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Newsletter of the Sustainable Energy Industry Association of the Pacific Islands Issue 1 (March) 2025

REnew Pacific Project gets Officially launched

Article by: SEIAPI Secretariat

REnew Pacific is the Australian Government's new AU$75 million investment in off-grid renewable energy solutions to rural and remote communities across the Pacific and Timor-Leste.

These partnerships provide co-funding of up to AU$1 million to organisations developing innovative renewable energy solutions that increase access to affordable, reliable, off-grid electricity. The goal is to improve livelihoods, climate resilience, and economic opportunities for those who cannot connect to an electricity grid. REnew Pacific is a five-year program and Palladium is an implementing partner.

Solomon Islands hosted REnew Pacific's regional launch event on 6 March, 2025

The REnew Pacific program is now accepting grant proposals for locally-led projects that will improve essential services, including lighting, water access, agriculture, healthcare, food security, education, and communication for off-grid communities with a particular focus on projects that improve energy access for women, people with disabilities and those from diverse groups.

Interested businesses, NGOs, community organisations, academic institutions and government agencies from Overseas Development Assistance (ODA)-eligible countries in the Pacific and Timor-Leste are invited to submit a concept note for their off-grid renewable energy solution by 28 April 2025.

Please visit the link below: https://renewpacific.com.au/call-for-proposals/

REnew Pacific Launch: Group photo

Source: https://renewpacific.com.au/solomon-islands-hosts-renew-pacifics-regional-launch-event/

First REnew Pacific Project awarded to Superfly Ltd (SEIAPI Member)

Article by: SEIAPI Secretariat

REnew Pacific launched its first project on 6th March 2025 in Solomon Islands, which is set to benefit over 81,000 people in the country by providing clean, renewable energy to power healthcare, education and essential services.

Led by Superfly Limited, a Solomon Islands-based solar energy company and SEIAPI member, the two-year project is based on installation of a solar PV hybrid system at Atoifi Adventist Hospital in Solomon Islands' Eastern Malaita province, a key healthcare facility serving 80,000 people.

The project will provide reliable energy for critical medical services, including emergency care and maternity, and power the hospital's nursing school, which trains over half of the country's nurses.

Goldie College in Western Province and Sir Dudley Tuti College in Isabel Province will also receive new solar PV hybrid systems, enabling extended learning hours, safer campuses and better supervision for over 1,400 students and staff.

Superfly Ltd Director, Gavin Pereira, highlighted that the project represented a transformative shift for Atoifi Adventist Hospital, Goldie College and Sir Dudley Tuti College, delivering sustainable, 24/7 power while significantly reducing diesel dependence.

"Through this REnew Pacific project, we're not just installing solar systems, we're building long-term energy resilience, lowering operational costs and improving essential services for thousands of people in remote Solomon Islands communities."

Through REnew Pacific, the Australian Government is investing $1.3million in this project, which will also contribute to Solomon Islands' national renewable energy, climate change and development ambitions.

Australia's High Commissioner to Solomon Islands, Mr Rod Hilton, with Superfly partners
Source: https://www.aiffp.gov.au/news/first-renew-pacific-project-benefit-81000-remote-solomon-islands-communities

DT Global to manage Pacific Australia Skills Platform

A new initiative, ''the Pacific Australia Skills Platform'' is set to take its place, promising a fresh approach to vocational training and workforce development. This would see the conclusion of Australia Pacific Training Coalition (APTC) operations. APTC is Australia's largest Technical and Vocational Education and Training (TVET) program in the Pacific and Timor-Leste.

DT Global Asia-Pacific has been selected as the service provider for the Department of Foreign Affairs and Trade's Pacific Australia Skills Platform (PASP). This five-year contract aims to enhance skills training across the Pacific and Timor-Leste and make skills systems more inclusive and responsive to the evolving needs of local and regional labour markets.

This project will foster collaboration and cooperation between national and regional education institutions, promoting authentic partnerships and scaling new approaches. It will create stronger connections between the Pacific, Timorese, and Australian skills development systems. PASP is also designed to be flexible, allowing it to adapt to evolving skills needs as training providers become ready and investments grow.

First Utility-Scale BESS in Tuvalu & Solar Expansion in Funafuti & three Outer Islands

Article By: CBS Power Solutions (Fiji)

FUNAFUTI 3MW/3.35MWH BESS AT TEC POWERSTATION

In the pursuit of achieving Renewable Energy (RE) targets while enhancing grid stability, the Tuvalu government launched its first utility-scale battery energy storage system (BESS) in Funafuti, and expanded solar arrays in Funafuti and the outer islands of Nui, Nukufetau and Nukulaelae. The Asian Development Bank (ADB), in partnership with the Tuvalu government, provided the financial resources necessary for the project's implementation from inception to completion.

CBS is honored to have been part of the system design, supply, installation, and commissioning as the EPC contractor under the supervision of the Tuvalu Electricity Corporation (TEC), and ADB consultant, the Elemental Group. The project included installations at TPCC Hall, Tulakiga Hall at QEII Park, the Airport Terminal building, and the outer islands.

On March 1, 2025, the TEC BESS was officially commissioned and brought online, providing essential support to the existing grid. Representatives from the Tuvalu government, ADB, TEC, Elemental, CBS and local Kaupule attended the commissioning ceremony, marking the successful completion of the project.

In the outer islands, each system was commissioned after pre-commissioning tests due to the remoteness of each location. The local Fale Kaupule in each island were present for the commissioning event as the client representatives.

The scope of work undertaken demonstrates CBS Power Solutions' commitment to enhancing energy security and sustainability across the islands. While this project spans four key Islands: Nukulaelae, Nukufetau, Nui, and Funafuti, each site presented unique requirements and challenges. A highlight of the key achievements at each Island is as follows:

Firstly, Nukulaelae: CBS successfully expanded the PV system to a total capacity of 96.69kWp by installing a 44.8 kWp ground-mounted PV system inland. This was accompanied by the construction of a new diesel powerhouse, upgrades to controls and communications, and the installation of the first distribution pillar.

Secondly, Nukufetau: The PV system was enhanced to an overall capacity of 160.04kWp, with the addition of a 78.4kWp ground-mounted PV system within the lagoon. CBS also upgraded controls, communications, and the first distribution pillar.

Thirdly, Nui: The total PV capacity was increased to 172.08kWp with the installation of a 100.8kWp ground-mounted PV system. This

included upgrades to controls and the first distribution pillar.
These expansions have significantly bolstered renewable energy generation and grid stability across the three sites.
Lastly, at Funafuti, the largest and most complex site of the project, CBS Power Solutions successfully installed 500 kWp of solar PV arrays across three key building rooftops: TPCC, Tulakiga Hall, and Airport Terminal Services. Complementing this, CBS deployed a Battery Energy Storage System (BESS) with a capacity of 3.0 MW / 3.35 MWh at the power station, integrated with its RMU and transformer.
Additionally, CBS integrated the BESS and PV systems with the existing 3 x 600 kW Medium Speed Daihatsu Diesel Generators, enabling fully automated operation. As part of this effort, CBS upgraded the entire power station's controls and SCADA system, streamlining operations and significantly reducing the operational burden on station operators by eliminating the need for manual management of diesel generators. This integration has resulted in a more efficient, reliable, and sustainable power system.
This initiative is part of a series of projects aimed at supporting Tuvalu's transition towards 100% renewable energy sources, paving the way for a more sustainable future.

NUKUFETAU LAGOON SOLAR ARRAY

QEII PARK SOLAR ARRAYS

COMAP HMI DISPLAY AT TEC POWERHOUSE

COMMISSIONING SUCCESS

Aitape Solar Power Plant for PNG

Article By: Sandip Kumar

Through Australian government support, PNG power has completed a new solar power plant in Aitape, West Sepik. The Aitape solar power plant took around 18 months to design and build, costing K18 Million. The solar plant comprises 784kW$_P$ solar PV array and 1MWh Battery storage to store energy generated during the day to supply power at night. The system will benefit the households connected to the PNG Power Ltd's grid in Aitape. There are

around 500 customers connected to the grid in Aitape comprising households, businesses, schools, health facilities and government buildings.

Aitape Solar Power Plant in PNG
Source: Australian High Commission Papua New Guinea Facebook page

Commercial Victron Hybrid Solar System for Out of the Blue Resort, Fiji

Article By: Solar Fiji

Solar Fiji successfully designed and installed a Victron Energy hybrid solar system for Out of the Blue Resort, an eco-conscious beachfront property in Fiji. This innovative system provides the resort with a reliable and efficient renewable energy solution, reducing its dependence on traditional diesel generators while ensuring a continuous power supply for guests and operations.

The system features high-performance solar panels, advanced lithium battery storage, and an intelligent Victron Energy power management system. This combination allows for seamless integration of solar energy, ensuring maximum efficiency by prioritizing solar power usage and only utilizing the backup generator when necessary. By leveraging this technology, the resort benefits from lower operational costs and reduced carbon emissions, aligning with its commitment to sustainability.

Operating in a remote location presents unique energy challenges, but with Solar Fiji's engagement, the resort now enjoys a stable, self-sufficient power system that enhances guest experiences and supports eco-friendly tourism. The hybrid setup ensures energy resilience, especially during peak demand periods or adverse weather conditions, guaranteeing an uninterrupted power supply at all times.

By investing in sustainable energy, Out of the Blue Resort sets a strong example for other tourism operators looking to reduce their environmental impact while benefiting from long-term energy savings.

https://solarfiji.org/commercial-victron-hybrid-solar-system-for-out-of-the-blue-resort-fiji/

SEIAPI Conducts Standards Webinars

Article By: SEIAPI Secretariat

As a build up upon the generic standards webinar held in June 2024 on Solar standards, SEIAPI has commenced hosting a webinar series for its members and associates covering Australia & New Zealand standards relevant to solar installations.

Group photo of EFL inspectors and SEIAPI representatives (July 2024)

The first webinar series (AS/NZS 5033 Webinar Series 1) was conducted online on 6th February with around 50 participants joining online via ZOOM whilst the 2nd webinar series (AS/NZS 5033 Webinar Series 2) was conducted online on 12th March with around 40 people joining (one hour sessions). The first and 2nd webinar series covered how to correctly interpret and apply AS/NZS 5033 to solar installations. The webinar series was conducted by Mr Geoff Stapleton. Geoff has begun covering the relevant sections of the standard with continuation of the remainder in the next webinar series.

Geoff specialized in solar (PV) energy in the final year of his electrical engineering degree in 1981and then went on to obtain his electrician's license. He joined BP Solar Australia in 1987. In 1989 he started his own company on the south coast of NSW where he designed, installed and maintained off grid power systems. In 1998 he was one of the co-founders of Global Sustainable Energy Solutions Pty Ltd (GSES) and currently the Director of International Training.

Geoff has played an active role on committees within the various Australian solar/sustainable energy industry associations since 1991; a Member of Standards Australia Working Groups since the mid 1990's and for 10 years was a member and later Chair of the Renewable and Sustainable Technical Advisory committee that oversaw the ongoing management of renewable energy training units in Australia. Geoff has been an accredited designer and installer since 1994.

The standards to be covered in the series include:

- AS/NZS 5033 Installation and safety requirements for photovoltaic (PV) arrays
- AS/NZS 5139 Electrical installations - Safety of battery systems for use with power conversion equipment
- AS/NZS 4777 Grid connection of energy systems via inverters - Installation requirements

These will then be followed by webinars covering the relevant sections of the USA National Electrical Code.

The standard AS/NZS 4509 Stand Alone Power Systems, is currently being rewritten, hence that will be covered in a future webinar when released.

The webinar series provided opportunity to representatives from the solar companies, Utilities based in the Pacific (including Energy Fiji Limited, Solomon Power, PNG Power Ltd etc) and individuals to join and grasp better understanding of the safety and installation requirements specified by the standards.

SEIAPI plans to continue with the standard webinars in the coming months for the benefit of the solar industry and hopes that these webinars would have a positive impact on solar installation practices.

SEIAPI Plans for Monthly Newsletters

IMPORTANT UPDATE

SEIAPI has been releasing newsletter every quarter to share updates on projects and developments, coverage on events and conferences relevant to the RE sector, technical articles and other useful information. Based on feedback received from the SEIAPI Executive Committee members and considering the remarkable changes and developments happening globally in this sector, it has prompted the secretariat to consider releasing short and succinct monthly newsletters rather than a detailed one every quarter. Are you looking forward to this?

If you are interested to share an update or some exciting news, please send us details of your articles

TECHNICAL ARTICLE

Earth Faults in PV Systems:

Identification, Safety, and Repair Strategies

Credit: GSES Technical Team

Earth faults can be a frequent issue for any size solar PV installation and may occur intermittently or persistently. Earth faults can impact system health and reduce productivity but can also cause serious damage to property and put human lives at risk. Every solar technician needs to know what they are, how to find them, and how to repair them effectively.

What is an earth fault?

An **earth fault** is an unintentional connection between a current-carrying conductor and a grounded metal part. On the DC side of a PV array, earth faults typically occur on either the positive or negative wire. They can also happen on one of the ungrounded conductors (L1, L2, or L3) on the AC side of the system. The accidental connection could be with the frame, racking, conduit, electrical box, or any other metal part.

An earth fault can take two basic forms:

1. **A hard earth fault** is a sustained, low-resistance connection between the current-carrying wire and the metal part. This connection remains unbroken over time.
2. **An intermittent fault** is more challenging to locate. It happens when the current-carrying wire occasionally connects to the metal part. A connection can happen during a rainstorm when there's less resistance or when there is mechanical action (due to wind or other vibrations) bringing an exposed conductor into contact with a grounded metal part. Over time, an intermittent earth fault may turn into a hard earth fault.

In PV arrays, several common issues can cause an earth fault:

- Installation errors like pinched wires, wires damaged during installation, or wires secured too close to a racking edge
- Thermal expansion and contraction
- Wind motion that causes wiring to rub against the module frames, conduit, or racking, causing wear on the insulation

It should be noted that earth faults are ALWAYS a problem. Earth faults are often ignored because they may be intermittent and the system may be performing as expected and visual inspection may not reveal any issues. However, even if the earth fault is small, this earth leakage could damage components over time, the fault could propagate into a larger issue and in worst case scenarios, create live exposed metallic parts or create fires. The image below (left) shows corrosion due to an earth fault. The earth fault caused an arc which damaged the wire tray, and burnt many of the wires (right) severely decreasing site production. To avoid this, earth faults should ALWAYS be investigated.

How are solar inverters protected from an earth fault

Most solar inverters will have an **earth fault detection and interruption (EFDI)** device (in accordance with AS/NZS4777.2 clause 2.4) to detect and stop earth faults. It can identify the earth fault, generate an error code, and shut down the inverter. Where EFDI is internal to the inverter, inverters will detect and interrupt the earth fault at insulation resistance measurements in accordance with Table 2.1 from AS/NZS4777.2.

Working on a PV system always requires PPE

Any time you work on an energized system, it's essential that you use appropriate personal protective equipment (PPE). Though the incident energy of a solar PV fault tends to be relatively low (given that PV is current limited), if

there is an arc, it tends to be sustained and the working distance may be small. AS/NZS 5139 Appendix F provides information on PPE and arc flash calculations for BESS, however these calculations can also be used for PV. The following table summarizes the PPE required for the arc flash categories.

Arc flash PPE Categories	
PPE Category 0 <1.2 cal/cm	Untreated natural fiber Long sleeve shirt Long pants Safety glasses Leather and voltage-rated gloves
PPE Category 1 1.2 - 4 calc/cm	Arc-rated long sleeve shirt Arc-rated pants Safety glasses Leather and voltage-rated gloves Leather footwear
PPE Category 2 4.1 - 8 cal/cm	Arc-rated long sleeve shirt and pants Arc-rated rain wear Arc-rated face shield, suit and hard hat Safety glasses and hearing protection Leather and arc-rated gloves Leather footwear
PPE Category 3 8.1 - 25 cal/cm	Arc-rated long sleeve shirt and pants Arc-rated rain wear Arc-rated flash hood Safety glasses and hearing protection Leather and arc-rated gloves Leather footwear
PPE Category 4 25.1 - 40 cal/cm	Arc-rated long sleeve shirt and pants Arc-rated rain wear Arc-rated flash hood Safety glasses and hearing protection Leather and arc-rated gloves Leather footwear

Smaller residential PV systems may only require electrically insulated gloves. Larger commercial systems, however, may require flame-resistant clothing, electrically insulated gloves, and an arc flash face shield. Some installations may require a complete arc flash suit to protect against potential hazards. Understand your company's rules and the hazards of the equipment you'll be working on so you can protect yourself with the appropriate PPE.

How to test energized DC PV string circuits with earth faults

Once the insulation resistance is confirmed to be below the required value as per AS/NZS 4777.2 and the affected string or strings are identified, further testing can begin. The specific location of the earth fault can be identified by measuring the voltage of the affected string or strings. Module open circuit voltage (Voc) can be found on the module label or data sheet and the PV string voltage is calculated by multiplying the module Voc by the number of modules in series. Remember that voltage is affected by temperature so consider the cell temperature of the module and adjust your simple calculation accordingly.

Test for current on each string first

It's critical that you test for current on both the positive and negative conductors before opening any fuse holders. Double earth faults or installation errors can lead to closed circuits where short circuit current (Isc) may be present. Opening a fuse holder, disconnection point or ELV connector (eg MC4) while current is flowing is dangerous. It can create a DC arc that can harm both you and the equipment.

Use a current clamp to verify zero current in each PV circuit string before opening the circuit.

De-energize and lockout/tagout (LOTO) where you're working

Isolate the equipment to be tested. Open (turn off) the load break rated disconnect in the section where you’re working — this may be a specific area or every isolator or disconnection point in the array.

Once the strings are open circuited, apply lockout/tagout devices to each component to prevent the system from being re-energized accidentally. Label each LOTO device with the worker's name, phone number, date, and the work being performed.

Inspect the PV array visually

Before conducting any tests, it's a good practice to visually inspect the array. You can find many earth faults by looking for obvious signs of damage, like burn marks on modules or melted connectors.

How to locate an earth fault in a PV string circuit by the numbers

A PV string circuit without an earth fault will have open circuit voltage (Voc) between positive and negative conductors. It will have zero volts from positive to ground and from negative to ground.

When an earth fault is present, measurement will show Voc between positive and negative conductors, but it may also reveal a value other than zero on the positive to ground, negative to ground, or both.

A severe fault may include line to line faults as well as earth faults where location identification may be easier to achieve visually. However, if the earth fault is localised then the earth fault can be located using the proportion of voltage from array positive or negative to earth over the open circuit voltage compared to the number of panels in the string. Let's look at an example:

Voltage to Ground on Both Positive and Negative Sides

In this example, a string of 16 modules with a Voc of 50.62 VDC per module should expect a total open circuit voltage on the string of around 809.92V

- Measure **between positive and negative conductors**:
  - Reading: **809.92 VDC**
- Measure **positive-to-ground**:
  - Reading: **607.44 VDC**
- Measure **negative-to-ground**:
  - Reading: **202.48 VDC**
- These readings indicate voltage to ground on both sides. We can determine the fault location by dividing the voltages by the string Voc (eg 202.48V/809.92V is 25% of the way up the string)
- Result: The fault is located at or after module 4 and before module 5 from the negative.

Voltage to Ground on the Negative Side Only

- Measure **between positive and negative conductors**:
  - Reading: **809.92 VDC** (as expected).
- Measure **positive-to-ground**:
  - Reading: **0 VDC** (normal behaviour).
- Measure **negative-to-ground**:
  - Reading: **809.92VDC**.
- Divide the voltage readings by the module Voc:
- Result: The fault is located in the **positive sub-array conductor** (the entire string is on one side of the fault).

In cases like this, the ground fault occurs in the wiring, which can often be missed if only one voltage-to-ground measurement is considered. The first place to inspect would be your terminations and if you don't notice anything there, perform a visual inspection over the entire length of the conductor.

Identifying Intermittent Earth Faults

Some earth faults only appear in wet conditions, either with morning dew, rain or even condensation in combiner boxes or within PV modules. Unfortunately, these types of faults can only be located when those conditions are present. In order to recreate these conditions, it may be necessary to spray the system down with a hose and conduct the tests as described above.

If this is required to be done however, it is critical that extra safety precautions must be taken since you have now created a dangerous situation for working with electrical equipment in a wet environment and working on a wet slippery roof. These safety precautions must be identified clearly in your Safe Work Method Statements (SWMS)

and adhered to during the works. The photos below show an intermittent earth fault caused by a small nick in a panel cable.

How to repair earth faults in PV systems

Once you've found the earth fault, the next step is to repair it by replacing the affected conductor or module.

If the damaged conductor is in conduit or free air, you can replace it with a new, undamaged conductor. A single conductor in a conduit with other conductors may be challenging to replace without removing all conductors from the conduit.

If the conductor is a lead to a PV module, you might try to bypass the affected module until a replacement module can be found. Alternatively, you may replace the lead yourself however you must verify that this does not affect the workmanship or performance warranty of the module.

If the earth fault is within the PV module itself you should reach out to the manufacturer and request a warranty replacement. You will most likely need to provide photographic evidence and possibly your tests to prove the module is causing the earth fault.

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