

PACIFIC ENERGY UPDATE --- 2019



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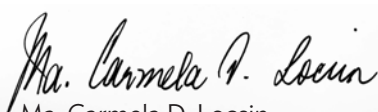
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ABBREVIATIONS

ADB	-	Asian Development Bank
AMI	-	advanced metering infrastructure
BESS	-	battery energy storage systems
CO ₂	-	carbon dioxide
DMC	-	developing member country
EPC	-	Electrical Power Corporation
FSM	-	Federated States of Micronesia
IPP	-	independent power producer
km ²	-	square kilometer
kW	-	kilowatt
kWh	-	kilowatt-hour
kWp	-	kilowatt peak
MEC	-	Marshall's Energy Company
MFF	-	multitranches financing facility
MW	-	megawatt
MWp	-	megawatt peak
NUC	-	Nauru Utility Corporation
O&M	-	operation and maintenance
PNG	-	Papua New Guinea
PRIF	-	Pacific Region Infrastructure Facility
SPEL	-	Sun Pacific Energy Limited
TA	-	technical assistance

Welcome to the 2019 edition of the Pacific Energy Update of the Asian Development Bank (ADB). ADB's Pacific Department partners with governments, communities, and the private sector to increase access to electricity, generated by clean and renewable sources of power. ADB supports its Pacific developing member countries and utilities to increase renewable energy generation capacity, improve energy access and efficiency, strengthen the enabling environment for resilient, low-carbon economic growth, and improve sector governance and sustainability.

Our work in the Pacific energy sector is improving energy security, lowering the costs of producing power, and reducing carbon emissions. This update highlights some of ADB's core activities in the Pacific energy sector, the impacts that these activities produce, and what ADB aims to achieve in the future.



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ADB ENERGY OPERATIONS IN THE PACIFIC

■ ACTIVE
 ■ COMPLETED
 ■ PROPOSED



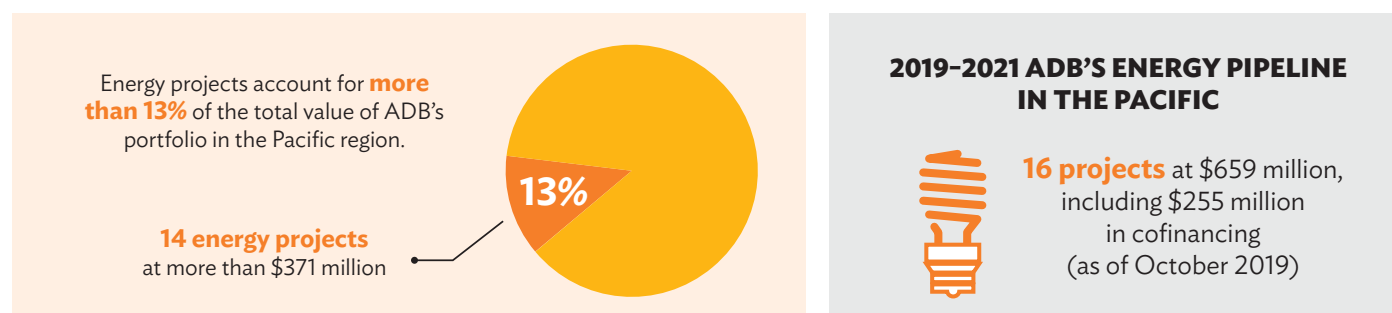
OVERVIEW

The work of the Asian Development Bank (ADB) in the Pacific energy sector is empowering people and communities. Energy sector operations in the ADB's Pacific developing member countries (DMCs) are installing new sources of renewable power, improving supply-side energy efficiency, integrating battery energy storage systems (BESS) to help grids absorb intermittent sources of power, and supporting domestic stakeholders to improve sector regulation and management.

From 2007 to 2018, ADB approved financing for projects to install 62 megawatts (MW) of renewable energy generation capacity, construct or refurbish more than 1,600 kilometers of transmission and distribution lines, and connect more than 10,000 households to electricity grids. From 2019 to 2021, ADB's energy portfolio will roll out nearly \$1 billion in energy investments across the region.

The *Pacific Energy Update 2019* provides an overview of ADB's technical assistance (TA), grant, and lending activities in the region. It showcases the impacts and outcomes of initiatives completed in 2019, and active as of November 2019. It also describes selected activities slated for implementation in the years to come.

ENERGY PORTFOLIO IN THE PACIFIC



Country Data, 2018

Pacific DMC	Population ('000)	Land Area (km ²)	Number of Islands/Atolls	GDP per Capita (current \$)	Electricity Access	Renewable Energy Target by Year
Papua New Guinea	8,738	452,860	approximately 600	2,651	12%	100% by 2030
Fiji	885	18,274	332	5,639	87%	100% by 2030
Solomon Islands	670	27,990	approximately 998	1,724	23%	79% by 2030
Vanuatu	297	12,274	84	2,876	33%	100% by 2030
Samoa	197	2,934	9 plus adjacent small islets	4,258	100%	100% by 2025
Kiribati	114	810	33	1,729	>65%	23%–40% by 2025
Tonga	105	750	171	4,011	89%	50% by 2020
Micronesia, Federated States of	102	702	607	3,300	65%	>30% by 2020
Marshall Islands	55	181	5 islands, 29 atolls made up of an indeterminate number of islets	3,669	87%	20% by 2020
Cook Islands	19	240	15	15,613	99%	100% by 2020
Palau	18	189	more than 300	16,261	98%	45% by 2025
Nauru	13	21	1	8,330	100%	50% by 2020
Tuvalu	10	27	9	3,545	98%	100% by 2020
Niue	1.6	261	1	15,074 ^a	99%	80% by 2025

DMC = developing member country, GDP = gross domestic product, km² = square kilometer.

^a Data as of 2016.

Source: Asian Development Outlook database (2018) and Pacific Regional Infrastructure Facility. 2019. *Renewable Energy Costs in the Pacific*. Sydney (Table 1: Pacific Island Countries' Electricity Sector Overview).

Box 1: Strategy 2030 and Energy Systems in the Pacific

Strategy 2030 of the Asian Development Bank (ADB) sets operational priorities for achieving a more prosperous, inclusive, resilient, and sustainable development path in Asia and the Pacific. To do so, it establishes seven focus areas that guide its operations. Text boxes and icons throughout this publication highlight the ways in which Pacific energy initiatives are aligned with ADB's Strategy 2030. The following descriptions highlight the key ways in which energy sector operations are aligned with the focus areas of ADB's Strategy 2030.



Addressing remaining poverty and reducing inequality by connecting homes and businesses to electricity for the first time; and by training people to participate in the formal economy or start new businesses, leveraging new electricity resources.



Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability by helping countries reduce their emissions from power generation, constructing infrastructure that is resilient to natural hazards, and mobilizing capital to rapidly respond to natural disasters with a “build-back-better” approach.



Accelerating progress in gender equality by integrating gender training into capacity building and workshops, and supporting women to access jobs and decision-making roles in the formal economy.



Making cities more livable by increasing access to clean electricity and efficient grid infrastructure. Energy sector operations are also helping increase the resilience of urban infrastructure, and supporting crosscutting solutions, including in the water and sanitation sector.



Promoting rural development and food security by extending grid connections to rural areas, enabling cold food storage with new electricity connections; and engaging rural communities in the construction, operation, and maintenance of energy infrastructure.



Fostering regional cooperation and integration by engaging countries, companies, and development partners in dialogue to identify and overcome common challenges, and by implementing regional solutions with technical assistance and programmatic financing.



Strengthening governance and institutional capacity by working with regulators and other institutions to align energy sector policies with international best practices, and by helping reform tariffs to support cost recovery and the financial sustainability of power utilities.

REGIONAL

Achieving reliable access to clean energy is essential to human development and low-carbon economic growth. As energy demand in Asia and the Pacific grows rapidly, ADB is helping to improve regional energy systems with a three-pronged energy approach. ADB seeks to (i) promote energy efficiency and renewable energy; (ii) maximize access to energy for all; and (iii) promote energy sector reform, capacity building, and effective governance. This approach leverages national and regional partnerships to strengthen energy systems, support low-carbon economic growth, improve living conditions, and respond to the diverse needs of ADB's Pacific developing member countries (DMCs).¹

The Pacific region, as a whole, faces a unique set of energy challenges. Its limited supply of domestic fossil fuel resources has led to a historical dependence on imported fuels for power generation, and a corresponding vulnerability to fluctuating energy prices. At the same time, outdated power infrastructure, geographical dispersion, small economies of scale, and limited generation capacity lead to high electricity tariffs (or costly subsidies), transmission and distribution losses, and low electrification rates in a number of the Pacific DMCs.

To overcome regional energy constraints, the Pacific DMCs have embarked on a structural shift toward renewable energy, and away from diesel power generation—many Pacific DMCs are targeting as much as 100% renewables for their energy mix, alongside increased access to electricity and more resilient infrastructure. The transition to cleaner, more efficient power source is reducing dependency on imported fossil fuels, increasing access to affordable and reliable electricity, and supporting climate change mitigation by reducing carbon dioxide (CO₂) emissions.

The Pacific DMCs possess a large potential to strengthen local economies and enhance the quality of life as they modernize their energy sectors. ADB's work in the Pacific is empowering people and communities by financing solar, wind, hydropower, and battery storage, alongside efficient transmission and distribution lines. TA is helping utilities to operate more efficiently—with advisory services to improve financial management and corporate governance—through legal, policy, regulatory, and institutional reforms.



A boy studying with a lamp at their home in Mai 2 Village in Papua New Guinea (photo by ADB).

¹ ADB's 14 Pacific DMCs comprise the Cook Islands, Fiji, Kiribati, the Marshall Islands, the Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu.

Box 2: Fostering Regional Cooperation and Integration: Delivering Finance at a Larger Scale across the Pacific

Communities across the Pacific are extremely diverse. However, geographical and economic similarities between the 11 smallest Pacific developing member countries (DMCs) contribute to similar energy sector challenges.^a The 11 smallest Pacific DMCs have recognized the need for a structural shift in the way they generate power—a movement away from costly imported diesel, in favor of domestically available, renewable energy.

The 11 smallest Pacific DMCs are endowed with cost-competitive renewable energy resources, and each country has ambitious renewable energy targets, ranging from 20% to 100% of the total generation mix. However, the uptake of renewables is restricted by lack of finance and private sector participation, capacity barriers, poor sector regulation, and the limited ability of local grids to absorb new sources of renewable power.

The Asian Development Bank (ADB) is leveraging its considerable experience in supporting the development of energy sectors in the Pacific DMCs to increase coordination between governments, donors, the private sector, and communities across the region.

^a The 11 smallest Pacific DMCs are the Cook Islands, Kiribati, the Marshall Islands, the Federated States of Micronesia, Nauru, Palau, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. They are sometimes grouped in ADB documents and publications because they share a country operations business plan—*The Pacific Approach, 2016–2020*.

Source: ADB.



A power station that generates 750kW from solar power and 1800kW from diesel generators in Funafuti, Tuvalu (photo by ADB).

Pacific Renewable Energy Investment Facility

Status: **Active**

ADB financing: \$200.00 million

Cofinancing: \$500.00 million

Counterpart: \$50.00 million

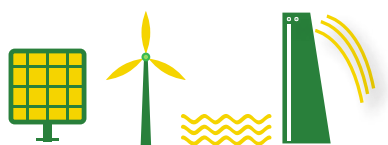
Total financing: \$750.00 million

The **Pacific Renewable Energy Investment Facility** is streamlining ADB and donor partner investments in the 11 smallest DMCs by funding a \$750 million pipeline of individual, small-value renewable energy subprojects through a single facility.

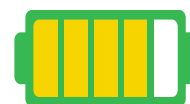
The facility is designed to achieve a paradigm shift in the Pacific region—helping Pacific DMCs rapidly move from their current energy pathway (which is almost entirely dependent on fossil fuels) to one that is low-carbon and climate-resilient and provides greatly increased levels of energy access to marginalized populations.

The facility is improving the efficiency of donor support by enabling development partners to deploy a larger volume of small-scale projects in rapid succession. The financing modality is based on the observation that renewable energy projects in the Pacific are typically small, often require similar project preparatory activities as large projects, and have historically required individual processing and approval. By grouping projects into a single facility, development partners and governments will be more capable of sharing knowledge and resources, and regional donors will be able to process assistance packages more efficiently.

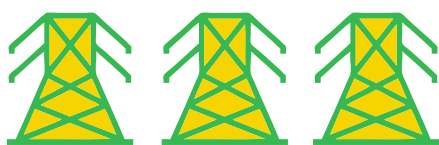
The facility is providing development support for around 20 separate renewable energy projects over a 5-year period. Physical improvements to the energy sector across the Pacific will include:



installation of **80 MW of solar, wind, and hydropower** generation capacity;



installation of **30 MW** battery storage;



construction or rehabilitation of **300 kilometers of transmission and distribution** lines;



refurbishment of **5 diesel plants to improve efficiency**; and



implementation of **4 rural electrification** projects.

The facility is also overseeing energy sector reforms, promoting private sector engagement, preparing further investment channels, and disseminating best practices and lessons learned. It is fostering regional economic development through improved energy infrastructure, and more efficient donor support. The facility's impact will be the improved energy security across the Pacific, and its outcome will be the increased generation of clean energy at lower costs.

Capacity Building and Sector Reform for Renewable Energy Investments in the Pacific

Status: **Active**

Cofinancing: \$5.00 million

The TA for **Capacity Building and Sector Reform for Renewable Energy Investments in the Pacific** is supporting the long-term sustainability of infrastructure and investments in energy sectors across the region. It is doing so by facilitating engagement with governments and power utilities to assess policy and institutional barriers to efficient, sustainable sector operations, and to address impediments to increased capital investments, including private sector investment.

The TA is financed on a grant basis by the Green Climate Fund, and is being implemented by ADB. It is (i) conducting a comprehensive assessment of utilities' operations and performance; (ii) reviewing their business processes, systems, and management practices; (iii) reviewing policy, regulatory, and governance arrangements; (iv) providing recommendations and support for policy dialogue; and (v) fostering coordination among regional peers to implement reforms.² The TA is improving energy security across the Pacific region, by supporting utilities to operate more sustainably and generate cleaner power at lower costs.

Pacific Renewable Energy Program

Status: **Active**

ADB financing: \$100.00 million

The **Pacific Renewable Energy Program** (PREP) is designed to encourage private sector investment by using donor funds to backstop the payment obligations of power utilities. The design for each project under PREP includes one or more of the following forms of financing support: partial risk guarantee, direct loan, letter of credit, and technical assistance. It mitigates short-term liquidity risk, through a donor-backed standby letter of credit, and supports long-term investment, through a partial risk guarantee.



A girl trying out the solar-powered drinking water in Tanna, Vanuatu (photo by Sally Shute-Trembath).

² The TA will cover seven Pacific DMCs—Cook Islands, Marshall Islands, Federated States of Micronesia, Nauru, Papua New Guinea, Samoa, and Tonga.

COOK ISLANDS



Historically, the Cook Islands has been almost entirely dependent on imported diesel for power generation. In 2012, about 99% of power generation in the Cook Islands came from diesel, and the corresponding fuel costs were about \$29.8 million, or 25% of the country's total imports.

The Cook Islands Renewable Energy Chart Implementation Plan sets a target of supplying 100% of residents on the inhabited islands with renewably generated power by 2020. Supplanting diesel power with renewables can reduce the cost of generation by up to 40%—lowering household and business expenditures on electricity, improving fuel security, and reducing carbon emissions. ADB is supporting the Cook Islands to reshape its power sector by investing in solar energy and battery storage, and by building capacity to manage new assets sustainably.

Renewable Energy Sector Project

Status: **Active**

ADB financing: \$11.19 million

Cofinancing: \$23.52 million

Counterpart: \$8.94 million

Total financing: \$43.65 million

The **Renewable Energy Sector Project** is installing solar-generating systems on five islands. The photovoltaic systems will provide a combined installed capacity of about 2 megawatt peak (MWp), coupled with batteries to store electricity from solar energy. The project is also building institutional capacity to attract private sector investment in new renewable energy projects.

In 2017, the Global Environment Facility and the Green Climate Fund awarded two separate additional financing grants that have significantly expanded the scope of the original project. The additional financing is installing a total of four BESS to provide load shifting to offset renewable generation. BESS installations are allowing the state-owned utility, Te Aponga Uira, to connect more intermittent electricity generated by solar and wind power, without negatively affecting the grid. The addition of BESS is making it possible for the private sector to finance new renewable energy generation in the future.



Fiji has set targets of reaching 99% renewable energy for power generation by 2030 and a 100% electrification rate by 2020. Achieving these goals will require significant investment—approximately \$760 million over the coming decade—as well as increased regulation of Fiji’s electricity sector.

The government’s priority actions for achieving these goals include (i) expanding the role of the private sector in power generation, including through the partial privatization of Fiji Electricity Authority; (ii) increasing the role of non-Fiji Electricity Authority renewable energy from small-scale systems; and (iii) restructuring regulatory arrangements to improve transparency and accountability, particularly with respect to electricity tariffs.

ADB is assisting the government to strengthen the regulatory environment in support of deeper private sector participation, as well as building domestic capacity to plan and implement a pipeline of investments.



Support for Energy Sector Regulatory Capacity and Rural Electrification Investment Planning

Status: **Completed in March 2019**

Total financing (ADB): \$1.20 million

The TA for **Support for Energy Sector Regulatory Capacity and Rural Electrification Investment Planning** supported capacity development in Fiji’s Department of Energy for its expanded mandate in regulation of the country’s energy sector. Improvements in the regulatory environment and increased transparency in tariff-setting processes are expected to foster deeper private sector participation in the energy sector.

The second component of the TA supported the Department of Energy to develop a rural electrification master plan, by establishing the underlying policy framework and tools for identifying, prioritizing, selecting, and implementing discrete investments in electricity expansion projects. The TA was completed in March 2019, and contributed the development of a more resource-efficient, cost-effective, and environmentally sustainable energy sector.

MARSHALL ISLANDS



Streetlights in Marshall Islands (photo by ADB).

In 2009, the Marshall Islands adopted its National Energy Policy and Energy Action Plan, setting a 20% renewable energy generation target for 2020. The government has also established a 35% greenhouse gas emissions reduction target against a 2010 baseline. Achieving these goals will require considerable investment in the power system on the nation's capital, Majuro, which is almost entirely dependent on diesel for power generation and accounts for 72% of national electricity demand.

The distribution system of the Marshalls Energy Company (MEC) in Majuro is over 30 years old and was not designed to accommodate renewable energy sources. The current system can accommodate no more than 11.8% renewables—well below the national 20% target—without upgrades to the Majuro power plant and distribution network. Furthermore, outdated fuel storage facilities pose critical risks to public safety, fuel security, and economic growth.

ADB is supporting the Marshall Islands to strengthen energy security and modernize outdated power infrastructure. The Capacity Building and Sector Reform for Renewable Energy Investments in the Pacific is helping build capacity and strengthen the commercial performance of MEC, while corresponding investments are improving system efficiency, enabling the uptake of new renewable sources of power, and addressing key safety concerns (page 6).



Majuro Power Network Strengthening Project

Status: **Active**

ADB financing: \$2.00 million

Counterpart: \$ 0.25 million

Total financing: \$2.25 million

The **Majuro Power Network Strengthening Project** is installing an advanced metering infrastructure (AMI) which will allow MEC to manage power more efficiently, decrease network losses, reduce diesel fuel consumption for power generation, and improve revenue collection. Data provided by the AMI will inform future investments to improve system efficiency and increase the share of renewable energy used to power the grid.

The project is also strengthening MEC's financial sustainability with a comprehensive program for management improvements and business process reengineering. The reform program is targeting key areas such as governance, accounting, and methodologies for setting and approving tariffs. ADB anticipates financing a second phase of the project to replace transformers and conductors, and to further support the uptake of renewable power generation into the grid.


Energy Security Project

Status: **Active**

ADB financing: \$12.70 million

Counterpart: \$3.10 million

Total financing: \$15.80 million

Majuro houses the largest fuel storage facility in the Central Pacific. The 6 million-gallon fuel tank farm was constructed in 1981 to meet increasing electricity demand. Nearly four decades later, the site continues to supply fuel to Majuro, Kwajalein Atoll, and maritime customers (fishing fleets and shipping vessels). However, the facility is in critical need of repair.

The fuel tank farm is located approximately 30 meters from the ocean, making it extremely vulnerable to atmospheric corrosion. At the same time, constrained funds have contributed to limited maintenance and corresponding degradation of facility equipment. MEC and the government have flagged refurbishments as an urgent investment need to safeguard against potential health, safety, economic, and environmental risks associated with tank floor leaks, pipeline leaks, or catastrophic tank failure.

The **Energy Security Project** is (i) rehabilitating the fuel tank farm and instituting a comprehensive (operations and maintenance) O&M plan, (ii) mitigating key safety and environmental risks associated with the handling and storage of refined petroleum products, and (iii) improving the overall fuel security of the Marshall Islands.

Box 3: Strengthening Governance and Institutional Capacity: Improved Sector Governance to Drive Clean Energy Investments

Investments in energy efficiency and renewable power generation can greatly reduce the Pacific region's reliance on fossil fuels for power generation, drive down generation costs, and support increased access to electricity. Although development assistance will continue to play an important role in financing energy infrastructure, the Pacific developing member countries will need to increasingly focus on attracting private sector finance—strengthening governance and sector regulation is essential to creating an enabling environment for investment.

A major constraint to mobilizing investment in the Pacific energy sector is the poor commercial performance of utilities in the region. Effective governance and sector regulation can strengthen the financial sustainability of utilities and support new investment. However, many governments and utilities in the region lack the capacity or resources to design and implement effective regulatory regimes for the energy sector.

Asian Development (ADB) Bank is supporting governments, utilities, and regulators across the region to strengthen sector performance. Technical assistance initiatives are (i) building human and institutional capacity in the areas of accounting, management, and governance; (ii) reviewing tariff structures to encourage cost recovery without the need for government subsidies, (iii) supporting utilities to improve commercial performance through business process reengineering; and (iv) helping plan and implement prudent pipelines of investments to meet sector goals.

Source: ADB.

FEDERATED STATES OF MICRONESIA



Solar panels in Yap, Federated States of Micronesia (photo by Mike Trainor).

The Federated States of Micronesia (FSM) comprises four states—Chuuk, Kosrae, Pohnpei, and Yap—spread across 607 islands in the West Pacific. Each state enjoys considerable autonomy, with responsibility for many public services (including power sector management) devolved from the central government.

As a whole, the FSM is working to lower its dependence on imported diesel for power generation, and to reduce its exposure to fluctuating fuel prices. State targets are aligned with the FSM's National Energy Policy (2012), which seeks to reduce generation costs and address energy security in a financially and environmentally sustainable manner. National targets include 30% power generation from renewable energy sources, a 50% increase in end-use efficiency, and a 90% rural-household electrification rate by 2020.³

ADB is supporting the FSM by addressing diverse power sector needs at the state level. In December 2018, ADB completed the Yap Renewable Energy Development Project, and is processing a second project under the Pacific Renewable Energy Investment Facility, which will scale up support for the power sectors in Yap and Kosrae and improve Pohnpei power utility operations.

³ Of the FSM's total population of approximately 111,000 people, about 55% enjoy access to electricity. However, this figure varies widely between states.

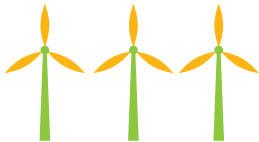


Inauguration of the wind farm for the Yap Renewable Development Project in the Federated States of Micronesia (photo by Mike Trainor).

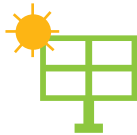
Yap Renewable Energy Development Project

Status: **Completed**
 ADB financing: \$9.04 million
 Counterpart: 2.12 million
 Total financing: \$11.16 million

The **Yap Renewable Energy Development Project** financed an integrated solar, wind, and high-efficiency diesel power system for the state utility, Yap State Public Service Corporation. The project is completed and rated *successful*. The project installed:



three wind turbines
 with a combined peak capacity
 of 825 kilowatts (kW),



**a 300 kW solar photovoltaic
 system,**



**integration and
 control system,**



two high-speed diesel generators
 (with 1.65 MW and 0.83 MWp
 capacity) to improve system efficiency
 and allow for an increased renewable
 energy penetration rate in the grid, and



provided the utility capacity-building
 and project management services to
 support project implementation and
 long-term sustainability.

The project was physically completed in April 2018, and the 12-month operational testing period took place from April 2018 to March 2019. At completion, renewable energy accounted for 19.3% of power generation on Yap, comprising 17% from the project and 2.3% from a solar system financed in parallel by the Government of Japan.

Renewable Energy Development Project

Status: **Proposed**

ADB financing: \$15.00 million

Counterpart: \$0.51

Total financing ADB: \$15.51 million

The **Renewable Energy Development Project** will increase the renewable energy penetration rate on Yap and Kosrae, and contribute to increased energy security for the FSM as a whole. In addition to integrating solar photovoltaic systems into the main grids on Yap and Kosrae, the project will construct a solar hybrid mini-grid and install solar home systems to increase access to high-quality electricity services on the remote island of Walung, in Kosrae. The project will finance:

YAP STATE



800 kW/800 kilowatt-hours (kWh) BESS at the power station,



1.67 MWp of ground-mounted solar photovoltaic,



300 kilowatt peak (kWp) of rooftop solar photovoltaic at the sports center, and



upgrade to power station supervisory control and data acquisition (SCADA) systems.

KOSRAE



1.05 MWp of solar photovoltaic on the main grid,



60 kWp solar photovoltaic for the Walung mini grid,



30 kW of high-efficiency diesel generation for the Walung mini grid,



30 kW/ 160 kWh BESS for the Walung mini grid, and



9 solar home systems installed in Walung.

The project will support the FSM to expand its population's access to modern energy services; improve service quality, reliability, and climate resilience; and reduce its reliance on fossil fuels for power generation, with corresponding reductions in generation costs.

The project will also support the implementation of key reform actions for Pohnpei Utilities Corporation that were developed in early 2019 under the regional TA on Capacity Building and Sector Reform for Renewable Energy Investments in the Pacific.



Staff visiting the power plant at Yap in the Federated States of Micronesia (photo by Mike Trainor).

KIRIBATI



Kiribati is a remote country comprising 810 square kilometers (km²) of land spread across 33 islands and atolls, with half of the nation's 114,395 residents living on the nation's capital, South Tarawa. Kiribati's distance from major economies leads to high import costs, while the country's low elevation—averaging only 2 meters above sea level—creates high vulnerability to storm surges, sea level rise, salt water intrusion, and other natural hazards associated with climate change. Building resilience to changing weather patterns is essential in safeguarding the population.

At the same time, Kiribati is heavily reliant on imported diesel for power generation, which exposes it to fluctuating fuel prices and contributes to one of the highest costs of generation in the region—\$0.36 per kilowatt-hour, against the average \$0.32. Although most of the population on South Tarawa (71%) are connected to the grid electricity, the high cost of electricity suppresses demand, impedes business growth, and contributes to energy poverty in households, which disproportionately affects women.

The Kiribati Integrated Energy Roadmap 2016–2025 identifies solar power as the least-cost option for scaling up renewable power generation and improving fuel security. South Tarawa has 1.57 MWp of grid-connected solar plants, but there remains a significant untapped potential to scale up the use of renewable energy for power generation—about 554 MWp of solar and 1.1 MWp of wind potential.

The central barriers to scaling up renewable energy generation in Kiribati include (i) lack of energy storage to manage intermittency and supply nighttime demand, (ii) limited financing options apart from development partner resources, and (iii) a policy and regulatory environment that is not conducive to private sector investment.

ADB is leveraging crosscutting solutions to support Kiribati in enhancing resilience to climate change, strengthen fuel security, and build an enabling environment for further investment in renewable energy power generation.

South Tarawa Renewable Energy Project

Status: **Proposed**

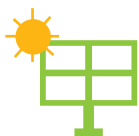
ADB financing: \$8.0 million

Cofinancing: \$5.70 million

Counterpart: \$1.00 million

Total financing: \$14.70 million

The **South Tarawa Renewable Energy Project** will directly increase the share of renewable energy serving the grid on South Tarawa, and will pave the way for further investments in clean energy. The project will deliver financing from the Pacific Renewable Energy Investment Facility to:



install **4.1 MWp** of solar photovoltaic,



install a **1.9 MW/2.6 MWh BESS**,



create an enabling framework for renewable energy and private sector investments, and



build institutional capacity in project management, and O&M for renewable generation assets

The project will contribute to a 26% renewable energy grid penetration rate in South Tarawa, and make it possible to introduce additional renewable energy generation units into the grid, by modernizing and strengthening the network, adding battery storage, and helping develop an enabling environment for further investment in the sector. Increased access to affordable power will help drive economic growth and improve living conditions on the nation's capital.



Women selling freshly caught fish by the beach in Kiribati (photo by ADB).

Box 4: Making Cities More Livable: Clean Energy Is Powering Crosscutting Urban Solutions

Populations across the Pacific are moving to cities. Rapid urban migration places strain on conventional infrastructure and services—including the provision of water and electricity—and the effects of climate change can intensify these challenges. Asian Development Bank (ADB) is implementing crosscutting solutions to build resilience and safeguard key resources in cities and peri-urban areas.

South Tarawa is a highly urbanized, low-lying atoll with a surface area of approximately 14 square kilometers. Urban migration and high fertility rates contribute to a population growth rate of about 2.3% per year, and an average population density of 4,000 people per square kilometer—with concentrations as high as 42,000 people per square kilometer in some parts of the capital.

The water supply on South Tarawa relies almost entirely on freshwater underground lenses and rainwater, which are increasingly threatened by sea level rise and droughts. As such, protecting the water supply on South Tarawa is of central importance to the 62,298 people living on the nation's capital.

Source: ADB.

South Tarawa Water Supply Project

Status: **Active**

ADB Financing: \$13.0 million

Cofinancing: \$41.59 million

Counterpart: \$7.24 million

Total Financing: \$61.83 million

ADB is collaborating with the government, the Green Climate Fund, and the World Bank to implement a project that will dramatically increase water security for all residents of South Tarawa, Kiribati.

The **South Tarawa Water Supply Project** will construct a seawater reverse osmosis desalination plant that can produce 4,000 cubic meters of water per day. It will install a 2.5 MW solar array to offset the electricity consumed by the desalination plant. The project will also upgrade 1 kilometer of the existing power network which connects the facility to the grid, and ensure that all assets are built with a climate-resilient design.

The project will teach local communities about climate change, water, sanitation, and hygiene, and train the utility to manage and maintain the infrastructure. The project will increase access to a safe, climate-resilient supply of water for the entire population of South Tarawa.



Mangroves growing along the beach of Tarawa in Kiribati (photo by ADB).

NAURU



Boys playing basketball with streetlights at night in Nauru (photo by ADB).

Nauru is a single isolated island in the South Pacific, with a land area of 21 km² and a population of 13,300 people. Access to grid electricity across Nauru's population is universal. However, electricity supply falls short of demand, and the nation is almost entirely dependent on diesel for power generation—exposing it to fuel price shocks and the risk of power outages if supply is interrupted. All fuel is imported through Nauru's single commercial port, which is vulnerable to severe weather events and the effects of climate change.

Scaling up renewable energy power generation can greatly improve Nauru's fuel security, in support of a more reliable, affordable, and environmentally sustainable power supply. The Government of Nauru is committed to improving energy security and reducing greenhouse gas emissions, and has established a 50% renewable energy target for power generation by 2020 in the Nauru Energy Road Map, 2018–2020.

ADB has supported the Nauru Utilities Corporation (NUC) to improve supply-side energy efficiency, and is helping it leverage efficiency gains to integrate new sources of renewable power into the grid. The project is supporting Nauru to strengthen the utility sector and amend tariff structures to encourage cost recovery and increase NUC's financial sustainability.



Electricity Supply Security and Sustainability Project

Status: **Completed in October 2018**

ADB financing: \$2.00 million

Cofinancing: \$7.68 million

Counterpart: \$2.52 million

Total financing: \$12.20 million

The **Electricity Supply Security and Sustainability Project** helped improve the quality and reliability of electricity services in Nauru by increasing generation capacity to supply baseload and by refurbishing degraded assets. The project achieved efficiency gains that enabled NUC to integrate new renewable power generation assets into the grid.

The project installed 6 MW of diesel-fired generation and replaced an 11-kilovolt switchgear, allowing the utility to retire older generation assets and perform scheduled refurbishments of existing units. Project activities increased generation efficiency by about 20%—from 3.4 kWh to 4.1 kWh per liter of fuel consumed—and decreased power outages by more than 50%. The project also repaired the roof of NUC’s powerhouse, providing weatherproofing and safer working conditions for NUC employees.

The attached TA for **Tariff and Subsidy Reform** complemented investments in NUC’s generation assets by assisting Nauru to gradually adjust tariffs to support cost recovery and decrease subsidies.



Solar Power Development Project

Status: **Active**

ADB financing: \$22.00 million

Counterpart: \$4.98 million

Total financing: \$26.98 million

The **Solar Power Development Project** will provide a grant under the Pacific Renewable Energy Investment Facility to finance a 6 MW grid-connected solar plant and a 2.5 MWh / 5 MW BESS. The project will reduce Nauru’s dependence on fossil fuels for power generation, and decrease its emissions by approximately 11,155 tons of CO₂ equivalent per year. It will also provide capacity building for the NUC in the areas of solar plants and BESS, their integration in the grid, finance and accounting, and gender mainstreaming.

“In the past when electricity was unreliable, our food went bad because of long hours without refrigeration. Power outages caused some of our electrical appliances at home to malfunction.”

—Ernest Stephen, Director of Foreign Affairs, Government of Nauru

“Unhampered by frequent outages, businesses are free to be more productive and plan better. They suffer from fewer machine breakdowns and operate at lower cost. People will be able to do household chores and school work faster, be more comfortable and healthy, and keep their communities safe.”

—Pivi Indrawansa, Senior Project Officer, Pacific Liaison and Coordination Office, ADB

“We can see a lot of improvement since the new generators arrived. Power outages are less frequent and the power station company tells the public when there’s going to be power outage. We can now plan.”

—Beniana Foilape, a grandmother who lives with her family of eight in Boe District

PAPUA NEW GUINEA

Transmission lines along the road in Port Moresby, Papua New Guinea (photo by ADB).



Providing more access to reliable electricity can drive economic growth and improve the quality of life across Papua New Guinea (PNG). Currently, about 12% of the total population and only 4% of the rural population are connected to the grid, while outdated transmission and distribution infrastructures lead to frequent outages in urban centers. As PNG's economy and population continue to grow, the government is collaborating with development partners and the private sector to scale up electrification rates and improve electricity services.

To achieve this, the Government of PNG, through its Department of Petroleum and Energy, has laid out three primary goals in its Electricity Industry Policy. The policy seeks to (i) improve access to electricity, (ii) improve the reliability of electricity, and (iii) ensure that power is affordable for consumers. The government has set the national target of achieving a 70% electrification rate by 2030.

ADB is supporting these efforts with a multitranche financing facility (MFF), and a number of TA and lending projects that aim to improve electricity services in urban centers and increase access to electricity in rural areas. These initiatives are improving living conditions and scaling economic activity.



Town Electrification Investment Program

The **Town Electrification Investment Program**, comprises two tranches, and is improving power supply in provincial urban centers by supplanting high-cost diesel generation with renewable energy sources, and extending the distribution network to more communities.

Town Electrification Investment Program, Tranche 1

Status: **Active**

ADB financing: \$54.30 million

Cofinancing: \$4.80 million

Counterpart: \$14.70 million

Total financing: \$73.80 million

Tranche 1 comprises three subprojects and is being implemented to (i) construct transmission lines to connect provincial centers, (ii) replace diesel generators with hydropower plants, and (iii) build stakeholder capacity to support project sustainability. Activities include:



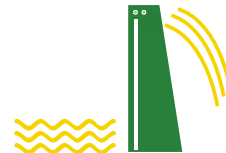
150 kilometers of 66 kV transmission lines from Bialla to Kimbe in West New Britain province completed in December 2017.



Construction of the **3 MW Divune hydropower plant** began in July 2017.



The utility, PNG Power, and project beneficiaries received capacity building and gender training.



Rehabilitation of the **0.8 MW Ruu Creek and 1.5 MW Lake Hargy hydropower plants**.

Town Electrification Investment Program, Tranche 2

Status: **Active**

ADB financing: \$45.90 million

Counterpart: \$15.70 million

Total financing: \$61.60 million

Tranche 2 is refurbishing two existing hydropower plants that are currently operating below their nameplate capacities. Rehabilitating the two aging hydropower plants will extend their economic life by 20–25 years each, and ensure that they meet current international operating standards. Upon project completion, the **Yonki Toe of Dam hydropower plant** will operate at its rated capacity of 18 MW and the **Warangoi hydropower plant** will operate at its rated capacity of 10 MW.

The investment program's overall improvements to grid connectivity and rural electrification will contribute to the impact of improved economic condition of the population in the targeted provincial centers, and an outcome of improved utilization of reliable and clean power to two provincial urban centers.



Port Moresby Power Grid Development Project

Status: **Active**

ADB financing: \$66.70 million

Counterpart: \$16.30 million

Total financing: \$83.00 million

Improving power supply in urban centers will play an important role in driving PNG's economic growth. PNG's capital, Port Moresby, has experienced a steady increase in electricity demand over the past decade. This growth, paired with poorly maintained transmission and distribution infrastructure, has led to increased power outages. The Port Moresby grid has historically been supplied by renewable energy from the 60 MW Rouna Cascade hydropower plant. However, degradation of this system—due to heavy demand and inadequate maintenance—has led to unreliable power supply and increased dependence on diesel for generation. Renovating the existing renewable energy generation assets and improving the transmission and distribution infrastructure are essential in supporting the capital's growing economy and population.

The **Port Moresby Power Grid Development Project** is addressing these needs by (i) rehabilitating two existing hydroelectric plants (Rouna 1 and Sirinumu), (ii) constructing a new substation and 66 kV transmission line for Kilakila, (iii) improving Port Moresby's transmission and distribution infrastructure, and (iv) providing project management support and capacity building.

The project is enhancing energy efficiency and will provide improved access to renewable power. It will produce an outcome of better power supply for Port Moresby, and deliver the impact of increased economic activity among grid-connected residential and commercial consumers.

Box 5: Addressing Remaining Poverty and Reducing Inequalities: Scaling Up Electricity Connections across Papua New Guinea

Access to electricity is essential for inclusive socioeconomic growth. However, thousands of communities across the Pacific still lack basic grid infrastructure, and can access electricity for only a few hours a day, at best. Papua New Guinea is one of the most underserved countries in Pacific region, in terms of energy access, but has ambitious targets to increase electrification rates.

The Asian Development Bank (ADB) is working with the government and its development partners to extend grid infrastructure and overcome energy poverty. Increasing the number of households, schools, and health outposts connected to the grid will support better education and health outcomes, and improve the quality of life for thousands.

Source: ADB.

Improved Energy Access for Rural Communities

Status: **Active**

Cofinancing: \$5.00 million

Counterpart: \$1.00 million

Total financing: \$6.00 million

The Government of New Zealand and the Japan Fund for Poverty Reduction are helping to extend the outcome of the Town Electrification Investment Program by increasing access to electricity and supporting community development in rural areas. The grant is helping address remaining poverty and inequality, improve the quality of life, and create new opportunities for livelihoods in remote areas in Papua New Guinea.

The \$5 million grant for **Improved Energy Access for Rural Communities** will provide electricity to about 25,000 new users—extending power distribution to 5,000 households, 20 schools, and 20 medical facilities in rural areas. To help leverage social and economic benefits linked to energy access, the grant is supporting community-training initiatives that help families identify new opportunities for income generation, while teaching energy efficiency, household budgeting, and electricity safety.

The project is using community-based civil works contracts to engage local stakeholders in the construction and maintenance of new transmission and distribution assets. The utility, Power Limited, has issued a total of 426 contracts in three provinces, which will benefit an estimated 5,579 participants with income-generating opportunities. Approximately 42% of the beneficiaries are women.

Power Sector Development Project

Status: **Proposed**

ADB financing: \$249.00 million

Counterpart: \$44.00 million

Total financing: \$293.00 million

ADB is preparing the proposed project to assist PNG to significantly increase the national electrification rate using renewable sources of power. The proposed **Power Sector Development Project** will have a total allocation of about \$249 million. The project will increase the national electrification rate from 12% to 19% by 2028.

The project will (i) expand the transmission network, (ii) expand the distribution network, (iii) enhance the capacity of the PNG Power Limited's monitoring system, and (iv) enhance the institutional support and capacity of the executing agencies and implementing agencies program beneficiaries and other stakeholders. The project will improve socioeconomic conditions by providing clean and reliable power services to the people of PNG.

SAMOA



Refurbishing hydro plants in Samasoni and Alaoa, which were severely damaged by Cyclone Evan in Samoa in 2012 (photo by ADB).

Samoa comprises nine islands, with about 95% of its population (197,000 people) living on the two main islands of Savaii and Upolu. As peak electricity demand grows at about 3% annually, the Samoa's Electrical Power Corporation (EPC) is tasked with ensuring sufficient generation and transmission capacity, while improving the quality and reliability of electricity supply. EPC is working to diversify Samoa's energy mix in line with the national target of generating 100% of power with renewable energy by 2025.

Samoa's power grid serves 95% of the total population, with the remainder generating electricity from small diesel or solar systems. Overall, the energy sector is well-governed and has been successful in attracting private sector investment. ADB is providing sovereign loans and grants to increase renewable generation capacity, and recently invested in a local independent power producer (IPP)—ADB's first IPP investment in the Pacific region.



Renewable Energy Development and Power Sector Rehabilitation Project

Status: **Active**

ADB financing: \$19.21 million

Cofinancing: \$7.55 million

Counterpart: \$5.83 million

Total financing: \$32.59 million

The **Renewable Energy Development and Power Sector Rehabilitation Project** is supporting Samoa's energy sector by increasing power generation from renewable energy sources, rehabilitating damages to power infrastructure caused by Cyclone Evan, and increasing the power sector's resilience to future natural disasters.

The project is assisting EPC to rehabilitate and reconnect 4.69 MW of hydropower capacity to the grid, and to build and connect an additional 3.3 MW of hydropower to the network. The amount of the new hydropower plant capacity changed with the addition of the Fuluasou small hydropower plant and the cancellation of the Faleaseela small hydropower plant. The project's outcome will be a higher share of electricity generated by hydropower, and its impact will be greater energy security. ADB is supporting training and knowledge-sharing activities to help ensure the long-term project sustainability with enhanced institutional capacity.



Solar Power Development Project

Status: **Active**

ADB financing: \$2.00 million

Cofinancing: \$1.00 million

Total financing: \$3.00 million

Since 2010, Samoa has promoted private sector investment in its renewable energy sector, and has successfully attracted three IPPs to introduce solar systems, which currently account for about 5% of the national installed capacity.

The Sun Pacific Energy Limited (SPEL) is one of the three IPPs and commissioned its 2.2 MW solar plant in 2015. The plant generates 3.5 million kWh per year, and sells the power to EPC under a 20-year power purchase agreement. In 2017, SPEL and EPC signed an addendum to the power purchase agreement, allowing for an expansion of the plant and sales of up to 6.1 million kWh per year.

Accessing long-term credit in the Pacific is difficult for local entrepreneurs, and the lack of private sector finance restricts growth in the renewable energy sector.

The **Solar Power Development Project** is the first renewable energy plant that is being developed as an IPP and seeking debt financing in Samoa. ADB's assistance will ease access to credit and support private sector participation in the Pacific energy sector. The investment is expanding the SPEL solar plant to a total of 4 MW, which will produce an anticipated 5.5 million kWh per year for 20 years. The project is lowering the cost of generating electricity, reducing emissions by an estimated 1,644 tons of CO₂ per year, and improving fuel security in Samoa.



Alaoa Multipurpose Dam Project

Status: **Proposed**

ADB financing: \$37.60 million

Cofinancing: \$32.30 million

Counterpart: \$11.90 million

Total financing: \$81.80 million

The Vaisigano River is the largest river in Samoa, and plays a crucial role in meeting 60% of the drinking water needs for the 37,391 people living in the capital, Apia. Extreme weather events have caused major flooding of the Vaisigano River, impacting public and private properties along the waterway. Furthermore, the river's catchment has very steep slopes, which increases the risk of rapid floods following heavy rain. The river is susceptible to both flooding and drought, which threaten drinking water supplies and impact Samoa's resilience to climate change.

The **Alaoa Multipurpose Dam Project** will construct a 55-meter high dam with an estimated storage capacity of 4.0 million cubic meters of water to prevent flooding and support seasonal water supply. The project will also construct a 0.26 MW run-of-river hydropower plant.

The project will (i) address disaster resilience by helping prevent floods, (ii) support climate change adaptation by ensuring a reliable water supply during drought, and (iii) improve Samoa's fuel security by installing a new source of renewable energy for power generation. The project will support climate change adaptation measures and reduce Samoa's dependence on diesel imports for power generation.

SOLOMON ISLANDS



Tina River project site in Solomon Islands (photo by Solomon Power).

Solomon Islands consists of 6 major islands and nearly 1,000 smaller islands covering a land area of about 28,000 km². About 16% of Solomon Islands' 670,000 residents are connected to the electricity grid, and nearly all grid-connected power is generated by diesel. The Solomon Islands National Energy Policy targets increasing the urban electrification rate to 100% and the rural rate to 35% by 2020. The policy also seeks to increase the share of renewable energy used to generate electricity from 1% in 2016 to 79% by 2030.

The Solomon Islands Electricity Authority (Solomon Power) is working with ADB to extend access to modern electricity services while scaling up the share of renewable energy used to power the grid. Increasing renewable energy generation capacity will enhance the nation's energy security, reduce generation costs, and drive economic growth with increased access to electricity.



Tina River Hydropower Project

Status: **Active**

ADB financing: \$30.0 million

Cofinancing: \$175.50 million

Counterpart: \$17.07 million

Total financing: \$222.57 million

The **Tina River Hydropower Project** will increase the share of renewable energy supplying Honiara's electricity grid and lead to a corresponding decrease in the cost of power generation on the nation's capital. The 15.0 MW hydropower system will underpin a paradigm shift in power generation for Solomon Islands.

The plant is expected to meet approximately 68% of Honiara's projected electricity. This will provide sufficient flexibility to the power system to permit further integration of renewable energy, without the need for additional battery storage systems. Successful commissioning of the plant will contribute an estimated savings of 49,500 tons CO₂ equivalent per year—more than twice Solomon Islands' commitment in its Intended Nationally Determined Contribution under the United Nations Framework Convention on Climate Change. ADB completed project preparatory TA in 2019, and the corresponding project was approved in September 2019.



Solar Power Development Project

Status: **Active**

ADB financing: \$2.24 million

Cofinancing: \$6.20 million

Counterpart: \$6.76 million

Total financing: \$15.20 million

The **Solar Power Development Project** is supporting the installation of renewable energy in Solomon Islands in order to (i) decrease the cost of generating electricity by replacing diesel generation with less-expensive solar power and (ii) reduce greenhouse gas emissions.

The project is installing a total of 2 MW of grid-connected solar power and building the capacity of Solomon Power staff, specifically in the operation and maintenance of small grid-connected hybrid solar systems. A total of five solar–diesel hybrid systems will be installed at different sites, and will replace from 66% to 87% of diesel generation in the five provinces of Kirakira (320 kW), Lata (290 kW), Malu’u (140 kW), Munda (1,000 kW), and Tulagi (250 kW). The project is also installing battery systems to allow higher penetration rates of intermittent solar power, creating favorable conditions for future private sector investment in solar home systems.

New electricity connections will allow students in these communities to access computers, thereby enhancing the quality of education with improved resource availability. Solar power will also allow remote hospitals and medical facilities to refrigerate and store medicine.

In parallel, local entrepreneurs are beginning to use new connections to start microenterprises. One example is the establishment of food refrigeration facilities, which will allow fishermen to store their catch, while providing supplemental income for facility owners. The project’s outcome will be increased supply of clean, reliable power, and its impact will be increased use of renewable energy.



Solar panels mounted on establishments in Solomon Islands (photo by Solomon Power).

TONGA

li 'o Manumataongo Wind Farm in Niutoua, Tongatapu, Tonga (photo by Tonga Power Limited).



Tonga comprises 171 islands spread over the five island groups of ‘Eua, Ha’apai, Niuas, Tongatapu, and Vava’u. Although 89% of households enjoy access to grid electricity, Tonga is heavily dependent on imported fuel, with about 90% of power generation coming from diesel. Increasing the share of renewable energy used to generate power, and improving supply-side energy efficiency can dramatically lower generation cost, enhance Tonga’s energy security, and decrease emissions.

In addition to supply-side improvements in the power sector, there is an urgent need for Tonga to build resilience to the effects of climate change. Its placement along the Tropical Cyclone Belt and the Pacific Ring of Fire makes Tonga the second-most vulnerable country in the world to natural hazards—second only to its Pacific neighbor, Vanuatu. Cyclones Ian (2014) and Gita (2018) caused cumulative damages in excess of \$200 million, with infrastructure reconstruction needs concentrated in the energy sector.

ADB is supporting Tonga to reconstruct assets using a build-back-better approach to safeguard infrastructure against natural hazards in the future. Assistance is also increasing Tonga’s renewable energy generation capacity, strengthening grid infrastructure, and supporting the nation to achieve a more resilient development pathway .



Cyclone Ian Recovery Project

Status: **Completed**

ADB financing: \$4.52 million

Cofinancing: \$4.27 million

Counterpart: \$1.82 million

Total financing: \$10.61 million

ADB responded to Cyclone Ian by helping the government reconstruct and climate-proof the main electricity network and damaged school facilities. The **Cyclone Ian Recovery Project** restored access to electricity and increased the power system’s resilience to future climatic shocks—immediately helping to attenuate secondary economic impacts of the cyclone while safeguarding assets against future climatic events.

Activities under the grant included (i) construction and upgrades of an above-ground and below-ground distribution system, (ii) construction and climate-proofing of underground networks to supply Ha'apai's hospital and high school, (iii) restoration and climate-proofing of streetlights, and (iv) provision of solar lanterns and solar community chargers for residents on Ha'apai's outer islands. As a part of these works, the implementing agency trained and hired female employees to operate heavy machinery and support the installation of power lines, contributing to gender equality of the nation's workforce.

Box 6: Tackling Climate Change: How ADB Energy Sector Operations Are Preparing for and Responding to the Changing Environment

Pacific island nations are among the most exposed countries in the world to natural hazards and the effects of climate change. Their small size, remoteness, and placement in volcanically active, cyclone-prone areas expose them to severe weather events, while their archipelagic and low-lying atoll topography increases the potential impacts of sea level rise.

Changing weather patterns can affect primary economic activity, including agriculture and tourism, while a single disaster event can erode decades of development gains by damaging infrastructure, affecting livelihoods, and diverting resources away from construction and toward reconstruction. At the same time, many Pacific island nations have low capacity for managing risks and limited financial resources for responding to crises.

The Asian Development Bank (ADB) is supporting its Pacific developing member countries to tackle climate change by (i) investing in power infrastructure that reduces fossil fuel consumption and greenhouse gas emissions; (ii) upgrading and constructing new assets that are resilient to natural hazards; (iii) helping countries access climate finance resources, including from the Green Climate Fund; and (iv) providing disaster-contingent finance to assist countries in responding to the impacts of natural disasters.

Source: ADB.



Cyclone Gita Recovery Project

Status: **Active**

ADB financing: \$6.80 million

Counterpart: \$2.62 million

Total financing: \$9.42 million

The **Cyclone Gita Recovery Project** is reconstructing and upgrading priority sections of the electricity network in Nuku'alofa damaged by Tropical Cyclone Gita in February 2018. The assistance package leverages ADB's comparative advantage supporting power sector improvements and reconstruction activities in Tonga, and will deliver a safer, more reliable power network for the capital.

The project is restoring access to reliable electricity supply and will make the network more resilient to future storms. It is rehabilitating the existing high-voltage and low-voltage overhead network using disaster-resilience measures, and installing new underground cable connections. The build-back-better approach takes into account opportunities to climate- and disaster-proof new assets, and network upgrades will form part of ongoing reconstruction efforts in Nuku'alofa, which will rebuild the city to a higher standard of disaster resilience.



Outer Island Renewable Energy Project

Status: **Active**

ADB financing: \$13.96 million

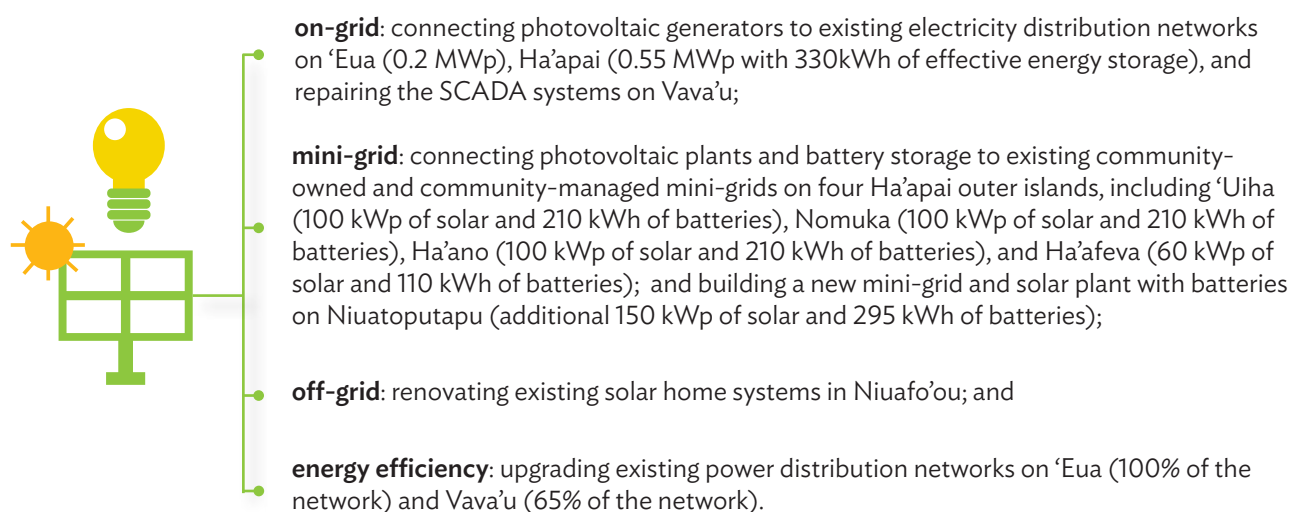
Cofinancing: \$12.20 million

Counterpart: \$1.57 million

Total financing: \$27.73 million

The Tonga Energy Road Map sets out the government objectives to improve energy efficiency and increase the renewable energy share of electricity generation to 50% by 2020 and to 70% by 2030. The **Outer Island Renewable Energy Project** is supporting this goal by constructing solar generation systems on eight, and upgrading the network on one, of Tonga's outer islands, with a total preliminary capacity of 1.32 MWp.

The project is helping Tonga to build photovoltaic systems into both existing grids and new grids, rehabilitate and improve energy efficiency among distribution networks, and install photovoltaic systems into community-owned mini-grids. The project is also building human and institutional capacity in the O&M of solar power and integrated diesel systems. Additional financing will help upgrade about 65% of the electricity grid on Vava'u. The subprojects include:



Once complete, the solar systems will supply environmentally sustainable power to households, schools, and other public facilities on the islands of 'Eua, Ha'apai, Vava'u, Nomuka, Ha'afeva, 'Uiha, Ha'ano, and Niuatoputapu, with the solar home systems on Niuafu'ou. The project is providing business skills training on income-generating opportunities for beneficiary communities, with at least a 50% female participation rate. The project will also support women to engage in project activities by mainstreaming gender components into the contracting for civil works, as well as into capacity building for the utility.

The project is increasing access to more affordable electricity, generated by renewable energy resources, and is designed to serve as a scalable model for replication. It is producing the sustainable impact of reduced dependence on imported fossil fuel for power generation.

“The cost of electricity and fuel is a major impediment for the growth of business in Tonga. With the renewable component increasing all the time, more businesses and Tongan consumers can afford to buy 5-star rated fridges or air-conditioners, which is going to make a big impact on costs for business and the people.”

– Paula Taumoepeau, President, Tonga Chamber of Commerce

“ [Now] There is no doctor for our health clinic and there are no refrigerators to store medicine. We know that when the project starts, it will bring doctors and storage facilities for the clinic to improve our health. It will also help the women to spend more time at night weaving, as it is the main household income for this Island.”

– Saia Langi, Resident of Ha'ano Island

“ Our renewable generation on a good month can reach up to about 14%. The goal is to displace 50% of our diesel with renewable energy technologies, and, at the same time move towards a hundred percent renewable by 2035.”

– Setitaia Pasivaka Chen, CEO, Tonga Power Limited



Tonga Renewable Energy Project

Status: **Active**

ADB financing: \$12.20 million

Cofinancing: \$32.40 million

Counterpart: \$5.60 million

Total financing: \$50.20 million

The **Renewable Energy Project** will deliver funds from the Pacific Renewable Energy Investment Facility to help Tonga rapidly transition to cleaner forms of power generation while increasing access to electricity for communities on the outer islands. The project will enable private sector investment in renewables by integrating battery storage into the grid to absorb intermittent solar and wind power.

The project will (i) install BESS units with a total capacity of 10.1 MW/19.9 MWh on Tongatapu; (ii) construct new renewable generation units in ‘Eua and Vava’u, and on the five outer islands of Kotu, Mo’unga’one, Niuafu’ou, O’ua, and Tungua; and (iii) adapt grid technology and management practices on the five outer islands to help integrate new sources of power. The project will increase access to clean, resilient, and affordable sources of energy for the people of Tonga, and will reduce the nation’s dependence on fossil fuels for power generation.

Box 7: Accelerating Progress in Gender Equality: Integrating Gender-Sensitive Design into Energy Sector Operations

Women are an indispensable part of the workforce, but face disproportionate barriers to accessing high-quality jobs in many of the Pacific developing member countries. The energy sector operations of the Asian Development Bank (ADB) are creating opportunities for women in the Pacific to engage in the workforce and to participate in decision-making structures, both in the formal and informal economy.

Energy sector projects across the Pacific are contributing to a higher participation rate of women in nontraditional jobs, including technical roles such as installing and maintaining solar, wind, and hydroelectric power generation plants. Technical assistance and lending activities are providing targeted trainings to mainstream gender considerations into government institutions and utilities, as well as training women in specialized skills to participate in the energy sector.

ADB works to ensure that tendering and civil works contracts provide equal opportunities for men and women, and that they receive equal compensation for work. A total of 10 energy sector projects in the Pacific are rated effective gender mainstreaming or have some gender elements, indicating that the project is designed to support more equitable and inclusive sector development.

Source: ADB.

TUVALU



Solar panels in a government office in Tuvalu (photo by ADB).

Tuvalu is a small island developing state with a population of approximately 10,000 people spread across eight islands. Although 98% of households have access to electricity, Tuvalu is highly dependent on diesel fuel for power generation. Similar to its Pacific island neighbors, Tuvalu's distance from major economies leads to high import prices for fuel and exposure to fluctuating market prices. Increasing the use of renewables for power generation can cause a paradigm shift in the nation's energy security.

Tuvalu has set the target of using 100% renewable energy for power generation by 2025. However, the current share of renewable energy in the fuel mix is only 16%. The government is seeking to transition the outer islands to more than 90% renewable energy for power generation and, subsequently, to concentrate efforts on the capital, Funafuti.



Increasing Access to Renewable Energy Project

Status: **Active**

ADB financing: \$6.00 million

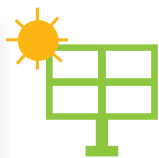
Counterpart: \$0.48 million

Total financing: \$6.48 million

The **Increasing Access to Renewable Energy Project** will scale up the installed peak capacity of solar generators on three outer islands; add BESS and new solar capacity to the grid on Funafuti; and build institutional capacity in the areas of financial management, technical O&M for the new assets, social and environmental safeguards, and gender mainstreaming, among others. The project will install:

44.8 kWp of solar photovoltaic on Nukulaelae,

78.4 kWp of solar photovoltaic on Nukufetau,



at least **100.8 kWp** of solar photovoltaic on Nui,

an additional of at least **500 kWp** of rooftop solar photovoltaic capacity on Funafuti, and



1 MW by 2 MWh BESS and associated modern control systems on Funafuti.

The project will increase the use of renewable energy to provide reliable access to clean power. The combined activities are expected to displace 6.7 million liters of diesel fuel and avoid 17,800 tons of carbon dioxide equivalent (CO₂e) in greenhouse gas emissions over its lifetime and support Tuvalu to achieve its target of 100% renewable energy for power generation.

VANUATU



Children drinking from solar-powered drinking water units in Tanna, Vanuatu (photo by Sally Shute-Trembath).

Vanuatu is an archipelago with a population of 297,000 people spread across 84 volcanic islands in the West Pacific—it is ranked the single most vulnerable country in the world to natural disasters and the effects of climate change. With a national electrification rate of 33%, the government has prioritized increasing access to electricity to drive sustainable economic growth. The Vanuatu National Energy Road Map sets the targets of achieving a 75% electrification rate and 65% renewable energy share of the generation mix by 2020.

The power sector is operated by two private utilities, which manage government-owned assets. Vanuatu Utilities & Infrastructure Limited operates the Luganville Electricity Concession on Espiritu Santo (the largest island), and Union Electrique du Vanuatu operates concessions on Efate, Malekula (the second-largest island), and Tanna. ADB is supporting Vanuatu to increase access to electricity on the two largest islands, and helping supply baseload with renewable power.



Energy Access Project

Status: **Active**

ADB financing: \$4.94 million

Cofinancing: \$7.00 million

Counterpart: \$3.10 million

Total financing: \$15.04 million

The **Energy Access Project** is installing a 400 kW run-of-river hydropower plant, which will supply more than 90% of all electricity generated for the Malekula grid through 2040. The project is also extending grid infrastructure on Vanuatu's two largest islands in order to connect an additional 1,050 households to the grid—increasing the electrification rate from 8% to 14% on Malekula, and from 22% to 29% on Espiritu Santo.

In addition to physical improvements to the grid, the project is training newly connected households in electricity-based income-generation opportunities, electricity safety, and household budget management. Overall, the project will deliver a clean supply of electricity to households on Espiritu Santo and Malekula, increase opportunities to generate income, and improve quality of life.

Box 8: Promoting Rural Development and Food Security: ADB Pilots Innovative Solutions in Remote Areas

The Asian Development Bank (ADB) is helping pilot new solutions to the critical challenge of geographic remoteness in the Pacific. Tanna Island is on the southeastern coast of Vanuatu, and although seasonal rainfall is plentiful, safe drinking water is not. Captured rainwater is regularly contaminated by sulfur dust from the very active nearby volcano, Mount Yasur, while the island's geography creates severe logistical challenges for transporting essential goods, including water.

Source: ADB.

“ADB, Zero Mass Water, and the Government of Vanuatu worked in partnership to install 20 solar-powered drinking water units that convert moisture in the air into safe drinking water. This project is an excellent example of innovation and technology delivering real benefits to people in places like Tanna.”

—Stephen Groff, Former Vice President, ADB

“This technology fills a critical gap in providing safe drinking water to the Petros school community and we hope this pilot may be extended beyond the education sector.”

—Jean-Pierre Nirua, Minister of Education, Government of Vanuatu

“We are proud to be a part of this landmark project, supported by the Government of Vanuatu and ADB, that has delivered a resilient, long-term, and safe drinking water solution to the Petros Primary School community in Tanna, one of the most remote, vulnerable, and infrastructure-challenged parts of the Pacific Islands.”

—Rob Bartrop, Executive Vice President of Global Business Development, Zermo Mass Water

About the Pacific Energy Update 2019

The Asian Development Bank (ADB) works across the Asia and Pacific region to strengthen communities and improve lives by supporting governments, businesses, and infrastructure to operate more effectively. Clean energy is an essential resource for driving low-carbon economic growth and for enhancing the quality of life for people in the region. The Pacific Energy Update 2019 describes ADB's work in the energy sector. It highlights how technical assistance and energy sector projects are helping to build resilient, low-carbon economies, while increasing access to clean, reliable power in the Pacific.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members—49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.



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Notes:

In this publication, “\$” refers to United States dollars.

Unless otherwise cited, the source for all tables and boxes is information provided by ADB's Pacific Department to the author.

On the cover: Solar panels in Aitutaki in Cook Islands (photo by Eun Young-So).

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