be your host for this year's
conference. It has brought to my attention that
Guam in the North Pacific was supposed to host
this year's conference. But because they are not
ready, Samoa put up its hand to host this year's
conference. Samoa is happy to host every year's
conference if PPA allows.

In light of this year's theme of "Affordable Electricity
For All", I believe every country in our region is
committed in ensuring that our people have
access to not only affordable electricity services
but also sustainable electricity supply. Electricity
prices in the Pacific region are among the highest
in the world due to small scale of our economies.
It is therefore important to explore all possible
renewable sources available on our islands to
completely remove our dependency of fossil fuel
which is beyond our control. However renewable

and green energy is not necessarily cheap.

Samoa is leading the Pacific in the development
and installation of solar energy with a total
installed capacity of 14MW without storage which
is about 50% of maximum noon demand which is
introducing huge challenge to the grid. You will have
the chance to visit some of those solar installations
during the conference. As your host, we are more
than happy to share our experiences and lessons
learnt with you all and we are also expecting to
learn from other power utilities and allied members
and of course the experts of the invited speakers.
We hope at the end of this week long conference,
each participant has taken home lessons learnt to
assist them in providing affordable and sustainable
electricity supply for their countries.

It has been brought to my knowledge that PPA is
the only member of CROP that has not yet received
diplomatic recognition by its host country, Fiji. I
would like to offer that Samoa is ready to be the
host country of the PPA office here in the capital
of Apia and grant the diplomatic status in no time.
Samoa has very stable Government and have very
flexible policies to accommodate the needs of the
PPA.

Last but not least, I encourage every participant to
also use this opportunity to experience and learn
our strong culture and traditions. May you all have
a fruitful conference.

I now declare the "26th Annual Conference & Trade
Exhibition" in Apia, Samoa open.

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Welcome Message from the Chairman of Pacific Power Association

K'ione J. Isechal, P.E

CEO - PPUC

Talofa and Welcome to "The Treasure Islands of the South Pacific" and the 26th Annual Conference and Trade Exhibition in Apia, Samoa, hosted by the Electric Power Corporation of Samoa. This will be EPC's second time to host PPA's premier event having done so previously in 1996, some twenty one years ago.

The theme of this year's conference, "Affordable Electricity for All" is interesting and important considering the focus of utilities in providing electricity services to the people of the Pacific. It also relates directly to the United Nation's Sustainable Development Goal 7 – Affordable and Sustainable Energy, one of the 17 Sustainable Development Goals adopted by the UN member countries on 25th September 2015; a set of goals to end poverty, protect the planet, and ensure prosperity for all.

This year's conference for the first time will bring together a number of Pacific Islands Government Ministers to the Association's annual meeting of Utility CEOs, Private Sector and Development Partners. The Pacific Power Association sees this as vital to ensuring that the Governments and the Utilities actively working to achieve our various development goals in energy and specifically in the electric industry.

The business of generating, transmitting, distributing and selling electricity is a rapidly changing one and utilities need to keep up with the changes or be left behind. Ten to fifteen years ago, the majority of photovoltaic installations were of the kilowatts to tens of kilowatts capacity. Today, utilities are fielding proposals from IPPs and development partner funded projects that are in the megawatt range capacity and hence a lot of thought has to be put into the technical and commercial aspects of renewable energy installations.

Utilities now need to consider the impact of solar homes systems on the demand and its ability to supply and respond to the changing demands. There is also the perceived impacts on the utility's revenue. With private sector participation comes

the need for utility and regulatory reforms to have a conducive environment for private sector to actively participate creating a win-win situation for all.

We are now hearing the concept of virtual generation, energy cloud and behind the meter services; all subjects that the utilities will eventually have to address as we travel the renewable energy route and as such the preparation should have started yesterday.

For a number of delegates, they will be attending the PPA Conference for the first time. I welcome you to the premier PPA event and encourage the delegates from the utilities to speak to our new, as well as our long time Allied Members.

On that note I would like to thank the Board and Management of the Electric Power Corporation together with the Government of Samoa for hosting the 26th Annual Conference. It is no easy task as the utilities who have done so in the past can attest to. I know it is going to be a successful event for all delegates.

Whilst in Samoa, we also encourage delegates to also take time to see and witness the rich Samoan Culture. Samoa is a tourist destination and has a lot to offer.

Wishing all fruitful discussions and a successful 26th Annual Conference and Trade Exhibition.



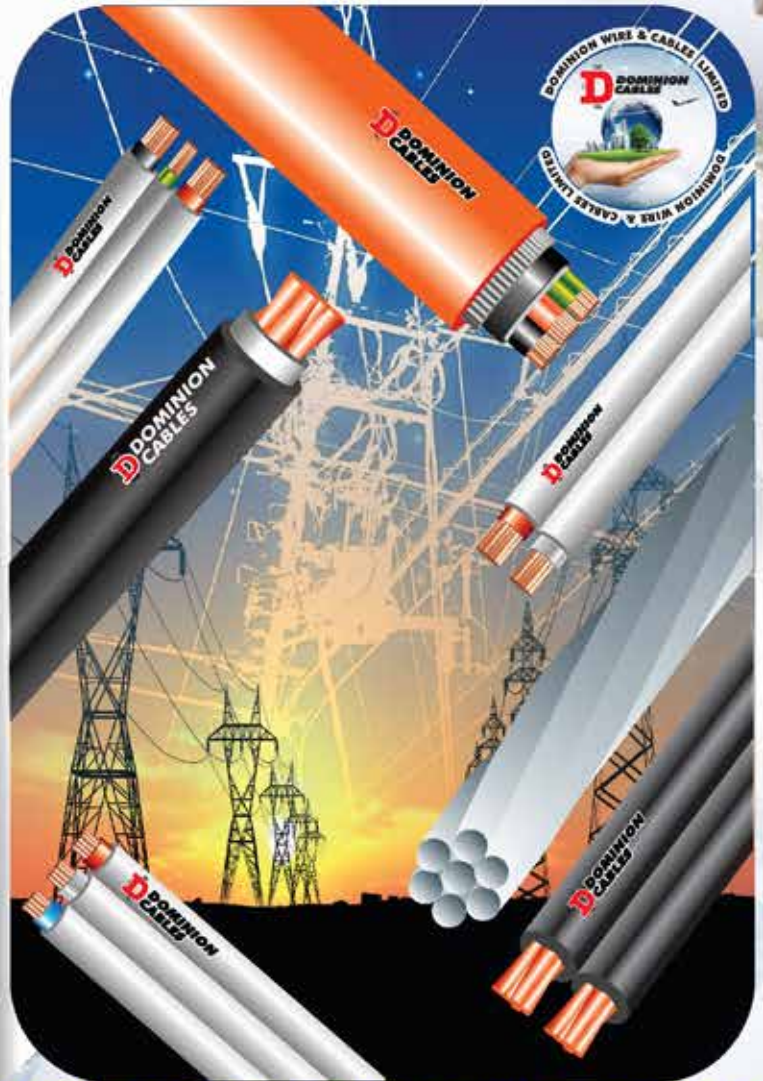
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Keynote Address by the Secretary General

Meg Taylor, D.B.E

Secretary General - Pacific Islands Forum Secretariat

Welcome

Honorable Tuilaepa Dr. Sailele Malielegaoi, Prime Minister of Samoa
Your Excellences, Ladies and Gentlemen

Opening

I would like to thank the CEO of the PPA Andrew Daka and the Government of Samoa for their invitation to speak at this meeting, the issue of energy affordability is a subject important to the national and regional economy, but also of critical importance to the regional response to the challenges of driving sustainable development.

2. Energy security is fundamental to achieving our social and economic development aspirations and national development strategies. Access to energy underpins all aspects of socio-economic development, ranging from production, storage and transport to health, education and the sustenance of livelihoods.

The Policy Pressure

3. Globally and throughout the region, Governments have made energy a policy priority. The success or failure of this priority rests with key implementers of energy investment decisions such as yourselves. In the last decade there have been many important developments and this has accelerated with the Paris Climate Change Agreement in 2015 that has been ratified by every Pacific island country.

4. However, rather than fill my limited time with new acronyms and discussion of the importance of the Sustainable Development Goals (SDGs) or the role of Nationally Determined Contributions (NDCs) in shaping national decisions that then create the incentives and sanctions that shape your work. Let me try and formulate some justification for your attention and how you as the 'agents of change' can make affordability a reality. As Leaders of the various public utilities your understanding of the national vision, and involvement in implementation is vital to ensuring

energy policy is implemented successfully.

Balancing Competing Policy Outcomes

5. You all here are no strangers to the pressures in trying to balance your management decisions with policy demands. From a policy maker view, to ensure energy security we must have several pillars, in particular, accessibility, reliability, affordability and sustainability but there is no one way to satisfy all of these at once. It means a rethinking of the ways that energy is sourced, generated, distributed, costed and used. To do this we need to build, invest, and work differently.

6. Let me detail some important policy facts:

7. Firstly, there is too much dependence on imported fuels. This is economically and environmentally unsustainable.

8. Secondly, there is a desire to learn more about and access to 'green' finance sources to back energy programs that support efficiency and increase the usage of renewables.

9. Thirdly, there is a supportive national and regional policy environment that will ensure that your boardroom decisions, technical training, procurements and investments are matching the needs of your people, shareholders and development partners.

10. Let me elaborate, Our region's dependence on imported fossil fuels has led to problems in the past and will do so again in the future. Consider that the increase in the price of petroleum from 2002 to early 2008 cost most Forum Island countries and territories about 10% of their gross national incomes, with impacts falling disproportionately on those with low incomes.

11. Governments, business and households don't want to go back to that time as in 2008, when the cost of a barrel of oil rose to more than US\$ 140. Consider the financial, economic and social effects when Fiji's imports increased by almost 25%, inflation rates in Kiribati and the

Republic of the Marshall Islands (RMI) soared to over 18% and 17% respectively, and Fiji's inflation rose to 7.7% and Samoa to 11.6%. Fiji's economy contracted by 2.5%, Palau's by 3%, while the Solomon Islands and Tonga declined by 0.4%. The rising oil prices in 2008 contributed to the RMI government to declare a state of emergency when its power utility was unable to cope with the heavy fuel bills.

12. Clearly this is unaffordable and these changes are only likely to be repeated again. Even with the recent advances in the adoption of renewable energy, the region still relies on imported oil to provide 76% of regions generated electricity. Hence, plans to increase the use and penetration of renewables whether it is through large scale solar projects or small community based micro and mini hydro schemes all work to move away from carbon based economies.
13. It is also important to reflect that our remoteness and the absence of economies of scale have also played a part and contributed to high fossil fuel costs and as a consequence electricity tariffs. The total losses in some power utilities are quite high and contribute directly to the high electricity tariffs. These inefficiencies are passed onto the customer or retained by the utility as part of their wider social commitment to supporting access and ensuring affordable energy. However, in the light of ongoing falling costs of renewable energy and the obvious net benefits of energy efficiency it rests on you as business leaders and the engineers to take these new opportunities and change the current business model.
14. Consider the recent decisions by the French and UK Governments to ban the sale of combustion engines by 2040. For a carbon based business model the writing is on the wall, it is only a matter of when and not if.
15. However, I guess as decision makers you are asking – what about the cost? How can I fund this?
16. What of Finance? This vital aspect that is the means of implementing your company investments and supporting national plans appears difficult. The promises of accessing funds from the Green Climate Fund, supportive private investors and/or development partners appears complex. However, there are many specific and widening opportunities for the private sector to access finance.
17. Just 2 weeks ago I gave a keynote at the Green Climate Fund Pacific Structured Dialogue on the topic of the private sector and improving access to finance. There are 'readiness' mechanism through the GCF and other sources of new and emerging opportunities to access finance to fund plans for transforming local communities and national grids to support a greater use and integration of renewables.
18. For example, The GCF, through its Private Sector Facility, the IFC's own private sector facility, multilateral banks such as the World Bank, Asian Development Bank (with private sector support based in Sydney) and the EIB through their own facilities (in Sydney), provide an opportunity for the private sector to access the funds necessary to contribute to improving resilience (in this context it means diversifying energy sources) in the Pacific, which is directly connected to commitments made in the Paris Agreement.
19. My last point is that in terms of a supportive environment, the national and regional policy environment has never been stronger for your sector. To progress these objectives we have well designed and integrated country action plans. There are some good specific examples, the Government of Tonga through their Energy Roadmap, has set a good benchmark. Other energy-related endeavours undertaken in the region and similar roadmap-initiatives taken in other Forum island countries, include Samoa, the Cook Islands, Tuvalu, and Vanuatu.
20. At a regional level. Leaders last year endorsed the Framework for Resilient Development in the Pacific this provides high level strategic guidance to different stakeholder groups on how to enhance resilience in ways that contribute to and are embedded in sustainable development. In particular, Goal 2 deals with Low Carbon Development.

Conclusion

21. Increasing access to clean and affordable energy is an important aspect of sustainable development and should be pursued within the context of low carbon development. Investing in clean and affordable energy can diversify the sources of energy, and thereby strengthen resilience to economic shocks. Low carbon economies hold opportunities for stimulating economic growth and creating new jobs.

22. Good business decisions need to be embedded in the long-term goals for meeting the sustainable development ambitions of their countries. Knowing what the Sustainable Development Goals may not be an immediate priority for you but if you want to understand the future of where policy, funding and the needs of your communities are heading then you should understand them. Rather than being on the fringe of the policy discussion, try to be at the centre of the discussions going forward at the national, regional and global level.

23. At the highest level in the Pacific, Leaders' have emphasised the importance of securing access to energy, their commitment to renewable energy and the promotion of energy efficiency and the need for significant progress in the diversification of sources of energy by developing domestic renewable energy to reduce their reliance on imported

fuels. Together these combine to support not just affordability but energy that is reliable, sustainable and accessible.

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How 3D Scanning Technology Can Benefit Refurbishment Projects

James Watkins

Mechanical Engineer - Vortex Group

Abstract

Three dimensional scanning technology has become increasingly accurate, portable and user friendly, thus enabling 3D scanning to be applied to many larger scale industrial applications such as refurbishment projects. Through the use of a handheld 3D scanner, there is no limit to the size of the objects that can be scanned, allowing the scanning of large parts such as turbine runners, drive shafts, and machinery foundations. Such benefits of having these scans include: the ability to compare with original tolerances and inspect localised wear of parts for replacement, replacement of complex geometric parts that would otherwise be difficult to measure, as well as the ability of measuring as-built components that may still be in service without the need of additional site visits and machine downtime.

1 Introduction

Three-dimensional (3D) laser scanning is a modern tool capable of taking any physical object and replicating it digitally as a computer model. 3D laser scanning is an ideal way to measure and inspect contoured surfaces and complex geometries. Laser scanning technology also has the potential to streamline otherwise complex or time-consuming engineering tasks such as quality control, as-built documenting and reverse engineering.

Here at Vortex Group we have invested in laser scanning technology, namely through the use of the Creaform Hanyscan 300, and have applied its use within a number of current projects in the energy sector. The ability to be quickly setup and used on site, along with a multitude of inspection and post processing tools, allows 3D scanning to supplement almost any engineering application, including refurbishment projects.

2 How it Works

The most common 3D scanners on the market work using the same general principle: a laser light is emitted from the scanner onto an object's surface, the light is then reflected and then detected by a sensor. The time it takes for the reflected light to

return, and angle of reflected light, can accurately determine the distance between the object and the scanner. Repeating this process thousands of times over an item's surface produces a "point cloud" of data that specific software can take, and within a few minutes, build a complete map of the objects viewable surface in 3D space (LaserDesign, T.M.).

Where 3D scanners differ comes down to the principles of imaging. Pulse-based and phase-shift scanners are able to scan objects 2 – 10 m away and form a complete 360° view around a central point. While this technique is less accurate for small-scale applications, it is suited to situations that require scanning of large and/or distant objects such as as-built surveying of buildings. Another imaging principle used for 3D scanning is laser triangulation. Laser triangulation scanners use either a laser line or single laser point to scan across an object. This results in an accurate reading (up to 25 microns in some scanners) but the scanner has increasingly limited range with higher resolutions (EMS®, Inc.).

Laser triangulation will be the method referred to in this report, specifically the use of the Creaform Hanyscan 300 (Figure 1).



Figure 1: Handyscan 300 in action.

This is a portable hand-held scanning device that is accurate up to 0.040 mm at a distance of 300 mm. Benefits of the Creaform Hanyscan 300 scanner include portability, ease of use and ability to scan large surfaces (Creaform).

In order to scan a surface, reflective targets must first be applied to the objects surface, in no particular order, as shown in Figure 2. The reflective targets are detected by the two cameras built into the scanner, and are used as positional references. A positional reference is essential to track the location and orientation of the object, therefore, having many targets allows the scanned object to be repositioned and rotated as needed to fully scan all required surfaces.



Figure 2: Pelton wheel covered with reflective targets ready to be scanned.

As no two configurations of targets are similar, the scanner is able to recognise where on the object it is referencing. If further scanning is needed on the object at a later time, so long as the targets remain in situ, the scanning process can be continued through the application of additional targets.

Creaform has its own software, VXelements, that is used to view the scan in real-time as it's created (Figure 3). The software also has many post-processing and inspection features which allow for the retrieval of required dimensions directly from the scan, or the conversion of a scan into a CAD model.

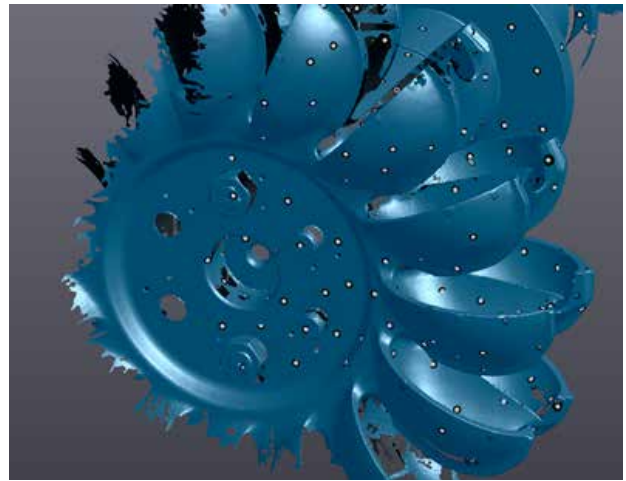


Figure 3: Pelton wheel scan in VX elements.

3 Applications in Engineering

The use of 3D scanning technology in the engineering industry can be a welcome tool to help simplify otherwise complex or time-consuming tasks.

At Vortex Group, we have incorporated this technology to assist with day-to-day tasks and are currently using it to aid with our current refurbishment works. Tasks include dimensioning of as-built plant equipment, inspection of worn or damaged parts in service, and reverse engineering or modification of complex replacement components.

The following sections contain examples of where we have used this technology in the past.

3.1 As-Built Dimensioning

Often critical components are not easily accessible, due to site locality or it is currently being used in service. If critical dimensions are required, a previously produced 3D scan of the component can provide an accurate substitute for any non-intrusive future dimensional inspection. For example, a current refurbishment project required an electric generator replacement that was to use the original mounting foundations. Along with traditional measurements, a 3D scan of the generator bed was taken, as seen in Figure 4.



Figure 4: 3D scan of the generator bed with surrounding equipment.

This scan allowed for accurate dimensions to be taken without the need for repeated site visits. Additionally, the scan provided the location relative to the bearing pedestal and turbine lower housing as a reference for later alignment. So long as all the areas of interest are scanned, all information is readily available when needed.

3.2 Tolerance Inspection

A scan was taken of a large spherical bearing housing for a $\varnothing 280$ mm shaft shown in Figure 5. This consisted of four parts: the two top and bottom cast steel outer casings and two halves of the spherical inner unit.



Figure 5: Exploded view of bearing assembly.

The 3D scan of the housing was taken to provide an indication of the level of deterioration the spherical surface had sustained in service. Additionally, the scan allowed for determining whether replacement or repair was necessary. The interface function is for self-alignment of the shaft, which if loose enough to move freely, could cause ceasing of the surface and potential further complications to the operation of the entire system.

Using the 3D scanning software tools available, a colourmap was created over the surfaces for inspection. This colourmap was set to show the recommended transition fit with required allowable clearance for operation. Figure 6 shows the colourmap for the bottom casing, while Figure 7 shows the colourmap for the bottom spherical unit.

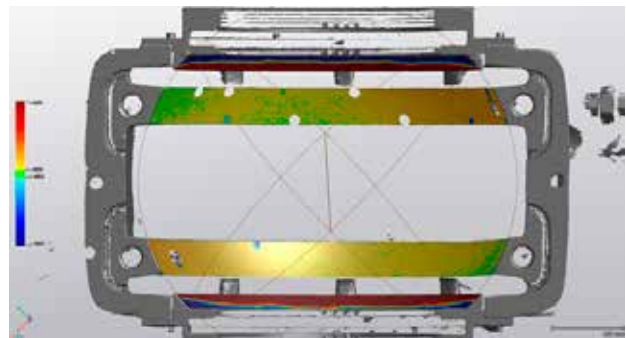


Figure 6: Colourmap of bottom casing spherical face.

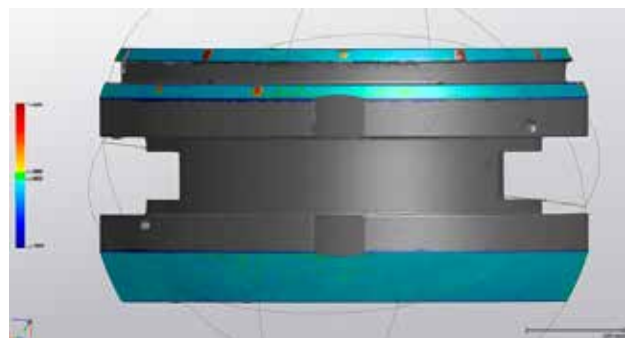


Figure 7: Colourmap of bottom bearing unit spherical face.

In this example, it can be seen that the combination of wear and fretting of the surface of the housing has resulted in it being largely oversized (up to 0.3 mm). Again, for the spherical unit, majority of the surface is undersized from wear and fretting (up to -0.1 mm). Together a maximum of 0.4 mm clearance exists between the two units clearly showing either replacement or repair is needed.

3.3 Reverse Engineering

A series of centrifugal pumps carrying fluid with abrasive solids can cause accelerated wear of the pump impellers, as can be seen in the 3D scan in Figure 8. These often require frequent replacement and can prove difficult and expensive to source.

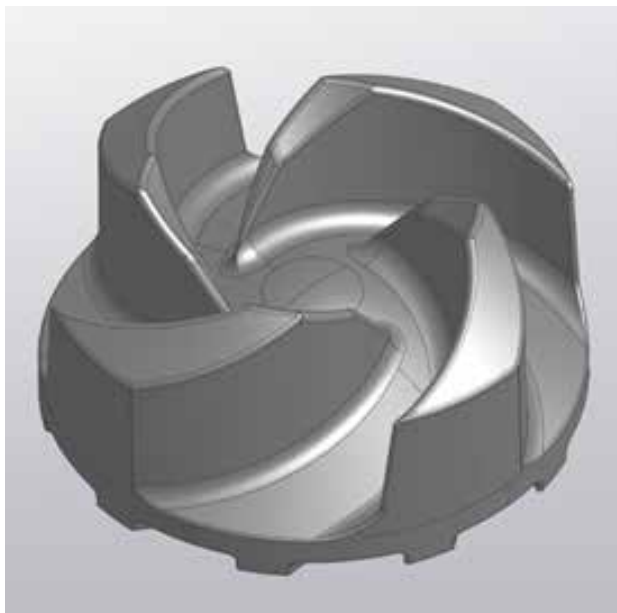
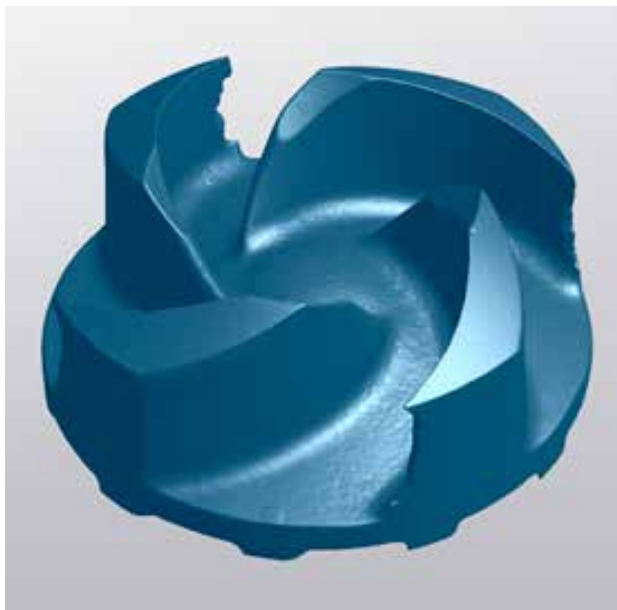


Figure 8: Pump Impeller mesh in current condition(Left) and CAD model of original part (Right).

A 3D scan can be used to create a CAD model which is accurate to the original part. The 3D mesh can then be overlapped with the CAD model as a visual guide to see how the two compare. A colour map is created to show where on the CAD model

these two differ, shown in Figure 9, which can be set to any required tolerance. This allows areas that require modification to be identified in the CAD model, which can be modified to achieve a required accuracy. The CAD model can be used to create engineering drawings and a machining programs for manufacture of the replacement parts such as the pump impellor mentioned above.

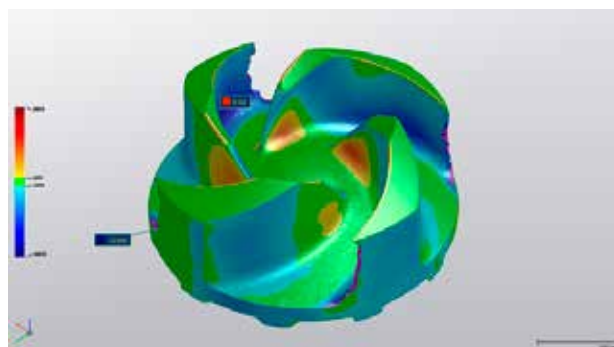


Figure 9: Colourmap of comparison between impellor mesh and CAD model.

3.4 Erosion Inspection of In Service Parts

It may be beneficial to know at what rate a component is eroding, such as in the following case of a gas turbine diaphragm in Figure 10. To estimate the remaining service life of the component, it was necessary to know the rate at which the internal walls of the gas turbine were wearing-down in service.



Figure 10: Two aligned scans of a gas turbine diaphragm.

During an annual maintenance shut, the diaphragm of the gas turbine was removed and an initial scan taken. Twelve months later, the same component was removed again to allow for a secondary scan to be taken. Using the parting face as a reference, the two scans could be overlapped and any

discrepancy between the two could be inspected via a colourmap, seen in Figure 11.

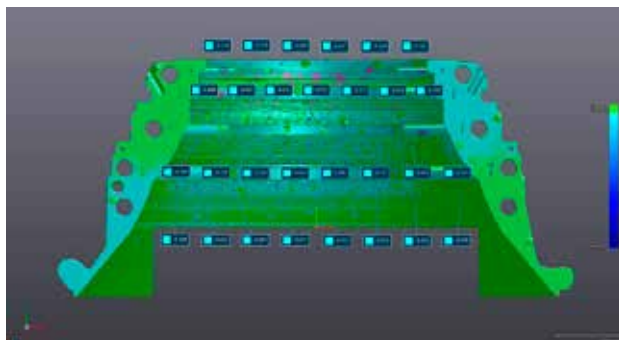


Figure 11: Colourmap of gas turbine diaphragm.

As can be seen from the overall colourmap, the light blue areas show a slight evenly distributed wear up to 0.2 mm on both inlet and outlet side as predicted. Points between the blade carrier sections show more concentrated points of wear up to 0.4 mm, yet the distribution of wear in these sections is smaller compared to the inlet and outlet sides.

4 Conclusion

The addition of 3D scanning technology has presented many possibilities for its use in engineering. 3D scanning has the ability to streamline otherwise difficult or time-consuming tasks with a high level of accuracy, such as as-built dimensioning, quality control inspection and reverse engineering. These skills greatly aid in such tasks as refurbishment projects where new parts must work in unison with existing machinery. At Vortex Group, we have adopted this technology and use it in many day-to-day tasks. It is a welcome tool that we have available in our workshop and on hand when conducting site visits. We continue to apply this technology to new and specialised applications to work towards obtaining faster, more accurate results.

5 References

- Creaform . (n.d.). Portable 3D Scanners: HandyScan 3D. creaform3d.com/en/metrology-solutions/portable-3d-scanner-handyscan-3d.
- EMS®, Inc. (n.d.). Types of 3D Scanners and 3D Scanning Technologies. ems-usa.com/tech-papers/3D%20Scanning%20Technologies%20.pdf.
- LaserDesign, T.M. (n.d.). 3D Scanning Technology – Hard Work That Looks Like “Magic”. laserdesign.com/what-is-3d-scanning.



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Outcomes of the 3rd Pacific Regional Energy and Transport Ministers' Meeting and its Impacts on Affordable Electricity for All

Rupeni Mario

Team Leader / Sustainable Energy Advisor -
Secretariat of the Pacific Community (SPC)

Purpose

The purpose of this paper is to: (i) provide an update on the outcomes of the 3rd Pacific Regional Energy and Transport Ministers meeting, held in Tonga in April 2017; and (ii) the implication of these outcomes on the 26th Pacific Power Association Conference theme of *Affordable Electricity for All*.

Background

The 3rd Pacific Regional Energy and Transport Ministers' Meeting was organized by the Pacific Community (SPC) and hosted by the Government of Tonga at the Fa'onelua Convention Centre in Nuku'alofa, Tonga from 26–28 April, 2017. The meeting was officially opened by His Royal Highness, Crown Prince Tupouto'a 'Ulukalala. The meeting was chaired by the Honourable Siaosi Sovaleni – Deputy Prime Minister, Minister for Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC) and Minister of Foreign Affairs, and the Honourable Semisi Sika, Minister for Infrastructure. It was attended by the Prime Ministers of Cook Islands and Tuvalu and Ministers/Secretary and Associate Ministers from the following Pacific Island countries and territories (PICTs): Federated States of Micronesia, French Polynesia, Kiribati, Marshall Islands, Niue, Papua New Guinea, Samoa, Solomon Islands, Tuvalu and Vanuatu. Heads of delegations or senior officials also attended on behalf of American Samoa, Australia, Fiji, France, Guam, Nauru, New Caledonia, New Zealand, Palau, United States of America and Wallis and Futuna.

The meeting was also attended by the United Nations High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States and Under Secretary General, the United Nations Secretary-General's Special Representative and Chief Executive Officer for the SEforALL initiative (Sustainable Energy for All), and representatives from the United Nations Industrial Development

Organization (UNIDO), the International Maritime Organization (IMO) and many other international and regional inter-governmental and non-governmental partner organizations, universities, civil societies and the private sector.

Launching of the Pacific Centre for Renewable Energy and Energy Efficiency

The Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE) is jointly funded and supported by the SPC, United Nations Industrial Development Organisation (UNIDO), Government of Austria and the Government of Tonga. PCREEE is hosted by the Government of Tonga's Ministry for Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC) in Tongatapu and currently has five staff members.

Accelerate the adoption and enforcement of energy sector laws

Highlighted the need for the adoption and enforcement of appropriate legal frameworks required for the effective management and governance of the energy sector – such as an Energy Act, energy sub-sector laws related to energy efficiency and the establishment of a regulator's office.

Commitments to the global efforts to reduce GHG emissions

Endorsed the vision of 100% renewable energy generation for the region and confirmed the value and need for regional renewable energy (RE) and energy efficiency (EE) targets.

New approach to capacity building on sustainable energy

Acknowledged the need for reform in the capacity-building efforts of SPC Members to meet national, regional and global obligations. Supported the approach that the region's capacity building

must be based on officially accredited /industry recognized qualifications constructed around a "competency" and "skill-set" approach, rather than non-formal ad-hoc, project-based training. This approach is currently being undertaken by the European Union Pacific Technical and Vocational Educational and Training in Sustainable Energy and Climate Change Adaptation project (EU PacTVET).

Strengthen and support:

- PCREEE – call for additional support from development partners
- PRDR – Pacific Regional Data Repository (endorsed the 2018-2023 PRDR Strategy)
- Petroleum Advisory to support safety and find cost-effective supply and price verification information
- Feasibility of phasing out fossil fuel subsidies and to use higher quality fuel that are less damaging to the environment

Mandate of the Pacific Power Association

Endorsed the mandate of PPA – supporting power utilities of PICTs in the provision of high quality, secure, efficient and sustainable electricity services.

Possible impacts of the these outcomes

- PCREEE – The PPA is a spoke of the PCREEE and will continue to play an important role in terms of electricity generation and supply and, the objectives of PCREEE.
- *Energy Sector Laws* – the transformation of the energy sector in the respective PICTs will strengthen the management and governance of the entire energy sector including electricity. There are reforms to promote public private partnerships, regulatory functions and general administration, to name a few. These may directly or indirectly have some impact on the electricity sub-sector including examples such as legislation for energy efficient appliances, tax incentives on renewable energy and energy efficient equipment /appliances, and the promotion of independent power producers.
- *Commitments to global efforts to reduce GHG emissions* – the electricity sub-sector (power utilities) play a significant role in efforts towards national targets, NDCs and SDG7. As far as electricity generation is concerned the effort towards reducing use of fossil fuels in generation by means of increased renewable energy technologies and higher quality fuels will

contribute to respective PICTs meeting these targets.

- *Petroleum Advisory* – the task to support safety and find a more cost-effective supply and price verification information would be of interest to some power utilities, particularly those that contract their fuel supply through a competitive bidding process.
- *Fuel subsidies* – many PICTs have the fuels used for electricity generation subsidized by government. With the current transformation trend of the energy sector and global commitments towards meeting national renewable energy and energy efficiency targets including NDCs and SDG7, these subsidies may reduce over time with more incentives towards renewable energy technologies and energy efficient measures.
- *Endorsement of the PPA mandate* – this formally endorse the important role of PPA in the region and paves the way forward for the PPA to be recognised as a regional entity within the diplomatic regulations and policies of Fiji.

Conclusions

Affordable Electricity for ALL is possible through strengthened management and governance structures of the sub-sector, electricity, and is made possible through not only a collective mechanism such as an association of Pacific Power Utilities but also through strong governance structures of the respective national energy sector. These are enhanced through a Pacific regional high-level decision making body such as that of the Pacific Regional Energy and Transport Ministers' directions and decisions. It is with such foresight that regional frameworks such as the Framework for Action on Energy Security of the Pacific (FAESP) and the Framework for Resilience Development in the Pacific (FRDP) can be successfully implemented.

Waste Heat to Power: The Baseload Renewable You Already Have

Robert Emrich

Director of Sales & Market Development
Electra Therm

Continuous duty gensets provide baseload power generation in diverse applications around the globe. However, high fuel costs and engine maintenance are pain points felt by operators as they deliver this critical service. A low maintenance path to significant fuel savings and lower emissions is what the U.S. Department of Defense (DoD) had in mind when they approached ElectraTherm to integrate the Power+ Generator™ with a Cummins KTA-50 1.1 megawatt generator. The DoD wanted to investigate the performance impact and economics for their diesel engine fleet. Between the DoD project and the 50+ Power+ Generators running in the field, ElectraTherm has demonstrated more than 10% increase in fuel efficiency along with simple installation, mobility and low maintenance. The Power+ Generator can replace the engine's radiator entirely and deliver a payback of two years or less for diesel or heavy fuel oil-fired gensets. In effect, the engine's waste heat becomes a source of cost savings by displacing the radiator's capital cost and parasitic load, i.e. more power with a quick payback.

In the past, there were no proven commercial products for converting engine heat to power so operators had little choice but to accept the heat loss to the atmosphere. Today ElectraTherm has deployed more than 50 units worldwide with over 700,000 hours of cumulative fleet experience. ElectraTherm is the leader in small-scale, distributed power generation from waste heat; we utilize Organic Rankine Cycle (ORC) and proprietary technologies to generate power from low temperature heat ranging from 77-122°C. ElectraTherm's Waste Heat to Power (WHP) technology converts various sources of heat into power, including internal combustion engines, small geothermal, biomass, concentrated solar and process heat. ElectraTherm's primary market is waste heat from stationary internal combustion engines. With the typical engine running at about 33% efficiency, there is considerable waste heat between the jacket water and the exhaust. Typical engine sites include: prime power production in remote areas, island and developing nations, biogas gensets including landfill and wastewater treatment plants, natural gas compression stations

and renewable biofuels.

Many Benefits of Heat-to-Power for Prime Power in Remote Areas

There are multiple benefits to integrating an ORC heat to power generator with an engine genset and we can confidently say that we have created the world's most efficient engine cooling device. The first benefit is clear: the additional electrical output from the conversion of the waste heat to electricity with no additional fuel consumption or emissions. Second and less obvious is the reduction or elimination of the parasitic load from the engine cooling fans. The Power+ Generator acts as the radiator and, therefore, the engine-driven radiator fans can actually be disconnected, allowing more work to be performed by the engine to generate additional electricity. A third benefit can be achieved in hot climates or seasonally high ambient conditions, due to the fact that the ORC has a greater cooling capacity than the engine requires. So for very high ambients when the engine radiator limits the output of the engine the increased cooling capacity provided by the ORC's radiator allows for increased performance. The Power+ electricity output combined with reduced parasitics account for 10%+ fuel efficiency gain depending on engine size and configuration. The additional benefit from decreasing the engine's de-rate period or the amount of de-rate will, of course, vary with ambient conditions.

The Department of Defense Projects

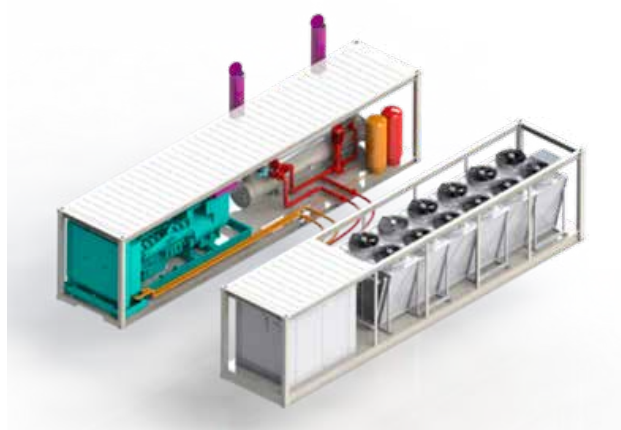
Our first project with the DoD was to simulate various engine models and ORC integration schemes, and fully test those configurations on ElectraTherm's test cell. A matrix was developed consisting of five engine models and two engine configurations over different ambient conditions for waste heat capture: jacket water only and jacket water boosted with exhaust energy for higher ORC efficiencies and output. U.S. Navy personnel visited ElectraTherm several times during the first project for training and inspection of our test cell and facilities. At the conclusion of this project a very favorable report was issued by the Navy.

The next step was to develop a higher output,

fully integrated ORC specific to a Cummins KTA-50 1.1 megawatt engine for DoD deployment. The ORC and all balance of plant was packaged in ISO shipping containers for ease of deployment and mobility throughout the world. Funding for this second project came from DoD's Environmental Security Technology Certification Program (ESTCP) through Southern Research Institute (SRI) who is independently monitoring the performance and fuel efficiency gains.

Figure 1 shows the configuration, comprised of two 40' ISO shipping containers. The Cummins genset, engine controls, switch gear and exhaust gas heat exchanger were housed in a Combined Heat and Power (CHP) module packaged under ElectraTherm's direction by Cummins Rocky Mountain from Denver, Colorado. The ORC module contained the Power+ Generator and associated controls, liquid loop radiator (combined radiator for the engine and ORC) and the corresponding balance of plant (piping, pumps and expansion tank, etc). The system was tested with the Mobile Utilities Support Equipment (MUSE) group at the Port Hueneme, CA Navy facility for fuel efficiency testing by SRI.

Figure 1. DoD funded ORC integration and replacement project



This project forced our engineering team to look hard at the question "Do we need both the engine radiator and ORC radiator?" All ORCs need condensing and all engines need cooling. Could it be done with one radiator, eliminating approximately \$75,000 in capital cost for an engine this size? The answer is a resounding "YES". Advanced engine cooling with a payback was born, accomplished with an intermediate heat exchanger to optimize the return temperature to the engine and a bypass

to ensure the engine cooling remained operating if the ORC is not running. The impact to the overall installed cost for an ORC can now be reduced by 20-30%.

ElectraTherm currently manufactures a 35 kW unit that fits well with ~500 kW gensets (our 4200 model), a 65 kW unit which fits well with ~800 kW engines (our 4400 model), and our project with the DoD is the first 110 kW unit (our 6500 model), well suited for 1-2 MW engines.

Figure 2. Electra Therm installed ten Power+ Generator 4400s at a district heating plant in Slovakia.



ElectraTherm's experience to date with genset integration has been very successful. Our applications include single engines and multiple engines utilizing jacket water heat alone as well as jacket water combined with exhaust heat. Engine models that have been integrated with the Power+ Generator include Jenbacher, Deutz and MWM engines in Europe as well as CAT and Waukeshau engines in North America.

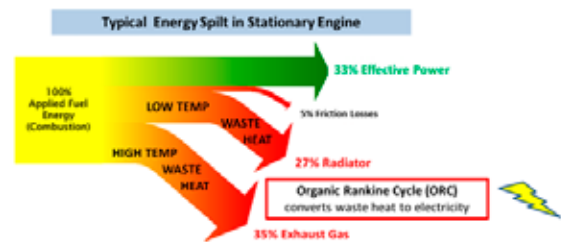
How it Works

ElectraTherm's Power+ Generator operates using a closed loop ORC, where hot water is the fuel. Hot water from the engine enters a heat exchanger to excite (pressurize) the non-flammable, non-toxic working fluid, driving the twin-screw expander and generator to create electricity. ElectraTherm's patented twin-screw expander is unique in its configuration, lubrication and specifications, but the core technology is based on reliable, proven compressor technology that has been around for more than 20 years.

The twin screw expander has a rotational speed

of 1800 - 4900 RPM, considerably less than turbo expanders. Unlike high speed turbo expanders, Screw expanders are robust units that tolerate "wet" dual phase flow. This allows the Power+ Generator to utilize more cost effective and compact heat exchangers that tolerate perturbations in both temperature and flow with turn down ratios of 6:1 available on demand. This is particularly advantageous in low temperature waste heat streams such as engine jacket water. Through a patented lubrication scheme, the Power+ Generator design is simplified and eliminates lubrication reservoirs, oil coolers, pumps, and filters, creating a simple, robust, and efficient system with fewer parasitic loads and maintenance requirements. Figure 3 shows why engine gensets are a great match for Power+ Generators from ElectraTherm since a significant portion of the waste heat is at low temperatures and engine throttle positions can vary widely depending on the electrical load demand.

Figure 3.



Distributed WHP systems for stationary engines are not yet well known or mainstream, but the technology is field proven, and the economics are now attractive. ElectraTherm's various packaged solutions are making it easier to economically capture waste heat and make emission-free and fuel-free power from sources that already exist. In planning your next genset application, or if you have an existing radiator replacement coming up – consider implementing waste heat to power, the renewable you already have.

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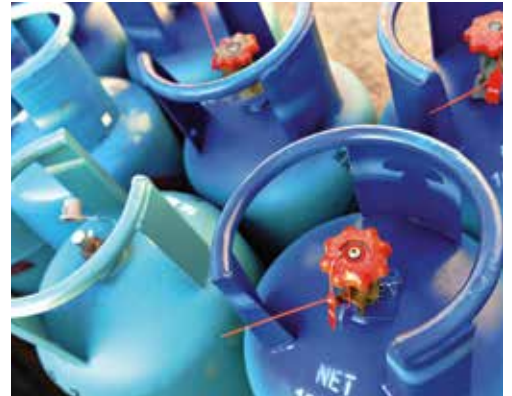
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26th Annual PPA Conference and Trade Exhibition

held at Sheraton Aggie Grey's Hotel & Bungalows,
Apia, Samoa

July 31 - 4 August, 2017

Introduction

This year's conference attracted a total of 308 delegates with 89 delegates representing 21 Active Utility members, 152 delegates from the 83 Allied Members', 21 spouses and 46 speakers from development partners, government representatives and multilateral aid agencies.¹

Such was the interest in attending the conference that the PPA Secretariat was still registering delegates and new Allied Members in the week leading up to the conference. Delegates wanted to be part of this great networking platform, which the PPA conference had to offer and also to take part in the trade exhibition showcasing their services and products.

The PPA Secretariat welcomes the following new Allied Members who joined prior to the conference:

1. America's Best Electric Mart
2. AVO NZ
3. EPC International Pty Ltd
4. Generator Rental Services
5. Indra Australia Pty Ltd
6. APR Energy
7. B&R Enclosures Pty Ltd
8. Busck Prestressed Concrete Ltd
9. Chapman Tripp
10. Progetti Plant S.R.L
11. Schweitzer Engineering Laboratories
12. Vortex Group Ltd
13. Akuo Energy Pacific
14. Australian Winders
15. Clean Energy Technologies
16. ComAp Pty Ltd
17. Gough Cat Power Systems
18. IMPS (UK) Ltd
19. Origin Energy
20. Siemens Ltd

We take this opportunity to welcome them into the PPA family and trust that the conference was of benefit to their companies and that they will continue to be members of the PPA.

There were forty five (45) trade booths initially planned for but due to the high demand of the trade booths from exhibitors this year, the number was increased to fifty nine (59) to cater for the additional numbers that wanted to participate in the Trade Exhibition.

The conference activities started with the Executive Committee meeting at 11.00am and followed with the conference registration at 2.00pm on Sunday, July 30 at the Sheraton Aggie Grey's Hotel & Bungalows. The PPA Secretariat acknowledges the huge effort put into the pre-conference preparation by Afamasaga Victor Elia Afamasaga, Palemafuta Sofia Silipa, Asiata Tavui Tafu Salevao, Tuiafelolo A J Stanley, Luatuanuu Salafai Ah Tong, Edwin Ulberg and the team at the Electric Power Corporation (EPC) who also assisted in the registration and distribution of the conference packages to the delegates.



Figure 1: Conference Registration in Progress

Day 1 - Monday July 31 Utility Board Directors' Workshop

The one-day workshop on Monday for the Utility Board of Directors was conducted at the Sheraton Aggie Grey's Hotel & Bungalows where sixteen (16) Board members from the different PPA Utilities participated in the all-day event. This gave all the Board members an uninterrupted opportunity to discuss and learn about grid connected PV overview, small roof-top solar metering and payment, avoiding renewable energy scams and adding energy storage to the grid.

¹ Registered financial PPA members can access the full delegates listing from the PPA website.



Figure 2: Utility Board Directors' Workshop in progress

CEOs' Retreat

The half day workshop on Monday for the Utility CEO's was conducted at the Sheraton Aggie Grey's Hotel & Bungalows where twenty (20) CEO's and representatives from the different PPA Utilities participated in the half day event. This gave all the CEO's an opportunity to discuss the overall progress of the World Bank Project and other relevant issues.



Figure 3: CEO's meeting in progress

PPA acknowledges the kind sponsorship of ABB Limited for the morning tea and afternoon tea and Arthur D. Riley and Top Tree Trimming for the lunch.

Allied Members Meeting

The formal Allied Members' meeting was held after the afternoon tea. The Allied Members' Alternate Chairman, Scott Coles, together with the Chairman and Executive Director of PPA conducted the meeting at the Sheraton Aggies Grey's Hotel & Bungalows.



Figure 4: Allied Members' formal meeting in progress

Delegates were treated to dinner and entertainment at a welcome dinner in the evening at the Robert Louis Stevenson Museum kindly sponsored by the host, EPC.



Figure 5: Entertainment during the Welcome Reception at the Robert Louis Stevenson Museum

Day 2 Tuesday August 1

The conference was officially opened by the Honorable Tuilaepa Dr. Sailele Malielegaoi, Prime Minister of Samoa with the keynote address delivered by Meg Taylor, DBE, Secretary General of the Pacific Islands Forum Secretariat.



Figure 6: Official Opening of the 26th Annual PPA Conference

MTQ
Engine Systems Australia

CBS
Power Solutions

HARELEC
solar power specialists

ltron

granite
power



Pacific Power **26th Annual Conference**

Theme: "Affordable
July 31 - August 1, 2015"

Hosted by Electricity
Apia, Samoa



er Association
ence & Trade Exhibition
"Reliable Electricity for All"
August 4, 2017

c Power Corporation
SAMOA



Figure 7: PPA Chairman Kione J. Isechal, P.E. with the Prime Minister of Samoa, Honorable Tuilaepa Dr. Sailele Malielegaoi



Figure 8: PPA Chairman Kione J. Isechal, P.E. with the Keynote Speaker, Meg Taylor, D.B.E of the Pacific Islands Forum Secretariat

The Official Opening Ceremony was followed by the official group photograph session and morning tea.

After morning tea, the PPA Chairman Kione J. Isechal, P.E, launched the Benchmarking Summary Report for 2015. The launching was witnessed by the utility CEOs', Development Partners, the Allied Members and Engineers.

This was then followed by Session One which was the Panel Discussions chaired by Utu Abe Malae, CEO, ASPA, American Samoa on the theme, "Affordable Electricity for all": the challenges - Government Representatives, Development Partners and Utilities.



Figure 9: Dr. Nailasikau Halatuituia, Mr. Olly Norojono, Mr. Martin Garrood and Ms. Isabel Neto

After lunch there were presentations by the Development Partners and other PPA Affiliate Members chaired by Mr. Hasmukh Patel, CEO, FEA, Fiji Islands. These included Japan International Corporation Agent (JICA) who presented on the Economic Operation and Maintenance of Hybrid Power Generation System while the South Pacific Community (SPC) shared the outcome of the 3rd Pacific Regional Energy and Transport Ministers Meeting and its implications of, "Affordable electricity for all". The University of the South Pacific (USP) spoke on Renewables 2017 – REN 21 Global Status Report and Global Sustainable Energy Partnership (GSEP) spoke on the Grid Connected Renewable Energies Workshop. The final presentation of this session was from Electric Power Corporation (EPC) which was on EPC Renewable Energy Programme.



Figure 10: Mr. Kenji Okamura and Mr. Tadayuki Ogawa of JICA



Figure 11: Dr. Atul Raturi of USP, Mr. Rupeni Mario of SPC, Mr. Toshikazu Ohasi and Ms. Hatsuki Mizuno of GSEP and Fui Tupa'I Mau Simanu of EPC

PPA acknowledges the kind sponsorship of King Construction and Samoa Commercial Bank for the morning tea, Greenpower for the lunch and Apia Lua Construction for the afternoon tea.

PPA Board Meeting

The PPA Board meeting which is open to all members began at 3:40pm and concluded at 5:22pm.



Figure 12: Board Members' meeting progress at the Sheraton Aggie Grey's Hotel & Bungalows

Opening of the Trade Exhibition

The evening saw the opening of the Trade Exhibition with the cocktail kindly sponsored by Itron Australasia Pty Limited.

The Trade Exhibition was officially opened by Honorable Papaliitele Unasa Niko Lee Hang, Minister of Works Transport & Infrastructure & Minister Responsible for EPC. In his remarks Mr. Hang reiterated that the Trade Exhibition was important as it was an opportunity for us to continue with our on-going dialogue and partnership with suppliers and the allied members on how affordability of the products that they sell and provide come into play, given the challenges we face with isolation in freight on both land and sea.

The following fifty-six (56) Allied members participated in the Trade Exhibition:

1. International Utilities Pole, Australia
2. Andritz Hydro, New Zealand
3. Itron Australasia Pty Ltd, Australia
4. Delstar NZ Limited, New Zealand
5. Maclean Power Systems, Australia
6. Energy Power Systems Australia, Australia
7. CBS Power Solutions, Fiji
8. Etel Limited, New Zealand
9. IS Systems, Australia
10. The Energy Network (Aust) Pty Ltd, Australia
11. Cummins South Pacific Pty Ltd, Australia
12. Pacific Energy SWP Ltd, Fiji
13. Granite Power Ltd, Australia
14. Transdiesel Ltd, New Zealand
15. Transdiesel Ltd, New Zealand
16. Hatz Diesel Australia, Australia
17. AR Industrial, Australia
18. ABB Limited, New Zealand
19. Aquaduct Trading Pty Ltd, Australia
20. Aquaduct Trading Pty Ltd, Australia
21. Global Sustainable Energy Solutions, Australia
22. S&C Electric Company, Australia
23. PLP Electropar New Zealand, New Zealand
24. Telsa, United States of America
25. Global Turbocharger Solutions, Australia
26. Hydro Tasmania, Australia
27. Arthur D. Riley & Co. Ltd, New Zealand
28. NZ & Pacific Solar & Storage Council, New Zealand
29. Penske Power Systems, Australia
30. ABB Australia Pty Ltd, Australia
31. Sulzer Australia Pty Ltd, Australia
32. McMahon Limited, New Zealand

33. AVO NZ, New Zealand
34. AMS International, Australia
35. Electra Therm, United States of America
36. Hubbell Power Systems, Phillipines
37. Komai Haltec Inc., Japan
38. Genus Metering, New Zealand
39. Maskell Productions, New Zealand
40. NZ Marine Turbochargers Ltd, New Zealand
41. APR Energy, United States of America
42. Hawthorne Pacific Corp, United States of America
43. RJE Global, Australia
44. Generator Rental Services, New Zealand
45. NAN Electrical Cable Australia, Australia
46. Nexans NZ, New Zealand
47. Busck Prestressed Concrete Ltd, New Zealand
48. MPower Pacific Ltd, New Zealand
49. Ampcontrol, Australia
50. Aggreko (NZ) Ltd, New Zealand
51. Schweitzer Engineering Laboratories Ltd, New Zealand
52. Vortex Group Ltd, New Zealand
53. MTQ Engines Systems (Aust) Pty Ltd, Australia
54. ComAp Pty Ltd, Australia
55. Australian Winders, Australia
56. Clean Energy Technologies Inc., United States of America
57. B&R Enclosures Pty Ltd, Australia
58. B&R Enclosures Pty Ltd, Australia
59. Optimal Group Australia, Australia



Figure 14: Jinlong Ma of EU and Tony Mulholland of Andritz Hydro



Figure 15: Itron Australasia Pty Ltd



Figure 13: Jona Salesa and Scott Coles of International Utility Poles



Figure 16: Rachel Ring and Matthew Spain Of Mclean Power Systems and Samisoni Of TPL



Figure 17: Chris of Energy Power Systems Australia Pty Ltd



Figure 20: Craig Harrison and Philip Madigan of IS Systems with Tito Cabunagan of PPUC



Figure 18: Neil Massey and Craig Dugan of Optimal Group Australia



Figure 21: Kam Mahdi and B Mahdi of Clean Energy Technologies with Trevyane Esiel of PUC



Figure 19: Mark Gosper and Ben Bridges Of B&R Enclosures with Ben Kawana of RJE Global Pty Ltd



Figure 22: Brad Raphael of Sulzer with Joe Hafler and Faustino Yangmog of Yap



Figure 23: Ken Asher of CIGRE Australia and Corey Scott of The Energy Network



Figure 26: Andrew Daka of PPA and Steve Douglas of MTQ Engines Systems



Figure 24: Richard Bird of ComAp Ltd



Figure 27: Tapuaki Fiaga and William Sword of Pacific Energy SWP with Hemal Solanki and Sami Solanki of Dominion Wire and Cables



Figure 25: Greg Monteith and Scott Lomate of Cummins South Pacific with Yogesh Sharma of SMA Australia



Figure 28: Hatz Diesel



Figure 29: Phillipe Nething of Enercal, Manfred Unger and Branko Stojakovic of AR Industrial with Mafalu Lotolua of Tuvalu Electricity Corporation



Figure 32: Mark Drew of Genus Metering with Mafalu Lotolua of Tuvalu Electricity Corporation



Figure 30: Cassandra Vaea of TPL, Ha Tranthithu of ABB NZ Ltd, PPA Chairman Kione Isechal and Rose Ortolani of Progetti Plant



Figure 33: Leiko Toyoda and Yoshihiro Yomamoto of Komai Haltec



Figure 31: Late Mark Rushworth with Ryan Peau and colleague



Figure 34: Tenikoria of PUB, Trevor Hogan of Pacific Power Engineering and Aaron Banano of GSES



Figure 35: Wade Hatch, Wallon Young and Sisifo of ASPA with Ivan Haeane and Grant Smith of PLP Electropar



Figure 38: Hillary Coates, Benjamin Materna and Shane Bannister of Tesla with Wenyu of OMICRON



Figure 36: Bernard of Hubbell Power Systems with TPL delegates



Figure 39: Rod Iliff of Global Tuborcharger Solutions with Steve Douglas of MTQ Engine Systems



Figure 37: David Knight, Mala Galani, Jiri Musilek, Rob Emrich of Electra Therm with Martin Garrood NZMFAT with Irene



Figure 40: Trevor Lord and Daniel Hurley of AVO NZ with Nixon Anson of PUC



Figure 41: David Butler and Ray Massie of Hydro Tasmania



Figure 44: Mike Thomas of Penske Power Systems



Figure 42: Martin Saville and Karl Henry of Arthur D. Riley and Company Ltd



Figure 45: Grant Yule and Anthony Abela of ABB Ltd with Jean-Pierre of EDT



Figure 43: Steve Rhind and Stephen Peters Of McMahon Ltd with Teiti Nia of TAU



Figure 46: Jevon Priestley of Vortex Group Limited



Figure 47: David Griffiths & Kieran O'Neill of Nexans with Tito Cabunagan of PPUC



Figure 50: Ross McLennan of Busck Prestressed Concrete Ltd



Figure 48: David McNamara and Karun McNamara of Nan Electrical Cables with Ileana Miritescu & Shirleen Swapna of EU



Figure 51: David Rice of Energy Power Systems with Billy Lavery of Mpower Group



Figure 49: Michael Redgrave of Generator Rental Services



Figure 52: Ben Kawana and Ryan Milton of RJE Global with Ben Bridges of B&R Enclosures



Figure 53: Grant Kirchmann of Gough Cat Power Systems with Cliff Yuen of Hawthorne Pacific Corp



Figure 56: Fui Tupa'I Mau Simanu of EPC with Paul Goodison, Sarah Hughes and Marc Palmer of Sweitzer Engineering Laboratories



Figure 54: Madeline Warren of APR Energy



Figure 57: Craig Aldridge and James Watkins of Vortex Group Limited



Figure 55: Mark O'Neil and Blair Hannay of NZ Marine Turbocharges Ltd with Mafala Lotolua of TEC



Figure 58: Tony Davis of Maskell Productions Ltd with Mark Kibby of Yingli

Day 3: Networking Day Wednesday 2 August

Transworks sponsored Wednesday's Networking Day, which was held at the Return to Paradise Resort after site visits to the Tuanaimato Solar Systems and Fiaga Power Station.



Figure 59: Tuanaimato Solar Systems and Fiaga Power Station and Return to Paradise Resort

Day 4 Thursday August 3

There were two morning sessions of presentations. Session three was based on PV and storage and this was chaired by Mr. Mark Waite, CEO, CPUC. The first presentation PPUC based on Conversion of Colling Tower System into a Radiator System for both Niigata Engines. This was followed by a presentation from Telsa on Telsa Powerpacks enable cost effective micro grids to accelerate the World's transition to sustainable energy. While Vector Limited presented on using energy storage towards increased and affordable electrification and S&C Electric Company presented on mixing the old with the new – Integrating systems energy storage and renewables with existing generation infrastructure to make electricity more affordable and reliable.



Figure 60: Tito Cabunagan of PPUC, Anthony Stocken of Tesla



Figure 61: Shazad Ibnul of Vector and Greg Schellenberg of S&C Electric Company

After morning tea presentations continued from the Allied members for session four which were based on utility case studies chaired by Mr. Apii Timoti, CEO, TAU. The first presentation was from Hydro Tasmania on Rarotonga Renewable Energy implementation followed by I S Systems Pty Limited on Case Study: Low cost inter island DC Electric Power transmission for Chuuk State. While Solomon Power presented on Solar – Hybrid mini Grid System – Recently Commissioned solar hybrid mini grid systems for two provinces and Sustainable Energie Partners presented on the practical application of solar power and battery storage in Pacific Island Countries.



Figure 62: Ray Massie of Hydro Tasmania, Craig Harrison of IS Systems, Pradip Verma of Solomon Power and Gregory Story of Sustainable Energie Partners

After afternoon tea presentations continued for session five which is based on new and emerging technology chaired by Tologata Tuimalealiifano Tile, GM, EPC. Vortex Group Limited presented on modernization of existing generation plant with PLC based control systems and Itron Australasia Pty Ltd presented on reducing energy costs with active grid. While Arthur D. Riley & Co. Ltd presented on Halo Solid Ring Main Unit and ComAp Pty Ltd presented on Cloud Cameras, saving fuel and cost. Electra Therm concluded the session presenting on waste heat to power. The base load renewable you already have.



Figure 63: Aidan Priestley of Vortex Group Ltd, Tim Wolf of Itron Australasia Ltd, Karl Henry of Arthur D. Riley Ltd, Richard Bird of CamAp Ltd and Robert Emrich of Electra Therna

PPA acknowledges the kind sponsorship of Island Rock and Ford Hyundai Samoa for the morning tea, EPC for the lunch and National Bank of Samoa for the afternoon tea.

Closing of the Trade Exhibition

The Trade Exhibition was formally closed by EPC Board of Directors Chairman, Pepe Fia'ailetoa Christian Fruean.

In his closing remarks he thanked the Allied Members who have put a lot of effort in participating in the exhibition.

PPA acknowledges the kind sponsorship of Granite Power for the closing of the trade exhibition, Nexans Olex for the conference lanyards, MTQ Engine Systems (Aust.) PTY Ltd for the conference satchels, CBS Power Solutions (Fiji) Ltd for the conference shirt and blouse and Harelec for the conference programmes.

Conference Closing Dinner

The conference closing dinner was held at the Taumeasina Island Resort. Delegates were treated to the wonderful local cuisine and entertainment. This was preceded by presentation of gifts to all the Active members, Allied members, presenters, spouses and the sponsors of the various events.



Figure 64: Closing Dinner at the Taumeasina Island Resort

Day 5 Friday August 4

The day began with session six which was the Ministerial session. This session was facilitated by Asian Development Bank on GCF support to power sector reform TA.



Figure 65: Mike Trainor and Anthony Maxwell of ADB, Apii Timoti of TAU, Finau Katoanga of TPL and Isabel Neto of WB



Figure 66: Mike Trainor, Anthony Maxwell of ADB and Isabel Neto of World Bank

After morning tea, the ministerial session continued based on the country statements on energy which was chaired by Mr. Kione J. Isechal.



Figure 67: Panelists at the Ministerial Session

After afternoon tea presentation continued on new and emerging technology which was chaired by Mr. Mark Waite, CEO, CPUC.

Vortex Group Ltd presented on how 3D scanning technology can benefit refurbishment projects while Indra Australia Pty Ltd presented on technical and non-technical energy losses control: making electricity more affordable and accessible while reducing costs. PLP Electropar presented two presentations one was exploring the pitfalls of managing utilities assets without network standardization and the other on global trend towards having quality, health & safety and

Environmental Management Systems in place and certified to assist all businesses. The final presentation was from Siemens Limited based on renewables and the role of energy storage and digitalization in the transition away from a reliance on fossil based fuels.



Figure 68: James Watkins of Vortex Group Ltd, Giovanni Polizzi of Indra Australia Pty Ltd, Brett Hewitt of PLP Electropar and Timo Alefaio of PLP Electropar, and Tom Mactier of Siemens Ltd

Annual General Meeting

The Annual General Meeting was held at the Sheraton Aggies Grey's Hotel & Bungalows.

At the meeting the Executive Director provided a summary of the resolutions from the Board meeting held on Tuesday. The results of the elections for the Secretary, Alternate Secretary, Allied Members Chairman and Alternate Allied Members Chairman was also announced.

The meeting also approved the theme for the 2018 conference which will be **"Renewables are our future"** as proposed by Pradip Verma, Chief Executive Officer of Solomon Power, from the

Solomon Islands and Mr. Hasmukh Patel, Chief Executive Officer, Fiji Electricity Authority of Fiji, from the Fiji Islands.

The PPA acknowledges the contribution of the following sponsors whose assistance has ensured a successful conference.

Sponsorships	Sponsors
Monday Morning Tea	ABB Ltd
Monday Lunch	EPC, Arthur D. Riley & Top Tree Trimming
Monday Afternoon Tea	ABB Ltd
Welcome Reception	EPC
Tuesday Morning Tea	King Construction, Samoa Commercial Bank
Tuesday Lunch	Green Power
Tuesday Afternoon Tea	Apia Lua Construction
Opening of Trade Exhibition Cocktail	Itron Australasia Pty Ltd
Wednesday Networking Day	Transworks
Thursday Morning Tea	Island Rock, Ford Hyundai Samoa
Thursday Lunch	EPC
Thursday Afternoon Tea	National Bank of Samoa
Closing of Trade Exhibition	Contribution from all trade exhibitors
Thursday Conference Closing Dinner	Granite Power & EPC
Friday Morning Tea	PPS
Friday Lunch	EPC
Friday Afternoon Tea	Silva Transport
Accessories	
Conference Program	Harelec
Conference Shirt & Blouse	CBS Power Solutions
Conference Satchels	MTQ Engine Systems (Aust.) Pty Limited

The PPA secretariat would like to commend and acknowledge this year's host utility, Electric Power Corporation for their tremendous effort and hard work in hosting a hugely successful conference. We also thank all the delegates who made all the effort to attend the conference and also the presenters who had taken the time to prepare and present the presentations. Without you all, the Conference would not be the same. Thank you all so very much for all the support, hard work and effort put in.

We invite you all to come and join the PPA for the 27th Annual Conference and Trade Exhibition and the 9th Engineers' Workshop in Koror, Palau, 2018.

Pacific Power Association Gathers for 26th Annual Conference and Trade Exhibition in Apia, Samoa.

Pacific Power Association

The Pacific Power Association (PPA) held its 26th Annual Conference and Trade Exhibition in Apia, Samoa, from 31 July to 4 August, 2017. The conference was hosted by the Electric Power Corporation (EPC) of Samoa; the second time EPC has hosted the event having done so previously in 1996, the then 5th Annual Conference.

The theme of the conference; **"Affordable Electricity for All"**, is very much in line with the **UN's Sustainable Development Goal (SDG) #7 – Sustainable and Affordable Energy for All**.

A total of 300 overseas and 50 local delegates representing Electric utilities, Pacific Island Governments, Development Partners and the Private Sector were in attendance.

The conference was opened by the Prime Minister of Samoa, the Honourable Tuilaepa Dr. Sailele Malielegaoi, with the keynote address delivered by Meg Taylor (DBE), the Secretary General of the Pacific Islands Forum Secretariat.

The Secretary General in her address emphasised the vital role that energy plays in achieving our social and economic development aspirations and national development strategies and that access to energy underpins all aspects of socio-economic development, ranging from production, storage and transport to health, education and the sustenance of livelihoods.

Global and regional developments have made energy a policy priority and the success or failure of these priorities lie with the utilities who are seen as the **agents of change**.

There has been many developments in energy and this has gained momentum with the Paris Climate Change Agreement in 2015. There are also changes globally that will have an impact on our islands such as the decision by UK and French governments to stop combustion engines by 2040. To prepare the region for the changes that are coming the region has to have the right policies in place, access to financing and a supportive environment both nationally and regionally.

The Board of the Pacific Power Association welcomed the offer made by the Prime Minister of Samoa at the opening of the conference for the PPA Secretariat to be hosted in Apia. The PPA Secretariat will be actively pursuing the offer.

The Board of the Pacific Power Association at its Board Meeting confirmed the Pacific Power Association's role in delivering against Forum Leaders' priorities, as outlined in the 2017 CROP Action Plan; Supporting emerging key messages of the PIFS-led analysis of regional governance and financing arrangements and its implications for CROP agencies; and to provide comments on the working recommendations of the draft report of the Review of the CROP Charter, and agree in principle to future endorsement of the CROP Charter, subject to endorsement by Pacific Islands Forum Leaders.

The Board also resolved that Palau Public Utilities Corporation (PPUC) will be the host for the 27th Annual Conference and Trade Exhibition and the 9th Engineers' workshop in Koror, Republic of Palau, in 2018 on a date to be agreed.

American Samoa Power Authority

The American Samoa Power Authority (ASPA) commissioned five major projects between September 2016 and July 2017; a period of 10 months.

The new Satala diesel power plant, constructed at a cost of USD \$50,000,000 was by far the largest of the five projects. Two Solar PV projects with Battery Storage Systems were also built on Ta'u island at a cost of USD \$8,000,000 and a second one on Ofu island in the amount of USD \$ 2,522,000.

ASPA also commissioned a new operations center building which was completed at a cost of USD \$4,700,000. The new operations center is located at ASPA's Tafuna compound; it houses a new customer service center and offices for the executive director, accounting, procurement and human resources departments. ASPA also upgraded its 34.5KV Tie-line capacity between the Satala and Tafuna power plants, from 5.0MW to 10.0 MW. It was completed at a cost of USD \$500,000.

24.5 MW Satala Power Plant Replacement Project:



New Satala Power plant

The new Satala power plant was commissioned on May 25, 2017; it comprises seven 3.5MW GE 16V250 generator sets, a double 13.2 KV Bus switchgear by ABB, SCADA and auxiliary equipment. Engine cooling is provided by seven external radiator sets, manufactured by PPA allied member Air Radiators of Australia.

The new GE 16V 250 generators provide significant fuel savings for ASPA and its customers. The 16.8 kWh per gallon fuel efficiency provided by the new GE diesels is 25% better than the Caterpillar plant which was installed after the tsunami disaster of 2009. The Caterpillar plant (fuel efficiency 13.6 kWh) is now decommissioned.

The new power plant building was designed to meet International Building Code - IBC 2012. Initially designed with a minimum basic wind load of 150mph; the roof and building walls were upgraded to a wind load of 170mph during the construction phase.

Ta'u Island Solar PV and Battery Storage System



Ta'u Island Solar PV and Battery Storage System

The Ta'u renewal energy project to make Ta'u Island 100 % renewable, was commissioned on September 30, 2016.

This USD \$8,000,000 project was completed through a partnership between ASPA and the prime contractor Solar City. Solar City now doing business under the TESLA name, provided the design and supplied all equipment for the project. ASPA provided the heavy equipment for the project, plus installation and construction labor.

The project comprises 1,412 KW PV Array (Yingli Mono panels) and 6.0 MWh of TESLA Lithium Ion battery packs.

The PV Array connect to the grid via forty-four 24KW FORNIUS 24.0-3480 string inverters. Sixty 100 KWh TESLA Lithium Ion battery packs connect to the grid via three Dyna Power inverters.

The Ta'u Solar PV and Battery storage system can be controlled remotely from the Ta'u power plant and from ASPA's power generation office on the main island of Tutuila.

Three new 275KW Cummins generator sets were also installed as backup for the PV system. The gen-sets, PV Array and Battery Storage system are controlled automatically by a single controller.

Ofu Island Solar PV and Battery Storage Project:



Ofu Solar PV Project

Phase-1 of the Ofu Solar PV project - to generate 80% of the island's energy needs was commissioned on May 05, 2017. Phase-2 to increase renewable energy generation on Ofu Island to 100% is expected to begin towards the end of 2017.

Phase -1 was completed at a cost of USD \$ 2,522,000 and Phase-2 is expected to cost an additional USD \$1,000,000.

Phase-1 comprises 342 KW of Solar PV Arrays and 1,000 KWh of AQUION storage batteries. A single Princeton Power BIGI 250 inverter is used to connect the storage battery to the grid. Three smaller GTIB-100 inverters connect the PV Array to the grid.

The project was completed through a partnership between ASPA and the prime contractor, Pacific Solar Innovations (PSI) of Hawaii. PSI provided the design and supplied all project equipment. ASPA supplied the Samsung PV panels, heavy

equipment, local materials, plus installation / construction labor.

Three new 160 KW Cummins generator sets were also installed as backup for the PV system. The gen-sets, PV Array and Battery Storage system are controlled automatically by a single EMOS controller.

ASPA Operations Center



ASPA's New Operations Center

ASPA's new operation center was opened on July 07, 2017. It was constructed by a local contractor Paramount Builders Inc. (PBI), at a cost of USD \$4,700,000

The new operations center is a net zero, platinum rated LEEDS building with 106 KW of roof mounted Solar PV panels. The building houses a new customer service center and offices for the executive director, accounting, procurement and human resources staff.

34.5 KV Tie-Line Upgrade



One of two 7.5MVA Tie-Line Transformer at each substation

ASPA operates two diesel power plants on the main island of Tutuila. These plants are tied or connected via a 34.5KV underground Tie-line circuit and two 34.5KV / 13.2KV substations; one at each plant. In order to take advantage of the newly completed Satala power plant and its higher fuel efficiency,

production was increased at the Satala plant from the average 45% of total kWh generation to 75%. To achieve this, the Tie-line substations at each plant were upgraded from 5.0 MW to 10.0 MW by the addition of a second 7.5MVA transformer at each substation.

In Memoriam of Late Mark Rushworth



Middle: Late Mark Rushworth with TPL Delegates at the 26th PPA Annual Conference

The PPA sadly lost one of its Allied Member delegates, the late Mark Rushworth of Aquaduct Trading, who passed away suddenly on 2 August 2017 during the PPA's Annual Conference and Trade Exhibition in Apia, Samoa.

Late Mark's Aquaduct Trading joined PPA in 2016 prior to the 25th Annual Conference and Trade Exhibition in Nuku'alofa, Kingdom of Tonga.

However, those from the utilities who also operate water supply functions would probably be more familiar with the late Mark as he and Aquaduct Trading have been associated with the water industry since 1995 and was one of the Pacific Water Wastewater Association's (PWWA) first Allied Members when it was formed.

The late Mark and Aquaduct were also involved

in the community they worked with through social engagement in sponsoring the annual Independence Day tennis tournament the Marist Bros Tennis Club at Lotopa, Samoa as well as various sporting clubs such as the Savalalo Tigers Table Tennis Club, with a table, shirts, caps and bats and a Table Tennis Table for the Samoa Water Authority. The Public Utilities Board of Kiribati staff canteen has also received assistance from Aquaduct with a new pool table, new dart boards, many sets of darts and bar equipment for their canteen.

The late Mark Rushworth's body was cremated in Apia with his daughter in attendance.

Our sincere condolences to the Rushworth Family and May He Rest in Peace.

PPA Secretariat Welcomes New Staff



Judy Yuen

Judy Yuen joined the PPA Secretariat on the 18 July 2017 as an accountant with seven years of experience in a commercial company and 3 years with a chartered accounting firm. She is ready to take the challenges from the PPA Secretariat.



Philip Andrew Silatolu

Philip Silatolu is 26 years of age and the youngest of nine siblings. He is originally from the beautiful and chiefly village of Lomanikoro, Rewa.

Philip joins PPA as an administration assistant in September 2017. Before joining the PPA team, he was working with the Fijian Elections Office as a recruitment assistant under the Human Resources Department and also as the administration assistant under the operation Department.

He is heavily involved with his church ministry serving as a youth and Sunday school committee member. Philip quote's: *"work hard, stay strong toward your ambition because greater opportunities lies ahead of you"*, Vinaka.



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Welcome! *To New Allied Members*

Eight (8) new companies have joined PPA as Allied Members since our last PPA Magazine. The new members are:

AKUO ENERGY PACIFIC: Akuo Energy Pacific is based in Sydney, Australia. Their primary activity is IPP and their secondary activity is EPC.

AUSTRALIAN WINDERS: Australian Winders is based in Western Australia, Australia. Their primary activity is power generator windings field service repair. Their secondary activity is generator ancillary product supplier.

CLEAN ENERGY TECHNOLOGIES, INC.: Clean Energy Technologies Inc. is based in California, United States of America. Their primary activity is executive, business development and operations.

COMAP PTY LTD: ComAp Pty Ltd is based in Melrose Park, Australia. Their primary activity is generator – power generation control. Their

secondary activity is renewable energy systems.

GOUGH CAT POWER SYSTEMS: Gough Cat Power Systems is based in Christchurch, New Zealand. Their primary activity is electric power generation: diesel, HFP, Gas Microgrid/Hybrid Turn Key Solutions.

IMPS (UK) LTD: IMPS (UK) Ltd is based in Lincolnshire, United Kingdom. Their primary activity is power generation. Their secondary activity is utility management.

ORIGIN ENERGY: Origin Energy is based in Victoria, Australia. Their primary activity is LPG supply to the Pacific. Their secondary activity is energy solutions.

SIEMENS LTD: Siemens Ltd is based in Queensland, Australia. Their primary activity is energy efficiency. Their secondary activity is power generation.

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