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A PACIFIC POWER ASSOCIATION PUBLICATION

VOLUME 30 ISSUE 4 - SEPTEMBER 2022

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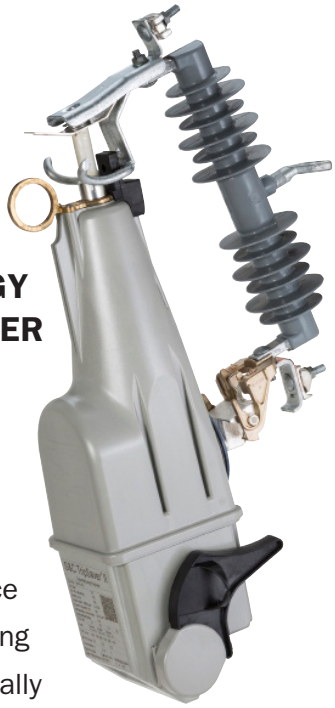

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September 2022, Volume 30 Issue 4

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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.

PACIFIC POWER magazine is published four times a year.

Advertising
Reena Suliana
Pacific Power Association,
Suva, Fiji Islands

Layout & Design
Star Printery Limited

This magazine is read by an audience of opinion leaders in governments, development partners, the public service, the academic community, the media in the Pacific and members of the Pacific Power Association. Subscription to Pacific Power magazine is available at US $60 a year from the association.

Correspondence should be addressed to: The Pacific Power Association, Private Mail Bag, Suva, Fiji Islands.

The articles published in this magazine do not necessarily represent the policies of the Board of Pacific Power Association.

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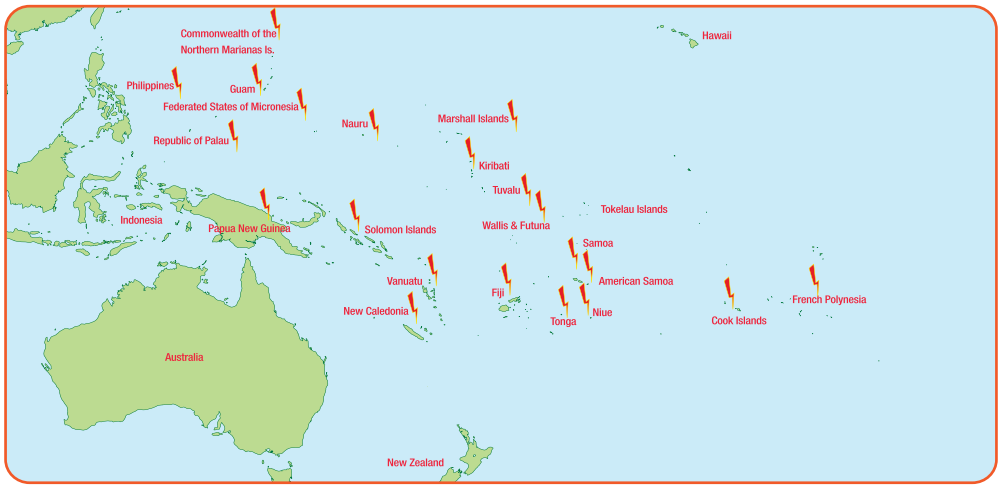

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Editor's Note

Gordon Chang
Acting Executive Director

Bula and Greetings from Suva.

The Pacific Power Association will be currently finalizing the logistics for the 29th Annual PPA Conference and Trade Exhibition in Brisbane, Australia from the 21-24 November 2022. It is going to be a well-attended event by the utility CEOs, one Utility Board member and one engineer as they will be funded by DFAT, Australia, World Bank and ADB. I hope that all the allied members will consider attending as all active members will be present in Brisbane, Australia. An interesting conference Programme has been organized for the week and I would encourage delegates to participate by presenting a paper that is in tuned with the conference theme.

The conference theme "Supporting Utilities towards Environmental Stewardship, Operational Performance and Financial Stability" PPA utilities are fortunate as donor partners will be in attendance and they are readily available to discuss funding options with them.

There has been much progress with the remaining activities with the World Bank funded "Sustainable Industry Development Project (SEIDP) to the Pacific Power Association as PPA is going full speed to complete the remaining activities as we approach the project end date in February 2023.

May I on behalf of the Association welcome the new Allied Member who has just recently joined the PPA, Longi Solar Technology Co, Ltd.

Lastly but not the least, my most sincere appreciation to the donor partners who assisted in funding the utilities attendance to this year's conference.

Vinaka vakalevu.
Gordon Chang

Use Of Organic Rankine Cycle Technology For The Generation Of Renewable Energy From Primary And Waste Heat Resources

David Knight
Business Development Analyst Asia/Pacific – ElectraTherm Inc.

Since the previous conference held in the Cook Islands in 2019 ElectraTherm have continued the development of their Organic Rankine Cycle (ORC) solutions including upgraded performance and the official release of the Active Cooler, a replacement for traditional power consumingcoolers,andthePowerModulePM75whichreplacesthePower+4400BORC. We have also continued to increase our knowledge for different innovative applications using ORC technology, with recent projects/ investigations undertaken in industrial process cooling, repurposing of oil and gas wells, waste to energy, remote geothermal and our first potential marine installation where we are working closely with a shipping company for the retrofitting of an ORC system to use the waste heat from ships main engines for power generation.

There has also been a change in the company leadership with the retirement of Rob Emrich who is well known within the PPA family having attended conferences in Tonga, Samoa, Palau and the Cook Islands. Our new managing director is Mr Matt Lish. He has many years' experience as a senior manager within Bitzer US including as the Managing Director of Vacom Technologies, another member of the Bitzer Group immediately prior to his appointment to ElectraTherm. Matt is continuing the ongoing company and product development programmes and has re-committed our support of the PPA and the Pacific Island Power Authorities.

For those not familiar with ElectraTherm and our technology, we are a renewable energy company focussed on the development of practical solutions to achieve Energy Efficiency through Heat to Power Generation using ORC Technology. The company was established in 2005 to develop the Power+Generator with the first commercial unit installed in 2011 which is still operating today. The ElectraTherm ORC Solutions are based on a proven technology with more than 100 units operating worldwide and a combined fleet hours exceeding 2 million hours.

In 2016 ElectraTherm was acquired by the Bitzer Group. The Bitzer Group are the worlds largest independent manufacturer of refrigeration compressors. Bitzer are represented across the globe with 3900+ employees generating sales approaching €1 Billion. With the backing of the Bitzer Group, the future of ElectraTherm and our technologies is secure.

The ElectraTherm technology incorporates the Bitzer Twin Screw Expander as the power generating unit. The twin screw expander provides several advantages over other technologies including the ability to operate safely under varying heat inputs including when full phase change of the working fluid is not achieved and a wide operating envelope with a 10:1 turndown capability. All ElectraTherm ORC Solutions are pre-engineered to a standardised design in a modular package which enables each and every unit to be fully tested at our manufacturing facility before shipment.

The heating and cooling inputs into the ORC are clean water which has known heat carrying properties, is environmentally safe, non-toxic and can be easily transferred through pipes from the heat or cold water source to the ORC. This provides ease of installation and also enables the ORC and associated condensing water source to be located at locations convenient to the layout of the clients facility.

The ORC systems currently manufactured by ElectraTherm include the Power+6500B/6500B+ with output up to 125 kWe, the Power Module PM75 with an output up to 75 kWe and the Active Cooler AC800 with cooling capacity of 800 kWth and potential output up to 75 kWe. With our modular design each system can be installed to match the thermal energy available and/or the facility power demand.

As indicated ElectraTherm have a robust product development pipeline to provide increased performance and additional capabilities. Key current developments include the manufacture of the Power+250B ORC which will provide increased output up to 250 kWe, development of a new range of ultra-low GWP working fluids to meet new environmental standards and increase operating range against lower heat temperatures, and an “off-grid” capability that will enable the use of the ElectraTherm ORC as the principal power generator for a localised micro grid and/or be part of a hybrid power generating system incorporating different renewable energy sources. It is anticipated, subject to the successful completion of product testing, that we will continue to bring new products/ performance enhancements during 2023.

In line with our commitment to the Pacific Nations we are continuing to work together with our partners to provide energy efficient solutions for different applications. Each ORC system can be installed as either a bottoming plant, where the ORC uses excess heat and/or waste heat to provide energy efficiency to the primary generating unit or as the primary generating system where the available heat is insufficient to support investment in capital intensive power generating equipment or when the heat supply is inconsistent.

There are many opportunities for the installation of ElectraTherm ORC Solutions in the Pacific including engine based power generation, waste water treatment, biomass, waste to energy systems and micro geothermal.

Engine based Power Generation

ElectraTherm provide several solutions for improved energy efficiency for installed engine based power generation where waste heat from the engines is used to generate additional electricity. It is understood that with the emphasis on renewable energy generation that there are concerns that further investment in engine power generation will be wasted and result in "stranded assets" in the near future.

Whilst renewable energy from solar and wind will be a part of the energy mix there still will be a requirement for engine-based power generation to provide "firming" of the grid and to also meet increased electrical energy demand. With new environmentally friendly fuels, such as green hydrogen and ammonia, the need for energy efficiency through the use of waste heat will remain an important component of any generating asset. An investment today in ElectraTherm's ORC solutions will not result in a stranded asset, it will provide long term savings in power generation costs offsetting the increased costs of the next generation fuels.

Current engine based solutions include;

- Replacement of traditional power consuming radiators by the Active Cooler where the Active Cooler uses the heat within the engine jacket water system to provide the power to operate the radiator and under typical conditions provide additional power for other uses,

- For larger capacity engines the incorporation of the Power Module as part of the cooling system where, through a simple connection to the existing jacket water line between the engine and the radiator, power can be generated as well as partial cooling of the jacket water. By partially cooling the jacket water the cooling load of the existing radiator will be reduced improving the efficiency of the cooling system and reducing fan power consumption.

- Both the Power+6500B and Power Module can utilise the available high temperature waste heat being rejected through the engine exhaust system, using an exhaust gas heat exchange to harvest the waste heat and transfer the thermal energy to a hot water circuit connected to the ORC's for the generation of electricity.

Wastewater/ Organic Waste Disposal Facilities using Anaerobic Digester Technology

The Power+6500B and Power Module can be utilised as the heat balance between a boiler and the Anaerobic Digester. Anaerobic Digesters require heat to operate efficiency and produce a biogas that is typically used as a fuel for a boiler to provide that heat which is fed to the digester as required. By incorporating an ORC as part of the process, the combination of the Anaerobic Digester and Biogas fuelled boiler can be operated efficiently with the ORC providing electrical power for the operation of the facility. The ORC provides a heat balance/ buffer so when heat is not required by the digester or the digester produces excess gas that is often flared, the excess heat is used to generate electricity thus eliminating energy waste and allowing the boiler to operate at optimum efficiency reducing operating and maintenance costs.

Waste Biomass/ Municipal Waste using Incineration or Pyrolysis Technology

ElectraTherm ORC systems are particularly suitable for using the variable waste heat from the Incineration/ Pyrolysis process for the generation of electricity and to also cool the exhaust gases prior to necessary environmental control systems. Typically the ORC's can provide all or partial power requirements for the operation of the facility and for larger facilities can provide additional power output for export to the grid.

Geothermal

Whilst it is known that there are geothermal resources available within the Pacific region the development of these resources has been restricted for a variety of reasons including the remoteness of the resource and lack of local power demand to support investment in geothermal power generating facilities.

Several ElectraTherm ORC's are installed on small geothermal systems where they have a dual purpose of generating electricity and cooling the geothermal fluid for other uses and/or reinjection into the aquifer.

The ORC can be installed as the principal power generator or as a bottoming plant to a larger capacity generator

providing energy efficiency by using the unused heat for further power generation. With the expected release of the off-grid capability towards the end of 2023, ElectraTherm will have the capability to utilize small/ remote geothermal resources for localised base load power generation.

Pohnpei Energy Efficiency Power Generation Project

Finally we provide an update of the installation of the Pohnpei ORC's being installed by our partners B:Power. This project was unfortunately delayed due to Corvid 19 restrictions that stopped the B:Power installation team from entering Pohnpei.

The project consists of three ElectraTherm Power+6500B+ ORC's that have been installed inside 40' shipping containers, that will recover waste heat from the diesel generators, both engine exhaust and jacket water. These units will significantly increase the efficiency of the existing diesel generators by producing about 200 kWe as well as replacing the existing engine coolers providing a further saving on the power drawn by the existing heat rejection.

B:Power have six personnel onsite, who together with local staff have now commenced the installation of the equipment. One of the big challenges has been the local climate conditions with excavation work being at times compared to swimming lessons. The containers and exhaust gas heat exchangers have been put in place with the installation of interconnecting pipework in progress. The advantage of containerisation of the ORC's, apart from protection against the weather conditions, has been reduced onsite installation time as key components where preassembled at B:Power's facility in Europe.

Full start-up of all units is scheduled for early 2023 when the equipment will be commissioned and officially handed over to the operators.

ElectraTherm look forward to the opportunity to continue our association with the Pacific Power Association and to support the Pacific Power Authorities with energy efficiency solutions for their engine-based power generation facilities and to provide alternative power generation opportunities for the future.

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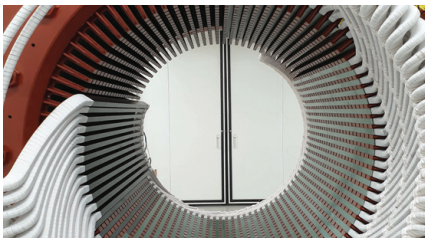

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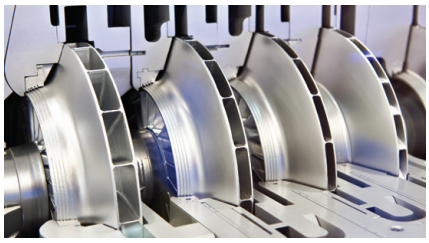

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Sustainable Energy Industry Association of the Pacific Islands -Achievements and Objectives

David Knight
Business Development Analyst Asia/Pacific – ElectraTherm Inc.

The Sustainable Energy Industry Association of the Pacific Islands (SEIAPI) was formed in 2010 with the mission to create an enabling environment for the growth of sustainable energy business entities and sustainable energy equipment and/or energy services in the Pacific Islands.

Based on SEIAPI's experience, there are key "components" that must integrate with each other and if one or more is missing or weak, there is reduced probability of a sound and viable industry.

SEIAPI has worked to be an effective industry association, to-date being managed by a voluntary executive committee and a part time administrative assistant.

SEIAPI Achievements

The focus of SEIAPI is to support its members, particularly in building the capacity of the nascent private-sector sustainable energy industry throughout the Pacific.

SEIAPI collaborated with the University of the South Pacific (USP) and in 2011, a Renewable Energy & Energy Efficiency Training Competency Standards Advisory Committee was formed. Over the next 12 months the committee developed five training competency standards to support the introduction of the certification/accreditation scheme.

SEIAPI's certification/accreditation program was launched in May 2012, and it was relaunched in 2014 as the Pacific Power Association (PPA)/SEIAPI certification/accreditation program.

The Pacific renewable energy industry needed such an initiative for two reasons:

I. To improve the quality of Pacific Island Country & Territories (PICT) installations by increasing the competencies of designers/installers; and
II. To ensure that the systems being installed by overseas and local companies through donors' funds were being installed by competent technicians.

To support the scheme, SEIAPI quickly developed four technical guidelines for solar photovoltaic (PV) systems that were released in 2012. These were: Design of Off Grid PV Systems; Installation of Off Grid PV Systems; Design of Grid Connected PV systems and Installation of Grid Connected PV systems.

To obtain accreditation a technician had to successfully complete a training course based on the training competency standards. The accredited installer had to design and install systems in accordance with the guidelines.

However, the voluntary scheme still has only a few accredited technicians because of the lack of suitable and ongoing training in the Pacific, partly due to the low profile of the scheme. Though several *ad hoc* courses have been provided by *Global Sustainable Energy Solutions Pty Ltd (GSES),* a Registered Training Organisation in Australia, and GSES continues to provide online and ad-hoc training courses in the Pacific, this is not a sustainable model for supporting the certification/accreditation effort. GSES has been working with SEIAPI to try to establish training courses being operated by in-country training centres within the Pacific countries.

An MOU with PPA in 2014 also led to accreditation being a joint effort with all technical guidelines being published as joint PPA/SEIAPI guidelines. (Note: The PPA and SEIAPI MOU is to collaborate on technical capacity building initiatives that benefited the members of PPA and SEIAPI.)

In April 2018, GSES, on behalf of SEIAPI, was successful in obtaining funding through the World Bank for the *Sustainable Energy Industry Development Project (SEIDP)* for the Pacific. This component of SEIDP was completed in August 2020 with the following results:

- 4 earlier technical guidelines were updated and are freely available on-line;
- 12 new technical guidelines were developed and are freely available on-line;
- 19 training unit standards were developed and approved by the Educational Quality and Assessment Programme (EQAP) for inclusion in the Pacific Register of Qualifications and Standards (PRQS); and
- 633 different people attended at least one of the thirty-two 4-day guideline workshops that were conducted in twelve countries.

GIZ/PPA License Agreement

In 2019, GIZ purchased a once off license agreement for the resource material for four of GSES face to face training courses. This agreement allows all Pacific based training centres free access to the resources after they sign a separate agreement with GSES that the material is for that training centre only. Agreements have been signed with Solomon Islands National University and College of Micronesia, Pohnpei to date.

SEIAPI has been promoting this to training centres around the Pacific but have identified the need to work with the countries to have the relevant training unit standards adopted in each specific country's education framework before they can offer the training.

USP Pacific TAFE Sustainable Energy Training Centre

In July 2022, GSES signed a partnership agreement with *The University of the South Pacific (USP) Pacific TAFE.* Under this agreement USP Pacific TAFE has commenced offering the following three online courses:

- Grid Connected PV Systems - Design and Install
- Stand Alone Power Systems (Off-Grid) -Design and Install
- Battery Storage Systems for Grid Connected PV System - Design and Install

The courses are similar to those GSES conduct in Australia and will allow those who successfully complete the course to be eligible to apply for their PPA/SEIAPI design accreditation (https://www.seiapi.com/seiapi-ppa-accreditation.) Mr Sandip Kumar will be the initial Tutor for the USP Pacific TAFE solar courses.

This partnership arrangement is the initial stage of a larger project establishing a new Sustainable Energy Training Centre at the USP Pacific TAFE Suva campus. SEIAPI is in discussions to secure funding for the centre. Also, SEIAPI is working with Fijian based companies and other stakeholders in planning the best method to conduct the practical session for the above courses before the new training centre is established.

SEIAPI is also working with other countries to identify potential trainers and training centres that can provide the practical training components of the courses in-country or to conduct the courses face to face. SEIAPI will work with these trainers/training centres to identify funding sources to provide the systems and testing equipment needed to support the practical training.

Though the training centre has started with the above courses to meet the current needs of the private industry and some of the power utilities, SEIAPI will be working with industry and other stakeholder to identify the other courses required to support the growth of the industry.

Course identified to date include:

- Operation and maintenance of both grid connect and off grid systems.
- Utility scale storage systems.
- Inspection of systems.
- Awareness course for various stakeholders.

These course will be developed and launched in the next 12 months.

SEIAPI's Current Objectives

SEIAPI's current objectives are:

- Support the establishment of the Sustainable Energy Training Centre at USP Pacific TAFE and identify how to establish either face to face courses or blended (online and practical) training within other countries.

- Develop the new courses that have already been identified, however, initiate discussions with industry and relevant stakeholders to identify what other training courses are a priority. This will include identifying the countries that do not have qualified electricians and hence basic electrical training courses may be required.

- Raise the profile of SEIAPI within the PICT's and work with the various in-country and regional stakeholders to develop a workplan on the specific needs in each country to increase the usage of sustainable energy products and services and how SEIAPI can support this.

- Work with the relevant in-country government departments, power utilities and where relevant donors to have the guidelines endorsed. The aim of the endorsements is to require that all solar systems (particularly those being funded through specific donor projects) are designed and installed in accordance with the technical guidelines.

- Work with PICT Governments to either have:

    - o them recognise the accreditation program with the outcome that they require all designers and installers of the systems to be accredited through the PPA/SEIAPI scheme or

    - o the relevant in-country regulator develops a "solar technicians license".

- Raise awareness to the relevant government departments/agencies of the international standards for individual PV system components. Also, to work with them to have these standards mandatory so that only components/equipment that have been tested and approved in accordance with the relevant standards are installed within the PV systems (and other RE technologies).

- Work with the relevant in-country education agency to adopt the training unit standards developed under SEIDP within the individual countries training frameworks.

- Liaise with members to determine the support they require from SEIAPI in terms of capacity building and in maintaining a sustainable RE industry.

To achieve these objectives the Executive Officer will undertake trips to the various PICT's over the next 12 months.

SEIAPI's Current Staffing

GSES has been providing secretariat services for SEIAPI since 2012. In 2018 GSES hired a Fijian national, Mr Sandip Kumar, to support GSES in providing the secretariat services for SEIAPI. However, Mr Kumar also works with the GSES training section and is an experienced trainer.

On 1st July 2022 Mr Geoff Stapleton stepped down from the Managing Director's position of GSES to take on the role of the first Executive Officer of SEIAPI. He will be working with the executive committee to undertake activities to achieve SEIAPI's objectives.

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29th Annual PPA Conference & Trade Exhibition 21-24 November 2022 Brisbane, Australia

Pacific Power Association

Introduction

This year's conference attracted a total of 166 delegates with 56 delegates representing 17 Active Utility members, 71 delegates from the 38 Allied Members, 11 spouses and 22 invited guests and development partners, government representatives and multilateral aid agencies and 6 conference committee members from the Secretariat.

Such was the interest in attending the conference that the 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. Cables Pte Limited
2. Camco Pacific Limited
3. Delstar NZ Limited
4. EDF Renewables
5. ESI Pacific Pty Limited
6. Essential Energy
7. Endeavour Energy
8. Flanders Electric of Australia
9. Generator Rental Services
10. HDF Energy Australia
11. ITP Renewables
12. Khan Advisory
13. KomaiHaltec Inc
14. Longi Australia
15. Pacific Engineering Projects
16. Pacific Power Solutions
17. Sino Soar Hybrid Technology

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 twenty-seven (27) trade booths and twenty-six (26) companies participated in the Trade Exhibition and one affiliate member, CIGRE.

The conference activities started with the CEOs meeting at 12pm and followed by the conference registration at 12.00pm on Sunday, November 20th at the Brisbane Convention and Exhibition Centre (BCEC). The PPA Secretariat acknowledges the huge effort put into the pre-conference preparation by Australia Department of Foreign Affairs and Trade (DAFT), Australian Infrastructure Financing Facility for the Pacific (AIFFP), Asian Development Bank (ADB), The World Bank, ROC Taiwan, Sulzer Australia and the University of New South Wales who also assisted.

Day 1 - Monday 21 November
Utility Board Directors' Workshop

The Utility Board of Directors had a two-day workshop which was facilitated by Mr. Janendra Prasad, Professor Ian MacGill and Mr. Edoardo Santagata of the University of New South Wales. where twenty-one (21) Board members from the different PPA Utilities participated. The following topics were covered during the two-day workshop;

1. Pacific Island Countries and Territories Electricity Boards Challenges and Opportunities by Dr. Iain MacGill
2. Sustainable Governance in the Utilities Sector by Dr. Maria Balabat
3. Facilitation of High Penetration of Variable Renewable Energy in the Pacific Island Country Utility Grids by Mr. Janendra Prasad
4. Engaging Persons with Disabilities in the Pacific Energy Sector: An Inclusive Approach towards Achieving SDGs by Ms. Reema Alpana
5. SDGs, NDCs and the Electricity Sector Future is Electric by Dr. Atul Raturi
6. Tariffs and DER by Dr. Anna Bruce
7. Decarbonizing the Pacific by Dr. Edoardo Santagata
8. Development of the Office of Pacific Energy Regulators' Alliance by Mr. Abraham Simpson

Figure 1: Utility Board Directors' Workshop Day 1 in progress

Figure 2: Utility Board Directors' Workshop Day 2 in progress

CEOs' Retreat

The CEOs retreat on Monday was conducted at the Brisbane Convention and Exhibition Centre where sixteen (16) CEO's and representatives from the different PPA Utilities participated in the full day event. This gave all the CEOs' an opportunity to discuss, following presentations regarding, Post COVID-19 recovery and rising fuel prices – lessons learned and assistance needed moving forward, sharing donor initiatives and project pipeline relevant to utilities and aligning priorities – what utilities want from donors. These discussions were conducted amongst utility CEOs and the Development Partners.

Figure 3: CEO's meeting in progress

Allied Members Meeting

The formal Allied Members' meeting was held after the afternoon tea. The Allied Members' Chairman, Trevor Lord, together with the Acting Executive Director of PPA conducted the meeting at the Brisbane Convention and Exhibition Center.

Figure 4: Allied Members' formal meeting in progress

Delegates were treated to a welcome cocktail in the evening at Brisbane Convention and Exhibition Centre, kindly sponsored by Australia Department of Foreign Affairs and Trade (DFAT) and Australian Infrastructure Financing Facility for the Pacific (AIFFP).

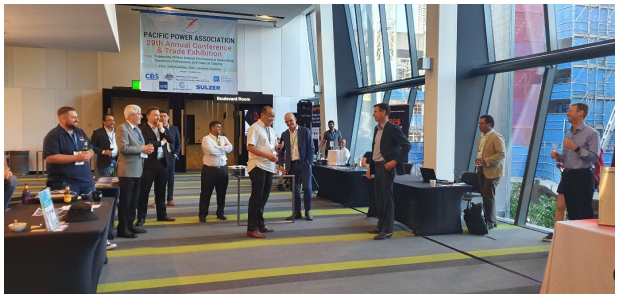

Figure 5: Welcome Cocktail at the Brisbane Convention and Exhibition Centre sponsored by Australia Department of Foreign Affairs and Trade (DFAT) and Australian Infrastructure Financing Facility for the Pacific (AIFFP)

Day 2 Tuesday 22 November

The conference was officially opened by the Chief Guest Mr. Jamie Isbister First Assistant Secretary Australia Department of Foreign Affairs and Trade (DFAT), with the keynote address delivered by Mr. Clay Koplin, the Chief Executive Officer of Cordova Electric Cooperative.

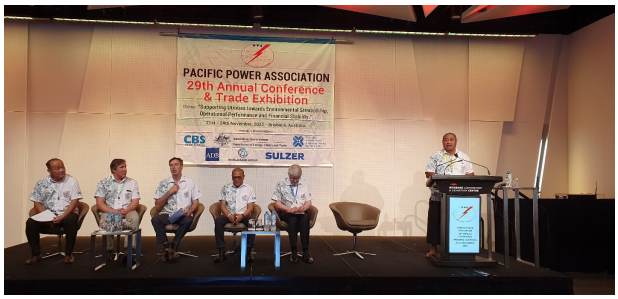

Figure 6: Official Opening of the 29th Annual PPA Conference

Figure 7: From Left-Right: Gordon Chang, Acting ED PPA, Clay Koplin, Keynote Speaker, Jamie Isbister, Chief Guest, Hasmukh Patel, PPA Chairman, Trevor Lord, PPA Allied Members Chairman, Mafalu Lotolua, CEO Tuvalu Electricity Corporation and Keiren Jacobs of Essential Energy

Figure 8: Delegates attending the official opening of the PPA 29th Annual Conference & Trade Exhibition

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

Session 1: Presentations
Chair: Mr. Hasmukh Patel, CEO, Energy Fiji Limited

Figure 9: Session 1 presenters and Chair of the Session Mr. Hasmukh Patel, CEO, Energy Fiji Limited

1030-1100 - "SEIAPI Capacity Building Achievements & Objectives", Mr. Geoff Stapleton,
Sustainable Energy Industry Association of Pacific Islands (SEIAPI) & Global Sustainable Energy Solutions
1100-1130 - "Transforming Island Development through Electrification and Sustainability", Mr.
Paul Makumbe, Camco Energy
1130-1200 - "Use of Organic Rankine Cycle Technology for the Generation of Renewable Energy from Primary and Waste- Heat Resources", Mr. David Knight, ElectraTherm
Q&A

Figure 10: Mr. Geoff Stapleton of Global Sustainable Energy

Figure 11: Mr. Paul Makumbe of Camco Energy

Figure 12: Mr. David Knight of ElectraTherm

Session 2: Presentations
Chair: Mr. Mafalu Lotolua, GM, Tuvalu Electricity Corporation

Figure 13: Session 2 presenters and Chair of the Session, Mr. Mafalu Lotolua, GM, Tuvalu Electricity Corporation

1300-1330 - "Operational Performance & Financial Sustainability Amidst COVID-19", Mr. Hasmukh Patel, Energy Fiji Limited
1330-1400 - "Open Source-Data ad Tools for Assessing the Renewable Energy Potential of the Pacific Islands

Countries & Territories", Dr. Iain MacGill, University of New South Wales
1400-1430 - "Appropriate Cable Fault Location for the Pacific Islands Networks", Mr. Trevor Lord, AVO New Zealand Limited
1430-1500 – "Island Nation Enhances System Reliability with Smart Devices" Mr. Zunash Ijaz, S&C

Electric Company
Q&A

Figure 14: Mr. Hasmukh Patel of Energy Fiji Limited

Figure 15: Dr. Iain MacGill of University of New South Wales

Figure 16: Mr. Trevor Lord of AVO New Zealand Ltd

Figure 17: Mr. Zunash Ijaz of S&C Electric Company

PPA Board Meeting

The PPA Board meeting which is open to all members began at 3:55pm and concluded at 4:45pm.

Figure 18: Board Members meeting in progress at the Brisbane Convention and Exhibition Centre

Engineers Workshop – Benchmarking
The Engineers Workshop conducted a four-day training facilitated by Mr. Abraham Simpson, Project Implementation Officer, through the Pacific Power Association (PPA) World Bank Project, Sustainable Energy Industry Development Project (SEIDP) at the Brisbane Convention and Exhibition Centre. The following topics covered are as follows;

1.Benchmarking and Managing for Performance
2.Benchmarking Financial Indicators
3.Benchmarking Customer Perspective Indicators
4.Benchmarking Process or Operational Perspective Indicators
5.Benchmarking Learning and Growth Perspective Indicators
6.Benchmarking Strategic Planning
7.Notes and Exercise on SAIFI and SAIDI Indicators

Figure 19: Engineers Workshop – Benchmarking Training

Opening of the Trade Exhibition

The evening saw the opening of the Trade Exhibition with the cocktail kindly sponsored by Australia Department of Foreign Affairs and Trade (DAFT) and Australian Infrastructure Financing Facility for the Pacific (AIFFP).

Figure 20: PPA Chairman and PPA Allied Members Chairman opened the Trade Exhibition

The Trade Exhibition was officially opened by the PPA's Chairman, Mr. Hasmukh Patel and PPA's Allied Members Chairman, Mr. Trevor Lord.

The following twenty-six (26) Allied members participated and the one of the PPA' Affiliate members, CIGRE, in the Trade Exhibition:

1. S&C Electric Company
2. The Energy Network
3. ElectraTherm
4. Transnet
5. EMACS
6. AVO NZ Limited
7. ITP Renewables
8. CIGRE
9. Hitachi Energy
10. Delstar
11. Selectronic Australia Pty Ltd
12. LONGI Australia
13. Cummins South Pacific
14. AR Industrial
15. Carpenters Fiji
16. Aggreko NZ Limited
17. CBS Power Solutions
18. Pacific Power Solutions
19. B&R Enclosures
20. ComAp Limited
21. Man Energy Solutions
22. HDF Energy
23. Power Protection Industries
24. Flanders Electric of Australia
25. Arthur D Riley
26. Sulzer
27. NOJA Power

Opening of the Trade Exhibition

The evening saw the opening of the Trade Exhibition with the cocktail kindly sponsored by Australia Department of Foreign Affairs and Trade (DAFT) and Australian Infrastructure Financing Facility for the Pacific (AIFFP).

Figure 21: Zunash Ijaz and Tomo Reed of S&C Electric Company

Figure 22: Mr. Kevin Harold and Lindsay Taylor

Figure 23: Mala Galani and David Knight of Electra Therm

Figure 22: Mr. Kevin Harold and Lindsay Taylor

Figure 25: Michael McGuiness, Scott Byers and Gary Lomax of EMACS

Figure 26: Trevor Lord and Mark Leach of AVO NZ Ltd with Tiaon

Figure 27: Julian Milthorpe of ITP Renewables

Figure 28: Clay Koplin Keynote Speaker and Ken Ash of CIGRE

Figure 29: John Morgan of Hitachi Energy Utilities

Figure 30: Gaurav Khire from Delstar and delegates of Kosrae Authority

Figure 31: Christine Scott, Rod Scott and Andrew Simpson of Selectronic

Figure 32: Andres Novoa, Brett Robinson and Kaili Shen of LONGI

Figure 33: Scott Lomate and Ralf Koegler of Cummins

Figure 34: Martin Bolanos of AR Industrial

Figure 35: Robert Salafia and Vishal Kumar of Aggreko

Figure 36: Ravitesh Kumar, Reggie Prasad and Irene Prasad of CBS Power Solutions

Figure 37: Aimee Reardon of Pacific Power Solutions

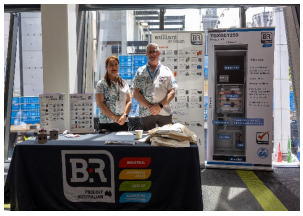

Figure 38: Cindy Zhang and Mark Gosper of B&R Enclosures

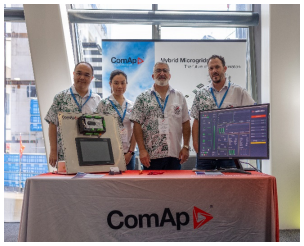

Figure 39: Dennis Chung, Wendy Truong, Les Cutajar and Tristen Place of ComAp Ltd

Figure 40: Lachlan Colquhoun and Tony Hristovski of MAN Energy

Figure 41: Bryan Dumail and Ildo Agnetti of HDF Energy

Figure 42: Justin Harris and Justin Hamilton of Power Protection Industries

Figure 43: Brad Raphael and Owen Uebel of Flanders Electric of Australia

Figure 44: Peter MacKenzie and Tanguy Kerzreho of UNELCO, Vanuatu

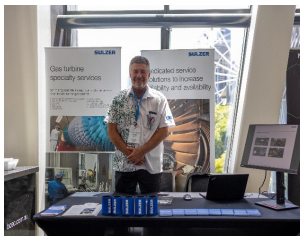

Figure 45: Boris Krull of Sulzer

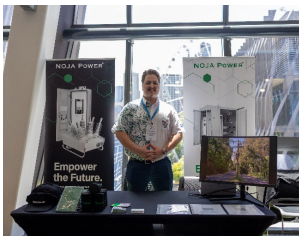

Figure 46: Norton Sutherland of NOJA Power

Day 3: Speed Networking Day Wednesday 23 November

Speed Networking day was divided into 3 sessions from the morning and in the evening was the closing of the trade exhibition cocktail and conference dinner.

Figure 47: Speed Networking Session

Figure 48: Speed Networking Session Continues

Figure 49: Conference Dinner

Figure 50: Conference Dinner continues

Day 4 Thursday 24 November
Session 8: Presentations
Chair: Mr. Iese Toimoana, GM, Electric Power Corporation, Samoa

0830-0900 - "Transformer Oil Dielectric – How to manage Transformers Simply & Cost Effectively", Mr. Mark Leach, AVO NZ Limited

0900-0930 - "High Penetration Variable Renewable Energy in the Pacific Island Country Utility Grids", Mr. Janendra Prasad, University of New South Wales

0930-1000 - "Open CEM for PIC: Concept Design for a Capacity Expansion Model of Future Electric Grids", Dr. Jose Zapata, ITP Renewables

Q & A

Figure 51: Jose Zapata, Janendra Prasad, Mark Leach and Chair of the Session Iese Toimoana

Figure 52: Mr. Mark Leach of AVO New Zealand Ltd

Figure 53: Mr. Janendra Prasad of University of New South Wales

Figure 54: Dr. Jose Zapata of ITP Renewables

Session 9: Presentations
Chair: Mr. Gary Camacho, CEO, Commonwealth Utilities Corporation, Saipan

1030-1100 - "5kV Insulation Testing – A Review of the Basics to Ensure Best Results", Mr. Trevor Lord, AVO NZ Limited

1100-1130 - "Scenario-based Modelling for E-Mobility in the Pacific", Dr. Edoardo Santagata, University of New South Wales

1130-1200 - "Hydrogen, the Fuel of the 21st Century for the Pacific Islands", Mr. Ildo Agnetti, HDF Energy Q&A

Figure 55: Ildo Agnetti, Edoardo Santagata, Trevor Lord and Chair of the Session Gary Camacho

Figure 56: Mr. Trevor Lord of AVO NZ Limited

Figure 57: Dr. Edoardo Santagata of University of New South Wales

Figure 58: Mr. Ildo Agnetti of HDF Energy

Session 10: Presentations
Chair: Mr. Jack Chong-Gum, CEO, Marshalls Energy Company, Marshall Islands

1300-1330 - "Environment Stewardship – Fiji Renewable Energy Plan Support & Sustainability", Mr. Hasmukh Patel, Energy Fiji Limited
1330-1400 - "Lithium-Ion Battery Testing & Performance", Ms. Julia McDonald, ITP Renewables
1400-1430 - "ROTA Island Feasibility Study", Mr. Nicholas Loga, ITP Renewables
1430-1500 - "Biofuels & Other CO2 Reduction Initiatives for Diesel Generators", Mr. Lachlan Colquhuon, MAN Energy Q&A

Figure 59: Mr. Hasmukh Patel of Energy Fiji Limited

Figure 60: Ms. Julia McDonald of ITP Renewables

Figure 61: Mr. Nicholas Logan of ITP Renewables

Figure 62: Mr. Lachlan Colquhuon of MAN Energy

Annual General Meeting

The Annual General Meeting was held at the Brisbane Convention and Exhibition Centre.


Figure 63: Annual General Meeting in progress

At the meeting the Acting Executive Director provided a summary of the resolutions from the Board meeting held on Tuesday. The Board members endorsed the election of Mr. Chris Pye as the PPA Allied Members Chairman and Mr. Ildo Agnetti as the PPA Alternate Allied members Chairman. During the meeting a committee was formed and confirmed to provide the PPA Board and Secretariat the theme for the 2023 Annual Conference and Trade Exhibition. The committee consists of Hasmukh Patel of Energy Fiji Limited, Mafalu Lotolua of Tuvalu Electricity Corporation, Trevor Lord of AVO NZ Limited and Ildo Agnetti of HDF Energy.

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

1. Australia Department of Foreign Affairs and Trade
2. Australian Infrastructure Financing Facility for the Pacific
3. Republic of China – Taiwan
4. Asian Development Bank
5. The World Bank
6. CBS Power Solutions
7. Sulzer

The PPA secretariat would like to commend and acknowledge all the sponsors of the event, all its Allied and Active members and also its Donor partners and Affiliate members for a 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 30th Annual Conference and Trade Exhibition in Saipan, Northern Mariana Islands in 2023.

Completion ceremony of the largest battery energy storage systems (29 MWh) in the South Pacific in Tonga

Adrien Bock
Chief Operating Officer – Asia Pacific – Akuo energy

The official opening of Tonga's first ever largescale Battery Energy Storage Systems (BESS) was held on October 25th by the Guest of Honor for the event, Honorable Huákavameiliku – Prime Minister for the Kingdom of Tonga. The two Battery Energy Storage systems are deliverables of the Tonga Renewable Energy Project (TREP) located in two separate locations. The first BESS, which is for grid stabilization, is located at the Popua Power Station and the second BESS, which is for load shifting, is located in Matatoa, Tofoa.

Distinguished guests for this event included the Chairman for the Common Utilities Board of Directors, Mr. Tapu Panuve, a high-level delegation from the Asian Development Bank led by ADB Director General for Pacific Department, Ms. Leah Gutierrez who delivered the remarks on behalf of the Asian Development Bank, and Mr., Aaron Batten, Regional Director of Asian Development Bank, Mr. Adrien BOCK, Chief Operating Officer for Akuo, Asia Pacific who delivered remarks on behalf of Akuo, as well as Chief Executive Officer for Ministry of Energy, Information, Disaster Management, Environment, Climate change & Communications Mr. Paula Maú, who delivered the Vote of Thanks on behalf of the Government of Tonga.

A consistent theme highlighted throughout the event was the importance of perseverance & collaboration throughout the COVID-19 pandemic, of all involved stakeholders towards planning, financing and implementation of this vital technological enabling component, towards Tonga's Nationally Determined contributions of achieving its 70% Renewable Energy generation target by end of year 2025. This project is worth a total of $16.7 million USD jointly funded by the Asian Development Bank, Green Climate Fund, and the Government of Australia, and implemented by Tonga Power Limited with assistance from the Government of Tonga. The contractor for the project was Akuo.

This project is a novelty in terms of technology for the Kingdom of Tonga, its main functions are a vital component and an enabling technology that is essential for the energy sector, which allows absorbing higher generation from renewable energy sources. The technology helps stabilize the electricity grid for intermittent generation of renewable energy and also operates as a load shifting to store the solar generation during the day to be utilized during high customer load demand hours in Tongatapu. This project is an essential step to allow further renewable energy to be connected to the electricity grid.
The successful execution and delivery of these 2 complementary BESS projects in Tonga through the pandemic is the fruit of a trustful cooperation between ADB, TPL and Akuo. Each party has proven to be open, forward-looking and able to find solutions to install and commission the largest battery energy storage system in the South Pacific, despite a close of borders for more than 2 years.

Two further hybrid solar and Battery Energy storage system projects, also part of the Tonga Renewable Energy Project, are close to completion in the outer islands of Vavaú & Éua. Both are aimed to be completed by November 2022.

Tonga Power Limited continues to work collaboratively with Donor Partners and the Government of Tonga towards effective implementation of Renewable Energy projects towards achieving our National Determined Contribution of 70% Electricity generation by end of year 2025.

Akuo is an independent global renewable energy producer and developer. The company is present across the entire value chain, including project development, financing, construction, and operation. Akuo had invested more than EUR 2.8 billion as of end 2021 and currently has a total capacity of 1.4 GW in operation or under construction and 10 GW of projects under development. With more than 450 employees, the Group, headquartered in Paris, France, has a presence in 15 countries around the world. In 2014, Akuo started its industrial branch to provide innovative solutions to clients looking for tier-one storage solutions. With almost 100 MWh of installed capacity, Akuo provides experienced and exhaustive support to its clients on the design, construction, and operation of battery energy storage systems.

Official ribbon-cutting ceremony of the two Battery Energy Storage Systems, part of Tonga Renewable Energy Project

Load-Shifting battery: 23MWh/7MW

The Palau Public Utilities Corporation (PPUC) remains committed in achieving Palau's target of 45% renewable as contemplated under the Nationally Determined Contributions (NDCs) declared in 2015. At nearly 97 – 98% of energy generation deriving from diesel, PPUC consumes approximately 6,000,000 US Gallons of diesel per year. Despite the unanticipated challenges of COVID-19, PPUC continues to engage in efforts to reduce its dependency on fossil fuel and integrate more renewable energy. Presently, PPUC and the ROP is on the verge of launching Palau's first Independent Power Producer (IPP) focused on the Koror – Babeldaob grid to raise our renewable energy generation levels from the current 3% to a minimum of 20%. This partnership between the PPUC and Solar Pacific Energy Corporation (SPEC) aims to construct a 13.2-Megawatt (MW) solar PV facility with a 10.2 MW energy storage system to generate a minimum of 20 Gigawatt hours (gWh) per annum for twenty (20) years with the possibility of an extension of an additional five (5) years. The project is now approximately 50% complete with an anticipated completion date for April 2023.

On September 8, 2022, the Republic of Palau with the Japan International Cooperation Agency (JICA), executed the Grant Agreement for a new project to improve the transmission network for the Koror – Babeldoab Grid. The Project titled, "The Project for the Development of the Power Transmission Network", aims to upgrade three of the main substations of the grid and install a secondary transmission line at the east side of the island to improve system reliability. PPUC will work with JICA to develop the bidding documents targeted to be advertised later this year or early next year in accordance to the JICA procurement guidelines.

PPUC also endeavors to implement projects to improve the resiliency of its island states that operate separately from the main grid by introducing and implementing renewable energy initiatives. On September 20, 2022, PPUC held a ribbon cutting ceremony of this facility with the Kayangel State Government to official signify the completion of the Kayangel Solar PV plant that involved the installation of 65 Kilowatt (kW) solar PV with 165 kwh of battery storage. This project was made possible with kind support of the Ministry of Foreign Affairs and Trade (MFAT) of New Zealand. Currently, Kayangel operates with 40 – 45% renewable energy penetration and has resulted in a reduction of monthly fuel consumption by at least 2,000 US Gallons/month. It should also be noted, that since the commissioning of this facility, fuel deliveries to Kayangel have been reduced from 3 trips/year to now 1 trip/year. Kayangel is the first state in the Republic of Palau to achieve 45% renewable energy electrification.

Palau Public Utilities Corporation

Palau Public Utilities Corporation

The Palau Public Utilities Corporation (PPUC) remains committed in achieving Palau's target of 45% renewable as contemplated under the Nationally Determined Contributions (NDCs) declared in 2015. At nearly 94% of energy generation deriving from diesel, PPUC

Aerial view of solar farm in Ngatpang consumes approximately 6,000,000 US gallons of diesel per year. Despite the unanticipated challenges of COVID-19, PPUC continues to engage in efforts to reduce its dependency on fossil fuel and integrate more renewable energy. Presently, PPUC and the ROP is on the verge of launching Palau's first Independent Power Producer (IPP) focused on the Koror – Babeldaob grid to raise our renewable energy generation levels from the current 6% to a minimum of 20%. This partnership between the PPUC and Solar Pacific Energy Corporation (SPEC) aims to construct a 13.2-Megawatt (MW) solar PV facility with a 10.2 MW energy storage system to generate a minimum of 20 Gigawatt hours (GWh) per annum for twenty (20) years with the possibility of an extension of an additional five (5) years. The project is now more than 50% complete with an anticipated completion date for April 2023.

The Project is made possible through the support of the Australian Government.

Aerial view of solar farm in Ngatpang

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PPA's Newly Appointed Allied Members Chairman

Chris Pye
Global Segment Manager Hybrid Microgrids – ComAp Limited

Chris Pye is the Global Segment Manager, Hybrid Microgrids at ComAp. He has been with ComAp for 8 years and in 2022 relocated from Australia to Prague. He has a wide range of skills with both technical and business-related qualifications including degrees in Electrical Engineering, Applied Science (Mathematics) and an MBA completed in 2021. Chris' goal is to facilitate change and drive real outcomes when it comes to making power both sustainable and globally accessible. His role at ComAp supports this ambition as the technology and services offered by ComAp directly realise these outcomes by delivering improvements to reliability, quality of supply, cost and environmental footprint. He is passionate when it comes to his work in this area, as it provides a conduit to utilise his knowledge and skills to provide tangible outcomes to vulnerable stakeholders and future generations alike. Having access to reliable and cost-effective power has been and will continue to be a key factor to support economic growth, improve standards of living, as well as overall health outcomes and it is Chris' purpose to ensure the technology that can maintain these principles, whilst also improving the overall sustainability of the power generation market, is available to all.

PPA's Newly Appointed Alternate Allied Members Chairman

Ildo Agnetti
Project and Business Developer – HDF Energy

Ildo Agnetti is the newly elected alternate chairman for Allied Members and works for HDF Energy as a business and project developer. Ildo has a master's degree in electromechanical engineering and has a deep understanding of the power generation industry. Over the last ten years, Ildo has been involved in the development and execution of various large scale energy projects around the world and has worked on exciting emerging technologies such as Solar thermal, battery energy storage and most recently hydrogen. Ildo is committed to fight climate change by deploying renewable energy projects across the pacific, lowering the cost of electricity and creating local community benefit models. He is keen to engage with allied members to better understand their needs, expectations and strengthen the PPA community.

Welcome!

to the New Allied Members and Members Re-Joining the Secretariat

Eleven (11) new Companies have joined and one (1) has re-joined PPA as Allied Members since our last PPA Magazine.

The new Allied Members are;
CAMCO PACIFIC LIMITED: Camco Pacific Limited is based in Auckland, New Zealand. Their primary activity is climate and impact fund manager.

EDF RENEWABLES: EDF Renewables is based in Sydney, Australia. Their primary activity is electricity generation.

ENDEAVOUR ENERGY: Endeavour Energy is based in New South Wales, Australia. Their primary activity is building, maintaining and operating an electricity network.

ESI ASIA PACIFIC PTY LIMITED: ESI Asia Pacific Pty Limited is based in Brisbane, Australia. Their primary activity is long duration energy storage systems.

ESSENTIAL ENERGY: Essential Energy is based in New South Wales, Australia. Their primary activity is electricity distributor.

FLANDERS ELECTRIC OF AUSTRALIA: Flanders Electric of Australia is based in Queensland, Australia. Their primary activity is repair and refurbishment of rotating electrical equipment.

HDF ENERGY: HDF Energy is based in New South Wales, Australia. Their primary activity is independent power producer in renewable energy.

ITP RENEWABLES: ITP Renewables is based in Canberra, Australia. Their primary activity is renewable energy consulting, system design.

PACIFIC ENERGINEERING PROJECTS: Pacific Engineering Projects is based in Auckland, New Zealand. Their primary activity is design and build contractor.

PACIFIC POWER SOLUTIONS: Pacific Power Solutions is based in Queensland, Australia. Their primary activity is power generation maintenance and repairs.

SINO SOAR HYBRID TECHNOLOGY CO. LIMITED: Sino Soar Hybrid Technology Co. Limited is based in Beijing, China. Their primary activity is renewable energy solution provider.

The re-joined member is:
DELSTAR NEW ZEALAND LIMITED: Delstar New Zealand Limited is based in Auckland, New Zealand. Their primary activity is electrical suppliers to power utilities and generating companies.

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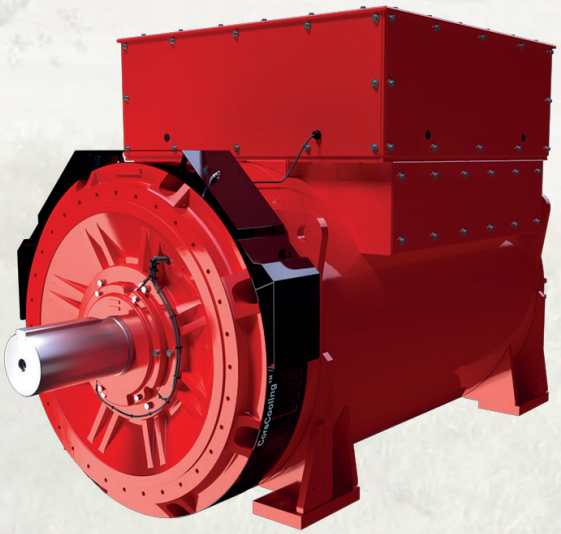

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