Utility Experience in the Pacific region with high penetration VRE

Workshop on High Penetration Variable Renewables in Pacific Island Countries: Small grids and Off-grid

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UNSW, Sydney, Australia

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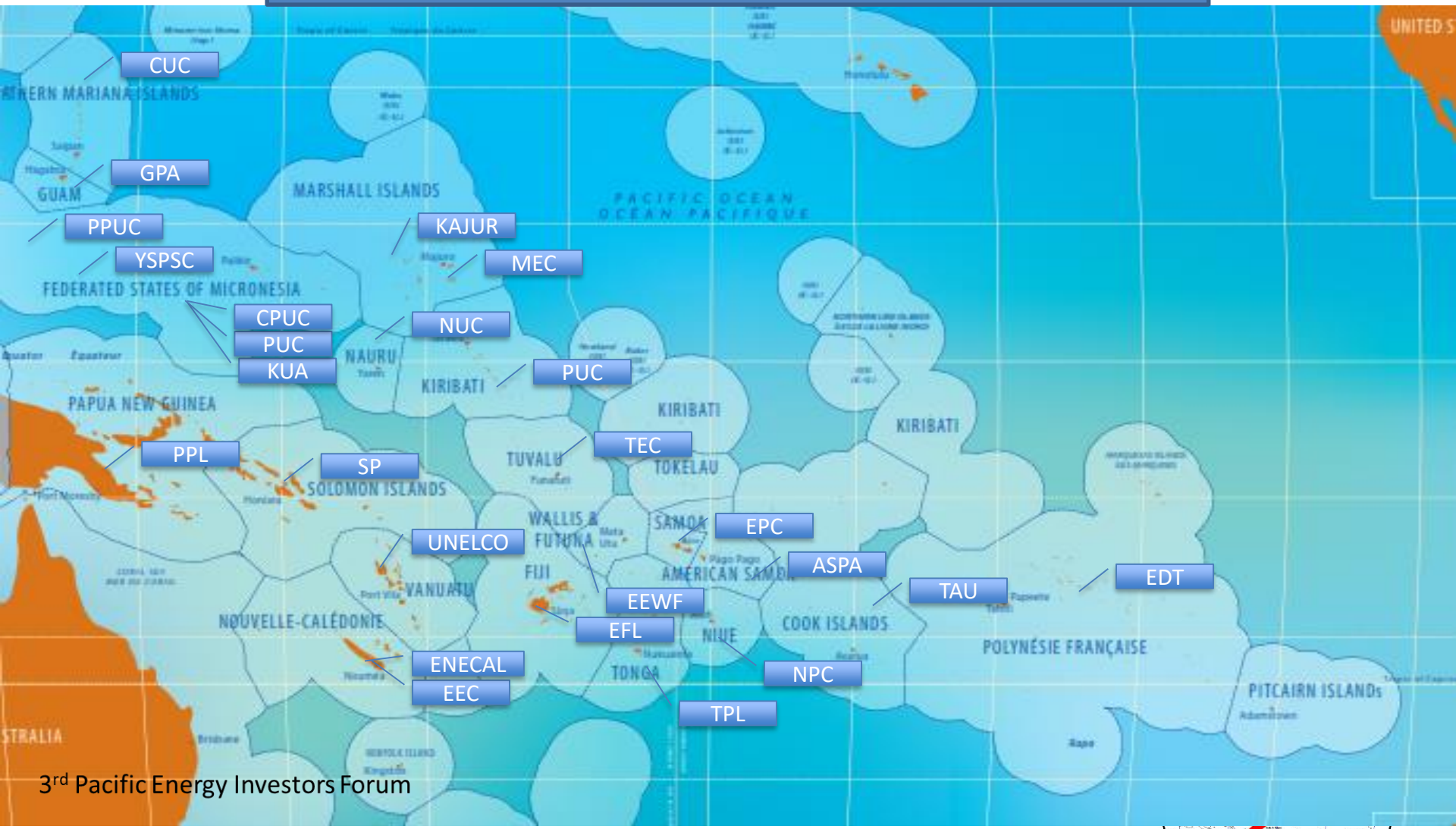
OUTLINE

1. The Pacific Power Association (PPA)
2. Pacific's Renewable Energy Targets and Nationally Determined Contributions
3. Trends and Developments in Solar
4. Specific Examples
5. PPA's Sustainable Energy Industry Development Project
6. Future of Renewable Energy is the Pacific

The Pacific Power Association

- Established in 1992, Secretariat based in Suva, Fiji Islands
- Membership – 25 Electric Utilities, 104 Private Sector Entities and 24 Development Partners, Regional and International Organizations

Pacific Power Association - Utilities



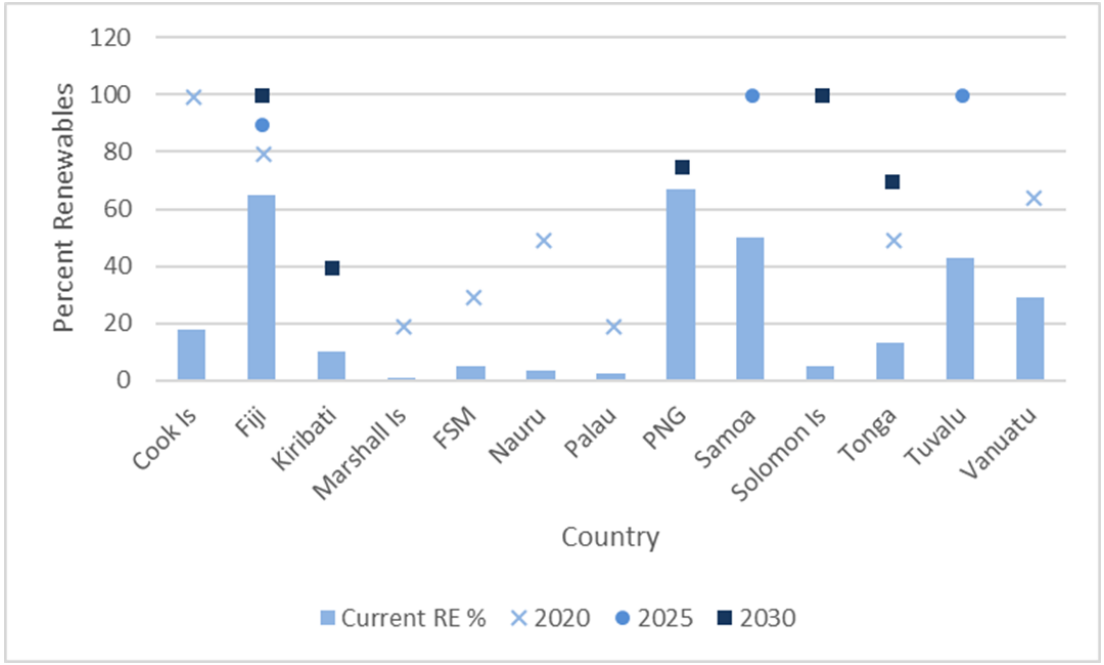
Vision

Access to sustainable and quality electricity services for the people of the Pacific Islands Region.

Mission

To support the Pacific Islands Country and Territory (PICT) power utilities in the provision of high quality, secure, efficient and sustainable electricity services.

Renewable Generation Penetration: NDC Targets



A natural fit between NDC targets and uptake of renewables

Technology Options

- Solar PV is dominating the current market; intermittency a challenge
- Hybrid models of diesel/solar PV or diesel/wind reflect transition from diesel dependence
- Larger scale hydro-electric opportunities central to PNG, Fiji and Solomon Islands
- Wind being considered; important role to offset storage needs
- Pumped storage a possibility; relatively high cost but viable storage option with current BESS costs
- Geothermal identified and being investigated – no immediate projects

Trends in RE Development in the Pacific

Larger Scale PV Projects

- greater contribution from RE
- Diesel abatement

Outer Island Hybrid Microgrids

- improve access
- reduce cost of supply
- improve reliability of existing networks

Energy storage

- voltage and frequency stability
- diesel abatement


INCREASED CAPACITY GRID CONNECTED- EXAMPLES

Henderson 1MWp PV Farm – Solomon Power, Solomon

Top Side PV Farm – Republic of Nauru

Raceourse 2.2MWp PV Farm - Samoa

Rarotonga Airport PV Farm – Cook Islands

PACIFIC POWER ASSOCIATION

Guam Power Authority – signing of PPA for 60MWp Solar Farm

Home > Top Stories > **Palau inks Power Purchase Agreement with ENGIE Eps**


Palau Public Utilities Corporation – signing of PPA for 35MWp Solar Farm

Palau inks Power Purchase Agreement with ENGIE Eps

Rhealyn Pojas 12 Oct 2018

Utility RFPs

American Samoa Power Authority – 30 to 35MW Wind Generation

Tonga Power Ltd – 5.1MW with 2.5MWh ESS

RE Investor Forum @ 27th Annual PPA Conference identified that significant RE potential – estimated $1 billion required if countries are to meet their 2025 NDC targets – excluding PNG (~$1.5 b)

PPA
PACIFIC POWER ASSOCIATION

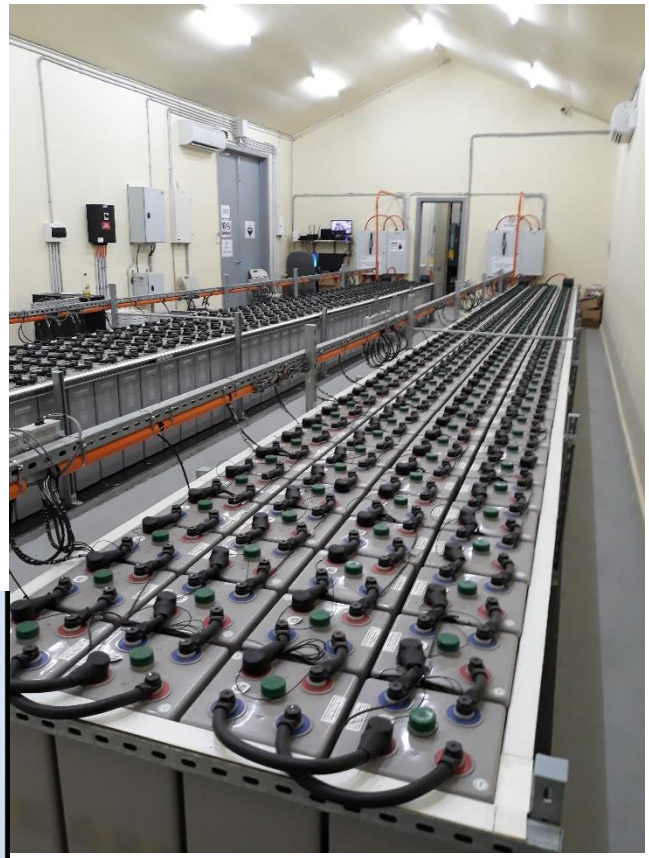
MICROGRIDS - EXAMPLES

Taro Island, Solomon Islands– 224 kWp Hybrid System

SOLOMON POWER – SOLOMON ISLANDS

	Taro Island – 224 kWp Hybrid System	**Seghe 168 kWp Hybrid System**
Energy Forecast	260,000 kWh per year	200,000 kWh per year
PV Array	224kWp-800 X Trina Honey 280W	168kWp-600 X Trina Honey 280W
String Inverters	200 kW – 8 X STP25000TL-30	150 kW – 6 X STP25000TL-30
SMA Sunny Islands	108 kW – 6 Clusters of S18.OH	90 kW – 5 Clusters of S18.OH
Battery Bank	1.58 MWh	1.01 MWh
PV Contribution	86.3%	87.7%
Generator hours /year	362	291
Diesel litres/year	10,270	7,109
Battery design life (years)	9.9 (35 degs C)	8.9 (35 degs C)
Battery Bank Autonomy to 40% SOC	31.9 hours	26.6 hours

HA'APAI, KINGDOM OF TONGA – 224 KWP HYBRID SYSTEM



Location	Installed Capacity (kWp)	Storage Capacity (kWh)	Back up Genset (kw)	% Energy Contribution
Phase 1 - Existing Systems				
Ha’apai	550	330	Grid	50
Lifuka	550	330	Grid	50
Phase 2 – Planned				
Nomuka	100	210	50	50
'Uiha	100	210	50	50
Ha'ano	100	210	50	50
Ha'afeva	60	110	30	50
Niuatoputapu	150	295	80	50

TA'U ISLAND, AMERICAN SAMOA – 1.4MW HYBRID SYSTEM

Location
Ta'u Island, American Samoa

Project Size
1.4 MW Solar PV
6 MWh storage

Distributed Energy Resource
Solar PV

Applications
Off-grid Microgrid
Diesel abatement
Reduced O&M

Commissioned
2016

Location
Ofu Island, American Samoa

Project Size
342 kW Solar PV
1 MWh storage

Distributed Energy Resource
Solar PV

Applications
Off-grid Microgrid
Diesel abatement
Reduced O&M

Commissioned
2016

Storage – an essential investment

Examples:

Operating Facility:

- Electric Power Corporation of Samoa - 13.4 MWh storage to cope with 14 MW of PV now in system. Operations demonstrated reduced cost of diesel generation and value of grid stability – 48% RE in 2017/2018.
- Cook Islands – 6.3MWh of storage in system with 4 MW of PV with additional 2 MW of PV planned

Planned development:

- Tonga Power Ltd – proposed GCF funding for 10MW/20MWh of storage

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S A M O A

Location
Upolu Island, Samoa

Project Size
13.6 MWh storage

Distributed Energy Resource
Solar PV (x2)
Hydro
Wind

Applications
Diesel abatement
Voltage & Frequency Support

Commissioned
2018

Location
Rarotonga Airport, Cook Islands

Project Size
6.3MWh storage

Distributed Energy Resource
Solar PV

Applications
Diesel abatement
Voltage & Frequency Support

Commissioned
November, 2018

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Lessons Learned

- Experience in Design, Approval, Tendering, construction, installation and commissioning.
- Sizing of PV to match the load profile – curtailing
- Remote location presents challenges- weather, materials, logistics
- Civil contractors - capability.
- Availability of locals with necessary skills
- Up skilling for operational staff

WORLD BANK GROUP

Pacific Islands Sustainable Energy Industry Development Project

Helping Pacific power utilities incorporate renewable energy technologies and manage energy sector resilience

PROJECT COMPONENTS

Component 1: Resource Mapping (US$2.27m)

Phase 1: Preliminary assessments (solar/wind)
Phase 2: Ground-based data collection
Phase 3: Validated resource maps

Component 2: Technical Assistance (US$2.57m)

- Modeling software for RE integration and capacity building
- Online power benchmarking platform
- Industry guidelines and competency standards
- Training/workshops
- Career development initiatives for power utilities
- Support from the Global Partnership on Social Accountability (GPSA) for citizen engagement
- Assistance with mainstreaming gender equity/equality in the power sector
- Disaster-recovery and risk-reduction activities for power utilities.

Component 3: Project Implementation Support (US$0.82m)

Building PPA's capacity for overall project coordination, management and monitoring including technical operation, procurement, financial management, environmental and social management, gender action plan implementation, monitoring and evaluation, and reporting

Future of RE in the Pacific

- PV will continue to be focus especially for smaller nations
- Private sector investment crucial
- Storage will play an important role
- Regulatory reforms need to take place

Vinaka.