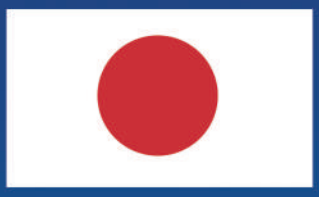
PACIFIC ENVIRONMENT COMMUNITY FUND CONSOLIDATED REGIONAL REPORT 2018



FROM THE PEOPLE OF JAPAN

PACIFIC ISLANDS FORUM SECRETARIAT

Foreword

"All the 16 projects have been successfully completed. Forum Island Countries (FICs) need similar practical initiatives to become more resilient to the impacts of Climate Change. On behalf of the Secretariat and the FICs, I wish to thank the Government and the people of Japan for this."

The Pacific Environment Community (PEC) Fund was a notable development initiative, launched in 2009 at the Fifth Pacific Annual Leaders Meeting (PALM5) in Hokkaido, Japan. The Government of Japan provided ¥6.8billion, approximately US$66 million, contribution to FICs to tackle environmental issues.

The PEC Fund was managed by the Pacific Islands Forum Secretariat and each FIC was provided with an indicative allocation of USD$4million to support projects with a focus on the provision of Japanese made solar power generation systems or sea water desalination plants or a combination of both.

This report provides details of each of the 16 projects in the 14 FICs, including the impact of these projects on the people in each FIC. The PEC Fund initiative promoted the development and implementation of practical pacific – tailored approaches to combating the impacts of climate change relating to energy and water.

This initiative has made prodigious impacts directly to the livelihoods of the people in the Communities where the projects had been carried out. The PEC Fund did not only bring direct development benefits to the FICs through improved access to electricity and water supply, but also provided a platform to encourage engagement by the Japanese private sector with the FICs.

Meg Taylor DBE
SECRETARY GENERAL, PACIFIC ISLANDS FORUM SECRETARIAT

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Allocation vs. Actual

The table below (as of 31/Dec/2018) provides a summary of the funds allocated per country against the actual funds spent.

Country	Project Type	Budget (US Dollars)	Actual (US Dollars)
Cook Islands	Solar	4,000,000	3,580,419
Federated States of Micronesia	Solar	4,000,000	3,424,926
Fiji*	Solar	2,300,000	2,210,034
	Desalination	1,700,000	1,646,518
Kiribati*	Solar	4,000,000	4,000,000
Nauru	Desalination & Solar	4,000,000	3,775,000
Niue	Solar	4,000,000	3,945,000
Palau	Desalination & Solar	4,000,000	3,738,701
Papua New Guinea	Desalination	4,000,000	3,977,431
Republic of Marshal Islands	78 Solar street LED lights	849,895	849,895
	Portable water solutions	3,150,105	3,150,105
Samoa	Solar	4,000,000	3,947,333
Solomon Islands	Solar	3,997,418	3,881,571
Tonga*	Solar	4,000,000	3,952,920
Tuvalu	Desalination & Solar	4,000,000	3,748,075
Vanuatu	Desalination	4,000,000	3,910,500
	TOTAL USD	55,997,418	53,738,428

** Final amount might vary as audit was in progress at the time of writing this report.*

Cook Islands

Solar Power Generation Project

Based on the Cook Islands National Energy Policy and the Cook Islands Renewable Energy Chart, Japanese companies Shinyo Koeki and Mitsubishi Electric Asia manufactured and supplied 13,784 solar panels for the six islands in the Southern Cook Islands. This component was financed by the PEC Fund. This is expected to contribute towards achieving the Cook Islands Government target of supplying 50% of energy from renewable sources by 2015 and 100% by 2020.

In addition, it would reduce the Cook Islands' fuel usage by 526,933 liters annually, a saving of $790,470USD,
while at the same time cutting carbon emissions by 1,512 tons per annum. The procurement of Japanese-made solar panels, as planned by the Cook Islands under the PEC fund project, was carried out without any significant problems. In April 2016, the solar panels were delivered to Rarotonga, then distributed to Mitiaro (620 panels), Mauke (884), Atiu (1,600) and Mangaia (1,820) as initially planned.

Centralized solar PV systems totaling 3,562kWp together with battery storages, backup diesel generators and grid-connect systems were installed, assisting the switch to renewable energy sources. Due to competitive tender prices, excess number of solar panels were also obtained, which made it possible to supply these to the comparatively larger islands of Aitutaki (3,874) and Rarotonga (4,986). Panel installation and other work on the smaller islands was funded by the Cook Islands Government, EU and ADB. Following installations, the four islands of Mitiaro, Atiu, Mauke and Mangaia switched to around-the-clock renewable energy generation, with 95% of energy supplied by renewable sources.

The remaining 5% will be supplied by backup generators when batteries cannot be recharged as usual, such as during long spells of rain when sunlight hours are limited. Shinyo Koeki and Mitsubishi Asia successfully manufactured and delivered the solar panels within the contracted timeframe of less than six months. The procurement of Japanese made solar panels through the PEC fund went smoothly; the contractor implemented appropriate quality control at all stages, from manufacture to packing, storage, containerization and shipping of the products. Although there were several cases of delays during installation, in terms of procurement the project was a great success.

Federated States of Micronesia

Solar Photovoltaic System Project

The Federated States of Micronesia (FSM), like other Pacific island countries and territories is highly dependent on imported petroleum fuels to sustain its economy. The impacts of high fuel prices have resulted in high costs of goods and services in FSM. The PEC fund project sought to address both the National Energy Policy as well as the respective State Energy Action Plans through the installation of up to 600kWp of grid-connected solar PV systems in FSM by Shinyo Koeki Co., Ltd.

The core aspiration of the project was for the state was to initially install 150kWp solar PV systems through the provision of solar equipment and other complimentary activities such as tariff, regulatory and legislation review, and consequently reduce fuel consumption for electricity generation on the four states of the FSM. About 92% of the project costs have gone directly towards fulfilling this.

With successful negotiation with suppliers, additional 200kWp solar PV was installed. This was a big achievement.

This project has been able to benefit approximately 107,000 residents across the FSM and has contributed towards 2.27% renewable electricity generation of the national target of sustaining FSM's 30% energy from renewable energy sources by 2020.

Furthermore, the project is appraised to have to have resulted in fuel savings for FSM of approximately USD648,000 per annum in addition to have tectonically reduced carbon emissions of 667 tons equivalent per annum.

Sustainable social and economic development of FSM has been promoted through the provision and utilization of cost – effective, safe, reliable and sustainable energy services inclusive of contribution to upgrading skills of local and national staff.

Results

Installation of
800kWp
Solar PV systems

2.2%
Contribution of solar PV toward the 30% National RE target

Approximately
USD648,000
Fuel savings

Reduction in greenhouse gas Emissions amounting to
667 tons *equivalent*
Per Annum

- At least one Utility Staff in each State trained on the installation, maintenance
- Operation and management of solar PV systems

Fiji

Desalination Project

The Fiji Government acknowledges the long existing water supply problems faced by the rural communities and in particular in villages throughout the one hundred and four (104) permanently inhabited islands in the Central/Eastern, Western and Northern regions apart from the two(2) main islands, Viti Levu and Vanua Levu. Rainwater harvesting is the primary source of water supply for them and in some very limited cases, underground water wells exist that are tapped on for water provision.

With the fluctuation and relative uncertainty in terms of future weather patterns and climate, desalination provides a robust water source option for these outer islands water scheme. The Water Authority of Fiji (WAF) had determined that installing Desalination plants on each of the priority islands is the least costly of any proposed alternative water projects and is the most feasible. Furthermore, seawater desalination is a climate independent, proven technology capable of delivering large quantities and supplies for the villages.

This project was implemented by NBK Corporation, Japan, and designed to address the water shortage faced by the communities as well as to provide a supplementary water supply.

Furthermore, to develop and establish a partnership arrangement with control mechanisms that will facilitate the efficient and sustainable operation of the desalination plants, Water Authority of Fiji has been engaged to look after the operations and maintenance of the plants.

Finally The Turaga Ni Koro of each village was trained on the operation and maintenance of the desalination plants. It has been noted that the communities have benefited from the desalination projects.

As a result of the project, 175 households on four islands are able to obtain water from seven plants capable of producing 136m^3 of fresh water per day from seawater. The Fiji Government, Ministry of Infrastructure and Transport, and the villagers benefiting from desalination are extremely pleased with this project.

Fiji

Solar Project

Renewable sources are being used in three main forms of electrification in Fiji: i) the main FEA grids with an average renewable energy generation of 61% (2015); ii) the Department of Energy and Ministry of Works mini-grids most of which are powered by diesel with a handful of exceptions where mini-hydropower and bio-fuel; and iii) the DoE led Solar Home Systems programme that currently consists of 11200 systems with a total installed capacity of 3,360 kWp as at June 2018.

The energy sector has a pivotal role to contribute to the attainment of Government of Fiji's (GoF) national development objectives. Renewable energy provides such stimulus focusing on solar, wind, hydro, biomass and geothermal resources. This project has fulfilled basic lighting requirements to 1000 rural in 41 villages collaterally triggering other multiplier effects – and an enabler of income-based activities such as mat weaving and handicrafts which are traditional sources of income. Moreover, educational needs of the children have been sufficiently supported and improved.

The installation of this PEC Fund 1000 SHS Kyocera panels is expected to reduce by approximately 358,000kg per year the amount of CO_2 emissions that otherwise would emanate from the continual use of kerosene lanterns for basic lighting. This increased electricity access to rural areas by about 8% bringing Fiji's rural electrification rate to 96% at present and finally a reduction of kerosene import by about 144,000 liters which translates to an annual domestic savings of $101,858.52USD.

Building the capacity of selected local people in the operational matters of solar home systems. VSTs were selected to attend to minor technical issues after the installations. These were trained during the installation stages of the implementation work. The trainings had been beneficial to the VSTs as they are able to trouble shoot minor problems like loose connections and components faults avoiding unnecessary trips to the villages by DOE and RESCO personnel and saving on operational costs.

Kiribati

Solar PV Grid Project

The Kiribati PEC FUND project which was implemented in October 2012 is a new and complex technology in Kiribati and the region. The solar PV grid project is the first time to connect solar PV output with national power electricity lines. It is also significant nationally as it assists to curb the emission of carbon dioxide into the atmosphere, and assists simultaneously the Public Utilities Board (PUB) to achieve saving as it reduces its consumption on fossil fuel. The project successfully achieved an increase in use of renewable energy on south Tarawa, cost reduction for PUB and reduction in green house emissions. It also increased locals capacity for operating, managing and maintaining the solar PV system.

Involving the community living at the project site to assist in safeguarding of solar panels was conducted through education awareness by the project and the Ministry of Public Works and Utilities (MPWU). This was a solution to the problem of children damaging solar panels by stones. The development launched to the community via a press release killing two birds with one stone; to raise awareness and education about the importance and upkeep of the endeavor towards a renewable power source and to introduce the community of the industry. On the job training was conducted by Japan NBK-FUJI experts where about 17 Technicians from PUB and Energy Unit attended. The enterprise generates 400kw solar energy grid connected to the PUB electricity lines, thus providing saving to the PUB in terms of less fuel to be used and less pollution into the atmosphere and more trained staff. It helped PUB to operate more efficiently, benefits customers and civil society in their gatherings, government and businesses with possible reduction of customer electricity bills in light of the combined solar energy.

Completion of Work

The installation work was completed on the 28th February 2015 which signified the completion of the project. The rejection test was carried out by Japan with out PUB Engineers and it was reported that the test was successful, meaning that the solar system is now fully operational grid connected to PUB diesel generators. There is a computerized display board showing important monitoring indicators such as radiation gauge and generated kilowatt monitor.

Impact of the Project

The project would achieve the expected outcomes as stated in the project proposal. This is due to the PUB electricity lines, thus providing saving to the PUB in terms of less fuel to be used and less pollution into the atmosphere and more trained staff. It helped PUB to operate more efficiently, benefits customers and civil society in their gatherings, government and businesses with possible reduction of customer electricity bills in the light of the combined solar energy generated from other similar solar projects installed. Although the solar panels occupy huge space, but this has been planned.

Nauru

Reverse Osmosis Desalination System

The main energy supply approximately 99% of Nauru's energy supply comes from fossil fuel. With fossil fuel prices rising annually, Nauru government aims to the Nauru government aims to reduce its reliance by at least 50% choosing renewable energy. The Reverse Osmosis Plant was a significant initiative on this path. A total of USD 3,775,000 was spent on this project which included the supply and installation of a 131.94 kWp grid-tie solar power generation system and a 4m^3/hr production capacity Reverse Osmosis Plant. It was projected that the plans could meet 1.3% of the energy demand in Nauru, doubling the existing energy production from solar energy.

The plant was installed and commissioned between 2012 and 2013; based on Ministry of Commerce, Industry & Environments (Nauru) requirement of a Reverse Osmosis Desalination System by Hitachi Plant Technologies Ltd. Japan. With a capacity of 100 cubic meters per day, the RO unit provided low operations and maintenance cost along with high performance and energy efficiency.

> *"The future of Solar Energy Looks bright"*

The RO unit has sustained minimum downtime since installation and with the most important outcome of the project being high quality treated water: TDS less than 500ppm (WHO standards for drinking water). The development is a highly protected and well controlled system with the latest operating and maintenance for drinking systems consequating in having highly trained local staff to maintain and monitor this system daily.

The Reverse Osmosis system has extensively contributed to the water demand thus benefiting Nauru by providing an approximately 800KL/day(RPC/Local demand) and hence playing a vital role of keeping the storage of water to a safe level.

Nauru was the first country to complete the project and start experiencing the benefits from it. This was possible through great support from the Nauruan government whom we need to acknowledge specifically for the successful achievement.

Niue

Solar - Power Generation Project

Niue is a Pacific Island paradise like no other, one of the smallest countries, and one of the largest raised coral atolls on earth. However, it has had its own difficulties over the year. Fuel imports on Niue constitute more than 15 percent of the country's GDP.

The Niue National Strategic Plan (NNSP) recognizes that a reliable, affordable, secure and sustainable energy supply is key to achieving prosperity for all Niuean's. The PEC funded project provided light to this.

The Pacific Islands Forum Secretariat agreed to provide US$4,000,000 from the Pacific Environment Community Fund (PECF) to the Government of Niue for the implementation of the Design, Manufacture and Installation of Solar Power Grid Connected Generators and Battery Backed Power Stabilizer Project. This was provided/implemented by Shinyo koeki Co. Ltd. Japan.

The commission of the PV system was completed in February 2014. The Government of Niue is expecting savings to the tune of USD91,000 per annum with the recent commissioning of their solar photovoltaic system project. In addition to the considerable savings to government expenditure, it is also anticipated that the PEC funded solar project will reduce GHG emission by 329 tons per year.

Key achievement of this project:

- √ Reduce, maintain and control the use of fossil fuel consumption and CO_2 production for the generation of electricity.
- √ Reduce the maintenance costs of diesel power generation.
- √ To showcase the best and most economical techniques to stabilize a diesel powered network incorporating a high level of grid connected solar power.
- √ Create public awareness of the benefits and practicalities of grid connected solar power generation at national and regional levels.
- √ Enhance Niue's image as a first-class environmentally friendly community by the continued adoption of advance renewable energy techniques.

Palau

Desalination (RO) system and Solar Powered Generation Project

Peleliu Island is located approximately 35 kilometres south of Koror State, capital of Palau. The Island is home to 443 people in 147 households, and 84 migrants from overseas and other states to work. The island is rich in its natural beauty and historical heritage. It is one of the sites planned for development into a tourist attraction.

Rainwater is the only water source the locals and tourists depend on for consumption, as there is no river water and the groundwater is saline. Peleliu Island enjoys a maritime tropical climate, having rainfall throughout the year averaging about 3,800mm annually.

However, the rainfall distribution is unpredictable. There can be periods of no rain ranging from one to two months at any one time. The rainfall distribution is also affected by the El Nino weather patterns and it can be warm and dry during this period. The lack of reliable water supply hinders the Palau Government plans to develop the island into a tourist attraction.

Without natural freshwater bodies, desalination was the best solution to Peleliu Island's water issues. Using a groundwater RO plant requires less energy and materials compared to a seawater RO plant. This was possible through the PEC funding project and implemented/provided by Hitachi Plant Technologies Ltd. The project supplied solar RO plant that desalinates the saline groundwater using solar energy.

It is providing 150L of fresh water to each islander and set the foundation for economic development of the island into a tourist attraction – the top priority of the Palau Government. The solar RO plant came with a two-year "WARRANTY" and quarterly maintenance program and will be sustained by tariffs collected from the end users. Continuous technical support (via telephone and email) will be provided for unlimited period to ensure the technical success of the project. The solar RO plant is operated and maintained by Palau Public Utilities Corporation.

The project is benefiting the residents on Peleliu Island, create jobs for the local people and simulate the development of the economy.

Based on Palau's 30-20-20 initiative as a response to Green Energy Micronesia, Palau aims to increase energy consumption efficiency by 30%, generate 45% of energy consumption through renewable energy source by year 2020.

The supply and installation of solar RO plant on the island brought sustainable fresh clean water supply to the island community. Each islander on Peleliu Island has access to fresh water for consumption and other uses. The existing rainwater harvesting system on the island and remaining wells not used for this project will remain in place and supply water to the island community in the event of the breakdown of the solar RO plant.

Papua New Guinea

Solar Powered Desalination Project

Ten Solar-powered Salt Water Desalination Plants were introduced in Manus Province to solve the most basic needs of islanders: to establish a sustainable and reliable water supply during droughts, natural disasters and emergencies. The installation of plants directly responded to the resident's fundamental needs; the plants have not yet experienced dry seasons.

Manus Province is the smallest province in the Independent State of Papua New Guinea (PNG) with a land area of 2,100 km^2, but with more than 220,000 km^2 of water. The rising sea level, which is reported to rise approximately 1mm per year, has caused the contamination of well water by seawater intrusion.

Thus, rainwater harvesting was introduced to diversify the water resource for islanders, while there has been less rainfall in recent years due to Climate Change and extreme weather patterns of prolonged wet/dry weather. A total of 4,965 men, women and children now have access to fresh and safe drinking water from both the installed fixed solar powered seawater desalination plants and supplied gasoline powered portable seawater desalination units, introduced by Sojitz Corporation, Japan on six remote islands of Manus Province. The combine total fresh drinking water capacity of all the plants per day is calculated to 32,640litres per day on full capacity of 8 hours of production.

The immediate impact of this solar powered seawater desalination project is that the target rural island communities have access to clean drinking water which is produced to WHO and PNG 2000 safe drinking water standards. In addition to this, these communities don't have to pay for fuel because the installed desalination plants are solar powered. Since these plants are intended for use during extreme dry spells or cases of El Nino, the lifespan of these plants have actually been extended. With the supply of two years' worth of spare RO membrane and intake filters these supplied and installed plants should be sustained for at least two years while the Manus Provincial Administration determine their long term sustainability arrangements.

The Project is in-line with the national government's plans to build water supply infrastructure in the rural areas of Papua New Guinea, under Vision 2050 Strategic Direction. The installation of solar-powered desalination plants will complement other objectives in Vision 2050, such as "increase the availability of rural electrification from 15 percent to 100 percent of the population".

Republic of the Marshall Islands

RMI Desalination Project

The Republic of the Marshall Islands consists of many isolated coral atolls and islands spread over more than a million square kilometers of the central Pacific Ocean. Approximately one third of the population of 54,000 people resides on the many small islets that make up these atolls, residing in small communities.

In the Republic of Marshall Islands, only residents in Majuro and Kwajalein receive public piped water to their dwellings. All other atolls rely mainly on potable rainwater that is collected from a variety of makeshift shelters and dwelling roofs, and the collected water is stored in an assortment of containers ranging from gallon bottles to plastic and cement storage tanks. According to the 2011 RMI census, the majority of, households i.e., 6,122 or 79%, used rainwater collection/ catchments as their main source of drinking water. With an average household size of 7, this means 42,854 individuals (about 80% of total population) rely heavily on collected rainwater for drinking. The communities in the 15 atolls which are the targets for this project suffer the most from such water difficulties over the past years. All rainwater soaks into the ground and, in isolated areas, is trapped as a lens floating on top of the natural saline groundwater. This fresh water layer may only be several inches or up to several feet in thickness, dependent upon the soil conditions and the width of the land area of the islands. Due to drought and rising seas, more of the wells from which freshwater is harvested are turning brackish each year, so residents are increasingly relying on direct catchment of rainwater and storage in above ground water tanks.

The Republic of Marshall Islands has experiences with RO desalination technology however, considering that there are 25 inhabited atolls in RMI, there is not enough RO units to cater for all atolls during periods of water shortage or disasters. In the meanwhile water shortage continues in the outer atolls and eventually results in the government of the RMI trying to mobilize volumes of drinking water to these communities utilizing various local vessels. The number of communities affected each year varies due to rainfall and the potential rainwater storage capacity of each landmass. But the additional expenditure for the government can be in the range of $100,000 USD to $250,000 USD annually. The PEC funding provided an opportunity to assist the people of RMI. The funding was used to establish small portable PV (Photovoltaic) powered RO (Reverse Osmosis) systems in the 15 outer atoll communities providing 150 to 300 gallons of fresh potable water per day. The RO Unit is powered by only PV so there is no need of relying on power generators which require additional consumption of fuels. It thereby ensures reliable and safe drinking water for the students and all other people in the community with long-term sustainability.

The project was implemented by the Energy Planning Division of the Ministry of Resources & Development by hiring Toyota Tsusho Corporation, Japan. Additionally, the project required the assistance of the Combined Utilities of the Marshall Islands who operate desalination systems and renewable energy systems in conjunction with the Energy Planning Division. Additionally, they have now provided 100% RE electricity to six outer atoll schools. The Energy Planning Division is also working towards developing a national training program for the operation and maintenance of RE systems which can be widened to include water systems.

The project benefits school children, their families, and all other residents +3,000 in the 15 outer island communities of

the Marshall Islands. Water is stored in above ground 1500-gallon storage tanks ready for dispensing to the students and public as needed. The treated water is primarily be used by the students in the school directly for drinking and also for cooking if a school lunch program is in place. This allows school children to take home an additional gallon of water each day so that their families and people in the communities can enjoy the safe potable water.

Solar Power Project

Annually the Marshall Islands has the highest insolation (solar energy resource) from mid-December through to mid-June. Not surprisingly, this is also the dry season. With the islands being located between latitudes 4 degrees North to 15 degrees North, there is a wide variation in the insolation (solar radiation), rainfall and wind resource between the atolls and islands. The problems to be addressed include, reducing energy consumption of existing public street lights in Majuro, reduce costs for maintenance and upkeep of streetlights while improving livelihoods in urban centers by providing a lighted environment to pedestrians at night.

The PEC Fund was allocated to expand the number of street lights that are powered by solar PV by installing approximately 78 units that will displace the need to use 63,623+kWh of electricity that would have been needed if the streetlights were powered by the grid by hiring JASA Corportation, Japan. This has displace equivalent of approx. 17,000 litres of fossil oil and will contribute to reduce Greenhouse Gas Emissions by approx. 3,000kgs of CO_2 equivalent, damaging the global environment. The main objective of the project is to procure and install approximately 78 solar photovoltaic (PV) streetlights for the urban centers of Majuro. The solar PV streetlights have been installed to provide lighting in urban centers of Majuro and areas that have no access to the electricity grid as well as to provide a back up in areas facing constant blackouts periods.

> *"82 street lights were in stalled compared to 78 Initially planned."*

The problem or critical issue that the government of the RMI seeks to resolve the implementation of this project is to provide good quality, affordable, reliable electricity, which (along with water) are essential for the economic well-being of the urban centers of Majuro through a renewable energy intervention.

The objective of national energy development was to provide "an improved quality of life for the people of the Marshall Islands through clean, reliable, affordable, accessible, environmentally appropriate and sustainable energy services" and also meet some of the broad goals for the development of the energy services highlighted in the national energy policy, which is to provide 20 % of energy through indigenous renewable resources by 2020. The solar-powered devices are very convenient, yet helpful, for locations where grid lines are not immediately available. Plus the fact that these solar devices are self-contained, meaning they can be installed in any place with minimum restriction, it makes them as friendly to the environment as can be. It has 138W of solar cell generating electricity during daytime, storing them onto a 200Ah lead-acid battery, and releasing them via 23W LED lamps for a maximum of 12 hours at night-time.

The project is primarily benefiting to the Government of RMI through the Marshall's Energy Company. The Marshall's Energy Company will save approximately $36,894 USD annually in electricity costs as compared to the use of normal MV streetlights. The secondary project beneficiaries are the residents living in the urban areas of Majuro that who are directly benefiting from this project through improved quality, reliability and availability of public lighting for up to 12 hours per day on the streets.

Samoa

Grid Connected Solar Power Project

Samoa relies heavily on imported fossil fuels to generate and supply electricity energy. Hydroelectricity accounts for 40% of total power generation, with the rest supplied mostly by diesel. Seeking to reduce greenhouse gas emissions from diesel plants, as well as costs attributed to diesel power generation and importing fuel, the government of Samoa has established a renewable energy development plan with the goal of 100% renewable energy generation by 2025.

Around 50% of electricity is currently generated from renewable energy, including 12 solar systems, one wind farm and five hydroelectric plants already in operation. Other renewable energy facilities like two new hydro plants are currently under construction and others are also being planned, including bidding for a biomass gasification power plant. In 2012, the government of Samoa received almost 4 million USD grant from the Japanese government through the PEC fund to build a 400kW solar system. Ground-mounted and grid-connected solar systems were built and installed in four locations by Sunwize Power Corporation: Electric Power Corporation (EPC) compound in Vaitele (250kWp), Tanugamanono diesel power station (150kWp) and MapuiFagalele (80kWp) on Upolu Island, and one 125kWp solar system station on Savaii (125kWp).

The total capacity of the four installed solar systems is 605kWp, generating a total of about 800,000kWh per year. This contributes to a reduction of 200,000 liters of diesel fuel, as well as 0.5 tons of greenhouse gas emissions annually. Combined electricity production from these four solar systems accounts for 0.5% of Samoa's annual electricity demand, supplying the power needs of about 1,500 households, out of 35,000 customers in total. The construction of these solar systems and other renewable energy facilities has reduced rates for electricity, which can now be accessed by 100% of the country. The four solar systems constructed through the PEC fund contributed greatly to Samoa's long-term goals of independence from imported fossil fuels and achieving 100% renewable energy use, as well as 100% accessibility to electricity throughout the country. The results of the PEC fund project are highly satisfactory.

Solomons

Home Solar System Installation Project

An alarming 74.6% of Solomon Islanders relied on kerosene in their daily lives (2009 Solomon Islands population/ housing data). Majority of the population of over 600,000 lives in rural areas of which 80% are rural residents did not have access to electricity. The objective of PEC project was to change this and provide an affordable source of light to brighten up the Solomon nights. In three out of nine provinces of Solomon Islands—namely, Guadalcanal, Malaita and Isabel. However, in early June 2012, Inter Action Corporation (IAC) received a directive from Ministry of Mines, Energy and Rural Electrification (MMERE) to expand the geographic scope of the project to accommodate five other provinces—namely, Choiseul, Western, Makira, Temotu and Central.

PEC fund project aimed to install solar power equipment to supply power to some 16,000 to 20,000 people in 2,000 un-electrified households in eight provinces around the Solomon Islands., the Home Solar System Installation Project was implemented according to the Solomon Islands National Energy Policy Framework 2007 and the Agriculture & Rural Development Strategy 2007. In January 2012 this project saw light with a total funding of $3,881,571USD. The (MMERE) selected Japanese company (IAC) as the contractor carrying out this project. The project was implemented under agreement between Inter Action and MMERE to deliver and install large-scale residential solar power systems in 2,000 un-electrified households in the Solomon Islands. The installation of large-scale residential solar power systems provided each house with three lights and the capacity to use small devices such as mobile phone chargers.

This project managed to supply power to 2,000 households. Furthermore, building the capacity of selected local people in the operational matters of solar home systems. VSTs were selected to assist in the installations and also to attend to minor technical issues after the installations. They were trained during the installation stages of the implementation work. An additional training co-hosted by the IAC and MMERE early 2012 was attended by 30 VSTs.

The trainings had been beneficial to the VSTs as they are able to trouble shoot minor problems like loose connections and components faults avoiding unnecessary trips to the villages by MMERE and RESCO personnel and saving on operational costs.

Results

*An **increase** in rural **electrification rate** of* **3.3%** *via **renewable resources***

334,000kg of CO_2 emission *has been mitigated by displacing kerosene usage*

kerosene import** reduced by* **220,000 liters annually** *equivalent to an annual savings of **USD 268,180

Tonga

Solar Power Generator Project

Tonga's project was called Rural / Remote Community Socio-economic Productivity improvement through solar power generation (RRSPG). The RRSPG aimed to replace the diesel- based water pumping systems in the rural villages of 'Uta Vava'u [main land] with 22 solar powered based water pumping systems [Solar Water Pump System - SPS]. The RRSPG project also provides 36 Solar Freezer Systems (SFS) to 20 remote islands of both Ha'apai and Vava'u Island Groups. The objective of the RRSPG was to enhance remote/rural communities' productivity while at the same time increase the households' accessibility to affordable, healthy, reliable water and food supply as well as employment opportunities. With the objective, the project is aligned closely to the Tonga Strategic Development Framework 2011/2014 (TSDF) and that is "To develop and promote a just, equitable and progressive society in which the people of Tonga enjoy good health, peace, harmony and prosperity, in meeting their aspirations in life."

As a project under the Tonga Energy Roadmap (TERM), it was designed with the fore thought on the reduction in fossil fuels and Green House Gas (GHG) emission in mind and its contribution to the government's renewable energy target. The project was therefore complementary to the various other efforts on Tonga's renewable energy target. Tonga selected Shinyo Koeki. Co. Ltd., Japan to implement the project

Each SFS can produce up to 300kg of ice every day and can accommodate various frozen needs of households. Women and youth groups in each village have also given business opportunities and has become an additional income generation for households with less costs. SPS has also provided satisfactory services of extracting underground water to a higher elevation for communities' water supply network. Cost of operating water supply of the community has also reduced dramatically. Women groups in the remote islands are tasked with operating the freezer systems and were all strengthened to be able to start a business for themselves and to provide services to the whole community. National strategic objectives have achieved particularly the renewable energy target as this project contributes 1.8% to the current achievement. Fossil fuels have saved so as to the greenhouse gas emission from the public and transportation sectors. Approximately 8.2giga grams of carbon dioxide equivalent in total is saved by the RRSPG Project intervention.

As outlined on the main project document, water is used for preparation of commercial agricultural products (such as kava, root crops, vanilla and vegetables) for subsistence income and pandanus leaves and other raw materials for fine mat weaving. The significance of fine mats for cultural ceremonies such as weddings, birthdays and funerals is an important element in Tongan societies locally and abroad. These are instant cash income for communities.

The four outcomes of this expenditure were:

- √ Increased household economic production and income generation opportunities In rural/remote communities;
- √ Reduced fossil fuel use in rural communities, water pumping and remote islands trading expeditions;
- √ Increased accessibility to affordable, hygienic water and healthy food supplies
- √ Increased employment opportunities in rural/remote communities.

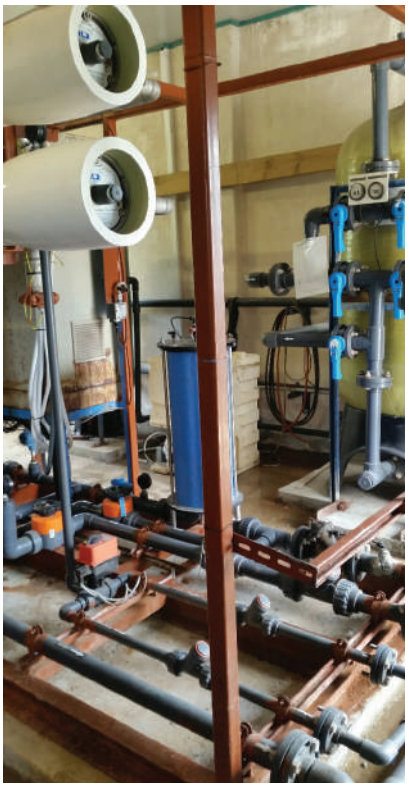
The Project equipment has reduced costs of operating community water supply and has become a source of income for the rural families.

Conclusively; this project brought about strong inclusive communities; creating dynamic public and private sector partnerships retrospectively bringing about a well-planned and fully maintained infrastructure, improved health of the people and cultural awareness, environment sustainability, mitigation and adaptation to climate change. A total of 1647 households benefiting from the project - a total of 8589 people. Approximately 820,000 liters of fossil fuel is saved annually by the PEC Fund Project equipment. Annual fuel savings of approximately USD 1,148,000.

Tuvalu

Solar-Powered Desalination Project

Water is life! Water supply in the small atoll nation of Tuvalu is strained. During normal times, this island state limits per capita water consumption by more than half. This was the situation in every household on the island. Reliant entirely on rainwater, water shortages threaten the livelihoods of communities across Tuvalu and come with significant social and economic costs that weigh heavily on human lives.



With the funding of $3,748,075USD providing through the PEC Project, it was targeted to install solar-powered desalination plants and provision of portable desalination systems. While Tuvalu's main power supply comes from diesel-powered generators, the project also involves the installation of a 65.52kWp grid-connected solar power generation system that provides enough power to operate the desalination plants.

Early 2013 (February) the 100m^3 capacity RO desalination plant was installed by Hitachi Plant Technologies Ltd and handed over to Public Works Department for operational until the plant was Officially Commissioned on September 2013. By March 2013, three desalination systems (one fixed, two portable) were installed. The three plants can produce a total of 120 m^3/day and with the capacity of an existing 50m^3/day plant they now have capacity to produce 170 m^3/day. The average water usage per person in Funafuti is 25 Liters per day. Based on the population of around 6,500 people the average daily requirement is 162,500 liters (162.50 m^3/day). The fixed plant installed at PWD premises provides a maximum of 100 m^3/day. During rainy seasons this plant is enough to meet the water demand.

The three PEC funded systems became a vital source of potable water in Tuvalu. In addition, the solar-powered systems are expected to save 38 tons of diesel fuel annually. From 2018, Tuvalu plans to conduct re-training of staff and receive spare parts through the Sustainability Project, aiding the sustainability of the plants. The outcomes of this project were highly satisfactory.

Vanuatu

Solar Powered Desalination Project

Rainfall is the main source of potable water on Vanuatu's Ambae Island. Although lake water has been used for purposes other than drinking, volcanic activity greatly affects the island's unstable water quality. In addition, the effects of climate change have caused shifts in Vanuatu's rainfall, leading to chronic water shortages. To deal with the challenge of these critical water shortages, Vanuatu's government selected Japanese company Hitachi Plant Technologies Ltd. to oversee the PEC fund project of $3,910,500USD.

The project aimed to supply potable water both for daily use and emergencies, while also factoring in the stability of supply and price of fuel for operating existing facilities, by installing a solar-powered desalination system on Ambae Island. Similarly, compact desalination systems were also installed to improve the situation on Aniwa Island, where residents previously relied on rainfall for potable water and used spring water containing salt in times of drought.

On Ambae Island, the solar-powered desalination systems raised the potable water supply capacity by 100m^3/day. Meanwhile, the desalination system on Aniwa Island, which runs on diesel generators, increased supply capacity by 10m^3/day. These facilities became the main source of potable water for residents of the two islands. Desalination facilities installed through the PEC fund deserve special mention for their ability to supply potable water when volcanic gases and ash caused water to acidify after an eruption on Ambae in September 2017, creating an emergency in terms of water resources and public health.

The outcomes of this PEC fund project were highly satisfactory, providing 11,000 residents of Ambae and 350 residents of Aniwa with safe sources of potable water.

PEC Fund Sustainability Project

1. Objective: To ensure effective utilization of the unspent component of the PEC FUND.

2. Background: The Pacific Islands Forum Secretariat (the Secretariat), in consultation with the Government of Japan released circular #122 on 20 September 2017, calling for Expression of Interests (EOI) from the Forum Island Countries (FICs) to ensure the sustainability of their PEC Fund installations. The Sustainability Project was to be from the available surplus of the PEC Fund.

3. Shortlisting Criteria: A total of eleven EOI's were received from the following FICs: Cook Islands, FSM, Fiji, Kiribati, Nauru, Palau, PNG, RMI, Tonga, Tuvalu &Vanuatu.

4. Applicable Expression of Interests (EOI): The following Countries submitted detailed EOIs to PIFS, which were subsequently reviewed in consultations with the suppliers, led by the PEC Officials in Tokyo, so that the approvals are within available funds.

Country	Disbursement for the Project
Fiji	USD316,400
Kiribati	USD324,800
Nauru	USD716,400
Palau	USD505,900
PNG	USD699,900
Tonga	USD202,450
Tuvalu	USD761,500
Vanuatu	USD756,400
Total	USD4,283,750

5. **Summary of Projects**

Country	Project Summary
Fiji	Supplier: NBK Corporation 2 years of extension of maintenance and refresher training for desalination plants. Original Project's maintenance support period expired in MAY 2015. Extension period: APR 2018 to APRIL 2020 Budget: USD316,400
Kiribati	Supplier: NBK Corporation 2 years extension of maintenance and refresher training for Photovoltaic system. Original Projects maintenance support period expired in FEB 2016. Extension Period: APR 2018 to MAR 2020 Budget: USD324,800
Nauru	Supplier: Hitachi Hitachi will supply the mandatory spare parts & critical equipment of the solar RO plant, provide training for desalination system and 2 years maintenance support. The original project's support period expired in FEB 2015. Period of 2 years maintenance support: APR 2018 to MAR 2020 Budget: USD716,400

Palau	Supplier: Hitachi Hitachi will supply the mandatory spare parts & critical equipment of the solar RO plant, provide training for desalination system and 2 years maintenance support. Original Project's maintenance support period expired in FEB 2016. Period of 2 years maintenance support: APR 2018 to MAR 2020 Budget: USD505,900
PNG	Supplier: Sojitz Sojitz will ship additional consumable and spare parts for Photovoltaic Reserve Osmosis (PVRO) desalination plants. They will also ship additional consumable and spare parts and back-up equipment for portable desalination equipment. Sojitz will send engineers from Japan to Manus for maintenance, for on site training for operation and maintenance, and supervising for enhancing sustainability. Original Project's support period expired in NOV 2016. Period of maintenance service: until the end of 2018. Budget: USD699,900
Tonga	Supplier: SHINYO KOEKI Co., Ltd 2 years extension of preventive maintenance package and refresher training for solar power system. The original project's support period will expire in FEB 2019 Period of 2 years extension of maintenance: FEB 2019 to FEB 2021. Budget: USD202,450
Tuvalu	Supplier: Hitachi Hitachi will supply the mandatory spare parts & critical equipment of the solar RO plant, provide training for desalination system and 2 years maintenance support. (The supplier will also offer site modifications and repair existing equipment.) The original project's support period expired in FEB 2015 Period of 2years maintenance support: APR 2018 to MAR 2020 Budget: USD761,500
Vanuatu	Supplier: Hitachi Hitachi will supply the mandatory spare parts & critical equipment of the solar RO plant, provide training for desalination system and 2 years maintenance support. The original project's support period expired in OCT 2016 Period of 2years maintenance support: APR 2018 to MAR 2020 Budget: USD756,400

Conclusion

Pacific Islands Forum Secretariats (PIFS), funding was aimed to improve rural communities' socio-economic living. The funding was administered and managed by the Pacific Island Forum Secretariat across fourteen Forum Island Countries who receive an indicative allocation of USD4million to spend on projects.

Each country's initiative has helped develop and implement solutions that now help the communities in combating challenges faced by them in their daily lives because of effects from climate change. Energy and water as known to be the basic needs in life were the focus of these initiatives.

16 projects in 14 countries where thousands of lives will now have better access to energy and water. Projects such as these will help build resilience in our communities to manage their livelihood in the face of climate change.

We thank the Government of Japan for providing this valued support and the people of these countries for helping execute these admirable initiatives.

Acknowledgment

The completion of these PEC funded projects across the pacific island would not have been possible without the assistance and support of firstly the funding partners as well as the executing partners including governments, suppliers and every individual who contributed during the progress of the individual projects.

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