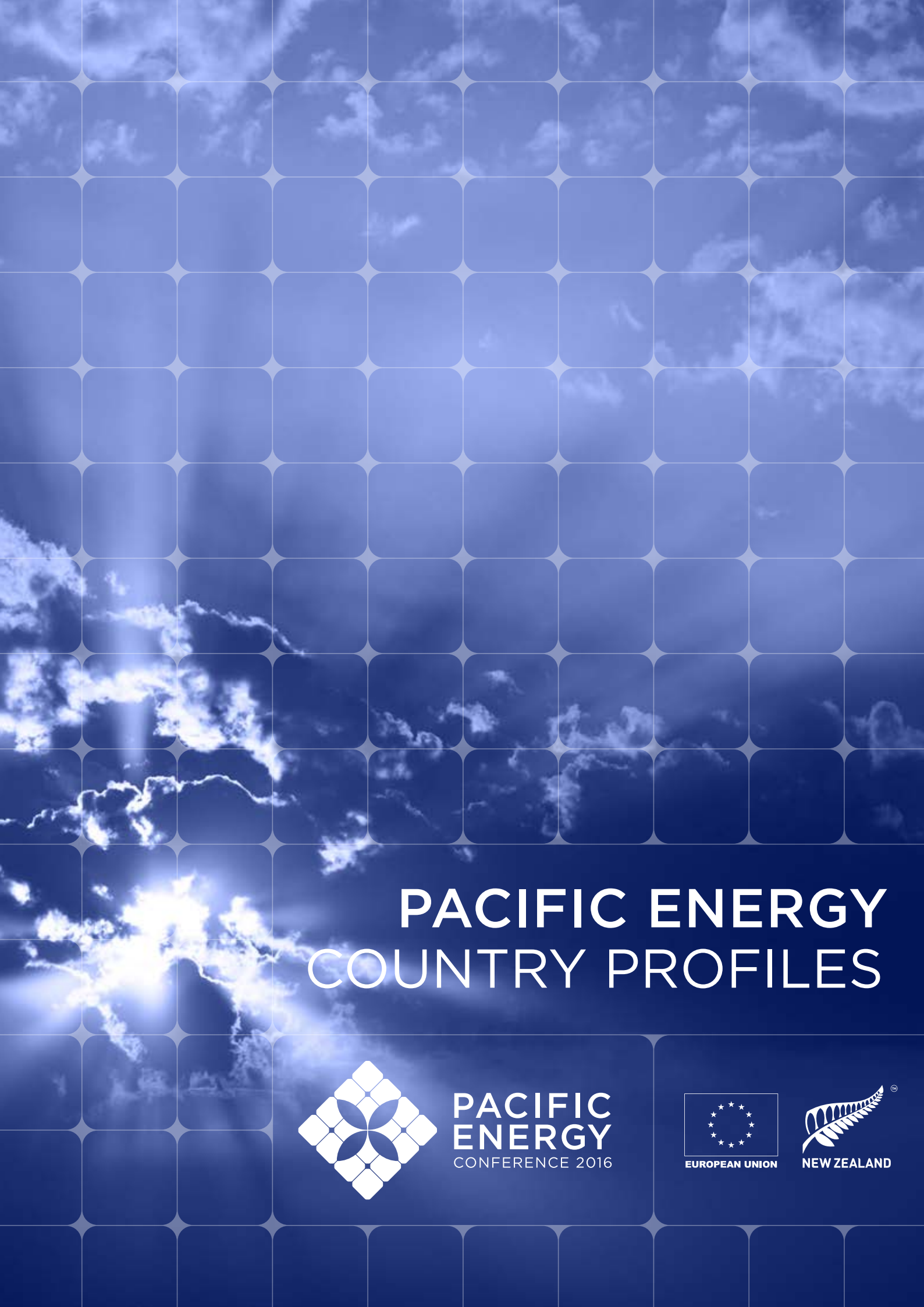

PACIFIC ENERGY COUNTRY PROFILES

PACIFIC ENERGY CONFERENCE 2016

EUROPEAN UNION

NEW ZEALAND

PACIFIC ENERGY CONFERENCE 2016

PACIFIC ENERGY COUNTRY PROFILES

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Limitations of this publication

While every effort has been made to ensure the information in this publication is accurate, errors and omissions may remain. The organisers of the Pacific Energy Conference have not independently verified or checked information, projects, or data. All cost estimates, project descriptions, analysis and assumptions are indicative and should not be relied upon. The New Zealand Government and the organisers of the Pacific Energy Conference expressly disclaim any warranty that the projects listed will be undertaken, that project costs will align with the estimates provided, or that projects will result in the benefits outlined. Neither the New Zealand Government nor the organisers of the Pacific Energy Conference will be held responsible in connection with the information contained in this publication.

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FOREWORD

In 2013, New Zealand and the European Union co-hosted the Pacific Energy Summit to fast-track sustainable energy development in the Pacific.

It resulted in funding commitments of more than $635 million for a range of innovative renewable energy projects, and showed that donors and the private sector were prepared to back the ambition and leadership shown by Pacific governments.

Three years on and the change across the region has been marked. Whole atolls are now 100% renewable, many more people have access to clean and reliable power, the amount of diesel imported for electricity generation has fallen dramatically, and Pacific countries can now better manage the impacts of climate change.

The Pacific is home to some of the countries most at risk from the effects of climate change. It is now also home to countries that are leading the world in reducing their fossil fuel consumption and shifting to renewable sources of electricity generation.

We also acknowledge the huge contribution of donors and development partners in supporting Pacific governments to achieve progress and following through on the commitments made at the Summit.

Enormous opportunities still exist across the region. This publication presents the energy profiles of 18 Pacific countries and territories. It summarises their progress since the 2013 Summit and identifies new opportunities for investment.

We have seen what can be achieved when we work together and our challenge now is to maintain this momentum for the good of the people of the Pacific.

INVESTMENT OPPORTUNITIES IN THE PACIFIC

Energy in the Pacific is undergoing a major transformation. Pacific countries are prioritising a shift to sustainable electricity sources and increased access for all communities. This offers real opportunity for public and private investment.

There are a number of areas where investment can be made – from expanding generation of renewable electricity to increasing access or providing solutions for small islands and dispersed populations. Reaching the region's energy targets presents prospects for the private sector to deliver the technical solutions and financing models that will ensure their sustainability.

The proposed projects within this publication range from large scale hydro installations to energy efficiency initiatives like upgrading lighting. The projects represent opportunities for investment that Pacific governments have identified as priorities.

Whether it's working with the utility companies to strengthen their capability to manage networks so that more renewables can be added to the mix or developing renewable generation resources where they are technically and economically feasible, a large number of projects are available. There are also opportunities for financing and operating community hydropower or solar PV-diesel energy initiatives – especially in those islands that are off-grid and remote locations.

It's an exciting time in the Pacific – the projects that have been completed, or are under way, since the Summit are proof that there is sound reason to continue investing in the region.

If you require further information about any of the proposed projects listed please email **pacificenergyconference@mfat.govt.nz**



COOK ISLANDS

GOAL 100% renewable electricity generation by 2020

18,100	Population
15	Total installed generation capacity (MW)
31,750	Annual electricity generation (MWh)
99%	Access to electricity
15%	Renewable electricity generation with completion of current projects

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- The proportion of electricity from renewables has risen from 3% to 15% since 2013. 10 of the 12 inhabited islands will have almost 100% renewable electricity by mid-2017.
- The Cook Islands Northern Group project completed eight photovoltaic (PV)-diesel hybrid systems on the six islands.
- A 961 kilowatt-peak (kWp) PV system was installed at Rarotonga Airport.
- 2,060kWp of privately owned PV capacity was connected to the Rarotonga network, accounting for 8.7% of Rarotonga's electricity demand.
- Four PV-diesel hybrid systems, providing over 95% of the islands' electricity needs from renewable resources, will be installed in the outer islands of the Southern Group by mid-2017.

Projects were supported by donors including New Zealand (NZ), Asian Development Bank (ADB), the European Union (EU) and Japan's PEC Fund.

Over 90% of electricity demand is on Rarotonga and Aitutaki, with the remaining 10% divided between the smaller outer islands.

PROPOSED PROJECTS FOR INVESTMENT

Electricity storage on Rarotonga

This will enable more intermittent renewable electricity generation to be connected to the network. The first phase will provide time-shifting storage, with additional grid-stability support storage to follow.

Further grid-connected PV on Rarotonga and Aitutaki

Once the Rarotonga electricity storage project has been deployed, additional PV capacity will be installed on Raratonga and Aitutaki.

Wind turbines for Rarotonga

Several years of wind data collection show that Rarotonga has a wind resource worth developing.

Electricity storage on Aitutaki

A feasibility study is required as the first step to determine the type and size of storage required but it could require as much as 10MWh of storage.

Renewable energy in transport

The transport sector remains dependent on fossil fuels. The Renewable Energy Development Division of the Office of the Prime Minister is investigating renewable energy options for road transportation on Rarotonga. This area requires further work to develop overarching plans, programmes, and individual projects.

Rarotonga grid upgrade

Although Rarotonga has a modern and relatively efficient 11 kilovolt (kV) network, transmission lines and controls need to be upgraded.

Waste-to-energy generation

A feasibility study is required to determine if there is sufficient suitable waste to power a waste-to-energy generation plant.

Photo: ADFEC

FEDERATED STATES OF MICRONESIA

GOAL 50% decrease in diesel imports by 2020 and 30% renewable electricity generation

111,000	Population
12	Total installed generation capacity (MW)
72,000	Annual electricity generation (MWh)
65%	Access to electricity
5%	Renewable electricity generation with completion of current projects

The Federated States of Micronesia (FSM) is an independent island nation made up of four states: Yap, Chuuk, Pohnpei, and Kosrae. Each state has a separate power utility and tariff structure. Access varies significantly between states: Kosrae 98%, Pohnpei 87%, Yap 67%, Chuuk 26%.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Since 2013 renewable generation has risen from 0% to 5%.
- All four utilities updated their diesel generation assets to improve efficiency, stabilise systems, and expand networks.
- A total of 1.625MW (solar 900 kilowatts [kW] and hydro 725kW) of grid-connected renewable generation was installed across the four states.
- Over 350 household solar systems providing a total capacity of 236kWp and 275kWp of solar photovoltaic (PV) micro-grid systems were installed on outer islands of Yap.
- Yap undertook energy audits for major government buildings to identify cost-effective energy-saving measures.
- The Government is amending the regulatory framework to enable private-sector investment in renewable energy. Changes include a new legal framework in Pohnpei for contracting IPPs, and legislative incentives in Chuuk.

Projects were supported by donors including ADB, Japan's PEC Fund, Australia and the United Arab Emirates.

PROPOSED PROJECTS FOR INVESTMENT

Rural electrification

This is a priority for all four states as most remote outer islands have very low rates of electricity access.

Yap grid-connected solar PV and wind generation

The utility on Yap proposes to install 1.5MW of grid-connected solar PV and over 500-600kW of wind generation.

Yap network loss reduction

This project will quantify network losses and implement measures to cost-effectively reduce them.

Yap streetlight upgrade

The Yap utility replaced 5% of inefficient streetlights with energy-efficient LED streetlights and wants to replace the remainder.

FSM supply-side efficiency improvement

The Pacific Power Association's electricity benchmarking programme has identified projects to improve supply-side efficiency.

INDEPENDENT STATE OF SAMOA

GOAL 100% renewable electricity generation by 2017

190,000	Population
69.1	Total installed generation capacity (MW)
140,000	Annual electricity generation (MWh)
100%	Access to electricity
50%	Renewable electricity generation with completion of current projects

The Electric Power Corporation (EPC) operates the country's electricity systems. The EPC also generates electricity from solar PV on Apolima, which was the first island in the Pacific to become 100% renewable.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Renewable generation capacity more than doubled from 7.5MW to 15.4MW.
- Renewable electricity projects completed or under construction on Upolu and Savaii include:
  - Six solar photovoltaic (PV) systems built in partnership with donors (3.1 MW)
  - Two wind turbines (550 kilowatts [kW])
  - Three independent power producer (IPP) solar PV systems on Upolu (10MW)
  - One IPP solar PV system currently in design for Savaii (2.0MW).

Projects were supported by donors including ADB, EU, NZ, Japan's PEC Fund and UAE.

PROPOSED PROJECTS FOR INVESTMENT

Policy, planning, and legislative framework

Technical advice and support on policy development, planning, and legislative frameworks.

Wind and hydropower IPP project

A new wind farm and pump storage hydro system with capacity of 25MW will contribute significantly to the network.

Taelefaga hydropower

A third turbine is planned for Taelefaga hydropower station. This will increase the station's capacity by 50%.

Savaii hydropower

Design is under way for a 2MW hydropower system. A 22 kilovolt (kV) transmission line will be required to connect it to the grid on the southern coastal network.

Submarine cable

A submarine cable between Upolu and Savaii will allow transmission of electricity between the islands.

Geothermal energy

Savaii may have a useable geothermal resource. A feasibility study is required.

Storage and "smart" network systems

Higher proportions of intermittent renewable generation necessitate detailed modelling of the electricity system.

Vaipu pumping station

Pumping water between the Vaipu and Afulilo dams could store excess intermittent renewable energy from solar and wind.

KINGDOM OF TONGA

GOAL 50% renewable electricity generation and 100% access by 2020

106,000	Population
16.5	Total installed generation capacity (MW)
55,400	Annual electricity generation (MWh)
89%	Access to electricity
13%	Renewable electricity generation with completion of current projects

Tonga consists of 176 islands in four main island groups. Tonga Power Limited (TPL) operates the electricity networks.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Renewable energy generation will more than double from 5.4% in 2013 to 13% by 2018.
- The Tonga Village Network Upgrade Programme will reduce system losses from nearly 20% to 12% over the next two to three years and provide 3,000 homes with pre-pay meters.
- The Outer Island Renewable Energy Project will increase access to electricity to nearly 100% and install grid-connected solar photovoltaic (PV) systems on the island of 'Eua, and the island groups of Ha'apai and Vava'u.
- Community-owned mini-grids on four outer islands in the Ha'apai Group will be converted to PV-diesel hybrid systems with battery storage.
- Tonga Police are installing solar panels at six police stations on Tongatapu including battery storage at one station who allow electricity to be sold back to the utility.

Projects were supported by donors including ADB, NZ, Australia, EU, UAE and Japan's PEC Fund.

PROPOSED PROJECTS FOR INVESTMENT

Private-sector generation

Up to 11MW of renewable generation could be provided by independent power producers. Regulatory reform and a donor-supported risk reduction facility are planned to enable investment.

Niutoua wind project

A feasibility study identified up to 6MW of wind capacity at Niutoua.

Network management and energy storage

Policy, process, and infrastructure improvements will increase energy efficiency and storage will improve grid stability.

Nuku'alofa Network Upgrade Project (NNUP)

This project will improve supply reliability and network safety by renewing customer connections, upgrading supply lines, and replacing power poles. Due diligence is currently under way.

Residential demand-side management and energy-efficiency measures

Smart meters, efficient lighting, minimum energy performance standards for appliances and water heater control can reduce demand during the evening peak load.

Commercial-sector demand-side management and energy-efficiency measures

Load shifting and minimum energy performance standards for equipment will be supported by an energy audit programme and fiscal/regulatory reviews.




Photos: *ITP Renewables*

KIRIBATI

GOAL Achieve at least 45% reduction of fossil-fuel energy generation by 2025

109,700	Population
8	Total installed generation capacity (MW)
23,000	Annual electricity generation (MWh)
>65%	Access to electricity
10%	Renewable electricity generation with completion of current projects

Kiribati consists of 32 atolls and one raised coral island spread over an exclusive economic zone of 3.6 million km². The Public Utilities Board (PUB) provides electricity on Tarawa and the Ministry of Line and Phoenix Islands Development runs the electricity system on Kiritimati Island. On some outer islands inhabitants lease household solar photovoltaic (PV) systems from the Kiribati Solar Energy Company (KSEC), a state-owned enterprise.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Since 2013 renewable generation has increased from 0.2% to 10%, and access has remained steady at around 65%.
- Projects completed or under way are:
  - Two projects installing 1449 kilowatt-peak (kWp) of solar PV on Tarawa
  - A 16kWp solar PV/diesel hybrid system in Poland on Kiritimati Island
  - 1,700 leased household solar PV systems on outer islands
  - The Solar Electrification of Schools project will provide solar PV and battery systems to seven outer island schools, up to 78kW
  - A small-scale biofuel plant is being piloted on Abemama Island.
- The Kiritimati Island Energy Sector Programme will provide two new power stations, 200kWp of solar PV generation and upgrade the distribution network.
- The PUB is undertaking reforms that will lead to increased operating efficiency and utility performance.

Projects were supported by donors including UAE, EU, ADB, the World Bank Group and Japan's PEC Fund.

PROPOSED PROJECTS FOR INVESTMENT

South Tarawa network upgrade

Replacing the electricity distribution system will improve safety and reliability, and reduce overall system losses.

Electricity storage system for South Tarawa

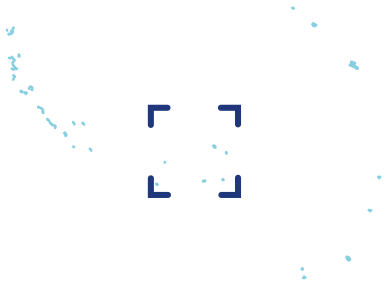
Storage will help the PUB manage increasing proportions of intermittent renewable electricity generation.

Energy Efficiency and Conservation Programme

This project aims to provide efficient lighting and could also broaden to include other energy-using appliances.

Ocean Thermal Energy Conversion (OTEC) for South Tarawa

A feasibility study to investigate the costs and benefits of OTEC is needed to properly assess the opportunity.



Photos: *Infratec*

NAURU

GOAL 20% increase in efficiency and 50% reduction in outages

10,000	Population
6.5	Total installed generation capacity (MW)
31,700	Annual electricity generation (MWh)
100%	Access to electricity
3.2%	Renewable electricity generation with completion of current projects

Nauru is a single raised coral island with a central phosphate plateau. The Nauru Utilities Corporation (NUC) provides grid electricity to all households.

PROPOSED PROJECTS FOR INVESTMENT

Increased renewable energy generation

A further 500kWp of solar PV can be added to the system without the need for control or storage systems.

Storage systems

As intermittent PV generation capacity increases it will become harder to manage the grid. Adding storage will mitigate this. It will also give the system operator more control over power quality and maximise efficiency of diesel generation.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Since 2013, renewable generation has risen from below 1% to 3.2%.
- A 132 kilowatt-peak solar PV generation system and desalination plant was completed in 2013. Nauru's main source of drinking water is from reverse osmosis desalination of seawater. The project saves 60 tonnes of diesel per year, equal to 1.3% of energy demand.
- A 500kWp solar PV system is due for completion in June 2016.
- Sixty household-sized PV systems of 130 watt-peak (Wp) each have been installed.
- In March 2017 the NUC is installing two high-efficiency medium-speed generators to replace old generators from 1989. This will improve fuel efficiency by 20% and reduce unscheduled power outages by 50%.
- Electricity tariff reform aims to gradually reduce electricity subsidies, which make up one quarter of all government spending. The goal is a financially self-sustaining energy system with full cost recovery; an interim target is 50% cost recovery by December 2016.

Projects were supported by donors including UAE, ADB, Australia, and Japan's PEC Fund.



NIUE

GOAL 80% renewable energy generation by 2025

1,500	Population
2.2	Total installed generation capacity (MW)
3,300	Annual electricity generation (MWh)
99%	Access to electricity
13%	Renewable electricity generation with completion of current projects

Niue is a is a single raised coral island with a resident population of approximately 1,500 people spread across 14 villages.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- The proportion of electricity from renewable sources has tripled from 2.5% to 9% since 2013, while access remains at almost 100%.
- Several solar photovoltaic (PV) installations were completed in 2014. However, because of grid instability, not all the electricity generated from PV is injected into the grid. Grid stability issues are expected to be resolved using battery storage by 2017 and renewable generation will then rise to about 13%.

Projects were supported by donors including the EU and Japan's PEC Fund.

PROPOSED PROJECTS FOR INVESTMENT

200 kilowatts (kW) of solar PV on the Northern feeder

This solar PV project will be split into two 100kW installations at Liku and Mutalau, villages on the northern side of the island. This will provide a more consistent supply at the end of the northern electricity distribution line and also reduce diesel consumption.

50kW wind

Installation of up to 50kW of wind generation will contribute to renewable energy supply.

1.8MWh battery storage

Adding storage to the grid will help integrate intermittent renewable generation.

Solar water pumps

Use of solar water pumps will reduce electricity demand.

LED street and household lighting

Improving the efficiency of street lighting and domestic lighting will also reduce electricity demand.




Photos (above three): *Global Sustainable Energy Solutions*

Photo: *MFAT*

PAPUA NEW GUINEA

GOAL 70% of households to have access to electricity by 2030

>8M	Population
580	Total installed generation capacity (MW)
217,250	Annual electricity generation (MWh)
12%	Access to electricity
50%	Renewable electricity generation with completion of current projects

Papua New Guinea has the largest land area and population of Pacific countries. State-owned enterprise PNG Power Ltd (PPL) is responsible for generation, transmission, distribution, and retail of electricity. There are also several privately owned generation networks serving the resources sector.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- 190,000 people have gained access to electricity since 2013, moving the overall access rate from 10% to 12%.
- The National Electrification Roll Out Plan will be completed this year to guide on- and off-grid renewable and non-renewable projects to increase access to electricity.
- PPL's Fifteen Year Power Development Plan (2016-2030) supports the national and provincial development plans through the use of hydropower where feasible.
- Tranche one of the Town Electrification Investment Programme is replacing diesel with 7MW of hydro generation in three provincial centres and connecting 5,140 new households. Work will be complete by 2018.
- Projects are under way to rehabilitate and upgrade existing main grids; expand urban grids and hydropower; and improve access, including a pilot project for a community-owned hydro mini-grid in the Tsak Valley.

Projects were supported by donors including ADB, NZ, World Bank Group, Japan's PEC Fund and Australia.

PROPOSED PROJECTS FOR INVESTMENT

Hydro independent power producer (IPP) proposal

This is an 80MW project planned for development and construction by an IPP. Final feasibility studies were completed in October 2015.

Ramu 2 hydro PPP

This 180MW project includes a 30km long 132 kilovolt (kV) transmission line.

Port Moresby grid reinforcement

This involves transmission and distribution networks upgrades, a major new substation, and rehabilitation and upgrading of the Rouna 1, Sirinumu, and Sirinumu Toe of Dam hydro power stations.

Distribution network expansions

Expansion of PPL's distribution network aims to connect 300,000 new households by 2031.

Town Electrification Investment Programme tranche two

This covers the development of one new mini hydro and refurbishment of five others in provincial centres, including new transmission lines.

District centres

Scoping is under way to identify opportunities for taking a cluster approach to develop new renewable-powered networks around such centres.

Subsidised solar household systems

Increased funding would increase the number of systems being installed under the scheme, which targets remote areas where electricity networks are not feasible.

Photos (above and right): *Fiji Electricity Authority*

Photo (above): *Pedram Pirnia*

REPUBLIC OF FIJI

GOAL 100% access by 2020 and 90% renewable electricity generation by 2030

865,600	Population
297	Total installed generation capacity (MW)
900,000	Annual electricity generation (MWh)
87%	Access to electricity
65%	Renewable electricity generation with completion of current projects

Fiji consists of approximately 330 islands, 105 of which are inhabited. The Fiji Electricity Authority (FEA) is a state-owned enterprise that generates, transmits, distributes, and retails electricity on Viti Levu, Vanua Levu, and Ovalau, covering 90% of Fiji's population.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- The proportion of electricity from renewable sources has risen from 59% in 2013 to 65%.
- The FEA has increased the catchment capacity of the Wainisavulevu hydro plant. This will provide an additional 10,000MWh/year.
- The 0.7MW Somosomo hydroelectric plant is complete. When the FEA takes over management of the plant, Taveuni will be the fourth island it services.
- Several power purchase agreements have been signed. Independent Power Producer (IPP) projects under construction include the 12MW Nabou biomass plant, scheduled for completion in May 2017.
- Fiji's energy policy prioritises attracting private-sector investment. Development partner assistance is being used to strengthen regulatory capacity and investment planning. This supports both public and private investment.

Projects were supported by donors including ADB, UAE, Japan and China.

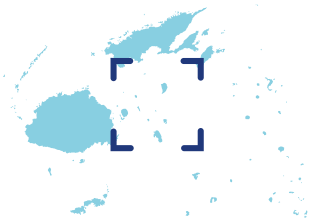
PROPOSED PROJECTS FOR INVESTMENT

Hydro IPP proposals

FEA is considering three new IPP hydro proposals totalling 32MW. Detailed feasibility work is required to determine which proposal(s) will proceed.

2MW to 5MW solar hybrid systems

The FEA has received proposals for several hybrid solar PV systems with a range of 2MW to 5MW. These will be operated by IPPs.






Photos: *ADFEC*

REPUBLIC OF THE MARSHALL ISLANDS

GOAL 20% renewable electricity generation by end of 2020 with at least 95% access

53,200	Population
32.2	Total installed generation capacity (MW)
101,000	Annual electricity generation (MWh)
87%	Access to electricity
<1%	Renewable electricity generation with completion of current projects

The Republic of Marshall Islands (RMI) consists of two groups of 29 atolls and five raised coral islands. Almost two-thirds of the population live in urban centres on the atolls of Majuro and Kwajalein (Ebeye). There are electricity grids on Majuro, Ebeye, and four outer islands.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Since 2013 access rates and renewable generation proportions have remained virtually unchanged.
  - The RMI Government's rural electrification programme provides solar home systems to the outer islands to reach the 13% of the population still without electricity.
  - A project to improve electricity supply to poor households installs prepay meters to help households with budgeting. It also rehabilitates and extends the distribution network to increase access.
  - A 600 kilowatt-peak (kWp) grid-connected solar photovoltaic (PV) plant on Majuro is due for completion in June 2016.

Projects were supported by donors including UAE, ADB and Japan.

PROPOSED PROJECTS FOR INVESTMENT

New grid-connected solar PV for Majuro and Ebeye

A current proposal includes 800kWp in Majuro and 200kWp in Ebeye. A co-financing arrangement will facilitate this project.

Additional grid-connected solar PV for Ebeye

This project proposes a further 200kWp of solar PV for Ebeye.

Coconut oil biofuels

Biofuels made from coconut oil can replace imported fossil fuels and generate income for locals. Some coconut oil is already produced locally. The proposal requires further study of the feasibility of securing a supply chain.




Photos: *ITP Renewables*

REPUBLIC OF PALAU

GOAL 45% renewable electricity generation and 35% energy efficiency improvement by 2025

21,200	Population
29.4	Total installed generation capacity (MW)
89,300	Annual electricity generation (MWh)
98%	Access to electricity
2.3%	Renewable electricity generation with completion of current projects

Palau consists of 200 islands, of which only nine are permanently inhabited. The biggest islands are Babelthaob, Koror, and Peleliu.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Since 2013 the renewable generation proportion has increased from 0.4% to 2.3%.
- A 1.5 megawatt-peak (MWp) grid-connected photovoltaic (PV) system supplies 2.3% of Palau's electricity demand.
- Current projects under Palau's National Energy Policy and supporting Strategic Action Plan – Energy Sector include: subsidised loans for rooftop solar panels; prepay metering; energy-efficient lighting; and a pilot energy audit programme for large commercial buildings.

Projects were supported by donors including Japan.

PROPOSED PROJECTS FOR INVESTMENT

Renewable generation assets

Renewable generation can provide an estimated 30% of peak demand (12MW) without the need for control or storage systems.

Diesel generation upgrade

Some diesel generators are 30 years old. Efficient modern generators will provide large diesel fuel savings.

Network loss reduction

Losses in the distribution network are over 15%. Upgrading the distribution infrastructure will reduce this significantly.

Implement a Tropical Energy Efficiency Building Code

A building code appropriate to Palau's tropical environment will see new buildings use as little energy as practicable during their lifetime.

Expand the Cool Roof Program

Cool roof technology reflects sunlight in the day and emits heat at night to cool the building below, reducing demand for cooling in buildings.

Expand Energy Audit Programme

This programme for buildings identifies and implements cost-effective savings.

Expand the Energy Retrofit Programme

Extending the programme beyond lighting and rooftop solar will further reduce demand.

Adopt the Energy Star Alliance Standard

This programme educates consumers on the most efficient and cheapest appliances to run and will reduce growth in demand.




Photos: *ITP Renewables*

REPUBLIC OF VANUATU

GOAL 100% renewable electricity generation and 100% access by 2030

234,000	Population
35.6	Total installed generation capacity (MW)
66,300	Annual electricity generation (MWh)
33%	Access to electricity
29%	Renewable electricity generation with completion of current projects

Vanuatu is an archipelago of 82 volcanic islands, of which 65 are inhabited. Private companies supply electricity to the four main urban centres through private-sector concessions. Union Electrique de Vanuatu Limited (UNELCO) has the concessions for Port Vila, East Malakula, and Tanna. Vanuatu Utilities and Infrastructure Limited (VUI) has the concession for Lungaville on Santo Island.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Since 2013, the proportion of renewable generation has risen from 16% to 29% and access rates have also increased from 20% to 33%.
- Three grid-connected solar PV plants providing 2.27MWp have been installed on Efate at Parliament House, Undine Bay, and next to the Devil's Point Wind Farm.
- Phase one of the Vanuatu Rural Electrification Program (VREP) provides a 50% subsidy to private sector suppliers to distribute solar home systems to provide lighting and phone-charging. Phase one aims to cover 17,500 households, 2,000 community halls, and 230 aid posts.
- Geothermal energy is being developed at Takara on the northern side of Efate.
- A 75 kilowatt (kW) hydropower system is under construction at the Talise River on Maewo Island to provide electricity to 300 households, 11 schools, 3 clinics, 6 churches, and a planned airport.
- A programme providing subsidies for low-income households aims to connect 4,300 homes by 2018.

Projects were supported by donors including NZ, ADB, UAE, Australia, Japan's PEC Fund and the World Bank Group.

PROPOSED PROJECTS FOR INVESTMENT

National hydro feasibility study

Vanuatu has significant potential for both on-grid and rural micro hydro projects. A nationwide survey of hydro power feasibility will start in 2016.

VREP – phase two

This will focus on increasing rural electrification through use of mini- and micro-grids.

400kW Brenwe hydro project

A proposed run-of-river hydro plant at Brenwe on Malekula Island would replace 90% of diesel generation and expand the distribution grids.

Photo (above): *ITP Renewables*

Photos (above and right): *CBS*

SOLOMON ISLANDS

GOAL 20% of electricity from renewables by 2020

642,000	Population
27	Total installed generation capacity (MW)
78,000	Annual electricity generation (MWh)
23%	Access to electricity
5%	Renewable electricity generation with completion of current projects

The Solomon Islands consist of six large islands and about 1,000 smaller islands. The Solomon Islands Electricity Authority (SIEA) operates nine electricity systems, including in Honiara.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Access has risen from 16% to 23% and renewable generation has risen from less than 1% to 5%.
- Projects to improve the quality and reliability of Honiara's power supply include a new 33 kilovolt (kV) transmission line and diesel power stations upgrades; a 1MW solar PV system at Henderson airport that meets 7% of electricity demand.
- SIEA plans to reduce diesel use and develop a hybrid power station model include installing solar PV generation and battery storage systems at three existing power stations, in Afio, Seghe, and Taro and adding 2MW of solar PV generation to five provincial power stations.
- The Tina River IPP hydro project is in the final phase of design prior to construction. The project will provide 18-21MW to the Honiara network. The SIEA will buy the output under a PPA with the government providing a payment guarantee.
- The SIEA is constructing a 500 kilowatt (kW) hydro system on the Fiu River to displace diesel generation in Auki and increase electricity access by 2019.
- A low-income-household grid-connection programme subsidises new connections to households in parts of Honiara and the provinces for only a small contribution.

Projects were supported by donors including NZ, UAE, Japan's PEC Fund, Australia, ADB, and the World Bank Group.

PROPOSED PROJECTS FOR INVESTMENT

New hybrid stations projects

The SIEA plans to develop over 40 new hydropower-diesel hybrid systems over the next decade. These will increase access in the provinces and provide over 80% of electricity from hydro and solar.

Provincial station conversions

Four remaining provincial stations will be hybridised with solar PV and battery storage to reduce diesel consumption and generation costs.

White River hybrid station

The SIEA is securing land at White River to develop a 2MW hybrid solar/diesel station. This will connect to the east side of the Honiara grid.

Henderson Airport PV expansion

Up to 1.7MW more solar PV generation could be developed in a single stage or in two 850kW stages.

Low-income-household connection programme

Extending funding beyond 2018 would enable more households to be connected to the SIEA's networks.



Photo (above): *ITP Renewables*

TOKELAU

GOAL 100% reduction in imported fossil fuels

1,380	Population
1.5	Total installed generation capacity (MW)
1,230	Annual electricity generation (MWh)
100%	Access to electricity
80%	Renewable electricity generation with completion of current projects

Tokelau is made up of three atolls: Atafu, Fakaofo, and Nukunonu. Each atoll is less than 200m wide and the combined land area is only 12km².

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- In 2013, the solar PV systems provided close to 100% renewable electricity. Since then people have taken advantage of a reliable 24/7 electricity supply so that demand has risen sharply, which has been met by increased diesel generation. Access remains at 100%.

Projects were supported by New Zealand.

PROPOSED PROJECTS FOR INVESTMENT

Expansion of PV and battery systems

Since the PV-diesel hybrid systems were installed in 2012, demand for electricity has risen. Consequently, the current systems use more diesel generation to meet this new demand. The Tokelau Department of Energy has budgeted to expand the existing systems.

Wind generation

The Department of Energy has plans to install 10 kilowatt (kW)of wind on each atoll to complement the solar arrays.

Biogas

The aim is to use the manure from pigs & other village waste to produce biogas that can run a generator, supply gas for cooking & lighting, and even be compressed to run converted vehicles & boat outboard motors, This project also improves waste disposal and in particular reduce the seepage of effluent waste into the reef environment. The by-product can also be used for fertilizer to improve productivity.

Education

Electricity loads have increased since installation of the hybrid PV systems. Consumer education on energy-efficient practices will be crucial to manage load growth.

Photo: *Powersmart*

Photo: *Infratec*

Photo: *Powersmart*

Photo: *GSES*

TUVALU

GOAL 100% renewable electricity generation and 30% efficiency improvement by 2020

10,850	Population
5	Total installed generation capacity (MW)
5,200	Annual electricity generation (MWh)
98%	Access to electricity
43%	Renewable electricity generation with completion of current projects

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

- Since 2013 renewable generation has increased from 4% to 43%. Availability of electricity 24/7 on outer islands has improved service significantly.
- The Fongafale atoll of Funafuti now has grid-connected solar PV systems on major public buildings.
- All eight inhabited outer islands have PV-diesel hybrid mini-grid systems.
- Prepay meters will be installed on Funafuti in June 2016. The meters will improve TEC revenue collection, enable customers to control their electricity costs better, and reduce electricity consumption by an estimated 5%.
- Early 2017 will see installation of a 900 kilowatt-peak (kWp) solar PV system, a 50-100 kilowatt (kW) wind generation system, and a 1 megawatt-hour (MWh) battery storage and control system on Funafuti.
- An energy-efficiency show home (fale) with energy-efficient appliances is due for completion in May 2016. A scheme providing low-interest loans will help facilitate energy-efficient appliance uptake.

Projects were supported by donors including NZ, UAE, EU and the World Bank Group.

Tuvalu comprises six islands and three atolls. The Tuvalu Electricity Corporation (TEC) provides 24-hour electricity supply to eight of the islands.

PROPOSED PROJECTS FOR INVESTMENT

The 1,000 Roof Programme

Funafuti has limited available land. Rooftop domestic and commercial solar PV systems are attractive options. The roof programme will require new policy and regulation to enable private ownership of generators.

Additional storage

Funafuti needs an additional 4 megawatt-peak (MWp) of renewable generation to achieve the 2020 target. This will require grid-stability measures and more electricity storage than currently planned.

Biofuels

The final few percent of the 100% renewable generation target can be cost-effectively achieved by using biofuels in diesel generators. Several pre-feasibility studies have been undertaken, but further investigation into viable options is required.

Capacity development

Ongoing development of capacity and capability within TEC is crucial to long-term asset management and maintenance of the systems.

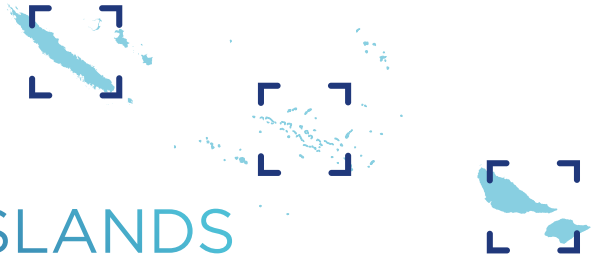
Expansion of central island hybrid systems

Additional solar PV generation and storage capacity for three existing outer island systems (Nukufetau, Nui, and Nukulaelae) will enable diesel consumption to be reduced. Options also need to be investigated to replace the last few percent of diesel generation on the islands of Vaitupu, Niutao, Nanumea, and Nanumaga and the islet of Amatuku in the Funafuti atoll.




Photo (above): EDT

NEW CALEDONIA, FRENCH POLYNESIA, and the TERRITORY OF WALLIS AND FUTUNA ISLANDS



GOAL Reductions in diesel use through reliable renewable energies

271,000	New Caledonia population
284,000	French Polynesia population
15,500	Wallis and Futuna population
>650	Total installed generation capacity (MW)
3M	Annual electricity generation (MWh)
>95%	Access to electricity
19%	Renewable electricity generation with completion of current projects

New Caledonia (Nouvelle-Calédonie) is a special collectivity of France. The archipelago includes the main island of Grande Terre, the Loyalty Islands, the Belep archipelago and the Isle of Pines. Two utilities supply electricity through two separate concessions. Electricite et Eau de Caledonie (EEC) covers the main population, and Enercal operates in the highlands on three of the larger islands.

French Polynesia (Polynésie Française) is an overseas country of the French Republic made up of 118 Polynesian islands, 60 of which are uninhabited. Two-thirds of Tahiti's population live in the capital, Pape'ete.

The Territory of the Wallis and Futuna Islands (Territoire des îles Wallis et Futuna) is a French island collectivity of three main volcanic islands: Wallis (the most populous); Futuna; and Alofi, which is uninhabited.

PROGRESS SINCE THE 2013 PACIFIC ENERGY SUMMIT

New Caledonia › New Caledonia is constructing one hydro and three off-grid hybrid systems to add 17.7MW of renewable generation across four sites.

French Polynesia › French Polynesia has produced a Climate Energy Plan and an Energy Transition Plan and revised legislation on energy, established an education campaign to raise awareness of energy as a resource, implemented an energy-performance labelling scheme for new appliances and studied the potential for centralised energy storage to increase penetration of renewable generation.

Wallis and Futuna › The territory installed several solar-powered water pumps and small grid-connected solar PV systems.

PROPOSED PROJECTS FOR INVESTMENT

French Polynesia

A project to install ocean thermal energy conversion (OTEC) is in the feasibility stage.