# Powering the Pacific

## A GUIDE TO INVESTING IN RENEWABLE ELECTRICITY GENERATION IN THE PACIFIC

IN PARTNERSHIP WITH

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# Acknowledgements

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# About ECA

Formed in 1997 to provide economic and regulatory consulting services to industry and government, ECA is a specialized economic consultancy. ECA's team and approach are based on many years' experience of carrying out economic and policy analysis, in the UK and worldwide. ECA specializes in advising on economics, policy and regulatory issues in the utilities industries, with particular expertise in the electricity, natural gas and water sectors.

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# About IFC

IFC—a member of the World Bank Group—is the largest global development institution focused on the private sector in emerging markets. We work in more than 100 countries, using our capital, expertise, and influence to create markets and opportunities in developing countries. In fiscal year 2021, IFC committed a record $31.5 billion to private companies and financial institutions in developing countries, leveraging the power of the private sector to end extreme poverty and boost shared prosperity as economies grapple with the impacts of the COVID-19 pandemic. For more information, visit www.ifc.org.

# Pacific Partnership

IFC's work in the Pacific is guided by the Pacific Partnership. Australia, New Zealand and IFC are working together through the Partnership to stimulate private sector investment and reduce poverty in the Pacific.

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# Foreword

Millions of people across the Pacific lack access to electricity, making the simplest tasks in life a burden, and curtailing growth opportunities. Less than a quarter of people are connected to a grid. Those who do have access to electricity often pay tariffs that are amongst the highest in the world.

Most Pacific nations have ambitious renewable energy targets which call for huge investment, a significant part of which is expected to come from the private sector. There are around 40 renewable energy projects across the Pacific Island Countries (PICs) which are either already operating, under construction, or are planned for commissioning in the next decade. Together they will add an estimated 420 mega-watts of renewable generation to the region.

While Pacific countries boast an excellent supply of the "raw materials" for renewable energy, more than 40 percent of their power generation uses expensive polluting diesel and liquid fuels. This heavy reliance on imported fuel contributes to crippling electricity prices in most countries.

With its considerable developmental needs, the Pacific offers strong opportunities. Our renewable energy work in the Pacific offers blueprints for responsible and inclusive project development that can be replicated by countries across the Pacific.

In Fiji, our agreement with Energy Fiji Limited for Fiji's largest solar project brings the nation closer to its 100 percent renewable energy target. The 15 mega-watt project, to be developed as an Independent Power Producer (IPP), could transition 14,000 households to renewable energy. Development of more renewable energy paves the way to significantly reduce Fiji's spend on fuel imports, estimated at US$500 million in 2019, comprising 20 percent of total imports.

IFC was transaction adviser to the government of Solomon Islands for the transformative Tina River Hydropower Project, the nation's first large-scale infrastructure project developed as a Public-Private Partnership. Tina River changes the nation's energy source from a virtual 100 percent reliance on imported diesel to about 70 percent renewable energy.

There is a strong appetite among Pacific nations for more renewable energy generation — backed by recently established targets, and changes to energy policies and supporting legislation — and yet, more can be done to drive the industry. Regulatory frameworks and planning can be improved. Targeted incentives and smart subsidies from donors and development institutions, paired with private capital and expertise can help spur renewable energy growth in the Pacific.

Recent findings from the 2021 IPCC report have provided a wake-up call against climate complacency. Global convergence seems to be emerging that climate action needs to happen now. Besides governments, major institutional investors and multi-national companies are doubling down on climate actions with ambitious net-zero commitments and GHG emissions-neutral goals. As countries seek sustainable pathways out of the disruption caused by the COVID-19 pandemic, the WBG's Climate Change Action Plan (CCAP) 2021-25 outlines our commitment to help clients move towards a green, sustainable, and resilient future.

With this report, IFC, with the governments of Australia and New Zealand, shares a call for action to the global renewable energy community that the Pacific offers an unparalleled opportunity for remote, energy challenged economies to rapidly adopt renewables. We look forward to working together, extending the myriad benefits of renewable energy to millions of people across the Pacific.

**Thomas Jacobs**

Country Manager, Australia, New Zealand and the Pacific

**Isabel Chatterton**

Director, Infrastructure Asia Pacific

*Monasavu Hydro, Fiji (The Fiji Times)*

# Executive summary

## The objective of this study

The International Finance Corporation (IFC) commissioned Economic Consulting Associates to prepare a detailed guide to investing in renewable electricity generation in the Pacific. The aim is to promote the development of bankable renewable energy (RE) projects in the Pacific Island countries (PICs) and Papua New Guinea (PNG). This step-by-step handbook provides a high-level overview of the Pacific region and comprehensive guidelines for the four most populous countries: PNG, Fiji, Solomon Islands, and Vanuatu.

## Overview of renewable electricity generation in the Pacific

RE can reduce the PICs' dependence on imported fuel. The overall potential for RE investment in these countries is summarized below.

**Retail electricity tariffs are high throughout the Pacific.** The significant potential for RE investments can prove to be a game changer, streamlining tariffs in the PICs, which are among the highest in the world. High tariffs are mainly due to the large share of diesel generation and low economies of scale.

**Solar potential is good or excellent throughout the Pacific.** Solar irradiation in the PICs is significantly better than many other places where solar photovoltaic (PV) generation is prevalent, including much of Europe and China. The commercial potential of solar PV is especially good in PICs, many of which rely on diesel generation to supply a daytime peak load.

**Hydro potential in Fiji, PNG, and Solomon Islands is good.** Both Fiji and PNG have already installed significant hydro generation, and Solomon Islands is developing the Tina River hydropower project. While accessing land can be challenging, all three countries have potential for further hydro investment.

**Biomass potential in the larger countries looks promising.** A new biomass-based independent power producer (IPP) has recently been commissioned in Fiji and another is under development in PNG. Both will partly rely on plantation feedstock. These projects will help indicate the potential sustainability of future initiatives.

**While RE IPPs are already operating in several PICs, more opportunities are emerging.** RE IPPs are either already operating or due to be commissioned soon in Fiji, Kiribati, PNG, Samoa, Solomon Islands, Tonga, and other PICs. More investment opportunities are soon likely, particularly hydro projects in Fiji and PNG, and solar PV projects—both IPPs and rooftop—in almost every PIC.

**Regulatory frameworks and planning for new RE generation can be improved.** Most countries have ambitious RE targets, recent energy policies, and supporting legislation in place. But, more can be achieved by (i) **directly incentivizing RE generation** through gross/net-metering/billing frameworks and subsidy mechanisms for mini-grids; (ii) **improving power planning and RE procurement**, for example, by regularly updating power development plans, competitive procurement frameworks, solar grid integration studies, and standardized power purchase agreements; and (iii) **studying RE resource and project potential**, including establishing testing stations and commissioning feasibility studies.

*Nadarivatu Hydro, Fiji (The Fiji Times)*

## Investing in renewable electricity generation in Papua New Guinea

**PNG has ample RE resources that can be developed.** There is significant scope to use solar PV and hydro to reduce the cost of electricity generation, given that diesel-based generation is still used in all of PNG's main grids and widely used in mini-grids. Moreover, a biomass IPP under development may demonstrate that planted biomass is a viable power resource in PNG. The country also has abundant hydro resources that can be developed. However, the lack of detailed assessments and land access issues can be challenging.

**Opportunities to invest in large RE IPPs are in the offing.** Both the government and state-owned power utility PNG Power Ltd (PPL) have indicated a strong preference for the private sector to meet the growing demand for electricity. Demand growth of at least 4 percent per year is predicted. In addition, given that only about 13 percent of households have access to grid electricity, there is huge potential for further load growth due to grid extensions. PPL has successfully tendered and contracted several large IPP projects, including from renewable sources. There is also potential for new IPPs to supply one of several existing or planned large mines, thanks to the regulatory framework that allows IPPs to supply large customers by transmitting power across PPL's grid. Projects based on third-party access have not been executed in PNG to date.

**Privately operated mini-grids could play a major role in meeting huge electrification needs.** The National Electrification Rollout Program (NEROP) implementation plan assessed the least-cost way to achieve PNG's target of 70 percent electrification by 2030. According to the NEROP modeling results, about 61 percent of the incremental connections would come from on-grid household connections and remaining 39 percent from off-grid – with significantly scaled-up in investments needed in each segment. It also recommended implementation plans for the rollout, including having the private sector play a leading role in the operation of mini-grids and off-grid solutions, which can be competitively tendered and made viable through smart subsidy programs. The government is preparing to implement the first stages of NEROP, including off-grid programs.

*PNG solar rooftop Credit: Christian Lohberger*

**PPL is piloting a solar framework that allows its customers to install rooftop solar PV systems.** The framework allows customers to connect solar PV installations that are for self-supply to the grid. Initially, the pilot is initially only available to commercial customers and places limits on both individual system sizes and cumulative installed capacity. Electricity exports to the grid during high sunshine hours will be allowed, but during the pilot these exports will not be offset against grid consumption during other hours. Through this pilot program, PPL intends to build capacity and assess grid impact and financial implications before scaling up the rooftop program through appropriate business models and a recalibrated tariff.

**To maximize PNG's RE investment opportunities, several key barriers need to be addressed.** Overall, PPL has sufficient installed generation capacity and a robust tariff-setting mechanism. However, operating costs and losses need to be reduced and revenue collection improved. Another issue is uncertainty regarding the electricity sector policy and governance, although significant steps forward were taken in 2021 with the establishment of a new energy sector regulator, the National Energy Authority (NEA). A third concern is the challenge of land acquisition and access in PNG—over 97 percent of land is held in customary title and access has proved problematic in the past.

## Investing in renewable electricity generation in Fiji

**Fiji has the second-largest electricity market of the PICs and has significant RE resources.** Fiji has an installed capacity of about 329 megawatts (MW) and a high electrification rate. Most households are served by Energy Fiji Limited's (EFL's) grids on the two main islands. The total share of electricity generation from renewable sources is about 65 percent, including both utility-owned generation and various IPPs.

**Opportunities for new IPP investments are significant.** The recently corporatized national utility, EFL, is a consistently high-performing utility in the Pacific. It regularly updates its power development plan and uses it as the basis for preparing and tendering new generation projects. There are several IPP opportunities including sizeable hydropower projects that have already been assessed to pre-feasibility level or higher. EFL is negotiating a new 5 MW solar PV plant at Qeleloa, to be implemented under an IPP arrangement, and EFL recently announced its intention to develop, in partnership with IFC, a new 15 MW solar IPP in Vanua Levu.

**Ongoing sector reform should further encourage private sector investment.** A new Electricity Act (2017), which came into force in October 2019, aims to encourage private sector investment in renewables. EFL will operate under a single buyer model where IPPs can add and operate generating capacity through competitive tendering, while EFL retains a monopoly in networks and retail. The act also outlines the partial divesture of EFL to private investors. The process began in 2019 with the sale of a 20 percent share to the Fiji National Provident Fund. It was announced in 2021 that a 44 percent share had been sold to Seven Pacific, a Japanese consortium made up of the Japan Bank for International Cooperation and Chugoku Electric Power Company, a construction company.

**The Fijian Competition and Consumer Commission (FCCC) has been designated as the electricity sector regulator.** The Electricity Act 2017 defined the role of an independent sector regulator. FCCC has taken over most regulatory functions from EFL, such as approving tariffs and issuing licenses. However, EFL has retained some technical regulatory functions under a memorandum of agreement signed with FCCC in 2019. FCCC issued a new electricity tariff methodology in 2019, which improves the transparency of tariff setting and helps protect EFL from fuel-cost fluctuations.

*Nadarivatu Hydro, Fiji (The Fiji Times)*

**EFL is preparing a rooftop solar policy which may include net-metering arrangements.** About 150 rooftop solar PV installations are already operating in Fiji, although most of them are very small. Private sector-led energy service companies operate multiple large installations—ranging from 88 kilowatts (kW) to 1.5 MW—on behalf of electricity consumers under a net billing arrangement with EFL. EFL is finalizing a rooftop solar policy for residential and commercial investors looking to install rooftop solar for self-consumption and/or export to the grid. Although the policy details are not yet known, it is expected to include net-metering arrangements.

**Opportunities for mini-grid investments exist.** The Department of Energy is responsible for building hybrid mini-grids in rural areas not mandated by EFL. Local authorities have been operating these grids, but they need a sustainable operating model. The department is exploring the possibility of the private sector operating mini-grids, either through Build-Operate-Transfer or Build-Own-Operate-Transfer contracts. Moreover, two pilot projects that involve installing and operating new mini-grids have recently been launched.

## Investing in renewable electricity generation in Solomon Islands

**IPP investors will have opportunities to sell electricity to the revitalized Solomon Power (SP).** Solomon Islands is heavily reliant on imported diesel, which is why it has the highest electricity tariffs in the Pacific and some of the highest in the world. Using new hydro and solar generation—especially in and around Honiara—will reduce the cost of generation. SP has improved its financial and operational performance significantly in recent years. It has started to reduce tariffs and has defined a clear process for procuring and connecting new generation. Although the 15 MW IPP Tina River hydro project has decreased opportunities for investing in new IPPs in Honiara, SP plans to add about 5 MW of solar capacity over the next few years, some of which may be implemented as IPPs.

**SP is planning to develop several new mini-grids, which may require private sector participation.** Only 16 percent of households in Solomon Islands have access to grid-based electricity. Given that SP has a mandate to achieve 100 percent electrification by 2050, it will need to make considerable investments to expand its service offering. SP has identified over 30 new mini-grids for prioritization and plans to implement at least one new mini-grid per year going forward. SP is expected to operate these mini-grids, but it is open to negotiating with the private sector.

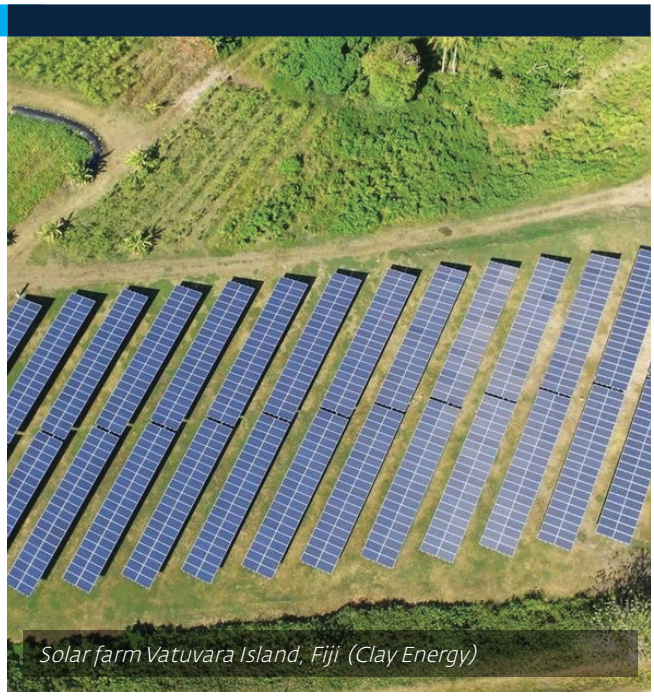
*Electricity towers in Honiara, Solomon Islands (IFC)*

**SP is considering piloting a net-metering framework that allows customers to install own-use solar.** Hotels and any customers installing more than 50 kW of generation for self-supply require licenses from SP. Any customer who wants to install solar and remain in sync with SP's grid will need to meet SP's terms and conditions. SP is preparing IPP guidelines and is considering piloting a net-metering program. It is easy for an investor to start a business in Solomon Islands. Most steps can be completed online. However, accessing land can be challenging. About 90 percent is unregistered (customary) land and the process of voluntary acquisition and long-term leasing can take years.

## Investing in renewable electricity generation in Vanuatu

**Private sector involvement in Vanuatu's electricity sector is already significant.** Electricity supply in urban areas is provided by private operators under concession agreements. The largest agreement is held by UNELCO, which is 51 percent owned by Engie of France and 49 percent owned by the Vanuatu National Provident Fund. UNELCO, which has been operating in Vanuatu since the 1930s, has already installed solar and wind generation on Efate, the most populous island. There is limited scope for further additions of intermittent renewables on that island. Vanuatu Utilities and Infrastructure (VUI), owned by Pernix Group of the United States, operates a 1.5 MW system on the island of Espírito Santos and several smaller systems on the islands of Maewo, Vanua Lava, and Ambae. Concession agreements for the islands of Tanna and Malekula are expected to be tendered in 2021, after UNELCO chose not to renew them in 2020.

**Comprehensive frameworks are in place to encourage private investment.** Independent regulator, the Utilities Regulatory Association (URA) recently issued several guidelines, including on the procurement of new generation, RE feed-in tariffs, and net-metering. According to the procurement/IPP guidelines, the URA approves a least-cost development plan and tenders out new generation projects competitively, with concessionaires (and affiliated parties) free to compete against other prospective investors. The guidelines also set out key power purchase agreement terms. However, these guidelines have been contested by UNELCO and are not being applied fully.



*Solar farm Vatuvara Island, Fiji (Clay Energy)*

**There is scope for private sector investment in mini-grids.** The Department of Energy is working closely with development partners and the URA to increase Vanuatu's electrification rate of about 35 percent. The department plans to develop several mini-grids from a priority list of more than 30. The operation of these mini-grids will either be bundled up with existing concession contracts or construction and operation will be tendered out to new private sector investors with the government contributing equity. While the implementation approach and financing mechanisms are yet to be decided, the URA's assistance—an independent and well-resourced regulator—will strengthen the Department of Energy's ability to meet the electrification target.

**Recent experience suggests that UNELCO is unwilling to accommodate rooftop solar.** UNELCO has the exclusive right to sell electricity within its concession area, although self-supply is allowed by law. Recent examples, such as attempts by Iririki Resort to install solar PV and remain connected to UNELCO's grid, suggest that UNELCO is reluctant to interconnect distributed solar PV.

# 1

*Solar panels in selected villages in Fiji (IFC)*

# 1. Introduction

Pacific Island countries and Papua New Guinea are heavily reliant on diesel generated power and many citizens are without electricity altogether. Most PICs have ambitious clean energy and electrification targets which will require a significant shift to renewable energy.

The overall objective of this report is to promote the development of bankable renewable energy projects in the Pacific Island countries and Papua New Guinea (PNG) by providing step-by-step guidance to prospective investors.

It comprises two main parts:

- A **high-level overview** of renewable electricity generation in the **Pacific Island countries and PNG** (Section 2).
- A detailed **step-by-step guide** to investing in renewable electricity generation **in the region's four most populous countries**: PNG, Solomon Islands, Fiji, and Vanuatu (Section 3 to Section 6).

IFC's work on renewable energy in the Pacific is guided by the Pacific Partnership. Australia, New Zealand, and IFC are working together through the Pacific Partnership to stimulate private sector investment and reduce poverty in the Pacific.

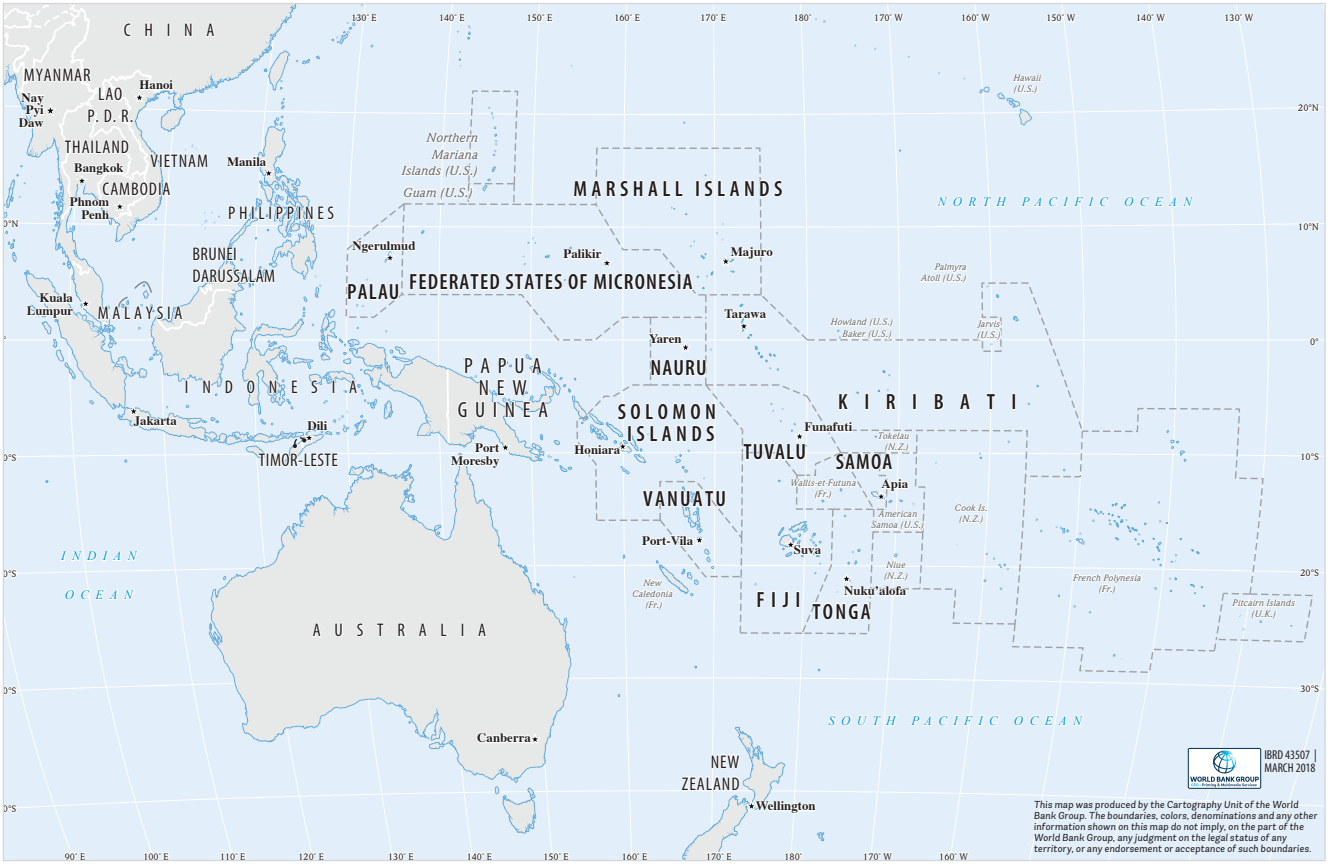
This report was commissioned by the International Finance Corporation (IFC), with support from the Australian government's Department of Foreign Affairs and Trade and New Zealand's Ministry of Foreign Affairs and Trade. It has been prepared by Economic Consulting Associates (www.eca-uk.com).

ECA and IFC have done everything possible to ensure the information in this report is as accurate and up to date as possible at the time of writing but acknowledge that the renewable energy landscape is quickly changing in some PICs. This is especially so in Papua New Guinea where changes to the energy regulator and leadership at some energy companies could impact policy formation. Should any reader notice information that is out of date, particularly owing to the major stakeholders and structure of the energy sector in the PICs please let us know by emailing renewableenergypacificreport@ifc.org.

# 2. Overview of renewable electricity generation in the Pacific

Section 2 provides an overview of renewable electricity generation in Papua New Guinea (PNG) and the 11 other Pacific Island countries (PICs) that are members of the World Bank, as illustrated in Figure 1. In the rest of this report, these 12 countries are collectively referred to as PICs.

## Figure 1: Map of the PICs




*Source: World Bank*

## 2.1 Highlights

The overall potential for renewable energy (RE) investment in the PICs can be summarized as follows:

- **Retail electricity tariffs are high throughout the Pacific.** Tariffs in the PICs, with the exception of Fiji, are among the highest in the world. This is largely due to the high share of diesel generation and low economies of scale. All else being equal, such as regional and regulatory risk, the potential for RE investments looks attractive.
- **Solar potential is good or excellent throughout the Pacific.** Solar irradiation is not as high as some other parts of the world such as the Sahara region, the Arabian Peninsula, and northern Chile. But it is better than many others where solar PV generation is prevalent, including much of Europe and China. The commercial potential to install solar PV is especially good in PICs because many of the countries rely on diesel generation to supply a daytime peak load.
- **Hydro potential in Fiji, PNG, and Solomon Islands is excellent.** Both Fiji and PNG have already installed significant hydro generation, and Solomon Islands is developing the Tina River hydropower project. All three countries have further potential, though accessing land can be challenging.
- **Biomass potential looks promising in the larger countries.** A new independent power producer (IPP) in Fiji has recently been developed, and another one in PNG is under development, both of which will rely partly on plantation feedstock. These projects will indicate the potential sustainability of future biomass initiatives.
- **Wind resource assessments have been conducted for several countries, and the prospects in Samoa look promising.** A 2019 onshore wind resource assessment conducted by the World Bank for PNG estimated a capacity factor of about 16 percent. Other studies in the Pacific suggest that onshore wind potential is generally limited in most PICs, with some exceptions, such as Samoa. Recent studies have found good potential for offshore wind in Fiji and PNG.
- **While RE IPPs are already operating in many of the PICs, more opportunities are emerging.** RE IPPSs are either already operating or due to be commissioned soon in Kiribati, Fiji, PNG, Samoa, Solomon Islands, and Tonga. Further investment opportunities are soon likely, particularly hydro projects in Fiji and PNG, and solar PV projects—both IPPs and rooftop—in almost every PIC.
- **Most countries have ambitious RE targets, recent energy policies, and supporting legislation in place.** But more can be achieved by:
  - **Directly incentivizing RE generation,** such as through net-metering/billing frameworks and subsidy mechanisms for mini-grids.
  - **Improving power planning and RE procurement,** for example, by preparing power development plants, competitive procurement frameworks, solar grid integration studies, and standardized power purchase agreements (PPAs).
  - **Studying RE resource and project potential,** including establishing testing stations and commissioning feasibility studies.

*PNG solar rooftop installation Credit: Christian Lohberger*

## 2.2 Country and electricity sector overviews

The size and character of electricity sectors in the Pacific vary widely, as illustrated in Table 1 and Figure 2. Key observations include the following:

- Fiji and PNG have the largest electricity sectors by far, with annual generation of more than 1,400 gigawatt hours (GWh) and close to 1,000 GWh respectively. Of the remaining countries, only Samoa's annual generation exceeds 150 GWh.
- Fiji, PNG, and Samoa generate a significant proportion of their electricity using renewables—largely hydro. The share varies from year to year depending on hydrological conditions, but it often exceeds 50 percent in these three countries. The smaller islands largely rely on diesel-based generation.
- Given that PNG, Solomon Islands, and Vanuatu have low access rates to electricity, the scope for rural electrification initiatives is significant.

## Table 1: Overview of the electricity sectors in the PICs

| COUNTRY | POPULATION[1] | ACCESS TO ELECTRICITY[2] (%) | PEAK DEMAND[3] (MW) | INSTALLED CAPACITY (MW) | ANNUAL GENERATION (MWh) | SHARE OF RE (%) |
|---|---|---|---|---|---|---|
| *Fiji*[4] | 899,000 | 100 | 171.57 | 329 | 976,372 | 65 |
| *Kiribati*[5] | 114,000 | 75 | 4.9 | 8.8 | 2,210 | 13.8 |
| *Marshall Islands* | 53,000 | 87 | 8.9 | 32.2 | 101,000 | <1 |
| *Micronesia, F.S.* | 105,000 | 65 | 6.15 | 12 | 72,000 | 5 |
| *Nauru*[6] | 13,000 | 100 | 5.0 | 9.8 | 35,800 | 3.3 |
| *Palau* | 21,000 | 98 | 12.8 | 29.4 | 89,300 | 1.6 |
| *Papua New Guinea*[7] | 8,085,000 | 13[8] | 232 | 416 | 1,434,064 | 47 |
| *Samoa* | 195,000 | 100 | 25 | 69.1 | 169,000 | 50[9] |
| *Solomon Islands*[10] | 599,000 | 16[11] | 16 | 30.6 | 99,100 | 5 |
| *Tonga*[12] | 107,000 | 98.9 | 10.4 | 17.1 | 66,000 | 8.9 |
| *Tuvalu* | 11,000 | 98 | 1.42 | 5 | 5,200 | 9.2 |
| *Vanuatu*[13] | 270,000 | 33 | 15.08 | 32.4 | 80,480 | 29 |

*Source: Various sources; refer to footnotes*

1 The World Bank; "World Bank Open Data"; Population, total page https://data.worldbank.org/indicator/SP.POP.TOTL
2 The World Bank; "Sustainable Energy for All" https://datacatalog.worldbank.org/dataset/sustainable-energy-all
3 Pacific Power Association, 2019, Pacific Power Utilities Benchmarking Report Fiscal Year 2019
4 Energy Fiji Limited, 2020, EFL Annual Report 2020
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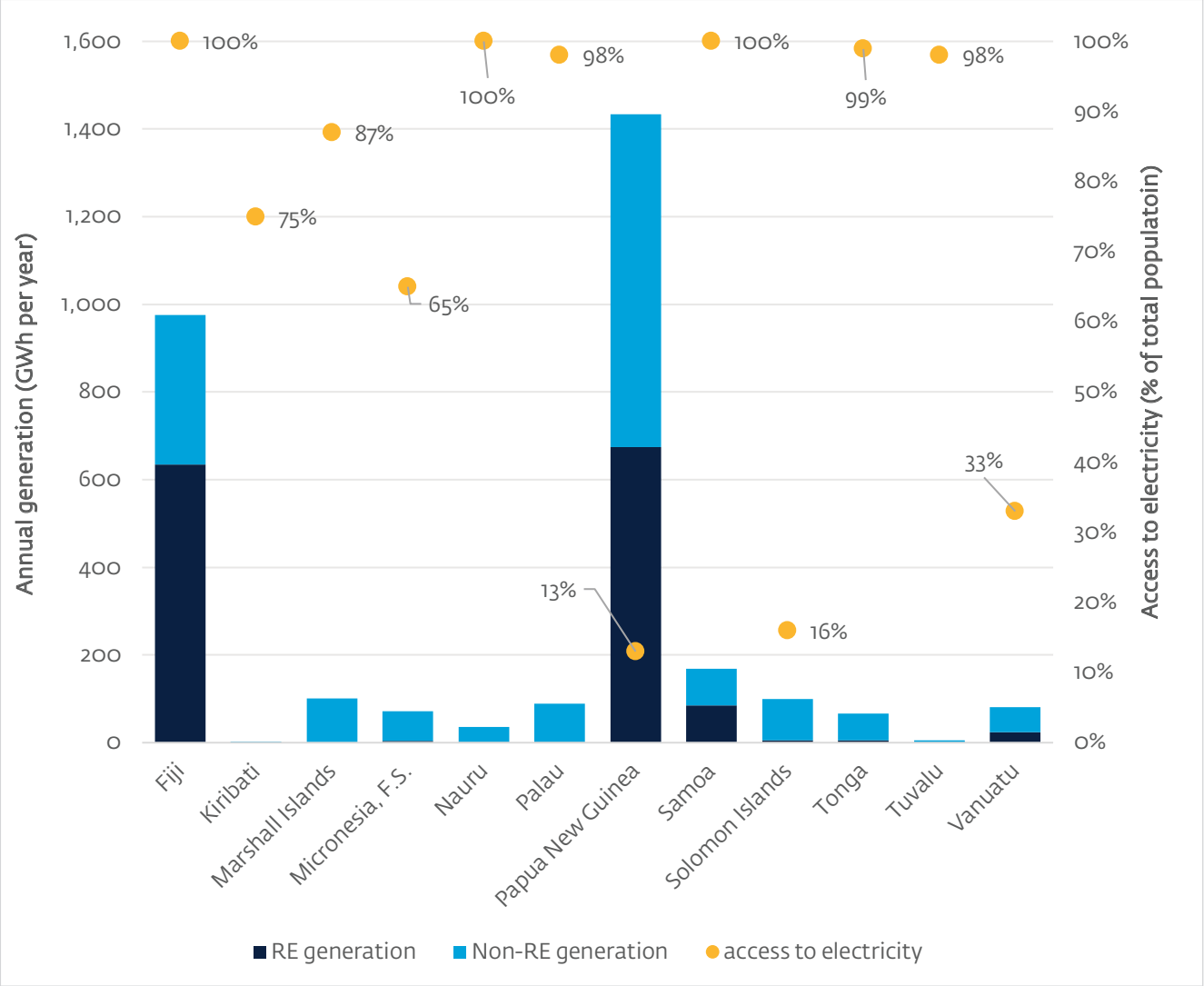
7 PPL Generation Data, 2019, Values exclude self-generation by extractive industries
8 The Earth Institute & Economic Consulting Associates, 2017, Preparation of National Electrification Rollout Plan and Financing Prospectus
9 Nataro, Ivamere "Samoa halfway to meeting energy target," Samoa Observer, September 20, 2019. https://www.samoaobserver.ws/category/article/49816
10 Solomon Power, 2019, Going Green Annual Report 2019
11 The World Bank; "Electricity Access Expansion Project (P151618)" Project Information Document
12 Tonga Power Limited, 2019, Business Plan 2019–2024
13 Utilities Regulatory Authority, 2020, Electricity Fact Sheet 2014-2019

**Figure 2: Annual electricity generation and access to electricity in the PICs**




*Source: Various sources as per Table 1*

## 2.3 Impact of COVID-19 pandemic

The COVID-19 crisis has had a significant impact on the PICs. Most countries implemented strict measures at the start of the pandemic and managed to keep the number of confirmed cases relatively low. However, these mitigation measures and lockdowns have negatively affected PIC's economies through their impacts on labor participation and production. In addition, tourism—a major source of income for many PICs—has mostly disappeared. In 2018, tourism earnings exceeded over 50 percent of gross domestic product (GDP) in Palau and about 30 percent in Samoa and Vanuatu.[14]

World Bank data shows that during 2020, GDP contracted by 19 percent in Fiji and 9.2 percent in Vanuatu. Although they are less reliant on tourism income, Solomon Islands and PNG's GDP contracted by 4.3 percent and 3.9 percent, respectively. Growth projections for 2021 are modest, ranging between 2 percent and 3.5 percent.[15]

Due to the considerable uncertainty arising from the pandemic, official forecasts can change frequently. This report uses the latest publicly available data at the time of writing.

14 Tateno, Yusuke & Bolesta, Andrzej, United Nations ESCAP, 2020, Policy responses to COVID-19

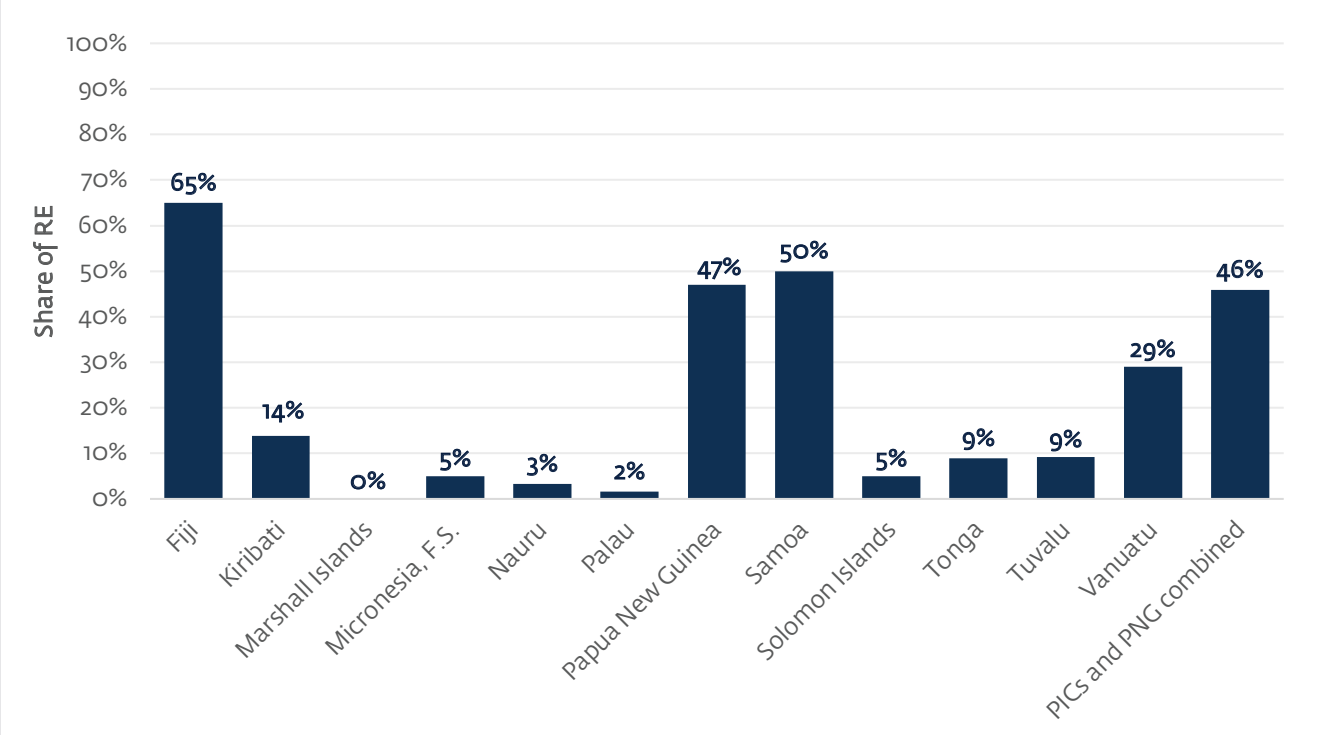
15 World Bank, Data (Fiji, Vanuatu, Solomon Islands, Papua New Guinea) https://data.worldbank.org/?locations=FJ-SB-PG-VU

## 2.4 Status and potential of renewable energy

### *Current share of renewable energy*

On average, about 46 percent of the electricity generated in the PICs is from renewable sources, as summarized in Figure 3. This is largely due to the significant hydro generation in Fiji, PNG, and Samoa. Vanuatu also has significant wind capacity. Relatively little solar generation is installed in the PICs. Samoa has led the way in solar development, and other PICs are likely to catch up soon, with most of the countries preparing for or considering new solar PV projects.

**Figure 3: RE share of annual electricity generation (%)**




*Source: Various sources as per Table 1*

### *Resource potential*

As described in Table 2, the potential for solar resource generation is good throughout the PICs and can be exploited further. Hydro potential is also very good in the relatively large islands of Fiji, PNG, and Solomon Islands. Biomass looks promising in the larger countries, while wind has some potential but is not well tested. A recent study identified good offshore wind potential in Fiji and PNG.

In general, detailed measurements of renewable resource potential are unavailable throughout the Pacific, with resource assessments conducted only for a few countries and energy sources.

In Table 2, the colored cells represent an estimation of the resource potential, categorized into high potential (green), medium potential (yellow), and low potential (red).

**Table 2: Overview of RE resource potential in the PICs**

| COUNTRY | HYDROPOWER | SOLAR ENERGY | WIND POWER | BIOMASS |
|---|---|---|---|---|
| ***Fiji***  | High potential, both for large utility-scale hydropower plants and mini/micro-hydro. | Solar potential varies with location due to average cloud cover.<br>Measured solar potential varies from 3.7 kWh/m2/day in Viti Levu's interior to 5.1 kWh/m2/day. | Low potential for wind power. EFL has 13 MW of installed capacity, but results have been poorer than originally expected.<br>Several good offshore wind areas identified in recent Energy Sector Management Assistance Program study. | Considerable biomass potential, especially from woodchips and excess wood from the wood and sugar mills.<br>A 10 MW biomass IPP has recently been commissioned but is running short on feedstock. |
| ***Kiribati***  | No usable hydropower resources. | Very good potential with average generation potential of<br>5.5-6 kWh/m2/day.<br>Cloud cover is seasonal. | Wind power assessments suggest enough potential for feasible generation.<br>Thick cover of coconut trees makes wind power difficult. | Some potential from coconut husk and waste from copra production. |
| ***Marshall Islands***  | No usable hydropower resources. | Excellent potential for solar energy.<br>Average monthly potential ranges from 5.1 kWh/m2/day in September to 6.1 kWh/m2/day in February. | Very little information available but encouraging data on wind power potential. | Insufficient biomass for power generation. |
| ***Micronesia, Federated States***  | Pohnpei has about 4-5 MW of usable hydropower potential, but with seasonal output. Other rivers have some micro-hydro potential. | Very good potential.<br>Average solar potential of 5.5 kWh/m2/day. | Very limited information available. Some sites have been identified that may have feasible resources, but data not definitive. | Current copra production would not sustain power generation without considerable crop planting. |
| ***Nauru***  | No usable hydropower resources. | Excellent potential.<br>Average solar potential of 6 kWh/m2/day. | Wind measurements indicate average wind speeds of 4.22m/s at 30 meters.<br>Probably not feasible. | No biomass potential on the island. |
| ***Palau***  | Very limited hydropower potential and highly seasonal. Some potential for run-of-the-river hydropower. | Very good potential.<br>Average solar potential of 5.5 kWh/m2/day. | No complete resource measurements have been conducted. Preliminary studies suggest there might be some isolated sites where generation is feasible. | Some biomass potential, but environmental regulations hinder uptake. |

| COUNTRY | HYDROPOWER | SOLAR ENERGY | WIND POWER | BIOMASS |
|---|---|---|---|---|
| ***Papua New Guinea***  | Huge potential but no detailed countrywide studies quantifying the potential. Estimated total potential is roughly 20,000 MW. | No solar mapping studies have been conducted in PNG, but resource potential is very high.<br>Daily sunshine ranges from 4.5 hours to 8 hours. | Wind mapping study, completed in 2019, suggested some potential (up to 16% capacity factor), but further testing is needed.<br>Several good offshore wind areas identified in recent Energy Sector Management Assistance Program study. | Most native vegetation is not suitable. However, development of a new 15-30 MW IPP (using a combination of existing rain trees and newly planted eucalyptus) strongly indicates viability. |
| ***Samoa***  | Some hydropower potential. Some studies suggest that about 1.5-5 MW is still to be developed. | Very good potential with average insolation of over 5 kWh/m2/day. Relatively small seasonal variation. | Several studies conducted on wind power potential suggest some potential for feasible wind power generation. | Some potential for biomass, especially using coconut crops. |
| ***Solomon Islands***  | Substantial hydropower potential but limited potential near load centers. The government maintains a database of over 100 potential hydropower sites with over 300 MW of generation potential, of which only a handful close to loads. | No solar mapping studies have been conducted. Solar installations managed by SP suggest very good potential for solar generation. | No countrywide wind mapping has been done, but a few wind turbines have been installed. Results suggest that wind power could be viable, but further studies are required. | Large potential for biomass, but land acquisition and environmental legislation make biomass a very difficult resource to develop. |
| ***Tonga***  | No usable hydropower resources. | Very good solar potential with average solar insolation of 5.8 kWh/m2/day. Over 25 years' experience using solar. | Some wind power potential, but the thick and tall tree cover makes generation difficult. | Some potential, but forestry is not very developed and forest logging just for electricity generation is not considered viable. |
| ***Tuvalu***  | No usable hydropower resources. | Very good solar potential with average solar insolation of 5.5 kWh/m2/day. | Wind measurements carried out at 30 meters indicate average wind speeds of 5.8 m/s, which could be viable. | High share of coconut trees with a slow regeneration time means biomass is not a viable RE source. |
| ***Vanuatu***  | Good potential for smaller hydropower plants in Vanuatu. No sites larger than 2 MW have been identified. | No solar mapping has been done in Vanuatu, but installed solar PV suggests an excellent resource. Insolation is estimated to be about 6 kWh/m2/day. | One wind farm already established on Efate. Wind energy monitoring has indicated a resource of 7.2 m/s at 55 meters. | Considerable waste from the forestry industry could be used for power generation. |

*Source: IRENA Pacific Lighthouses—Renewable energy opportunities and challenges in the Pacific Islands region*

### *Existing and potential renewable energy IPPs*

Numerous RE IPPs are already operating and planned or have been identified in the PICs, as summarized in Table 3 and Table 4. Most of them are in Fiji, PNG, and Samoa. Table 3 lists projects that are either already operating in the PICs or are already committed and are in the late stages of planning or construction. Table 4 summarizes potential IPPs that have been identified and are at various stages of development (from early assessment to full feasibility). There is undoubtedly further potential for IPPs, particularly new solar IPPs.

**Table 3: RE IPPs in the PICs (operating, under construction and planned)**

| COUNTRY (LOCATION) | OPERATOR | TECHNOLOGY | TOTAL CAPACITY (MW) | QUANTITY SOLD TO GRID | COMMISSIONING DATE (PLANNED) | COMMENTS |
|---|---|---|---|---|---|---|
| ***Fiji (Viti Levu)*** | Tropik Wood Industries | Biomass | 9 | Surplus exported | 2008 | Has had recurring operational issues |
| ***Fiji (Laotoka)*** | Fiji Sugar Corporation | Biomass | 5 | Surplus exported | 2009 | FSC is a state-owned entity |
| ***Fiji (Labasa)*** | Fiji Sugar Corporation | Biomass | 20 | Surplus exported | 2013 | Has not been able to supply to the grid due to a feedstock shortage |
| ***Fiji (Nabou)*** | Nabou Green Energy Ltd | Biomass | 12 | 100% | 2017 | Supported by GIMCO, has suffered from feedstock shortages. |
| ***Fiji (Qeleloa)***[16] | Sunergise | Solar | 5 | 100% | (2021) | |
| ***Fiji (Taveuni)***[16] | KOICA | Solar | 1 | 100% | (2021) | Commissioning expected in 2021 |
| ***Kiribati (Tearoaereke)*** | USP Solar System | Solar PV | 0.09 | N/A | N/A | Grid-connected but intended for self-consumption |
| ***Kiribati (London)*** | ANZ Solar System | Solar PV | 0.18 | 100% | 1999 | |
| ***Kiribati (Eita)*** | Moroni High School solar backup system | Solar PV w/ storage | 0.15 | Surplus exported to grid | N/A | |
| ***Marshall Islands***[17] | Delivered by Clay Energy | Solar PV | 0.14 | 100% | 2020 | |
| ***Micronesia, Federated States***[17] | Delivered by Clay Energy | Solar PV | 0.27 | 100% | 2020 | |
| ***Nauru***[17] | Delivered by Clay Energy | Solar PV | 1.1 | 100% | 2020 | |
| ***Palau***[17] | Delivered by Clay Energy | Solar PV w/ storage | 0.06 | Mini-grid | 2020 | |
| ***PNG (Baiune)*** | PNG Forest Products | Hydro | 15 | Surplus exported – 10 MW | 2013 | Three hydro plants, surplus exported |
| ***PNG (Ramu River)*** | Ramu 2 | Hydro | 180 | 100% | (2028) | Conditional PPA and implementation agreement signed in February 2021 |

16 Energy Fiji Limited, 2019, EFL Annual Report 2019

17 Sunergise, "Sunergise & Infratec switch on solar in the North West Pacific," news release, 30 June, 2020, https://www.sunergisegroup.com/news/2020/6/30/sunergise-amp-infratec-switch-on-solar-in-the-north-west-pacific

| COUNTRY (LOCATION) | OPERATOR | TECHNOLOGY | TOTAL CAPACITY (MW) | QUANTITY SOLD TO GRID | COMMISSIONING DATE (PLANNED) | COMMENTS |
|---|---|---|---|---|---|---|
| ***PNG (Edevu)*** | Edevu Hydro | Hydro | 51 | 100% | (2022) | Under construction |
| ***PNG (Markham Valley)***[18] | Oil Search | Biomass and Solar | 30 + 10 | 100% | (2025) | Conditional PPA signed, although may be cancelled |
| ***Samoa (Upolu Airport)*** | Green Power Samoa | Solar | 2 | 100% | 2015 | IPP (3.5 GWh p.a.) |
| ***Samoa (Upolu Airport)*** | Sun Pacific Energy | Solar | 2 | 100% | 2015 | IPP (3.5 GWh p.a.) |
| ***Samoa (Upolu Airport Extension)*** | Sun Pacific Energy | Solar | 1.5 | 100% | 2018 | IPP (3.5 GWh p.a.) |
| ***Samoa (Upolu Airport)*** | Solar for Samoa | Solar | 2 | 100% | 2016 | IPP (3.6 GWh p.a.) |
| ***Samoa (Upolu Racecourse)*** | Green Power Samoa | Solar | 2 | 100% | 2016 | IPP (3.5 GWh p.a.) |
| ***Samoa (Upolu Racecourse)*** | Solar for Samoa | Solar | 1.5 | 100% | 2016 | IPP (3.6 GWh p.a.) |
| ***Samoa (Mt. Lepue Upolu)*** | Shanghai E Power | Wind & hydro pumped storage | 7.5 | 100% | 2017 | IPP (48 GWh p.a.) |
| ***Samoa (Piu Village)*** | Piu Village biomass | Biomass | 0.025 | 100% | 2016 | IPP (0.046 GWh p.a.) |
| ***Samoa (Salelologa)*** | Louis Berger | Solar IP | 2 | 100% | 2017 | IPP (3.48 GWh p.a.) |
| ***Samoa (Upolu Island)*** | Green Power Samoa Ltd | Solar | 4 | 100% | 2015 | Chinese company |
| ***Samoa (Upolu Island)*** | Green Power Samoa Ltd | Solar | 1 | 100% | 2017 | Operating |
| ***Samoa (Upolu Island)*** | Sun Pacific Energy | Solar | 2 | 100% | 2014 | Australian company |
| ***Samoa (Upolu Island)***[19] | Sun Pacific Energy | Solar | 0.2 | 100% | 2017 | Australian company partly funded by ADB |
| ***Samoa (Upolu Island)*** | Solar for Samoa | Solar | 4 | 100% | 2016 | Australian company with local shareholders |
| ***Solar PV Project*** | Canadian Solar Inc | Solar | 20 | 100% | (2020) | Under development |
| ***Samoa (A'Asu)*** | Green Globe Solutions American Samoa | Wind | 42 | 100% | (2021) | Under development |
| ***Solomon Islands (Guadalcanal)*** | Tina River Hydro IPP | Hydropower | 15 | 100% | (2025) | Multidonor project has reached financial close and is under development |
| ***Solomon Islands***[20] | Delivered by Clay Energy | Solar PV | 0.82 | 100% | (2021) | 4 x solar-diesel hybrid plants under development |

18 PNG Biomass, "Project" https://pngbiomass.com/

19 Pacific Power Association, 2018, 3rd Pacific Energy Investors Forum Report and Outcomes

20 Infratec, "Kiwi company to turn on the power for remote Solomon Islands," news release https://www.infratec.co.nz/news/kiwi-company-to-turn-on-the-power-for-remote-solomon-islands

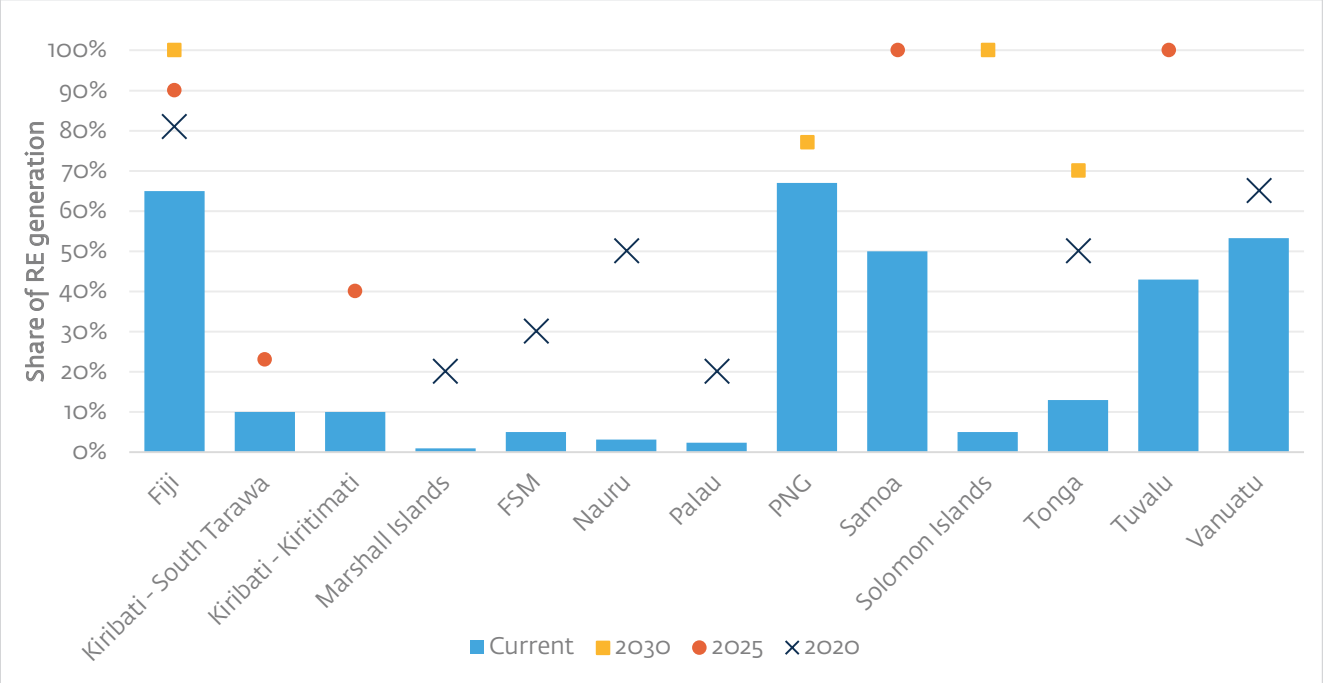
| COUNTRY (LOCATION) | OPERATOR | TECHNOLOGY | TOTAL CAPACITY (MW) | QUANTITY SOLD TO GRID | COMMISSIONING DATE (PLANNED) | COMMENTS |
|---|---|---|---|---|---|---|
| ***Tonga (Tongatapu)*** | Solar Island Technologies | Solar | 0.06 | 100% | Varying dates | Distributed generation from multiple sources of generation |
| ***Tonga (Matatoa)*** | Zhuhai Singyes Green Building Technology | Solar | 2 | 100% | 2017 | Operating |
| ***Tonga (Tongatapu)***[21] | Sunergise | Solar | 6 | 100% | 2021 | Awarded in March 2020 |
| ***Vanuatu (Devil's Point)*** | UNELCO | Wind power | 3.5 | 100% | 2008 | Utility is a private company |
| ***Vanuatu (Undine Bay)*** | UNELCO | Solar | 0.5 | 100% | 2016 | Utility is a private company |

*Source: Pacific Power Association, 3rd Pacific Energy Investors Forum, 2018 and various references in footnotes*

### *Renewable energy targets*

The PICs have disparate levels of RE generation as a share of total electricity generation. However, all countries have published ambitious RE generation targets for the next few decades. Figure 4 summarizes countries' latest official RE targets for 2020, 2025, and 2030, where available.

**Figure 4: RE generation targets**




*Source: PPPA 2019 Benchmarking Report; Pacific Community, Stocktake of Energy Sector Institutions, Legislation, Policies and Fiscal Incentives in Fourteen Pacific Island Countries, 2016; UNFCCC, Intended Nationally Determined Contributions*

21 Asian Development Bank, "South Pacific's Biggest Solar Plant to Help Tonga Meet Renewable Energy Target," news release, 21 March, 2019 https://www.adb.org/news/south-pacifics-biggest-solar-plant-help-tonga-meet-renewable-energy-target

## 2.5 Legal and institutional frameworks

### *Legal framework*

There is significant variation in the legal, policy, and regulatory environment for RE in the 12 PICs covered in this report, as summarized in Table 4. In some countries, the policies have not been officially approved by the government and are still in draft form.

**Table 4: Policies, legislation, and regulations relevant to renewable energy in the PICs**

| COUNTRY | POLICIES | LEGISLATION AND REGULATIONS |
|---|---|---|
| **Fiji**  | • Draft National Energy Policy 2013 | • Electricity Tariff Methodology 2019<br>• Electricity Act 2017<br>• Commerce Commission Decree 2010 |
| ***Kiribati***  | • Kiribati National Energy Policy 2009<br>• Kiribati Integrated Energy Road Map | • Public Utilities (Amendment) Act 2010<br>• Public Utilities (Amendment) Act 1997<br>• Public Utilities (Amendment) Act 1983<br>• Electricity Regulations 1981<br>• Public Utilities Ordinance Cap 83 |
| ***Marshall Islands***  | • Draft National Energy Policy and Action Plan 2015–2020 | • Import Duties (Renewable Energy & Energy Efficiency Equipment Exemption Amendment) Act 2011<br>• Alternative Energy Fund Act 1989 |
| ***Micronesia, Federated States***  | • FSM National Energy Policy Volume 1, 2011<br>• Infrastructure Development Plan 2004–2023 | • Pohnpei Public Utilities 2006<br>• Chuuk Public Utility Corporation Act 1996<br>• Yap State Public Service Corporation 1995<br>• Kosrae Utilities Authority Act 1993<br>• Pohnpei Act to Reform the Power Generation and Distribution<br>• Pohnpei Code—L.B. No. 42-12 |
| ***Nauru***  | • Nauru Energy Road Map 2018–2020<br>• Nauru National Energy Policy 2009 | • Nauru Utilities Corporation Regulations 2012<br>• Nauru Utilities Corporation Act 2011 |
| ***Palau***  | • National Energy Policy 2010–2020<br>• Strategic Action Plan Energy Sector 2009<br>• Energy Efficiency Action Plan 2008 | • Palau Energy Act 2015<br>• Utilities Consolidation Act 2013<br>• Palau Net Metering Act 2009<br>• Palau Utilities Corporation, Electrical Service Regulations 1995<br>• Palau Utility Corporation 1994<br>• Draft Power Purchase Agreement Template<br>• Proposed Guidelines, Standards, and Regulations for Renewable Energy Generation Systems Connecting to the Palau Central Grid<br>• Palau Public Utilities Corporation Summary of Electricity Rates |
| ***Papua New Guinea***  | • National Energy Policy 2017<br>• National Electrification Rollout Program 2017<br>• Development Strategic Plan 2010–2030<br>• Papua New Guinea Vision 2010–2050 | • National Energy Authority Act 2021<br>• PPL Electricity Regulatory Contract 2013<br>• Grid Code 2013<br>• Third Party Access Code 2013<br>• Environmental Act 2000<br>• Community Service Obligation Policy |

| COUNTRY | POLICIES | LEGISLATION AND REGULATIONS |
|---|---|---|
| ***Samoa***  | • Samoa Energy Sector Plan 2017–2022<br>• Strategy for the Development of Samoa 2016–2019<br>• Samoa National Infrastructure Strategic Plan 2011–2020 | • Electricity Act 2010<br>• Scientific Research Organisation of Samoa Act 2008<br>• Public Bodies (Performance and Accountability) Act 2001<br>• Electric Power Corporation Act 1980 |
| ***Solomon Islands***  | • Solomon Islands National Energy Policy and Strategic Plan 2014<br>• Solomon Islands Renewable Energy Investment Plan 2014<br>• Solomon Islands National Infrastructure Investment Plan 2012–2017 | • Tariff Regulations 2016<br>• Electricity Act Cap 128 |
| ***Tonga***  | • Tonga Energy Efficiency Master Plan 2018<br>• Renewable Energy Policy Framework 2016<br>• Tonga Strategic Development Framework 2015–2025<br>• Tonga National Infrastructure Investment Plan 2013–2023<br>• Tonga Energy Roadmap 2010–2020 | • Electricity (Amendment) Act 2010<br>• Renewable Energy Act 2008<br>• Electricity Act 2007<br>• Tonga Electric Power Board Act 2007<br>• Tonga Electric Power Board (Repeal) Act 2007<br>• Electrical Wiring By-Laws—Cap 32.12.3<br>• Electricity Concession Contract: Tonga |
| ***Tuvalu***  | • Tuvalu Renewable Energy and Energy Efficiency 2020 Master Plan<br>• Tuvalu Infrastructure Strategy and Investment Plan 2012–2022<br>• Tuvalu National Energy Policy 2009 | • Public Enterprises (Performance and Accountability) Act 2009<br>• Tuvalu Electricity Corporation Act Cap 32.20<br>• Electricity Regulations 1971 |
| ***Vanuatu***  | • Vanuatu National Energy Roadmap 2016–2030 | • Electricity Supply (Amendment) Act 2010<br>• Utilities Regulatory Authority Act 2007<br>• Geothermal Energy Act 2006<br>• Supply of Electricity (Districts) Act 2000<br>• Various guidelines issued by Utilities Regulatory Authority |

*Source: Pacific Community, Stocktake of Energy Sector Institutions, Legislation, Policies and Fiscal Incentives in Fourteen Pacific Island Countries, 2016*

### *Institutional framework*

Table 5 summarizes the major institutions relevant to RE electricity generation in the PICs. Institutions are categorized as either those providing electricity services, or those with regulatory, policy, planning, and coordination responsibilities.

**Table 5: Major institutions relevant to renewable energy in the PICs**

| COUNTRY | ELECTRICITY SERVICES | REGULATOR AND GOVERNMENT |
|---|---|---|
| **Fiji** | • Energy Fiji Limited (formerly Fiji Electricity Authority) | • Department of Energy and various specialized units within DoE<br>• Fijian Competition and Consumer Commission |
| ***Kiribati*** | • Public Utilities Board<br>• Kiribati Solar Energy Company | • Energy Planning Unit under the Ministry of Works and Public Utilities<br>• Ministry of Commerce, Industry and Cooperatives |
| ***Marshall Islands*** | • Marshalls Energy Company<br>• Kwajalein Atoll Joint Utilities Resources | • Energy Planning Division under the Ministry of Resources and Development<br>• Self/ministry regulated |
| ***Micronesia, Federated States*** | • Pohnpei Utilities Corporation<br>• Kosrae Utilities Authority<br>• Chuuk Public Utility Corporation<br>• Yap State Public Service Corporation | • Energy Division under the Department of Resources and Development<br>• Self/ministry regulated |
| ***Nauru*** | • Nauru Utilities Corporation | • Department of Commerce, Industry and Environment<br>• Ministry of Finance |
| ***Palau*** | • Palau Public Utilities Corporation<br>• Renewable Energy Division under Palau Public Utilities Corporation | • Energy Administration under the Ministry of Resources and Energy<br>• Self /ministry regulated |
| ***Papua New Guinea*** | • PNG Power Limited | • National Energy Authority<br>• District Development Authorities |
| ***Samoa*** | • Electric Power Corporation<br>• Renewable Energy Unit under the Electric Power Corporation<br>• Environment and Renewable Energy Division under Scientific Research of Samoa | • Office of the Regulator<br>• Price Control Unit<br>• Energy Policy Coordination and Management Division under the Ministry of Finance |
| ***Solomon Islands*** | • Solomon Power<br>• Energy Division and Rural Electrification Unit | • Solomon Power (self-regulating) |
| ***Tonga*** | • Tonga Power Limited<br>• Renewable Energy Authority under the Energy Department | • Energy Department under the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications<br>• Electricity Commission |
| ***Tuvalu*** | • Tuvalu Electricity Corporation<br>• Renewable Energy Unit under the Tuvalu Electricity Corporation | • Energy Unit under the Ministry of Works and Energy<br>• Price Control Unit under the Ministry of Finance |
| ***Vanuatu*** | • Union Electrique Du Vanuatu Limited (private)<br>• Vanuatu Utilities and Infrastructure Limited (private) | • Department of Energy under the Ministry of Climate Change Adaptation, Meteorology, Geo-Hazards, Environment, Energy and Disaster Management<br>• Utilities Regulatory Authority |

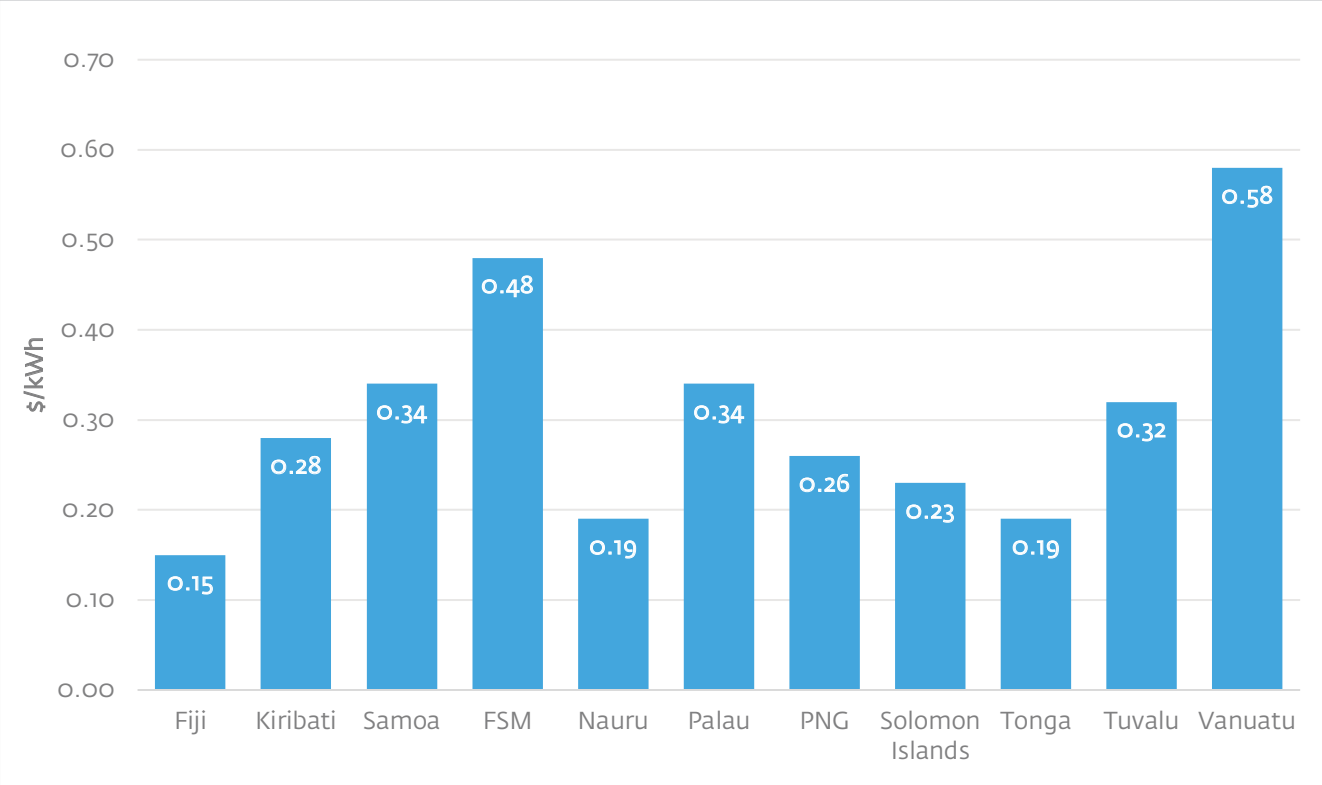
*Source: Pacific Community, Stocktake of Energy Sector Institutions, Legislation, Policies and Fiscal Incentives in Fourteen Pacific Island Countries, 2016*

## 2.6 Electricity tariffs and incentives

### *Electricity tariffs*

Retail electricity tariffs in the PICs are among the highest in the world. This is especially true of the tariffs applying to commercial customers. A significant share of electricity is generated using imported diesel fuel and therefore there is significant scope for RE generation to reduce tariffs. These high tariffs also help improve the commercial viability of investments in RE generation.

**Figure 5: Average domestic electricity tariffs ($/kWh)**[22]




*Source: Pacific Power Utilities Benchmarking Report 2019*

22 The graph shows the average cost of electricity for residential customers consuming 200 kWh per month.

### *Specific incentives for renewable energy*

As described in Table 6, most PICs provide tax exemptions and other fiscal incentives for renewables. Few provide targeted incentive frameworks such as feed-in tariffs or net billing/metering.

**Table 6: RE specific incentives in the PICs**

| COUNTRY | FISCAL INCENTIVES | FEED-IN TARIFF | NET-METERING/ BILLING |
|---|---|---|---|
| **Fiji** | • 10-year tax holiday for RE developers<br>• No import duty on RE equipment<br>• Financial grants and direct investment for RE development from Fiji Development Bank<br>• Requirement for commercial banks to loan 2% of portfolio to RE projects<br>• Subsidized borrowing and grant funding through Reserve Bank of Fiji | Under development (23) | Under development (24) |
| ***Kiribati*** | • Government-funded RE projects are exempt from import duty<br>• Development partners have provided direct grants for RE development | No | No |
| ***Marshall Islands*** | • Equipment for RE generation is exempt from import duty<br>• Development partners have provided direct grants for RE development | No | No |
| ***Micronesia, Federated States*** | • Interest-free loans have been provided to the utility<br>• Financial grants have been offered for RE development | Yes | No |
| ***Nauru*** | • Development partners have provided direct grants for RE development | Yes | No |
| ***Palau*** | • Equipment for RE generation is exempt from import duty<br>• Subsidized loans and grants have been provided for RE development | Yes | Yes |
| ***Papua New Guinea*** | • Development partners have provided direct grants for RE development<br>• 10-year tax holiday in free-trade zones<br>• Import duty exemption on RE equipment | No | Yes |
| ***Samoa*** | • Equipment for RE generation is exempt from import duty<br>• Development partners have provided direct grants for RE development | Yes | No |
| ***Solomon Islands*** | • Equipment for RE generation subject to 10% import tax can apply for exemption<br>• Development partners have provided direct grants for RE development | No | No |
| ***Tonga*** | • Equipment for RE generation is exempt from import duty<br>• Equipment for RE generation is exempt from consumption tax<br>• Development partners have provided direct grants for RE development | Yes | Yes |
| ***Tuvalu*** | • The utility receives a grant from the government<br>• Development partners have provided direct grants for RE development | No | No |
| ***Vanuatu*** | • Equipment for RE generation is subject to lower tiers of import duties<br>• Development partners have provided direct grants for RE development | Yes (25) | Yes |

*Source: Pacific Community, Stocktake of Energy Sector Institutions, Legislation, Policies and Fiscal Incentives in Fourteen Pacific Island Countries, 2016*

23 A "feed-in tariff" exists, but this is a floor on all IPP generation and is not specific to RE. It is not technology specific and does not guarantee priority dispatch to RE generators. A regular feed-in tariff is being developed as part of EFL's draft Rooftop Solar Policy.

24 A Rooftop Solar Policy is being developed that will include net-metering arrangements.

25 Although feed-in tariff and net-metering regulations exist, they are not currently applied by UNELCO.

# 3

*Rabaul volcano East New Britain, Papua New Guinea Credit: David Kirkland*

# 3. Country investment guide—Papua New Guinea

## 3.1 Highlights

### *PNG has large undeveloped RE resources*

PNG has large hydro resources with significant potential for development, although detailed assessments are scarce and land access issues often prove challenging. Since diesel-based generation is still used in all of PNG Power Ltd's (PPL's) main grids and mini-grids, there is also substantial scope to use solar photovoltaic (PV) to reduce the cost of generation.

### *Good opportunities to invest in large RE IPPs are in the offing*

Both the government and power utility PPL have shown a strong preference for the private sector to meet the growing demand for electricity. Demand is predicted to grow at least 4 percent per year. In addition, there is huge potential for further load growth due to grid extensions, given that about only 13 percent of households have access to grid-based electricity.

Despite some technical and managerial capacity constraints, PPL has successfully negotiated and contracted several large IPP projects, including from renewable sources. The majority of these IPPs were from unsolicited proposals, although PPL has, on occasion, competitively tendered new generation projects in line with its published power development plan. PPL is interested in auctioning further RE capacity over the next few years and the United States Agency for International Development is assisting with potential auctions.

There is also potential for new IPPs to supply one of several existing or planned large mines, because the regulatory framework allows IPPs to supply large customers by transmitting power across PPL's grid.

### *Privately operated mini-grids could play a role in meeting huge electrification needs*

The draft National Electrification Rollout Program (NEROP) study assessed the least-cost way to achieve PNG's target of 70 percent electrification by 2030. This study showed that a combination of mini-grids and other off-grid solutions is needed to achieve the electrification target. Experience with privately operated mini-grids in PNG is limited. Before mini-grids can be deployed at the necessary scale, a sustainable business model must be in place to attract private investors.

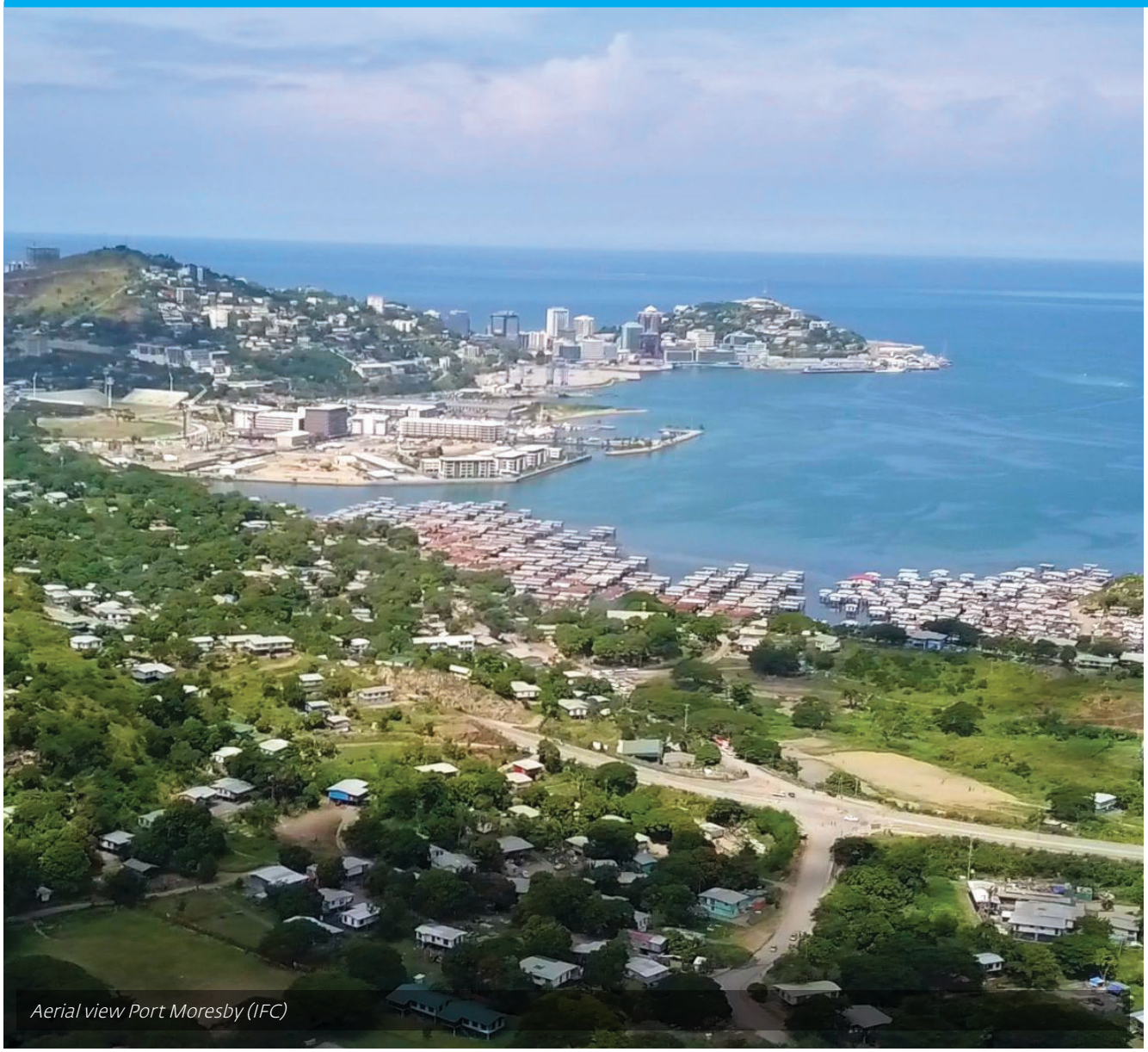
The NEROP implementation plan, a follow-up to the NEROP study, has been presented to the government. The private sector is expected to play a leading role in the development and operation of mini-grids, which will be competitively tendered by the recently established National Energy Authority (NEA) and may need to be made viable through subsidy programs. According to NEROP modeling, about 61 percent of connections would come from on-grid household connections and the remaining 39 percent from off-grid – with significantly scaled-up in investments required in each segment.

### *PPL is piloting a solar framework that will allow its customers to install rooftop solar PV systems*

The framework allows customers to connect solar PV installations—that are for self-supply—to the grid. Initially, the pilot scheme has been designed to cater to only commercial customers and include both individual capacity limits and a 2 MW ceiling on cumulative capacity.

Electricity exports to the grid during high sunshine hours will be allowed, but during the pilot scheme, these exports will not be credited—that is, offset against grid consumption during other hours. PPL may open the scheme to residential customers and to start crediting exports in future phases of the program once the financial impacts are better understood and the tariff has been recalibrated. At such time, scheme participants will save by offsetting their energy consumption, but will still pay a demand charge that covers PPL's costs of providing network and backup capacity.

The entire 2 MW has been allocated and the commercial customers of PPL are currently undertaking detailed design and construction of the same. Given the strong response to this scheme, there is good potential to scale up grid-connected rooftop solar projects in PNG.



*Aerial view Port Moresby (IFC)*

### *PNG clearly offers good RE investment opportunities, though several barriers need to be overcome*

One barrier to RE investment is PPL's institutional and technical capacity constraints. Development partners have been supporting the company to strengthen its financial management and financial advisers were appointed in 2019. The World Bank led Energy Utility Performance and Reliability Improvement Project (EUPRIP) aims to improve PPL's operational performance and the reliability of electricity supply in the Port Moresby and Ramu grids. These will help to establish a foundation for PPL to become financially sustainable and catalyze private investments in the energy sector. EUPRIP finances the urgent rehabilitation and upgrade of PPL's electricity infrastructure, PPL's Revenue Protection Program, and its Management Information Systems.

A second barrier has been uncertainty regarding the electricity sector policy and governance. Significant progress was made early in 2021 with the establishment of a new energy sector regulator, NEA, which will take over responsibility for regulating the electricity sector from ICCC and will lead on policy formulation and implementation, including coordinating rural electrification projects in off-grid areas.

A third barrier is the challenge of land acquisition and access in PNG. Over 97 percent of land is held in customary title and several projects have been delayed or become costlier because of access disputes.

## 3.2 Country, sector, and renewable energy overview

### 3.2.1. Country and electricity sector overview

***Overview of the country's demographics and economy***[26]

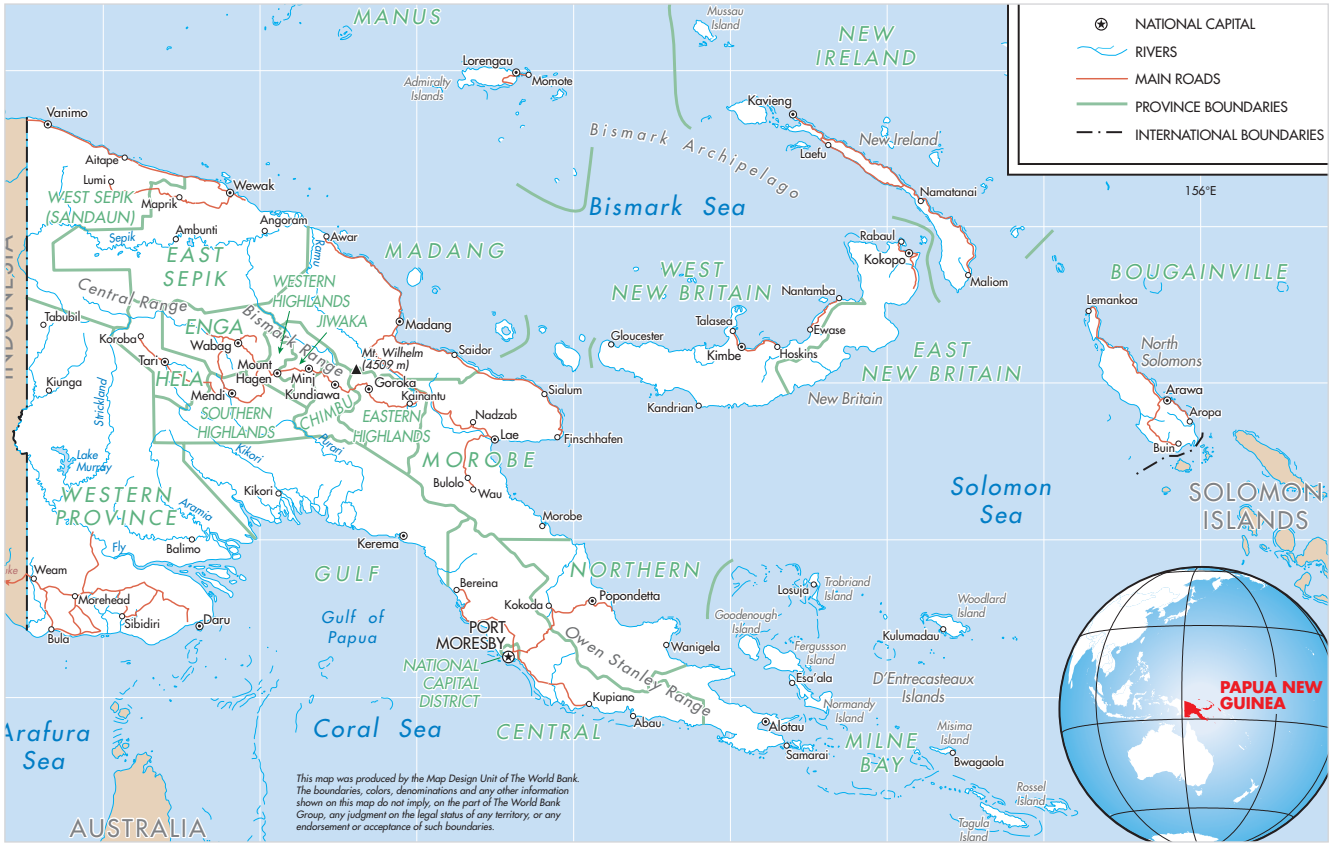
PNG is one of the most culturally diverse countries in the world, with over 800 languages and over 1,000 distinct ethnic groups. Eighty-seven percent of the country's 8 million people live in rural communities and face significant challenges in the areas of health, education, and economic opportunities.

PNG's gross domestic product (GDP) per capita was about $2,637 per person in 2020. The country's economy is dominated by two sectors:

- The agricultural, forestry, and fishing sector, which engages most of the labor force (majority informally).
- The minerals and energy extraction sector, which accounts for most export earnings and GDP.

Overall, PNG's economy has grown consistently, with real GDP per capita averaging 3 percent since the mid-2000s. From 2007 to 2014, growth was particularly high (6 percent to 11 percent), driven largely by the development of large new liquefied natural gas exports. However, this high growth has slowed down significantly, including declines in 2018 (largely due to a fall in liquefied natural gas prices) and 2020 (due to the effects of the COVID-19 pandemic). PNG's government has posted significant deficits in recent years (in 2020 it was 9 percent of GDP).[27]

**Figure 6: Map of PNG**




*Source: World Bank*

26 World Bank, "The World Bank in Papua New Guinea" www.worldbank.org/en/country/png/overview

27 Deloitte, 2020, Papua New Guinea Budget 2021: Consolidation for Growth

### *Overview of the country's electricity sector*[28]

PPL operates 30 electricity systems at various centers throughout the country. Of these, only three have medium- to high-voltage lines and a generating capacity of more than 10 MW. These three main grids are:

- **Port Moresby grid—**The largest in PNG in terms of peak demand (125 MW in 2019) and annual energy, although it is quite compact geographically. The grid serves the National Capital District and surrounding areas of Central Province.
- **Ramu grid—**The second-largest in PNG in terms of peak demand (97 MW in 2019) and annual energy, but it is by far the most extensive geographically. The grid runs from Lae and Madang in the east to Mt Hagen and Mendi in the west. There are plans to expand the grid further west to Tari and Hides. This grid is in the most populous area of PNG, although only a minority of the population is supplied. Several existing and prospective large mines close to the existing and planned Ramu grid increase the grid's potential for further development. At present, only the Hidden Valley Mine is grid-connected.
- **Gazelle grid—**The third-largest grid within PNG, with a peak load of about 10 MW. It supplies the Gazelle Peninsula and surrounding areas of East New Britain Province, including the provincial center of Kokopo and Rabaul town.

All three grids have significant hydropower generating capacity. The remaining generating capacity is thermal—mostly running on light fuel oil, although there are two heavy fuel oil plants and one gas turbine. A new gas-fired power plant in Port Moresby was commissioned in December 2019 and has enabled PPL to relegate its existing diesel to reserve, significantly improving the reliability of supply and reducing the cost of generation.

**Table 7: Electricity generation from three main grids in PNG**

| NAME | TYPE | NOMINAL CAPACITY IN 2019 (MW) | AVAILABLE CAPACITY IN 2019 (MW) | ANNUAL GENERATION IN 2019 (MWh) | LOAD FACTOR IN 2019 (%) |
|---|---|---|---|---|---|
| **PORT MORESBY GRID** | | | | | |
| ***IPP*** | Liquefied natural gas | 96 | 89[29] | 320,113 | 38 |
| ***PPL*** | Hydro | 66 | 58 | 271,368 | 47 |
| ***PPL*** | Thermal | 138 | 89 | 85,371 | 7 |
| **SUBTOTAL** | | **300** | **236** | **676,852** | **26** |
| **RAMU GRID** | | | | | |
| ***IPP*** | Hydro | 10 | 12 | 88,740 | 84 |
| ***IPP*** | Thermal | 34 | 32 | 130,616 | 44 |
| ***PPL*** | Hydro | 108 | 52 | 305,504 | 32 |
| ***PPL*** | Thermal | 84 | 33 | 29,690 | 4 |
| **SUBTOTAL** | | **236** | **129** | **554,550** | **27** |
| **GAZELLE GRID** | | | | | |
| ***PPL*** | Hydro | 10 | 10 | 44,911 | 51 |
| ***PPL*** | Thermal | 17 | 11 | 7,768 | 5 |
| **SUBTOTAL** | | **27** | **11** | **52,678** | **22** |
| **ALL MAIN GRIDS** | | | | | |
| ***PPL*** | Hydro | 305 | 170 | 588,187 | 22 |
| ***PPL*** | Thermal | 187 | 112 | 301,678 | 18 |
| ***IPP*** | | 139 | 134 | 544,199 | 45 |
| **TOTAL** | | **631** | **416** | **1,434,064** | **26** |

*Source: PPL Generation Data, 2019*

28 PPL Generation Data, 2019

29 26 MW of this is from a temporary Exxon Mobil IPP, which was decommissioned following the commissioning of the 45 MW Dirio IPP, running on LNG, in November 2020. As at early 2021, the total available capacity LNG-fired IPP for Port Moresby is approximately 109 MW.

## Figure 7: PPL's power system


*Source: PPL, Information Handbook, 2016*

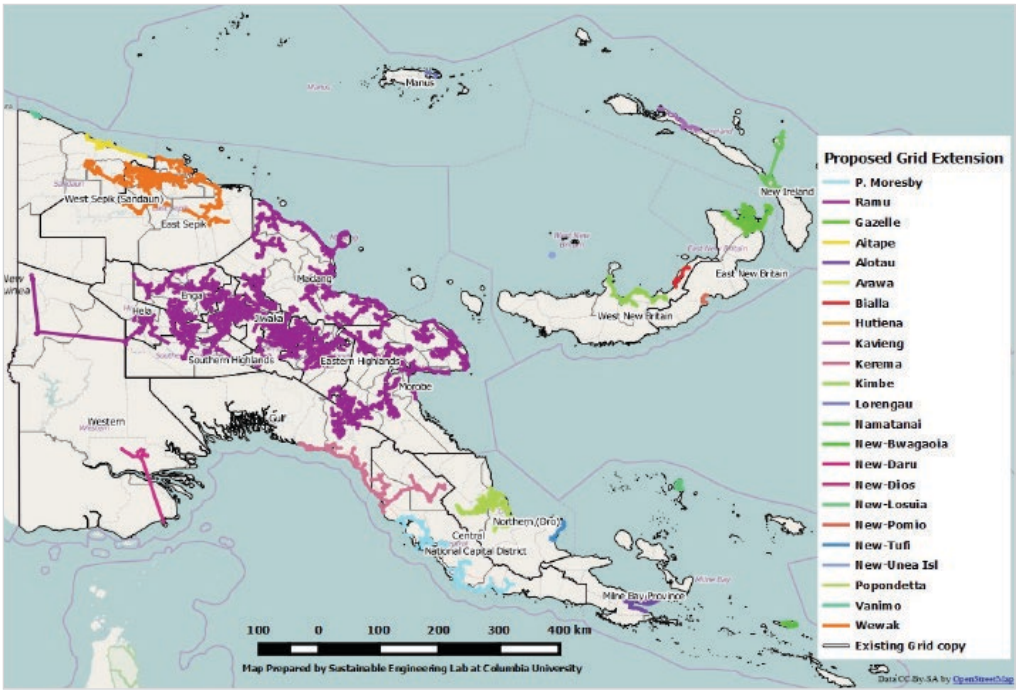
The transmission voltages in PNG are 132 kilovolts (kV), 66 kV, and 33 kV, while the distribution voltages are 11 kV and 22 kV. The standard consumption voltages are 415 volts and 240 volts at 50 hertz (Hz).

Electricity demand growth in PNG is strong. Between 2020 to 2040, the Least Cost Power Development Plan projects demand to grow annually by 4.2 percent (Business as Usual scenario) to 4.8 percent (High Mining Growth) for the Port Moresby grid, and 3.5 percent to 13.4 percent for the Ramu grid for the two scenarios respectively. The economic slowdown caused by COVID-19 in 2020 has been considered, while the average annual growth rates from 2021 to 2040 referred PPL's estimate in its 15-year expansion plan (2020-34).

As per the 2020 implementation plan for NEROP, investments of around $750 million would be required across distribution infrastructure and off-grid solutions to meet the 2030 targets of 70 percent access to electricity.[30] The geospatial study of grid extensions shows the possible future extent of PPL's grid in Port Moresby and Ramu, as summarized in Figure 8.

30 NRECA, 2020, Draft NEROP Implementation Plan

## Figure 8: Proposed grid extension of PPL system under NEROP Implementation Plan




*Source: Papua New Guinea National Electrification Rollout Plan (NEROP) Implementation Strategy and Investment Plan Final Report, Aug 2020, NRECA*

Mines and large industrial users in PNG that are not connected to the grid have an additional installed generating capacity of about 300 MW. There is potential to connect some of these large loads (and planned additions) to the Ramu grid, as illustrated by the red squares (large loads) in Figure 9.

## Figure 9: Map of possible large load locations


**Key:**

**Green star =** Existing PPL generator
**Orange star =** Possible new generator
**Red square =** Large mining load (not connected to PPL)
**Light green circle =** Existing PPL substation
**Green line =** PPL transmission line
**Red line =** Private transmission line

*Source: Economic Consulting Associates, Grid Development Rapid Review, 2016*

Possible existing and new large loads that could be connected to the Ramu grid include:

- Ramu—Kurumbakari (6 MW)
- Ramu—Basimuk (25 MW)
- Kainantu (5 MW)
- Wafi-Golpu—stage one (41 MW)[31]
- Pacific Marine Industrial Zone (27 MW)
- Porgera—extension of life (80 MW)
- Yandera (130 MW)

### *Financial performance of the utility*

Little information about PPL's financial standing has been made public in recent years. While it has been reported that PPL recorded a profit of 63 million PNG kinas in 2015,[32] recent reports suggest that the utility lost 197 million PNG kinas in 2018.[33],[34] In late 2018, PPL was restructured into three operational business units – Generation, Transmission & Distribution, and Retail, supported by three service units – People & Transformation, Finance & Shared Services, and Strategy & Innovation. Recent reports suggest that PPL plans to implement a new Grid Stabilization Plan as part of a Government injection of capital into the business.[35]

In theory, the regulatory regime that is in place should allow PPL to recover its generation costs, finance its required investments, and earn a return on capital. This requires PPL to meet the efficiency targets built into the regulator's cost forecasts and adjust its tariffs accordingly.

PPL is vulnerable to political sensitivity around tariffs, which, if combined with increasing diesel prices, could put PPL in a difficult financial position. The commissioning of the 45 MW gas-fired Dirio power plant in Port Moresby in late 2020 and commissioning the 58 MW gas-fired Niupower power plant in late 2019, have likely significantly reduced PPL's costs.

## 3.2.2. Status and potential of renewable energy

### *Current level of renewable energy generation*[36]

Based on data published by PPL, total grid-connected available generating capacity in 2019 was 416 MW. Of this, 124 MW (30 percent) was from hydro sources, which generated 47 percent of PPL's total electricity in 2019. PPL's only other RE generating capacity is a small (0.8 MW) biomass plant.

Of the 300 MW of capacity installed by mines and other large loads, 59 MW is hydro (Ok Tedi Mine) and 50 MW is geothermal (Ladolam Gold Mine on Lihir Island). RE generation, therefore, accounts for about 30 percent of self-generated energy by mines and large industrial users.

### *Renewable energy targets*

PNG's Strategic Development Plan 2010–2030 forecasts that RE will comprise 77 percent of its total installed generating capacity by 2030. This represents an increase from 30 percent at present.[37] Hydro is targeted to make up 52 percent of total installed capacity and other renewables to make up an additional 23 percent. The bulk of the remaining capacity will be gas-fired generation.

PNG's Vision 2050 sets a target of 100 percent power supply from renewable and sustainable energy sources by 2050.

The National Energy Policy 2017-2027 sets out specific targets for the development of RE power generation by 2030—100 MW of solar and 100 MW of wind.

31 Including stage two, the total demand of this mine would exceed 100 MW

32 Lapumi, Charles, PNG Power nets K63 million profit, Loop, September 28, 2016 http://www.looppng.com/content/png-power-nets-k63-million-profit

33 PNG Power, "PNG Power Setting a New Benchmark in Financial Good Governance," news release 15 July, 2019 https://www.pngpower.com.pg/index.php/news/view/png-power-setting-a-new-benchmark-in-financial-good-governance

34 Kumul Consolidated Holdings, "KCH Releases 2018 and Q1 2019 Financial Performance Results," July 2019 https://www.kch.com.pg/kch-releases-2018-and-q1-2019-financial-performance-results/

35 "Ramu 2 hydro will be a gamechanger for Papua New Guinea, says PNG Power MD", **Business Advantage**, 29 Mar, 2021, https://www.businessadvantagepng.com/ramu-2-will-be-a-nation-building-project-says-png-power-md/

36 Economic Consulting Associates, 2016, Grid Development Rapid Review

37 The share of energy generated from RE is currently around 47 percent, whereas the share of installed capacity that is RE is 30 percent

### *Resource potential*[38]

- **Hydro—**The RE potential in PNG is enormous, particularly for hydropower. However, limited detailed technical studies on hydrological potential have been undertaken in recent years, with the last major studies completed in the 1980s. The exact potential is therefore unknown. However, in 1994, the World Bank estimated the gross potential of large-scale hydro to be roughly 20,000 MW and 175,000 GWh/year, with technically feasible potential of 14,000 MW and 122,600 GWh/year. The economically feasible sites total about 4,200 MW, producing roughly 37,000 GWh/year. These estimates exclude micro- and mini-hydro for rural communities.
- **Solar—**Like much of the Pacific, PNG has strong potential for solar generation. Few resource measurements have been undertaken, although the World Bank assisted with a solar mapping study in 2018. Satellite data indicates that average insolation in much of the country appears to be good, with 4.5 hours to 8 hours of sunshine daily. Due to the mountainous terrain and the associated persistent clouds, the solar energy reaching the ground can vary greatly from place to place and cannot be easily estimated for a particular site from satellite data. Of the 23 locations assessed in studies from the 1990s, Port Moresby is considered PNG's sunniest location, with 2,478 sunshine hours per year. The lowest is Tambul, Western Highlands, with 1,292 sunshine hours. The best locations for solar PV are the offshore islands and the southern regions due to fewer persistent clouds caused by mountains. Solar is particularly attractive in PNG given that PNG's peak load is in the daytime.
- **Wind—**A 2019 World Bank-funded wind mapping study assessed three locations with the highest resource potential: Central Province, Morobe Province, and Western Highlands Province. The results were not promising for onshore wind power generation, with estimated net capacity factors ranging from 6 percent to 16 percent. The best results were from Morobe Province.[39] A recent World Bank assessment found good potential for offshore wind power, particularly off Port Moresby and in the straits between New Guinea and New Britain. It estimates total generation capacity is 147 GW.[40]
- **Geothermal—**PNG has strong geothermal potential, but no systematic geothermal energy assessments have been carried out. Exploration studies suggest that the most promising area is the northern coast of New Britain, where there are at least seven geothermal sites. The only existing commercial geothermal development is in Lihir, north of New Ireland, where there may be up to 70 MW of additional developable potential.
- **Biomass—**Although two-thirds of PNG is forested, most of the biomass is inaccessible or unsuited for energy use. An estimated 58 percent of land is subject to strong or severe erosion and 18 percent is permanently inundated or regularly flooded. The main practical biomass energy potential is from logging or agricultural production, using either the crop output or processing waste. Log exports are about 2 million cubic meters per year, but very little is processed locally, leaving relatively small amounts of biomass waste for energy production. There are 18 major wood-processing facilities, but the amount of residue produced and available for energy use is not known. The development of the plantation for a new 30 MW IPP at Markham Valley, using a combination of existing rain trees and newly planted eucalyptus, was expected to demonstrate the potential for biomass generation in PNG. But the project has been delayed since the power purchase agreement was signed in 2015 and there are recent reports that PPL has terminated the agreement.[41]

38 IRENA, September 2013, Pacific Lighthouses: Renewable Energy Roadmapping for Islands (Papua New Guinea)

39 World Bank, December 2019, Wind Resource Mapping in Papua New Guinea

40 World Bank, March 2020 (revised January 2021), Offshore Wind Technical Potential in Papua New Guinea

41 "PNG Biomass green power project under threat in Papua New Guinea," Business Advantage 31 May 2021, https://www.businessadvantagepng.com/png-biomass-green-power-project-under-threat-in-papua-new-guinea/

### *Existing renewable energy projects*

Table 8 provides a summary of existing grid-connected RE generation projects.

**Table 8: Existing renewable energy projects**

| POWER STATION | GRID | OPERATOR | GENERATION TECHNOLOGY | YEAR COMMISSIONED | INSTALLED CAPACITY (MW) | AVAILABLE CAPACITY (MW) | ANNUAL GENERATION (MWh) |
|---|---|---|---|---|---|---|---|
| ***Rouna Scheme*** | Port Moresby | PPL | Hydro with reservoir | 1957–1986, some units refurbished in 2008 | 65.60 | 58.25 | 271,368 |
| ***Ramu 1*** | Ramu | PPL | Hydro with reservoir | 1976–1990 | 77.40 | 43.50 | 258,614 |
| ***Yonki ToD*** | Ramu | PPL | Hydro with reservoir | 2013 | 18.00 | 0.00 | 0 |
| ***Pauanda*** | Ramu | PPL | Hydro run-of-river | 1982 | 12.00 | 8.50 | 46,890 |
| ***Baiune*** | Ramu | IPP | Hydro run-of-river | 2006 | 10.00 | 12.00 | 88,740 |
| ***Warangoi*** | Gazelle | PPL | Hydro run-of-river | 1987 | 10.00 | 4.40 | 7,768 |
| ***Ru Creek*** | Kimbe | PPL | Hydro run-of-river | 1978 | 0.90 | 0.82 | 336 |
| ***Lake Hargy*** | Bialla | PPL | Hydro run-of-river | 1987 | 1.50 | 0.80 | 3,211 |

*Source: PPL Generation Data 2019*

### *Planned and possible future renewable energy projects*

In theory, there is a large number of possible RE generation projects in PNG. However, due to limited studies conducted on resource potential, few specific projects have been studied to pre-feasibility or feasibility level.

Table 9 provides a summary of planned RE projects, for which planning is well advanced.

**Table 9: Planned RE generation projects**

| POWER STATION | GRID | OPERATOR | GENERATION TECHNOLOGY | EXPECTED COMMISSIONING | AVAILABLE CAPACITY (MW) | ANNUAL GENERATION (MWh) | STATUS |
|---|---|---|---|---|---|---|---|
| ***Edevu*** | Port Moresby | IPP | Hydro with reservoir | 2022 | 51 | 252,000 | Under construction[42] |
| ***Naoro Brown*** | Port Moresby | IPP | Hydro with reservoir | Unknown | 80 | 560,000 | Feasibility study and ESIA completed[43] |
| ***Ramu 2*** | Ramu | IPP | Hydro with reservoir | 2028 | 180 | 900,000 | Conditional PPA signed in 2021[44] |
| ***Markham Valley*** | Ramu | IPP | Biomass (30 MW) and Solar (10 MW) | Unknown | 40 | 260,000 | PPA signed but may be cancelled[45] |

*Source: Various (as provided in footnotes)*

42 Kil, Lynette, "Elevu Hydro Project to Come Online in 2020," PostCourier, October 17, 2019 https://postcourier.com.pg/edevu-hydro-project-to-come-on-line-in-2020/

43 "Naoro Brown Hydro Power Project", Major Projects, PPL, http://www.pngpower.com.pg/index.php/projects/view/naoro-brown-hydro-power-project

44 "Ramu 2 hydro will be a gamechanger for Papua New Guinea, says PNG Power MD", *Business Advantage*, 29 Mar, 2021 https://www.businessadvantagepng.com/ramu-2-will-be-a-nation-building-project-says-png-power-md/

45 PNG Biomass green power project under threat in Papua New Guinea," Business Advantage 31 May 2021, https://www.businessadvantagepng.com/png-biomass-green-power-project-under-threat-in-papua-new-guinea/

*Solar rooftop business Port Moresby (IFC)*

Other projects that PPL has recently considered include:[46]

- **Hela hydro—**A 168 MW run-of-river hydro on the Tagari River, near Hewaii Falls in the Hela Province. A 2014 feasibility study, commissioned by the Hela Province, assessed the viability of supplying power to mines.[47]
- **Warangoi B hydro—**A 5 MW run-of-river hydro on the Warangoi, upstream of the existing power station, in East New Britain.
- **Mevelo hydro—**A 24 MW run-of-river hydro in the Gazelle peninsula, supplying East New Britain.
- **Purari hydro (lower)—**A $5 billion, 2,500 MW hydro project to supply North Queensland via an underground transmission line was proposed by Origin Energy in 2010, but was shelved in 2014. More recently, a Deed of Agreement was signed between the Government of PNG and Fortescue to complete a feasibility study and potentially develop the project.[48]
- **Purari hydro (upper)—**A feasibility study has been completed for a 1,000 MW hydro project on the Upper Purari River.
- **Karimui hydro—**In 2016, a feasibility study was completed for this 1,800 MW hydro project, located in the Simbu Province. It is being developed by Kumul Consolidated Holdings Ltd.
- **Mendi hydro—**This 20 MW hydro project in the Mendi was proposed in 2013 and was at one point under development by Kumul Consolidated Holdings.
- **Baime hydro—**A 10 MW hydro project in the tender and design stage; the feasibility study and environmental impact assessment have been completed.
- **Mongi-Bulum hydro—**A pre-feasibility study suggests that this 12 MW hydro project is financially viable.
- **Kaugel hydro—**A 30 MW planned hydropower plant.
- **Yanderra hydro—**A 65.9 MW planned hydropower plant.
- **Imbrum II hydro—**A 44 MW hydropower plant in its early stages of planning. A pre-feasibility study concluded that although there was good potential for generation, it might only be financially viable under favorable circumstances.
- **Alatou solar—**A relatively small 1 MW solar PV plant.
- **Kavieng solar—**Another relatively small 1 MW solar PV plant.
- **Frieda River hydro—**Geotechnical investigations and feasibility studies have been completed for this planned 272 MW hydropower plant.

46 Economic Consulting Associates, 2016, Grid Development Rapid Review

47 Innovative Agro Industry, September 2014, Hela hydropower project—Feasibility Study

48 "Papua New Guinea's hydropower development potential to be assessed," *The International Journal on Hydropower and Dams*, September 2, 2020. https://www.hydropower-dams.com/news/papua-new-guineas-hydropower-development-potential-to-be-assessed/

## 3.2.3. Legislation, policy, and regulation

### *National Energy Authority Act*

The National Energy Authority Act 2021 sets out a new structure for the PNG electricity sector. The act's objectives include promoting efficiency and competition and ensuring the electricity system operates safely and efficiently.

The act creates a new National Energy Authority (NEA) which has wide-ranging responsibilities in the power sector, including for policy formulation, economic regulation, technical regulation, and implementing off-grid rural electrification projects.

It effectively takes over the responsibilities of the Energy Wing of the Department of Energy and Petroleum and the Independent Consumer and Competition Commission (ICCC), as outlined in Section 3.2.4.

The National Energy Authority Act 2021 also introduces new requirements relating to 'National Content', including to:

- Convene a National Content Forum for each project, which includes all stakeholders, to discuss and agree benefit sharing, with the agreement to be approved by the Minister.
- Conduct a study that identifies traditional landowners before construction begins.
- Pay a royalty benefit of up to 5 percent of gross annual revenues to owners of land that is within one kilometer of the project's generation facilities and transmission and distribution lines.
- Offer an equity benefit option of up to 20 percent combined to the government (national, provincial, and local level) and landowners, with the following caps on the individual shares of equity:
  - National government – 10 percent
  - Provincial and local level government – 5 percent
  - Landowners – 5 percent

### *National Energy Policy 2017-2027*

The National Energy Policy 2017-2027 is the most recent policy document endorsed by Government.

The National Energy Policy describes clear objectives for promoting renewable energy, across a range of different resources. Strategies include developing a master plan for renewable energy, green energy certification schemes, and feed-in tariff schemes. At the time of writing none of these had been actioned but establishing the NEA may lead to progress.

The National Energy Policy reaffirms PPL's exclusive right to sell electricity to customers with a load of 10 MW or less and that are within 10 kilometers of its existing grid. This right was first set out in the 2011 Electricity Industry Policy and was subsequently defined in PPL's Retail License with ICCC. Anyone can apply for a license to sell electricity, as long as their customers are outside of PPL's exclusive zone or have a load greater than 10 MW.

The National Energy Policy generally encourages competition in the electricity sector and among a long list of strategies mentions:

- Creating separate commercial entities for generation, transmission, distribution, and retailing.
- Establishing an independent system operator.
- Establishing a competitive electricity market.
- Creating transmission interconnectivity with Australia and Indonesia.

The National Energy Policy also confirms the arrangements for community service obligations (CSOs) that were first set out in the 2011 Electricity Industry Policy:

- PPL is only obliged to undertake grid extensions if they are commercially viable. For those that are unviable, PPL can access funding through the government's community service obligation (CSO) mechanism—at the time of writing, this mechanism has not been used for any projects.
- IPPs and new retailers have access to funding through the CSO mechanism if the investment to provide electricity is not otherwise viable.
- Differential pricing is permitted, to reflect the different costs of providing services in urban and rural areas and to improve the viability of rural electrification.

*Rouna Falls Port Moresby Credit: Stefan Krasowski https://www.flickr.com/photos/rapidtravelchai/*

### *Third Party Access Code*

The Third Party Access Code was issued in 2014 by ICCC, the previous economic regulator of the electricity industry. It will now be the responsibility of the NEA to enforce. The Third Party Access Code addresses three specific areas relating to investments in the power sector:

- **Power purchase reference prices**, which are avoided cost benchmarks for IPP prices and are used for regulatory approval of new PPAs.
- **Wheeling terms and charges**, which are used by PPL to grant third parties access to its network, such as IPPs who want to supply large loads (>10 MW) using PPL's grid to transmit the power.
- **Connection terms and charges**, which are used to determine the cost that third parties, such as IPPs, should pay for connection to PPL's grid.

Section 3.3.6 outlines the process for getting regulatory approval of new PPAs.

Since the Third Party Access Code was published in 2014, PPL has submitted power purchase reference prices for approval. But it has not yet submitted wheeling terms and charges and connection terms and charges to the regulator for approval. This means that while the overall framework for wheeling and connection is set out in the Third Party Access Code, the detailed terms and conditions are not yet defined.

The Third Party Access Code only applies to regulated retailers and transmission network operators. It does not apply to distribution-connected generation and grids without a transmission network.

### *Grid Code*

The Grid Code sets out the technical rules for operating transmission networks in PNG. It applies to PPL (or any other transmission system owner or operator) and IPPs that connect to a transmission network. It covers:

- Technical and performance standards for the grid covering safety, power quality, reliability, system loss, protection, grounding, equipment, and maintenance.
- Rules, procedures, and requirements for applying for, reviewing, and approving transmission connections.
- Rules, procedures, and requirements for preparing, reviewing, and approving power development plans.

- Rules, procedures, and requirements for system operation, including operational planning, frequency and voltage control, ancillary services, scheduling and dispatch, emergency, and safety coordination.
- Implementation and enforcement procedures.

The Grid Code focuses solely on technical matters, whereas the Third Party Access Code focuses on economic and commercial matters.

Although the Grid Code is in force in PNG, PPL is still working to implement the improvements required to meet the Grid Code standards.

### *National Electrification Rollout Program*

The NEROP was prepared in 2017 by the Department of Petroleum and Energy, with support from the World Bank, and was adopted by the National Executive Council in August 2019. The World Bank has supported the government to prepare a detailed plan for implementing the first stages of the NEROP. The NEROP Implementation Plan and the least cost expansion plan are expected to be to be approved by the Government of PNG in due course.

In addition, the World Bank is also preparing a least-cost expansion plan for PNG to identify the generation and transmission requirements necessary to meet its electrification target.

### *Other relevant policy, legislation, and regulations*

- **Development Strategic Plan 2010–2030—**The plan sets out the broad strategy for the development of PNG, including increasing the country's share of RE power generation.
- **Environment Act 2000—**The act defines the rules regarding environmental permits, environmental impact assessments, and water resources. Accompanying regulations include the Environment (Prescribed Activities) Regulation 2002 and the Guideline for Conduct of Environmental Impact Assessment and Preparation of an Environmental Impact Statement 2004. The Environment (Prescribed Activities) Regulation 2002 defines hydroelectric plants with a capacity of more than 2 MW as Level 2 activities and hydroelectric plants with a reservoir of more than 5km$^2$ as Level 3. This means they are required to prepare a Notification of Preparatory Work which is submitted to the Department of Environment and Conservation (DEC) which will advise on the level of investigation required.
- **Public Private Partnership Act 2014—**The act defines the legal framework for undertaking PPPs, defined as a "method to procure and deliver infrastructure and services through cooperation between a public institution and one or more private enterprises." It establishes a Private Public Partnership Centre, which is an unincorporated statutory body responsible for assisting the government in developing, tendering, and implementing PPPs. A PPP Steering Group is also established under the act. However, the PPP Centre and Steering Group have not yet been fully operationalized. The Department of National Planning and Monitoring is the central agency responsible for PPP policy.
- **CSO Policy and Guidelines 2014—**The CSO Policy and Guidelines define a framework for providing CSO funding to PPL and other service providers. Unlike the Electricity Industry Policy, the CSO Policy is not explicit about how funding is provided, but rather lets it be decided on a case-by-case basis for each industry, although it does express a preference for direct budget allocations. At the time of writing, the CSO Policy has not been implemented for any state-owned enterprises due to a lack of funding. The Department of Treasury has, however, put PPL on a shortlist of state-owned entities to pilot the new CSO approach. All CSO funding must be approved by the National Executive Council and the Department of National Planning and Monitoring.
- **Good Procurement Manual—**Issued by the Central Supply and Tenders Board, the manual was developed to help national departments and provincial administrations, public bodies, and supply and tenders boards achieve value-for-money outcomes in the contracts that they establish. It applies to major contracts, which are defined as anything of 300,000 PNG kinas or more. It does not, however, apply to contracts for whole of life costs, commercial development contracts (defined as Build-Own-Transfer contracts or similar), or donor/aid agency procurement.
- **Geothermal Policy 2012—**This policy establishes a framework that guides and promotes the exploitation, development, production, and use of geothermal resources in PNG.

*Rabaul from the Vulcanology Observatory. Credit: Stefan Krasowski https://www.flickr.com/photos/rapidtravelchai/*

- **Investment Promotion Act & Regulation 1992**—The act establishes the Investment Promotion Authority (IPA) to facilitate investment and assist with obtaining necessary licenses and permits. In addition, the IPA issues certification for foreign investors, maintains a register of foreign investors operating in PNG, and monitors their activities. According to the act, IPA will also provide policy advice to the government on all issues relating to local and foreign investment. The Investment Promotion Regulation was issued alongside the act. The regulation defines a list of activities reserved for PNG citizens, offers direction on foreign certification applications and fees, and prescribes official forms required for certification applications.
- **Land (Ownership of Freeholds) Act 1996**—The act consolidates and amends previous legislation that relates to land and repeals various statutes that were in place under the administration before independence. The Land Act relates to matters of national interest and is also consistent with section 29 of the Organic Law on Provincial Government and section 41 of the Organic law on Provincial and Local Level Governments. The most relevant provisions for land acquisition are covered in division 10, section 103, which deals with urban development leases. The act also deals with compulsory acquisition of customary land and acquisition of land by agreement (parts III and IV).
- **Land Groups Incorporation Act 1974**—The purpose of this act is to provide for greater participation by customary landowners in the PNG economy through greater certainty of land title and resolution of land-related disputes. The act provides for legal recognition of the corporate status of customary groups and confers on them, as corporate entities, the power to acquire, hold, dispose, manage, and lease land.
- **Land Disputes Settlement Act 1975**—The purpose of this act is to provide a just, efficient, and effective framework for settling customary land disputes by encouraging self-reliance through involving people in the settlement of their own disputes, and using principles underlying traditional dispute settlement processes.
- **PPL Electricity Regulatory Contract**—The detailed terms of the regulation of PPL are contained within the Regulatory Contract between NEA (previously ICCC) and PPL, which is reviewed every five years.
- **Village Courts Act 1989**—Village courts operate alongside local and district courts. Their function is to "ensure peace and harmony" in the village and they have jurisdiction over all residents. These courts can often adjudicate on matters relating to land acquisition and the payment of compensation to affected persons. Typically, the Provincial Government District Lands Officer attempts to mediate and settle claims for payments for customary-owned land according to the Land Act's procedures and processes. If this is found to be unsatisfactory, affected persons may request a formal village court hearing.

## 3.2.4. Institutions

### *Papua New Guinea Power Limited*[49]

PPL is the vertically integrated national power authority that provides generation, transmission, distribution, and retail electricity services throughout much of PNG. The National Energy Policy 2017-2027 mentions unbundling PPL, but the only progress made to date is the creation of separate business units within PPL.

PPL is a state-owned entity. Its shareholder is Kumul Consolidated Holdings Ltd, which acts on behalf of the government. Under the Kumul Consolidated Holdings Act 2015, Kumul Consolidated Holdings is an independent entity and any inappropriate political intervention is forbidden and must be reported to Parliament. Through its board, PPL, provides financial and operational reports and a five-year business plan to Kumul Consolidated Holdings each year. The PPL board consists of seven directors and a chair. The National Executive Council appoints board members from diverse professional backgrounds rather than simply the civil service.

PPL holds licenses for the generation, transmission, distribution, and retail of electricity with the NEA (transferred from ICCC). It operates under a five-year regulatory contract. Under the contract, it has the exclusive right to sell electricity to customers with a load of 10 MW or less that reside within 10 kilometers of its existing network.

PPL has previously undertaken the role of technical regulation on behalf of the ICCC. This includes approving licenses for electrical contractors, providing certification for electrical equipment and appliances to be sold in the country, and providing safety advice and checks for major installations. PPL recently announced[50] it would ringfence these functions with a view to transferring them to NEA.

### *National Energy Authority*

The National Energy Authority Act 2021 establishes the NEA which has the following responsibilities in the power sector:

- Policy formulation and implementation, including updating and implementing the National Energy Policy, which was previously the responsibility of the Energy Wing of the Department of Energy and Petroleum.
- Economic regulation, including setting retail tariffs and reviewing power purchase agreements, which was previously the responsibility of the ICCC.
- Technical regulation, including licensing electricity service providers, and defining and enforcing technical standards, which was previously the responsibility of the ICCC. Many of these functions had been largely delegated to PPL and may continue to be while NEA builds its capacity.
- Administration of the National Electrification Trust Fund, which will be used to help fund the National Electrification Roll-out Plan, and to coordinate or implement rural electrification projects in off-grid areas.

Under the Act, the Deputy Secretary of the Energy Wing of the (former) Department of Petroleum and Energy will act as the Interim Managing Director until a new Managing Director is appointed.

The NEA also has responsibilities in the petroleum sector, including receiving and administering domestic gas market obligations.

### *Other relevant public sector institutions*

- The **Investment Promotion Authority** was established through the Investment Promotion Act to help local and foreign investors acquire the necessary permits, licenses, and approvals for their intended investment. The IPA also issues certifications to foreign investors wanting to invest in PNG. The IPA should be the first stop for all investors, both local and foreign, looking to invest in PNG.

49 PPL, 2016, PNG Power Information Handbook

50 "Ramu 2 hydro will be a gamechanger for Papua New Guinea, says PNG Power MD", **Business Advantage**, 29 Mar, 2021 https://www.businessadvantagepng.com/ramu-2-will-be-a-nation-building-project-says-png-power-md/

- **District Development Authorities** are responsible for providing infrastructure services in provincial areas under the District Development Authorities Act 2014, but whether that includes power supply is subject to a ministerial determination on a case-by-case basis.
- **Treasury** administers central funding for electrification projects and manages the CSO scheme.
- The **Conservation and Environment Promotion Authority** approves compliances with PNG environmental and social safeguards requirements.
- The **Office of the Valuer-General** issues up-to-date compensation values for land and crop loss resulting from electrification projects.

### *Development partners*[51]

Development partners active in the power sector in PNG include:

- World Bank Group (including the International Bank for Reconstruction and Development, the International Development Association and the International Finance Corporation)
- Asian Development Bank (ADB)
- Japan International Cooperation Agency (JICA)
- Australian Department of Foreign Affairs and Trade
- New Zealand Ministry of Foreign Affairs and Trade
- European Union
- United Nations Development Program (UNDP)
- United States Agency for International Development

To date, funding has been given on a project basis and no sector-wide approach has been established, although there is significant cooperation and communication among the development partners.

### *Commercial lenders*[52]

Commercial financiers operating in PNG include the following:

- **Bank South Pacific (BSP)** is the largest bank in PNG. As of December 2020, BSP had total assets of 27.5 billion PNG kinas.[53]
- **ANZ Papua New Guinea** provides specialized institutional and large corporate services in PNG. ANZ sold its retail, commercial, and small and medium enterprise (SME) services to Kina Group in 2019.[54] The company opened its first PNG branch in Port Moresby in 1910.
- **Westpac Bank PNG Limited** is a wholly owned subsidiary of the Australian-based Westpac Banking Corporation. The bank provides a wide range of personal and business banking products and services, including home and personal loans, credit cards, savings and current accounts, and term deposits.
- **Kina Group** offers full retail, commercial, and SME services after its purchase of ANZ's divisions. It is the largest wealth manager, one of the largest fund administrators, and the leading stockbroking firm in PNG.

51 Economic Consulting Associates, 2016, Grid Development Rapid Review

52 Primary source: https://www.relbanks.com/oceania/papua-new-guinea

53 "Banks in Papua New Guinea", Banks Around the World https://www.relbanks.com/oceania/papua-new-guinea

54 "ANZ PNG's Retail, Commercial and SME Businesses Transfer to Kina Bank," ANZ Media Centre, September 9, 2019 https://media.anz.com/posts/2019/09/anz-png_s-retail--commercial-and-sme-businesses-transfer-to-kina

## 3.2.5. Electricity tariffs and renewable energy incentives

### *Retail electricity tariffs*

The NEA recently took over responsibility from ICCC for setting retail electricity tariffs. The ICCC's approach, which the NEA is likely to also follow, sets a cap on PPL's weighted average retail tariff. The cap is set by conducting a detailed review of PPL's costs every five years. Interim reviews are conducted every two-and-a-half years to automatically adjust for some costs.

PPL's electricity regulatory contract explicitly allows for its tariffs to vary by service area (that is, grid), in accordance with the National Energy Policy. In practice, PPL has not applied for such a tariff, nor has ICCC or NEA enforced one. PPL is, therefore, effectively using its main grids to cross-subsidize its more expensive mini-grids.

PPL's current retail tariffs, unchanged since 2013, are summarized in Table 10 and Table 11. A general supply customer is effectively a commercial customer. Any customer with a minimum load greater than 200 kVA can apply to be classified as an industrial customer. Minimum charges also exist, but these are not shown in the tables.

**Table 10: Summary of PPL's retail tariffs (PNG kina/kWh)**

| TARIFF CATEGORY | ENERGY CHARGE | DEMAND CHARGE |
|---|---|---|
| | Kina/kWh | Kina/kVA |
| ***Domestic (credit meter)*** | 0.85[55] | - |
| ***Domestic (Easipay)*** | 0.70 | - |
| ***General supply (credit meter)*** | 0.99 | - |
| ***General supply (Easipay)*** | 0.96 | - |
| ***Industrial*** | 0.63 | 77.12 |

*Source: PPL*

**Table 11: Summary of PPL's retail tariffs ($/kWh, assuming exchange rate of 0.29)**

| TARIFF CATEGORY | ENERGY CHARGE | DEMAND CHARGE |
|---|---|---|
| | $/kWh | $/kVA |
| ***Domestic (credit meter)*** | 0.25 | - |
| ***Domestic (Easipay)*** | 0.20 | - |
| ***General supply (credit meter)*** | 0.29 | - |
| ***General supply (Easipay)*** | 0.28 | - |
| ***Industrial*** | 0.18 | 22.36 |

*Source: PPL*

Industrial customers pay both an energy charge and a demand charge. An industrial customer with a monthly peak demand of 300 kVA and a load factor of 85 percent will pay 0.91 PNG kina/kWh ($0.26/kWh) in total.

### *Specific incentives for renewable energy*

The National Energy Policy 2017-2027 envisages a feed-in tariff regime and a green certificate scheme, but neither have been implemented.

PPL has recently taken the first steps towards a net-metering regime, as described in Section 3.3.7.

Renewable energy equipment is exempt from import duties, as described in Section 3.3.8.

55 0.50 PNG kinas/kWh for the first 30 kWh per month, and 0.85 thereafter.

## 3.3 Step-by-step guide to investing

### 3.3.1. Introduction

The detailed description of the steps required to invest in RE power generation projects in PNG focus on three broad categories of RE projects:

- **IPP generation—**Private investors developing generation capacity and selling to the utility. Energy sources are likely to include hydropower, biomass, and solar farms.
- **Own-use solar generation—**Investments in solar PV capacity primarily for own-use by residential, commercial, and industrial customers. This can include rooftop solar installations or ground-mounted solar installations. Excess energy generated may or may not be exported to the grid, depending on the offering of the utility.
- **Off-grid generation (mini-grids)—**Investments in solar PV, hydropower, or hybrid mini-grids. Under this type of project, the developer is responsible for investing in and operating the mini-grid for a period of time.

This guide is not intended to cover the following types of projects, although much of the information may still be relevant:

- **Solar home systems—**These are basic solar systems that are not connected to the grid. They typically do not need to be licensed and can be purchased over the counter.
- **Construction contracts** for RE projects.

### 3.3.2. Setting up a business

#### *Registering as a foreign investor*

The Investment Promotion Act 1992 defines foreign investment as investment by any individual or corporation that is not a citizen. Section 5 of the act establishes the IPA as a legal entity. All foreign investors must have been granted a certification by IPA to invest and conduct business in PNG. Religious entities and certain non-profits are exempt from requiring a certification.

Foreign investors can apply for a certification on IPA's website, www.ipa.gov.pg. The application fee is 2,000 PNG kinas and must be paid before the application is processed.

Section 27 of the act gives the Minister of Foreign Affairs and Trade the power to prescribe activities that are reserved for PNG citizens or national enterprises. The Investment Promotion Regulations 1992 include a detailed list of reserved activities in section 3.

The section was amended in 1995 with the most recent list of reserved activities. Energy generation, transmission, and supply are not on the list of reserved activities and can therefore be conducted by a foreign investor, if a certification has been issued.[56]

Section 28 defines the requirements for applying for certification. The application is made according to Form 3—Application for certification by a foreign enterprise, accompanied by the following documents:

- A document stating the management or proposed management of the foreign enterprise
- Various documents offering proof of the applicant's merits, financial security, clean criminal record, and financial history

56 As per the recently enacted Electricity Industry (Amendment) Act, 2020, licence for small scale generation projects with installed capacity of upto 10 MW must be reserved for Papua New Guinea citizen companies; and licence for generation project with installed capacity of more than 10 MW must involve Papua New Guinea citizen companies as joint venture partners in the project.

### *Setting up a company*

The registration process can be completed online through IPA's website, www.ipa.gov.pg. Users must register for an account and submit their applications through the online portal. All forms can also be downloaded from the website.

The Companies Act 1997 lays out the legislation surrounding starting and operating a company in PNG. Section 13 defines the process of submitting an application for incorporation. Applications must be submitted to the Registrar of Companies, which issues certificates of incorporation. This section also lists the information required to accompany all applications. This information includes:

- Documents containing the names and information of all directors, secretaries, shareholders (including share ownership information), and any other authorized agent. The documents must be signed by all aforementioned individuals.
- Postal address and address of the company's registered office.

In addition, sections 21 to 23 state that all companies must have a unique name to use for all official dealings. Reserving the name is done at the Registrar of Companies and can be done alongside submitting the incorporation application.

The Company Regulations 1998 define the official application forms in Schedule 1 and the application fees in Schedule 2. These forms can be downloaded from the IPA's website.

The forms required to register a company are:

- **Form 1**—Application for registration of a company (400 PNG kinas if online, 500 PNG kinas if over the counter)
- **Form 2**—Consent of director of proposed company
- **Form 3**—Consent of secretary of proposed company
- **Form 4**—Consent of shareholder of proposed company
- **Form 5**—Application for reservation of a company name (150 PNG kinas if online, 200 PNG kinas if over the counter)

Following the successful submission of all required documents and forms, the Registrar of Companies issues the certificate of incorporation.

Within one month of the incorporation or the issue of new shares, the company must send every shareholder a certificate of ownership.

The requirements for share certificates are set out in section 75 and include:

- A certificate signed under the common seal of the company[57]
- Information on the class and number of shares held
- A statement setting out the rights, privileges, condition, and limitations of the shares held
- The relationship of the shares to other classes of shares

57 While the act does not explicitly state that companies must have a seal, requirements such as those listed in section 75 cannot be met without having a seal.

*PNG solar rooftop Credit: Christian Lohberger*

## 3.3.3. Land access and acquisition[58]

### *Types of land*

Land may be owned or occupied within three systems in PNG:

- Customary rights
- State owned
- Privately owned

Ninety-seven percent of land in PNG is customarily owned, meaning the land is owned in common by distinct clans, or communities while individuals only have user rights to land.

Customary land in PNG can be further categorized as:

- **Total clan land—**The entire land holdings are held by a land group, which has absolute control over the holdings without reference to any other group.
- **Traditional clan commons—**Land including the bush, graun, tais, ruran wara, and mountain, that is accessible to all members of the land group to hunt wild animals and collect non-timber forest products and firewood.
- **Gardens—**Land that has been taken out of the commons and used by individuals or families. This land is returned after use to the commons to lie fallow until it recovers its fertility. It is reallocated according to local conditions and customs and not necessarily to the same individuals or families.
- **Individual clan land—**Has been taken out of the clan commons permanently for the cultivation of coffee, cocoa, coconuts, betel nuts, sago, and increasingly rice, but only the land use is individual, not the land itself.

In addition, some private land in parts of the Highlands was removed from the traditional clan commons long ago, but it is still handed down and governed by a social contract guided by local custom.

Much of customary land remains outside the country's Torrens title system given the absence of a customary land registration database. There is also resistance to register under the Torrens system, as land ceases to be governed by custom once a Torrens title is issued.

### *Land acquisition challenges*

Despite abundant land, land acquisition is a serious challenge in PNG for the following reasons:

- **Indigenous people have a close affinity to land.** The ancestry and identity of a clan are inseparably linked to the land. The permanent loss of the entire customary land is seen as akin to the death of the clan.

58 Cape PNG, ADB, 15 April, 2020, Energy Sector Assessment

Hence, customary landowners resist the purchase or outright transfer of ownership of even a portion of their land. Even if they consent to sell a portion, it is likely to be at an exorbitant price.

- **Resettlement of a clan to another clan's land is rare.** The land or parts of the hosting clan's customary land would have to be voluntarily or compulsorily acquired by the government first, which is difficult to arrange. Other than resettlements for natural resource projects, resettlement in PNG has mainly been undertaken in preparation for or in the aftermath of a natural disaster and to populate vacant land for agricultural projects, such as contracts for palm oil cultivation.
- **Some land is settled informally.** Informal settlers are not entitled to customary land rights or compensation. The predominant practice of the government is to serve notice to the informal settlers to leave the land, which may not be compatible with the standards adopted by development partners. Informal settlers usually occupy vacant or state land. As such, they are not entitled to compensation under PNG law.

### *Options for accessing land*

Customary landowners prefer leasing because the land reverts to its original customary status on the expiration of the lease. Leasing also provides a steady stream of benefits for the duration of the agreement. In the past, land was lost in exchange for an axe or tobacco; today such land is prime property (for example, Jackson International Airport), and this has made the sale of customary land unpopular.

There are three options to access customary land for a large project involving the state:

- **Compulsory acquisition by the state.** The Minister of Lands, on behalf of the PNG government, purchases land from the customary landowners for a public purpose (which includes power generation and transmission) through a "compulsory acquisition," and leases the land to the project.
- **Lease negotiated by the state.** The Minister of Lands, on behalf of the government, negotiates and enters into "lease-lease back" arrangements with the customary landowners under the Land Act 1996. Under this arrangement, the state leases land from the customary landowners and then leases that land to the project under a state lease.
- **Lease directly to the project.** The customary landowners establish a legal entity known as the Incorporated Land Group under the Incorporated Land Group Act 1974. The Incorporated Land Group applies to the Lands Department to register, and obtain, a title in its name for the portion of the land included in the project site. The group then leases the land directly or indirectly to the project.

The leasing options are generally preferred because buying customary land through compulsory acquisition can take several years or even longer if there are competing claims on this customary land.

## 3.3.4. Social and environmental assessments

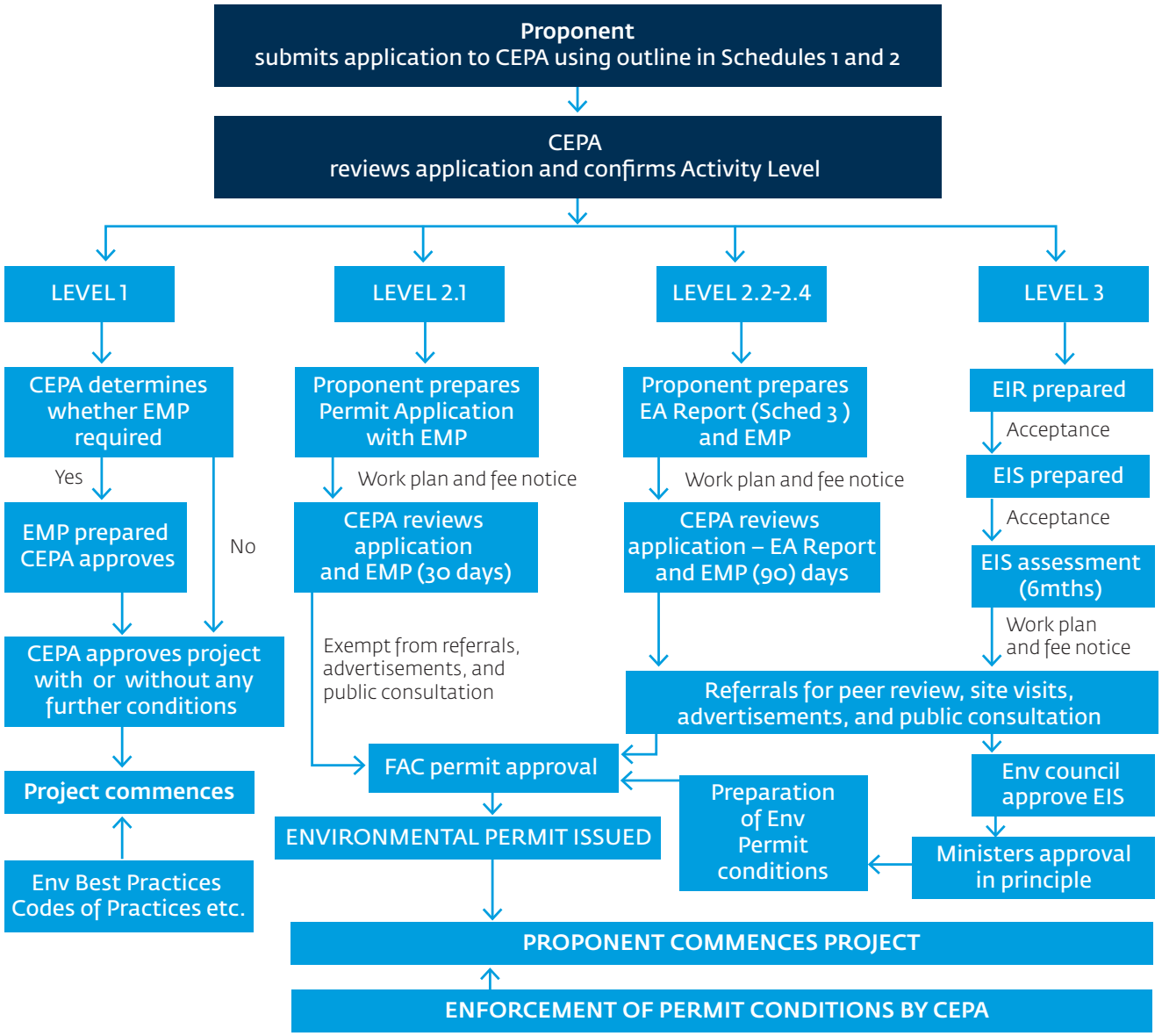
The Environment Act 2000 is the defining legislation for environmental requirements for energy development. Sections 16–19 establish the legal authority of the Director of Environment and the Environment Council as the entities responsible for enforcing the requirements of the act and issuing permissions.

Section 44 of the act requires all Level 2 and Level 3[59] projects to have an environmental permit before the start of construction and during operation, while Level 1 activities do not require a permit. The CEPA is the agency responsible for implementing the act and issuing permits.

Documents required for permit applications depend on the type of activity. Figure 10 and the following subsections provide an overview of the application process for an environmental permit for Level 1, 2, and 3 activities.

59 The Environment Act applies different requirements to Level 1, Level 2, and Level 3 activities. Level 3 activities are subject to the most strenuous requirements. The Environment Regulations offer greater clarity on project categorization. The projects relevant to this report included in the regulations are hydroelectric plants with a capacity larger than 2 MW. Other development projects (such as rooftop solar and solar IPPs) are not explicitly named in the regulations.

## Figure 10: Environmental permit application process




*Source: Fees and Application Advisory Committee*

## Environmental permit for Level 1 activities

The environmental regulatory approval process for Level 1 activities consists of the following steps.

### Project screening

The proponent submits an application to CEPA to register their intent using the *Application for an Environmental Permit Form* obtained from CEPA.

The following documents are available from CEPA to assist the proponent with this initial step:

- Information Requirements for Permit Applications and Registration of Intention to Carry out Preparatory Work—Operational Procedures Directive
- Application for an Environmental Permit—Schedule 1 with the List of Prescribed Activities
- Additional Information for Schedule 1 Environmental Permit Application Form—Schedule 2

### Approval

CEPA reviews the application and validates the categorization of the activity as a Level 1 activity if it agrees with the categorization. CEPA then notifies the proponent whether an environmental management plan (EMP) is required for the activity. If an EMP is required, the proponent submits the EMP for approval. If the EMP is approved, the activity is approved and can be carried out. If no EMP is required, the activity is approved by CEPA.

The proponent is now able to commence activity but is subject to environmental best practices and any Codes of Practices that CEPA advises the proponent to follow.

Level 1 activities may be elevated to Level 2 activities should CEPA consider that there are special reasons for moving the activity to a higher environmental risk level.

## Environmental permit for Level 2 activities

The process for applying for an environmental permit for Level 2.1 and 2.2–2.4 activities—as defined in the Environment Regulations 2002—is shown in Figure 10. The permit application is normally a two-step process, which commences with project screening. The second step is assessing the application, which results in the issuing of an environmental permit.

### Project screening

The proponent submits an application to CEPA to register their intent (applies to both 2.1 and 2.2–2.4 activities), choosing the appropriate activity level from the list of prescribed activities in Schedule 1. CEPA reviews the application, validates the activity level, and notifies the proponent of the level. The proponent then follows the steps to complete the assessment according to the activity level.

The following documents are available from CEPA to assist the proponent with this initial step:

- Information Requirements for Permit Applications and Registration of Intention to Carry Out Preparatory Work—Operational Procedures Directive
- Application for an Environmental Permit—Schedule 1 with the List of Prescribed Activities
- Additional Information for Schedule 1 Environmental Permit Application Form—Schedule 2

### Environmental permit application

The environmental impact of the project is assessed during this step and the extent of the requirements depends on the activity level that has been confirmed by CEPA. The proponent prepares supporting documents, including an EMP, that will allow CEPA to assess the environmental risk of the project and determine the conditions for issuing the environmental permit.

For Level 2.1 activities, the proponent's permit application prepared during screening is used to assess the approval for an environmental permit. Additionally, the proponent prepares an EMP according to the EMP Guideline. The plan is submitted to CEPA for appraisal along with the original application.

The process is as follows:

- For Level 2.2–2.4 projects, the proponent prepares an environment assessment report according to Schedule 3 together with an EMP according to the EMP Guideline. This is submitted to CEPA for appraisal.
- Acceptance of environmental permit application (applies to Level 2.1 and 2.2–2.4 activities):
  - For Level 2.1 activities, CEPA reviews and appraises the documentation, and if satisfied, issues a work plan and a fee notice. The proponent is required to pay the fee at this stage before the permit application proceeds any further.

- For Level 2.2–2.4 activities, CEPA reviews the submitted documentation against the Schedules and EMP Guideline requirements. If it is satisfied with the application, CEPA asks the proponent to submit 20 additional copies for referral to both internal and external reviewers. CEPA also issues a work plan and a fee notice. The proponent is required to pay the fee at this stage before the permit application proceeds any further.
- Following receipt of payment, the application is then processed:
  - For Level 2.1 activities, CEPA will issue an approval generally with conditions allowing the proponent to start the project. Level 2.1 activities are to be assessed and approvals given in one month (30 days). Depending on the complexity of the application, these time frames may be extended by the director as required.
  - For Level 2.2–2.4 activities, CEPA will commence assessment and arrange a review of the documentation (by both internal and external reviewers), an advertisement, and a conference of interested parties. The costs of these review and assessment activities are covered by the fee that is determined by CEPA. The assessment of Level 2.2–2.4 activities is to be completed within two to three months (60 days). Depending on the complexity of the application, these time frames may be extended by the director as required.
- Referral of environmental permit application (applies to 2.2–2.4 activities):
  - CEPA refers the application to relevant people and government agencies for comment.
- Advertisement of environmental permit application (applies to 2.2–2.4 activities):
  - CEPA notifies the proponent of its intention to conduct a public review of the application. CEPA also provides an advertisement notice.
  - CEPA publishes the advertisement notice.
- Conference of interested parties (applies to Level 2.2–2.4 activities):
  - CEPA receives comments from the public, including recommendations and objections to the application. If there are objections, CEPA directs the proponent to present the application to the conference of interested parties that is scheduled by CEPA.
- Decision on Environmental permit application (applies to both Level 2.1 and 2.2–2.4 activities):
  - CEPA accepts the environmental permit application and publishes an advertisement notice, announcing the approval of the environmental permit.
  - CEPA issues the environmental permit and advises the proponent of their environmental obligations. The permit may include provisions for monitoring, conducting an audit at periodic intervals, and submitting an environment improvement plan.

### *Environmental permit for Level 3 activities*

It is unlikely that RE projects will require a Level 3 assessment unless the location of any sub-project component triggers a Level 3 activity such as transmission lines being routed through a nature conservation area. This will then become a prescribed activity.

Level 3 activities are major projects with large anticipated environmental impacts. Accordingly, the Level 3 approval process requires the preparation of an environmental inception report and an environmental impact statement. Proponents can use the following guidelines to help them prepare these documents:

- Guideline for Preparation of an Environmental Inception Report, 2004
- Guideline for Conduct of Environmental Impact Assessment and Preparation of an Environmental Inception Statement, 2004

The process for applying for an environmental permit for a Level 3 activity is shown in Figure 10. Approval for a Level 3 activity may take three to six months (90 days).

## 3.3.5. Licensing and permits

### *Responsibility for licensing and process for applying*

The National Energy Authority Act 2020 specifies that the generation, transmission, distribution, and sale of electricity require a license. NEA is responsible for licensing in the electricity supply industry.

Generation license fees are payable on a quarterly basis:

- 0.009 PNG Kina per kWh of electricity generated, plus
- Installed capacity of 1-10MW: 10,000 PNG Kina per year
- Installed capacity of 11-20MW: 20,000 PNG Kina per year
- Installed capacity of 21-50MW: 30,000 PNG Kina per year
- Installed capacity of 51-100MW: 40,000 PNG Kina per year
- Installed capacity of 101-500MW: 100,000 PNG Kina per year
- Installed capacity of 501MW and above: 500,000 PNG Kina per year

License fees for transmission, distribution, sale of electricity, and generation less than 1 MW will be set by the NEA in regulations, which have not yet been issued.

### *Licensing generation, including own-use solar*

As per the National Energy Authority Act 2020, anyone wishing to generate electricity in PNG must be licensed.

The act defines generation as the "production of electricity through the operation of any kind of generating plant". The definition also allows for regulations issued by the NEA to exclude some types of generation, although as far as we are aware, none have yet been excluded. It is unclear whether individuals wishing to generate electricity for their own consumption require a license. Many households and businesses in PNG have stand-by generation and as ICCC previously never required them to be licensed. The distinction between stand-by generation and supply to the grid becomes more complex for own-use solar installations. These installations are usually only for self-consumption, but occasionally they export energy back to the grid.

### *Licensing mini-grids*

As per the National Energy Authority Act 2020, NEA may grant an exclusive license to sell electricity in a specified area. In accordance with the National Energy Policy 2017-2027, PPL's license grants it the exclusive right to sell electricity to customers—with a load of 10 MW or less—that are within 10 kilometers of its existing grid.

This means that any would-be mini-grid operator would need to apply for licenses to generate, distribute, and sell electricity. It can only sell electricity if it operates outside of PPL's exclusive zone or is exclusively supplying customers with a load greater than 10 MW.

### *Licensing IPPs to sell to large loads*

The fact that PPL does not have an exclusive license to supply large loads (>10 MW) opens the possibility of an IPP applying for a license to sell power directly to a large load customer or customers, either through the IPP's own network (for which it would need a license to operate) or through third-party access to PPL's grid.

The Third Party Access Code defines a framework for third parties to access PPL's transmission network, to "wheel" power across the grid, as detailed in Section 3.2.3. The code applies only to PPL's transmission networks (that is, the Port Moresby, Ramu, and Gazelle grids) and not to its distribution networks. It requires PPL (and any other licensed transmission network operator) to issue detailed wheeling terms, but PPL has yet to publish them. Nevertheless, PPL is obliged to process any application to wheel across its grid and to offer a fair charge.

The Third Party Access Code defines a clear process for these applications and a dispute mechanism.

The process for physically connecting to the transmission network can be summarized as follows:

- **Application for connection**—Any third party seeking a new connection or a modification of an existing connection to a transmission network must apply for connection to the transmission network owner.
- **Connection service procedures and charges made available**—The Statement of Connection Service Procedures and Charges must be made available by the transmission network owner to any third party or person applying for connection.

*PNG solar rooftop Credit: Christian Lohberger*

- **Processing and evaluation of proposed connection—** The transmission network owner must process the connection application on payment of processing and evaluation fees as approved by the regulator. The transmission network owner must evaluate the impact of the proposed connection to the grid by conducting grid impact studies and connection facility studies in accordance with the requirements of the Grid Code.
- **Approval of proposed connection—**The transmission network owner must approve the proposed connection if there is no significant impact that may adversely affect the operation, safety, and security of the grid. If there is a significant impact, including on network augmentation or the cost of connection, the transmission network owner must determine the least-cost requirements to mitigate these impacts on the grid. The basis for the assessment of impacts and least-cost mitigation requirements must be the grid impact studies and connection facility studies.

The specific process for obtaining approval to wheel power is to be determined by PPL (in the Statement of Wheeling Arrangements and Charges), but must include the following:

- The application process, including timelines, for granting third parties access to the transmission network
- The operational and technical requirements that third parties must meet when accessing the transmission network, in line with those set out in the Grid Code
- The service standards that the transmission network owner will meet, in line with those set out in the Grid Code
- A compensation mechanism to third parties for service quality that does not meet the service standards
- A current list of charges, the process and timeline for updating charges, and procedures for billing and payment
- The process for transferring an existing large load customer from one supplier to another

## 3.3.6. Procurement and project approval

### *IPPs*

#### *Responsibilities identifying and procuring new generation*

PPL issued an Independent Power Producer and Major Infrastructure Policy in 2018. The policy states that PPL will update its least cost development plan at intervals of no longer than two years and that it will be made available to development partners, financial institutions, and private sector participants.

In its plan, PPL identifies the least-cost capacity additions required to meet demand. Its most recent plan was completed in 2020 but has been made publicly available. It has been described by PPL as an "ever evolving strategy", with the first auctions for new generating capacity to be run in the third quarter of 2021.[60]

As per the National Energy Policy 2017-2027, which encourages IPPs, PPL has shown a clear preference for involving the private sector in new generation projects. It has recently successfully tendered 30 MW of new capacity in Lae (the Daewoo IPP, which will run on heavy fuel oil). PPL has successfully negotiated several IPPs more recently, but none of those were the outcome of competitive tenders.

In select cases, PPL's shareholder, Kumul Consolidated Holdings, has taken charge of developing and procuring large projects. It helped prepare and negotiate the Ramu 2 hydro project, for which PPL has now signed a conditional PPA. Earlier, Kumul Consolidated Holdings had also started preparing the very large Karimui and Purari hydro projects, but at the time of writing, only the Purari project is actively under preparation.

#### *Procurement process*

PPL's Independent Power Producer and Major Infrastructure Policy describes the following steps for competitively procuring projects:

- Feasibility study, to be conducted by PPL and approved by its board.
- Expressions of interest, which serves to screen firms to ensure they have the suitable technical and financial expertise to undertake the project. Interested firms must sign a non-disclosure agreement.
- Request for proposals, which PPL will send to shortlisted bidders.
- Evaluation of proposals, from which PPL will select the preferred bidder.
- Negotiation and execution, which will commence once PPL's board gives its approval to proceed. Upon successful negotiation, PPL will work with the preferred bidder to secure the necessary regulatory approvals.

#### *Unsolicited proposals*

In recent years PPL's capacity additions have been strongly influenced by unsolicited proposals. These include the Edevu hydro project and the Dirio and Niupower LNG-fired IPPs.

PPL's Independent Power Producer and Major Infrastructure Policy aims to encourage competition by channeling investors through competitive tendering, but nevertheless describes a broad framework for evaluating unsolicited proposals. Unsolicited proposals will only be considered if a project meets one or more of these conditions:

- Not a current investment program for PNG Power
- Not a generation or infrastructure proposal that is currently or planned to be competitively bid
- A funding or research opportunity to develop a unique generation proposal
- Leverages strategic and economic benefit for Papua New Guinea

If PPL evaluates the unsolicited proposal and decides to proceed, PPL will issue a letter of interest committing to further evaluation of the project on an exclusive basis with the proponent, subject to certain timeframes. The proponent will be required to conduct a full feasibility study and meet specific security requirements.

#### *Political influence in projects*

PPL's Independent Power Producer and Major Infrastructure Policy requires that project proponents provide details of all beneficial owners of the project, including whether any of those owners are Politically Exposed Persons,

60 PNG Power Ltd, "PNG Power Meets with Independent Power Producers," news release, 30 March 2021 https://www.pngpower.com.pg/index.php/news/view/png-power-meets-with-independent-power-producers

which are defined as "individuals who are or have been entrusted with prominent public functions domestically, by an international organization, or by a foreign country, for example Heads of State or of government, senior politicians, senior government, judicial or military officials, senior executives of state-owned corporations, and important political party officials".

PPL will evaluate the impacts of any involved Politically Exposed Persons and may reject proposals as a result.

#### *State guarantees*

PPL's Independent Power Producer and Major Infrastructure Policy makes it clear that it is unlikely a state guarantee (a commitment to fulfill the financial obligations of PPL if it were to default) will be provided for any new generation projects.

#### *Regulatory approval of new IPPs*

The Third Party Access Code requires PPL to develop and publish power purchase reference prices, which are avoided cost benchmarks for new generation and will likely be used by NEA (as successor to the ICCC) to approve new PPAs. Such regulatory approval is important to ensure NEA allows PPL to recover the generation costs through the tariff.

The process for PPL, or any other retailer of electricity, to get approval for prices contained within a new PPA is as follows:

- Every regulatory review (every 2.5 years), PPL and any other retailers (none at present) must submit proposed power purchase reference prices to the regulator for approval. There are different power purchase reference prices for each grid and for different types of capacity (firm, non-firm, and short-term supply). The prices are calculated based on the avoided cost of generation—in the case of firm capacity this is the long-run marginal cost of generation, that is the levelized cost of the next least-cost investment in firm generation capacity.
- Before signing a new PPA, the retailer must provide evidence to the regulator that the average price paid for generation under the PPA is less than the applicable power purchase reference price, or demonstrate that exceptional circumstances apply (for example, there is an immediate capacity shortage).

At the time of writing, PPL has only published (and had approved by ICCC) a power purchase reference price for the Ramu grid.

### *Own-use solar*

In late 2019 PPL launched a pilot rooftop solar framework, which allows customers to install solar PV systems that are primarily for their own consumption and export surplus energy to the grid. The first phase of the solar pilot had a cumulative capacity limit of 2 MW and was quickly filled on a first-come first-serve basis.

The details of the scheme are provided in PPL's Notice on Grid Connection of Solar PV Systems in PNG. The notice defines the technical and commercial terms under which own-use solar PV installations can connect to PPL's distribution network. It defines clear eligibility criteria and a detailed application process. Once PPL approves connection of an own-use solar installation, the customer has a fixed period of time to construct and certify the installation or its approval will expire. Further details on interconnection of own-use solar PV is provided in Section 3.3.7.

### *Mini-grids*

Recent studies make it clear that there is a demand and need for new mini-grids in PNG. The procurement of mini-grids is, however, uncertain because the arrangements proposed under the NEROP implementation plan have, at the time of writing, not yet been approved by the Cabinet, so implementation has not started.

The recently established National Energy Authority will be responsible for licensing and implementing all mini-grids outside of PPL's existing networks. The detailed arrangements for implementation are still undefined, but the NEROP envisaged that the off-grid authority (now established as the NEA) will not directly construct or operate systems, but contract out services to either the private sector or PPL, effectively, acting as a procurement authority or asset manager. It envisaged that the NEA will procure the construction and operation of mini-grids competitively and on standard terms, with PPL possibly being allowed to compete with the private sector for these tender contracts.

*Port Moresby, PNG Credit: David Kirkland*

## 3.3.7. Commercial terms

### *IPPs*

PPL has a PPA template that has been refined over several recent negotiations, including the 58 MW Niupower gas-fired IPP, the 51 MW Edevu hydropower project, and the 45 MW Dirio gas-fired IPP. PPL's draft PPA is not publicly available.

As described in Section 3.3.6, PPL must seek regulatory approval of the price contained in any new PPA. To get approval, PPL must show that the average IPP price is below the benchmark price or otherwise demonstrate that the new IPP is least-cost.

PPL does not have a standardized PPA for small-scale renewables, nor does it offer a feed-in tariff scheme. The commercial terms for any small-scale renewables must, therefore, be negotiated on a case-by-case basis.

### *Own-use solar*

In November 2019, PPL issued a Notice on Grid Connection of Solar PV Systems in PNG. This notice defines a framework that allows its customers to interconnect solar PV installations with the grid, bank any energy that is exported to the grid during high sunshine hours, and use that banked energy to offset consumption during other hours. Customers will not be paid for excess exported energy, so it would not make commercial sense for a customer to install solar PV that generates more than their annual consumption.

Other key features of the net-metering framework include the following:

- The framework will **begin as a pilot scheme, with only some types of customers eligible**. Initially, the scheme is likely to cater to only commercial customers (to limit the number of participants, allowing PPL to closely monitor impacts), only be available on some grids, and have a cap on the size of each installation (to limit the impact on PPL's network).

- There will also be a **cap on the cumulative capacity of solar PV that can be installed** to limit the impact on PPL's network. Customers can apply to participate in the scheme on a first-come first-serve basis, until the capacity limit is reached.
- Customers who sign up will save by offsetting their energy consumption, but they will **still have to pay a demand charge that covers PPL's costs of providing capacity** (the cost of the network and stand-by generation). This will likely be administered through a separate solar PV electricity tariff that, like PPL's other tariff categories, falls under PPL's regulatory contract with ICCC.
- Customers who install solar PV will be **guaranteed participation in the scheme for ten years**, but PPL's tariffs may change during that period (based on the regulatory process).

PPL intends to increase the capacity limit and widen the pool of eligible customers in future phases of the program, if the technical and commercial impacts of increased solar penetration can be managed appropriately.

Upon launching the pilot in late 2019, applicants quickly reached the cap on cumulative capacity. It is unknown when PPL will consider extending the cap or expanding the program.

### *Mini-grids*

Mini-grids are one option for achieving electrification targets in rural communities. Should mini-grids be tendered out to the private sector, the construction and operation may be tendered under either Build-Operate-Transfer (BOT) or Design-Build-Operate contracts. Interested parties will compete for the contract by either bidding for the size of capital subsidy required to make the scheme financially viable (under a BOT contract) or indicating the lease fee it is willing to pay for the rights to operate the system (under a Design-Build-Operate contract):

- **BOT contracts—**The private sector builds and operates the off-grid scheme and, at the end of the contract, transfers ownership back to the government. The private sector would compete for the contract by bidding for the size of capital subsidy to be contributed by the government (administered by the Department of Energy and Petroleum and Treasury) and development partners. The contract would specify a cap on tariffs, likely just for the initial years (for example, five) of the contract. In the subsequent years, the tariff could be set on a cost-recovery basis by the regulator (NEA), allowing flexibility for future changes in costs to ensure affordability. If cost-recovery tariffs are higher than the cap, the operator is eligible for an operational subsidy that is administered by the Department of Energy and Petroleum.
- **Design-Build-Operate contracts—**Similar to the BOT model, with the key difference being that the public sector fully finances the initial construction of the grid. The private sector, therefore, faces significantly less risk, and procurement is simpler, essentially comprising a turnkey and operating contract. Private sector entities would bid on the basis of a lease fee (an annual payment to the public sector) as compensation for the rights to use (and earn revenue from) the system assets.

The capital subsidies made available to mini-grid investors could be funded by the government and development partner support. In select cases, operational subsidies might also be made available if the cost-recovery tariff of the mini-grid is higher than the affordability cap set by the regulator.

## 3.3.8. Tax and fiscal regime

### *Taxes applying to renewable energy projects*

Tax legislation and regulation are enforced by the Internal Revenue Commission and PNG Customs. Both institutions fall under the jurisdiction of the Treasurer and the Minister of Finance.

The Income Tax Act 1959, and its subsequent amendments and iterations, set out the legal basis for individual and corporation taxation. The tax code distinguishes between resident and non-resident companies and individuals. The main taxes relevant to this report are summarized in Table 12.

**Table 12: Taxes applicable to RE development**

| TAX | RATE (RESIDENTS) | RATE (NON-RESIDENTS) |
|---|---|---|
| ***Corporate tax***[61] | 30% | 48% |
| **INCOME TAX (PGK)** | | |
| ***0*** | 0% | 22% |
| ***12,500*** | 22% | 22% |
| ***20,000*** | 30% | 30% |
| ***33,000*** | 35% | 35% |
| ***70,000*** | 40% | 40% |
| ***250,000*** | 42% | 42% |
| **WITHHOLDING TAX ON -** | | |
| ***Dividends*** | 15% | |
| ***Interest*** | 15% | |
| ***Royalty*** | 10% | |
| ***Foreign contractors*** | 12% | |
| ***Management fee*** | 17% | |
| ***Training levy*** | 2% of total payroll | |
| ***Business payment tax*** | 10% | |
| ***Stamp duty*** | 2-5% | |

*Source: IRS, Internal Revenue Commission Papua New Guinea, 2020*

The Income Tax Act specifies several tax incentives that could be applicable to a renewable energy developer in PNG. These incentives include:

- 200 percent deduction for training expenditure for PNG citizen staff (section 72A of the Income Tax Act)
- 150 percent deduction for research and development costs—subject to approval by the Internal Revenue Commission (section 95 of the Income Tax Act)
- 10-year tax holiday for development in underdeveloped areas (section 45 I–M of the Income Tax Act and 6AA of the Income Tax Regulations)
- Accelerated depreciation—allowance for up to 2x regular depreciation following a few requirements (Income Tax Act and Income Tax Regulations)
- Carrying forward losses of up to 20 years (section 101 Income Tax Act)

**Table 13: Legislation relevant to Tax and fiscal regime**

| INCOME TAX AND OTHER RELATED LEGISLATION |
|---|
| Income tax Act 1959 |
| Income Tax (International Agreements) Act 1987 |
| Income Tax Dividend (Withholding) Tax and Interest (Withholding) Tax Rates Act 1984 |
| Income Tax (Salary and Wages Tax)(Rates) Act 1979 |
| Goods and Services Tax Act 2003 |

### *Import duties*

The Customs Tariff Act 1990 and later amendments set out PNG's import tariff code. Most equipment relating to RE generation and distribution falls under Chapter 85—Electrical Machinery and Equipment.

All goods included in Chapter 85 are not subject to any import duty. This includes all goods intended for solar PV generation (tariff code 8541.40), electricity distribution (tariff codes 85.35, 85.36, and 85.37), batteries (tariff code 85.06), and generators (tariff code 85.01).

The head of state has the power to exempt or reduce the import duty of certain goods. The act states that exemptions can be made for goods if they are not intended for a commercial project, and duty rates can be reduced at the head of state's discretion.

Sections 9A and 9B offer duty exemptions for two large projects: the Ramu Nickel project and the PNG liquefied natural gas project. It is, therefore, possible that larger RE projects could be exempted from import duty. However, the law clearly states that for-profit projects cannot be exempted from import duty. Applications for exemption must be directed to PNG Customs.

61 The tax code differentiates between companies operating in the following sectors: mining, petroleum, gas, and general. Electricity generation is not specified and is assumed to fall under "General" in the table.

*Ramu River Credit: Kahunapule Michael Johnson https://www.flickr.com/photos/kahunapulej/*

## 3.3.9. Financing

### *Local financiers*

PNG ranks 48 out of 190 countries in the World Bank's Doing Business list[62] in the access to credit category.

The commercial banking sector consists of four commercial banks:

- **BSP** is the largest commercial bank in PNG with branches in all major towns across PNG.
- **ANZ** was previously PNG's second-largest commercial bank but after selling its retail, commercial, and SME services to Kina Group, it now only operates institutional and large corporate banking. It has been operating in PNG since 1910.
- **Kina Group** provides financial services for individuals and companies. In 2015, the bank bought out all Maybank's assets in PNG, and in 2018, it bought ANZ's retail, commercial, and SME services.
- **Westpac** offers a wide variety of business and individual services. The sale of Westpac's PNG businesses to Kina Bank has been announced and is expected to take place in the latter half of 2021.

### *Renewable energy-specific financing products in the Pacific*

- The private sector arms of multilateral development banks are very active in the region and are looking to support IPPs and off-grid electrification through solar/hybrid mini-grids, as detailed in Section 3.2.4.
- A broad overview of the types of financing available to RE investors internationally is provided in the Annex.

62 World Bank, 2020, Doing Business 2020

## 3.3.10. Design, construction, and commissioning

### *Labour market*

The Employment Act (Cap 373) sets the legislation for the labor market in PNG. It establishes a few notable measures such as:

- Section 13 states that when an employer terminates a contract with an employee, all contracts of service the employer has with the employee's spouse are also terminated, unless otherwise agreed.
- Section 15 states that the employer must make a written record of the terms and conditions of all oral contracts and present them in case of disputes. The written record must be made at the time of the engagement, but no requirements for witnesses are stated.

Other employee requirements and labor market legislation of relevance to this report include:

- Sections 33 to 36 discuss the termination of contracts, required notice, and grounds for termination. The length of termination notice depends on the time the employee has been employed for, ranging from one day (after less than four weeks of employment) to four weeks (after more than five years of employment).
- Division 7 defines the requirements for repatriation and the employer's responsibility to cover transport and subsistence expenses if the employee has been brought to the place of employment.
- Part IV of the act defines the allowed conditions of employment as:
  - A normal working week consists of 44 hours
  - Overtime is to be paid on all work exceeding 44 hours and work done on Sundays and after 12 noon on Saturdays
  - Employees are not allowed to be made to work more than 12 hours a day
  - The overtime rate is as follows: Sunday 2x normal pay, other overtime 1.5x normal pay
  - Employees are to receive 14 days of paid leave for a full year's employment and one day for each full month if the total period of employment is less than a full year
- Part VI covers the employment of underage workers and females, poses limits on the employment of women during nights, and sets maternity leave at six weeks. Employing people between the age of 11 and 16 is severely limited and is only allowed when the employment does not conflict with school attendance.

A comprehensive study on labor practices in the Pacific, including PNG, is being prepared by the World Bank.

**Table 14: Legislation relevant to design, construction, and commissioning**

| IMPORT DUTY |
|---|
| The Customs Tariff Act 1990 |
| Import Export Tariff 2012 Version |
| Customs Act 1951 |
| Customs Regulations 1951 |
| Customs Excise Act 1956 |
| Customs Excise Tariff Act 1956 |
| **LABOUR MARKET** |
| The Employment Act (Cap 373) |

## 3.3.11. Grid interconnection and operation

### *Connection to the transmission network*

The Third Party Access Code defines a process and framework for third parties (including IPPs) to connect to PPL's transmission network and details how the cost of connection will be covered. This includes:

- **Connection assets used solely by a third party—**The capital costs of the transmission connection assets must be paid for by the third party exclusively.
- **Connection assets used by two or more third parties—**Where the transmission connection assets are to be shared between two or more third parties, the costs must be apportioned between these parties in proportion to their share of the total contracted peak demand (in MW) at the connection point.
- **Subsequent connections to an existing connection asset—**A reimbursement process will be triggered where a new third party becomes a user of any portion of an existing transmission connection asset that was previously used solely by a third party or group of third parties who paid fully or partially for the asset. The connection charges payable by each third party are recalculated by apportioning the remaining unrecovered capital cost of the assets between the existing and new third parties.

The Third Party Access Code does not specify technical terms relating to connection, although it does instruct network owners to publish terms that are approved. At the time of writing, PPL had not submitted its terms to NEA (or the previous economic regulator, ICCC) for approval. PPL has, however, recently agreed connection terms with IPPs and the terms are not expected to be onerous.

### *Operation of the transmission network*

In 2014 ICCC issued a Grid Code that was developed by consultants in close consultation with PPL, which now falls under NEA's remit.

The Grid Code sets out the technical rules for operating transmission networks in PNG. It applies to PPL (or any other transmission system owner or operator) and IPPs that connect to a transmission network.

### *Connection of own-use solar*

In November 2019, PPL issued a Notice on Grid Connection of Solar PV Systems in Papua New Guinea, which defines the terms under which own-use solar PV installations can connect to PPL's distribution network. PPL has the legal authority to set such terms as per the Electricity Code, which states that a customer's installation must be safe and not interfere with the network.

The terms under which own-use solar PV can connect to PPL's distribution network include the following:

- The solar **equipment**, including the modules and the inverter, meets the national **standards**
- The installation is in the **configuration specified** in the notice
- A **bi-direction meter** is installed according to PPL's specifications
- The **installation** has been conducted by a licensed contractor, conforms to wiring standards, and has been **certified** by a PPL engineer

# 4

*Fiji Islands Credit: Chris McLennan*

# 4. Country investment guide—Fiji

## 4.1 Highlights

### *Fiji is the second-largest market in the Pacific with significant RE resources*

In 2019, Fiji achieved an electricity access rate of 100 percent following sustained growth from 76 percent in 2000.[63] Most households, representing 90 percent of the population, are served via grid networks on the two main islands by Energy Fiji Limited (EFL, formerly Fiji Electricity Authority, FEA), which has a total installed capacity of 329 MW. [64] According to EFL's latest annual report, the share of electricity generated from renewable sources in 2020 was 64 percent, principally composed of hydro (57.2 percent of total generation), in addition to solar and biomass plants.[65] Several RE independent power producers (IPPs) now operate in Fiji, representing 6.9 percent of electricity generated by EFL in 2020. Major IPPs commissioned in recent years include the 12 MW Nabou biomass plant, the 10 MW Tropik Wood biomass plant, and the 10 MW bagasse cogeneration plant operated by Fiji Sugar Corporation (FSC).

### *There are significant opportunities for new IPP investments*

Despite Fiji's high level of existing renewables, there are numerous opportunities for further investment in RE generation. EFL regularly updates its power development plants, which it uses as the basis for preparing and tendering new generation projects. The regulatory framework in Fiji also provides an environment that is conducive for investors and the establishment of IPP. EFL earns a cost-reflective tariff that is approved by the Fijian Competition and Consumer Commission (FCCC). In light of this, various sizeable hydropower projects have already been assessed to pre-feasibility level or higher, and EFL is negotiating with several prospective IPPs, most of which have emerged as unsolicited proposals.

In 2019, EFL tendered out the engineering services for the proposed 5 MW Qeleloa solar plant under a joint venture. Energy service company, Sunergise was chosen as the preferred bidder. The proposed model has evolved from a joint venture model and EFL is negotiating a power purchase agreement (PPA) with Sunergise to operate as a conventional IPP, with expected delivery in 2021.[66] In 2020, EFL signed an advisory agreement with IFC to structure a 15 MW solar plant in Vanua Levu, which will be competitively procured using global practice.

### *EFL is developing a new rooftop solar policy*

Around 150 rooftop solar photovoltaic (PV) installations are already operating in Fiji, although the majority of these are very small. Sunergise operates many large installations (ranging from 88 kilowatts [kW] to 1.5 MW) on behalf of electricity consumers under a net billing arrangement (with a fixed tariff for electricity exported back to the grid) with EFL.

A new rooftop solar framework is being developed by EFL and at the time of writing was with FCCC for approval. It is expected that the framework will define explicit options and terms and conditions for residential and commercial investors looking to install rooftop solar for self-consumption and/or export to the grid, including defining net-metering arrangements. The details have not been made public.

63 World Bank, 2021, Sustainable Energy for All (SE4ALL) database
64 Energy Fiji Limited, 2018. Offer Document
65 Energy Fiji Limited, 2020, EFL Annual Report 2020
66 Ibid.

### *Sector reform is under way, which should further encourage private sector investment*

Fiji's Parliament recently approved a new Electricity Act (2017), which was gazetted in October 2019. A key aspect of the law is the partial divesture of EFL to private investors, with the Government retaining a share majority. The objective is to encourage greater private sector participation in the power sector, particularly in RE generation. Following this act, 51 percent of shares were retained by the Government, 5 percent were sold to domestic customers of EFL, 20 percent were sold to the Fiji National Provident Fund (FNPF), and 24 percent were divested. In 2021, Sevens Pacific Pte of Singapore acquired the 24 percent of shares set aside for divestment in addition to the 20 percent held by FNPF, meaning the current shareholders of EFL are the Government (51 percent), Sevens Pacific Pte (44 percent), and domestic customers (5 percent).[67]

The act also outlines changes to the structure of the electricity market. It envisages that EFL will operate under a single buyer model where IPPs can add and operate generating capacity through competitive bidding, while EFL retains a monopoly in networks and retail. It is likely that these new reforms will lead to increased transparency around EFL's interactions with private investors.

A key aspect of the law is the transfer of EFL's technical regulatory functions to FCCC. FCCC would thus become more actively involved in tariff regulation, including presumably issuing detailed tariff methodologies and tariff review processes. This handover of regulatory functions is being gradually implemented, with EFL currently still enforcing technical regulations and licensing of electrical contractors.[68]

### *There are also some opportunities for mini-grid investments*

The Department of Energy (DoE) is responsible for rural electrification outside EFL-mandated areas and has been responsible for the construction of hybrid mini-grids. Local authorities have been operating such schemes, but this has not proved to be a sustainable operating model. For example, the failure of the hybrid wind/solar/diesel mini-grid on the island of Vanua Levu, established in 1998, was attributed to a lack of trained personnel.[69]

In light of this problem, the DoE has been exploring the possibility of the private sector operating mini-grids, either through Build-Operate-Transfer (BOT) or Build-Own-Operate-Transfer (BOOT) contracts.[70] In 2017, the Fiji Rural Electricity Fund (FREF) initiated a three-phase approach to improving mini-grid projects in the country.[71] As part of the first phase, a pilot solar mini-grid with battery storage was installed on Vio Island in 2019. The project involved several stakeholders including Sunergise as the electric power corporation (EPC), the Leonardo DiCaprio Foundation, EFL, the DoE, and the Fiji Locally Management Marine Area Network. This project may serve as a model for the rollout of more mini-grids, and FREF envisages mini-grids in ten additional communities in its second phase (2020-2021). No indication has yet been given on progress of the second phase.

As alternative models, the Global Green Growth Initiative is exploring options for a solar PV installation in Ovalau and Taveuni islands under a BOOT arrangement.

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67 Krishant, Naveel, "Sevens Pacific Pte Limited acquires 44 percent of EFL shares", *Fiji Village* 9 July 2021 https://www.fijivillage.com/news/Sevens-Pacific-Pte-Limited-acquires-44-percent-of-EFL-shares-x5f48r/ Seven Pacific Pte Ltd is a Japanese consortium made up of the Japan Bank for International Cooperation and Chugoku Electric Power Company.

68 Reece, Lana, "FCCC appointed as independent regulator for electricity sector," *FBC News* October 2, 2019 https://www.fbcnews.com.fj/news/fccc-appointed-as-independent-regulator-for-electricity-sector/

69 Emília Inês Come Zebra, Henny J. van der Windt, Geraldo Nhumaio, André P.C. Faaij, A review of hybrid renewable energy systems in mini-grids for off-grid electrification in developing countries, *Renewable and Sustainable Energy Reviews*, Volume 144, 2021, 111036, ISSN 1364-0321 https://www.sciencedirect.com/science/article/pii/S1364032121003269

70 Ministry of Economy, December 12, 2017, Workshop on PPP (Public Private Partnership) for Mini-Grids https://www.reinfofiji.com.fj/wp-content/uploads/2018/04/171212_PPP-Workshop-for-Small-Scale-Renewable-Energy-Power-Systems-in-Fiji.pdf

71 Fiji Rural Electrification Fund, August 6, 2020, Objectives and Approach of the Fiji Rural Electrification Fund PFAN Roundtable on Energy Access and Private Financing in Fiji https://www.pcreee.org/sites/default/files/event/files/presentations/2%29%20Strategies%20for%20Energy%20Access%20%E2%94%82%20Vineil%20Narayan.pdf

## 4.2 Country, sector, and renewable energy overview

### 4.2.1. Country and electricity sector overview

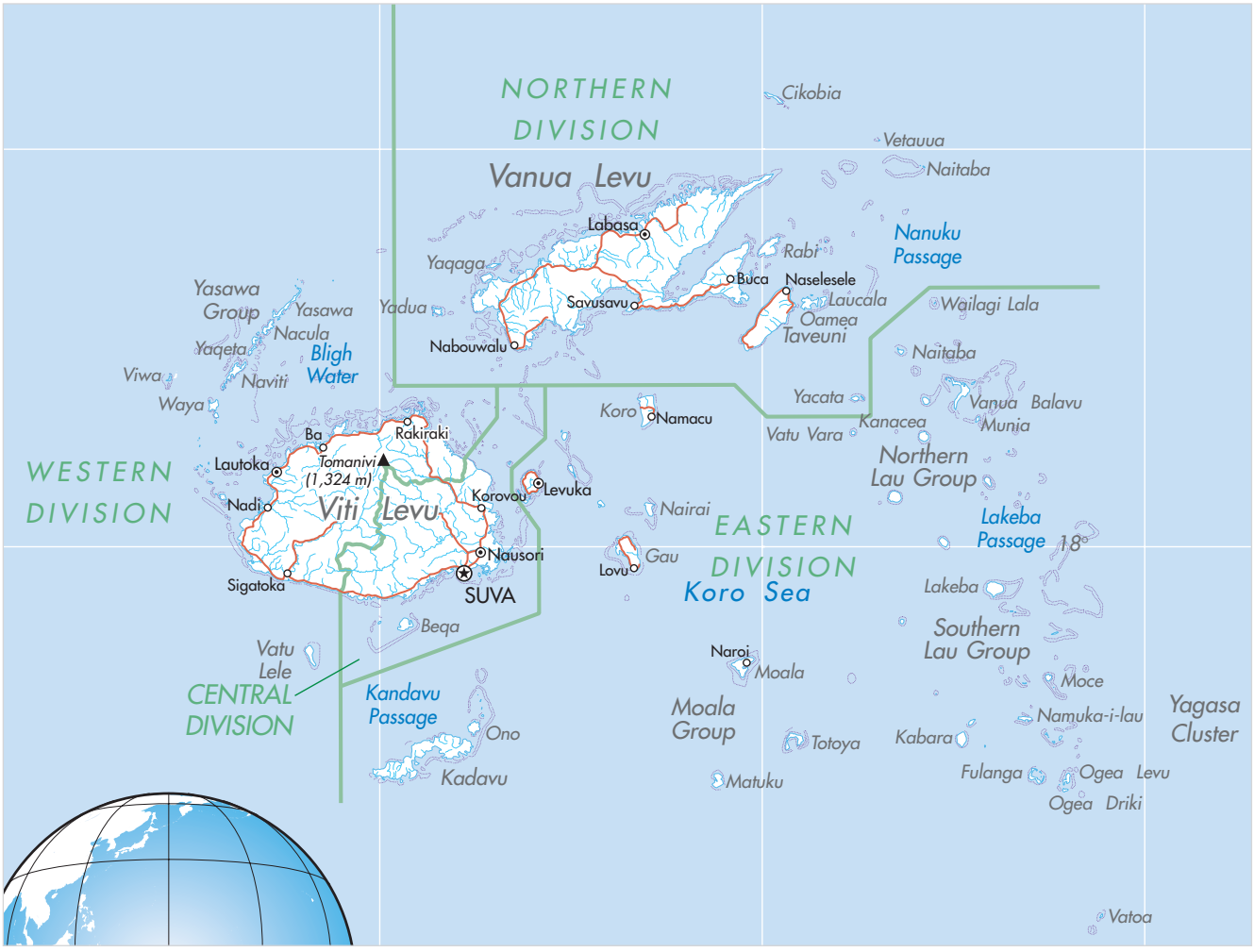
***Overview of the country's demographics and economy***[72]

Fiji is an island country in the South Pacific Ocean consisting of two main islands, Viti Levu and Vanua Levu, and over 300 smaller islands, many uninhabited. Fiji's population is about 900,000, of which almost 90 percent live on the two major islands.

Fiji is classified as an upper-middle-income country with a gross domestic product (GDP) per capita of $4,881 in 2020, down from over $6,000 from 2017 to 2019. It has averaged GDP growth of about 2 percent over the last two decades, excluding the 19 percent drop in 2020 due to the COVID-19 pandemic. Reform measures taken in the last decade, including introducing competition to the telecommunications market and customary land-leasing business, along with substantial tax cuts and other fiscal stimuli, have helped drive economic growth.

Fiji's traditional economic drivers include agriculture, forestry, and fisheries. However, there has been an increasing shift toward manufacturing, mining, construction, and tourism.

**Figure 11: Map of Fiji**




*Source: World Bank*

72 Primary sources: *World Bank Development Indicators, World Bank, 2016*; *Fiji Profile, Economist Intelligence Unit*

### *Overview of the country's electricity sector*

Electricity in Fiji is supplied through two measures:

- EFL, formerly FEA, is the corporatized national utility and supplies three of the larger islands (Viti Levu, Vanua Levu, and Ovalau) with grid-connected electricity.
- Other electrified regions are supplied through multiple smaller mini-grids operated by the government's DoE, or in some cases EFL.

A new Electricity Act (2017) prescribes considerable changes to the sector's institutional framework (discussed in greater detail in Section 4.2.2). The most important changes implemented by the new act are:

- Divesture of EFL shares—In 2019, 20 percent was sold to the Fiji National Provident Fund (FNPF), with 51 percent retained by the Government, 5 percent sold to domestic EFL customers, and 24 percent to be divested to private investors. In 2021, Sevens Pacific Pte Ltd[73] acquired the 24 percent of private shares and the 20 percent share owned by FNPF. Shares are consequently held by the Government (51 percent), Sevens Pacific Pte (44 percent), and domestic customers of EFL (5 percent).
- Removal of EFL's regulatory functions, which will be transferred to FCCC. This transfer of regulatory functions is being gradually implemented while FCCC builds internal capacity. EFL, under agreement with FCCC, has retained several regulatory functions.

EFL's installed generation capacity is 329 MW, comprising 182 MW of thermal generation capacity and 147 MW of RE capacity. Available generation capacity is 267 MW in total, comprising 141 MW of thermal and 126 MW of RE.[74]

Most of the electricity generated in Fiji is from hydropower and fossil fuel generators.

The composition of electricity generated in 2020 is:[75]

- 57.2 percent from hydropower
- 35.8 percent from generators running on diesel and heavy fuel oil
- 6.9 percent from biomass IPPs, such as the 12 MW Nabou biomass plant, the 9 MW Tropik Wood biomass plant, and the 20 MW and 5 MW bagasse cogeneration plants operated by Fiji Sugar Corporation (FSC)
- <1 percent from the Butoni wind farm

EFL is the only off-taker for IPPs in Fiji. Through the 1966 Electricity Act, EFL is the licensing authority in Fiji, effectively leading to self-regulation. The new act is supposed to increase competition by transferring the regulatory powers from EFL to FCCC.

EFL's generating assets that are greater than ≈10 MW are summarized in Table 15.

**Table 15: EFL Generating Assets**

| GENERATOR NAME | TYPE | YEAR | INSTALLED CAPACITY (MW) |
|---|---|---|---|
| ***Wailoa/Monasavu Power Station*** | Hydro | 1983 | 80 |
| ***Butoni Wind Farm*** | Wind | 2007 | 9.8 |
| ***Nadarivatu Power Station*** | Hydro | 2012 | 44 |
| ***Vuda Power Station*** | Thermal (IDO) | 1976 | 10 |
| ***Labasa Power Station*** | Thermal (IDO) | 1995 | 15 |
| ***Vuda Power Station*** | Thermal (HFO) | 2001 | 12 |
| ***Vuda Power Station (New)*** | Thermal (HFO) | 2019 | 10 |
| ***Kinoya Power Station*** | Thermal (HFO)<br>Thermal (IDO) | 2001<br>2005 | 20<br>28 |
| ***Kinoya Power Station (New)*** | Thermal (HFO) | 2014 | 35 |

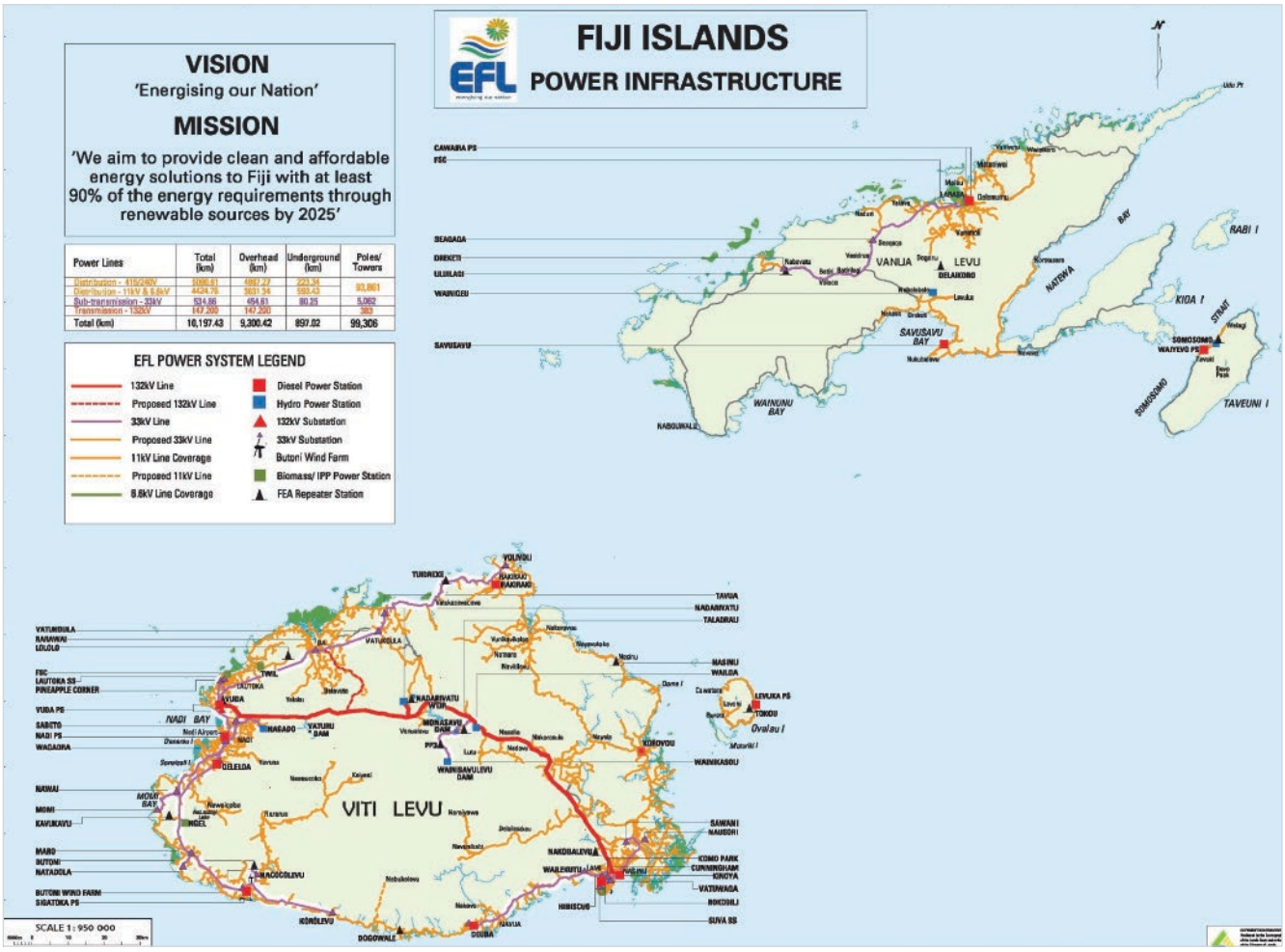
*IDO: Industrial Diesel Oil HFO: Heavy fuel oil*
*Source: Energy Fiji Limited (formerly Fiji Electricity Authority) Annual Report 2019*

73 Seven Pacific Pte Ltd is a Japanese consortium made up of the Japan Bank for International Cooperation and Chugoku Electric Power Company.
74 Energy Fiji Limited, 2018, Offer Document
75 Ibid.

Three IPPs operate in Fiji, all generating electricity from biomass. Two of the IPPs—Fiji Sugar Corporation and Tropik Wood Industries—are joint ventures between the government-owned agriculture entities and EFL. The third IPP was commissioned in July 2017 and operates on woodchips and unsuitable logs from Fiji Pine Limited. All three IPPs sell their generated electricity to the grid.

EFL's transmission network consists of 147 kilometers of 132 kilovolt (kV) transmission lines, 455 kilometers of 33 kV overhead sub-transmission lines, and 80 kilometers of 33 kV underground sub-transmission cables. The network consists of 36 zone substations, which transform electricity to the required voltages. The distribution network consists of 3,831 kilometers of overhead high-voltage distribution lines, 593 kilometers of underground high-voltage distribution cables, 4,867 kilometers of overhead low-voltage distribution lines, and 223 kilometers of low-voltage distribution underground cables.[76] The networks are summarized in Figure 12.

**Figure 12: EFL/FEA's transmission and distribution grids**



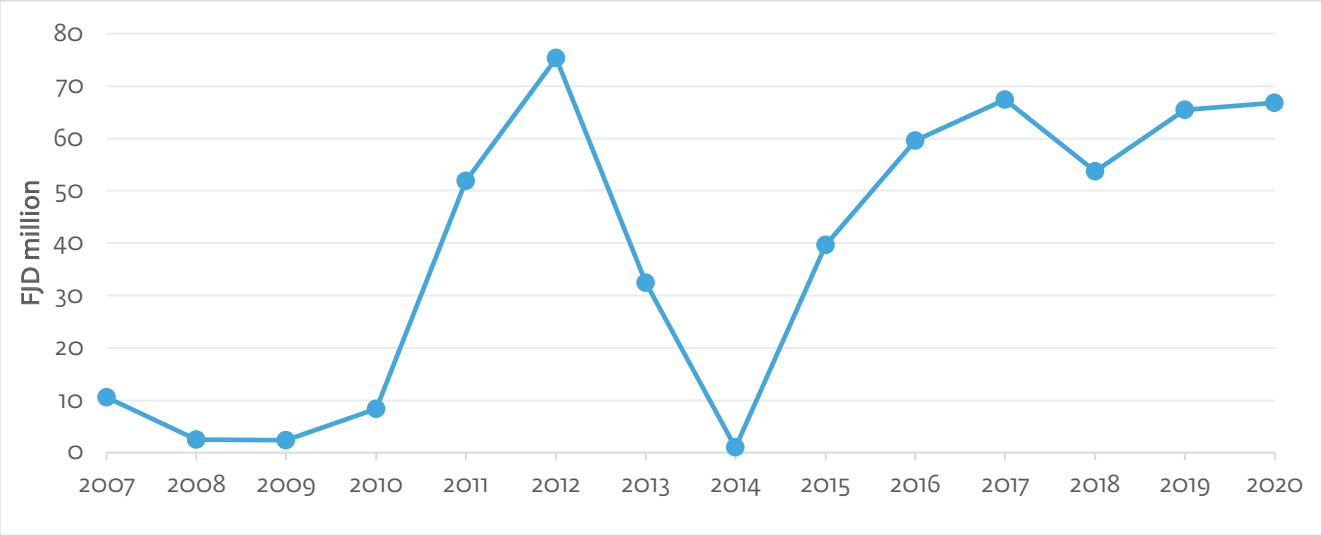

*Source: Fiji Sun, March 4, 2016*

76 Ibid.

### *Financial performance of the utility*

EFL's financial performance has been steadily improving over the last decade after posting losses for three consecutive years in 2004, 2005, and 2006. Following financial restructuring in 2010, and the establishment of FCCC to regulate retail tariffs, the utility has been posting healthy profits. No fuel adjustment mechanism was in place during this period, which caused high fluctuations in EFL's reported profit, as shown in Figure 13.

**Figure 13: EFL net profits**



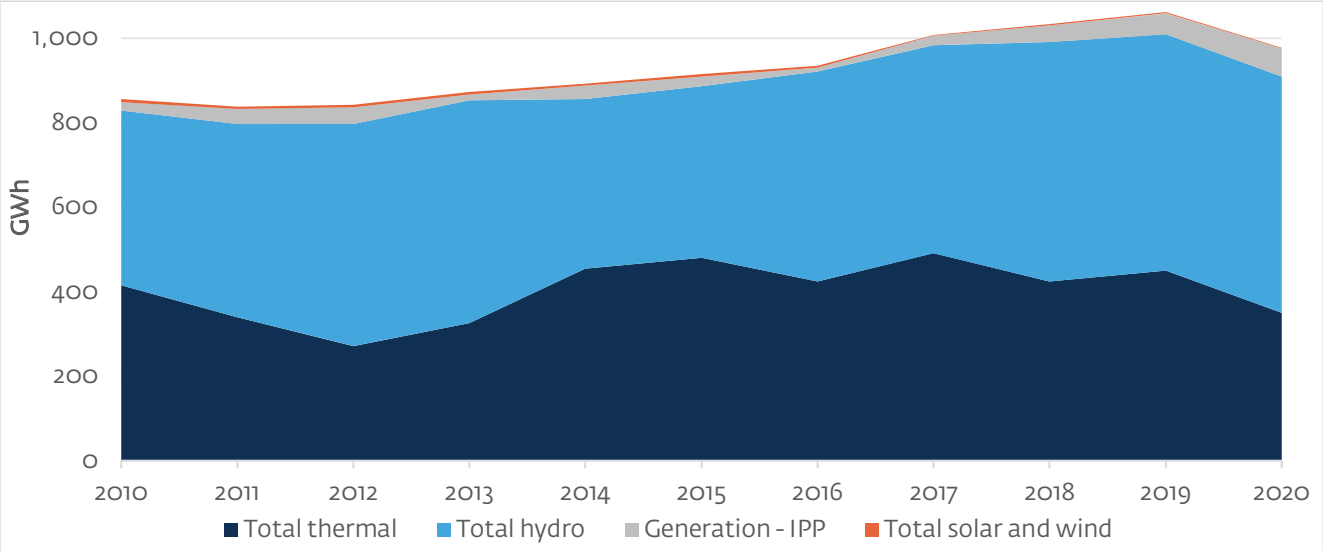

*Source: EFL Annual reports*

## 4.2.2. Status and potential of renewable energy

### *Current level of renewable energy generation*

In 2020, 64 percent of electricity generated in Fiji was from RE sources. Hydropower was the largest RE source, representing 57.2 percent of generation in 2020. RE IPPs, fueled by biomass, represented 6.9 percent of electricity generated in 2020. Intermittent RE sources such as solar and wind power only account for a small share of the total generation in Fiji (<1 percent), as can be seen in Figure 14.

**Figure 14: EFL's generation mix in Fiji**




*Source: EFL annual reports*

### *Renewable energy targets*

The Government of Fiji's (2013) draft National Energy Policy defined RE targets of:[77]

- 81 percent share of RE generation by 2020.
- 100 percent share of RE generation by 2030.

By ratifying the Paris Agreement, the Government has also committed to a 30 percent reduction in national carbon emissions by 2030, solely from the electricity sector. EFL has also set its own goals:

- Provide at least 90 percent of Fiji's energy requirements through renewable sources by 2025.
- Achieve 100 percent of its generation through RE by 2030.[78]

### *Resource potential*

#### *Hydropower*

Fiji has substantial potential for hydropower generation due to its high elevation and considerable rainfall.

In 2015, the Japan International Cooperation Agency (JICA) assessed hydropower potential in Fiji. Thirty-seven potential hydro sites in Viti Levu and Vanua Levu were reviewed and ranked. The potential sites ranged from 700 kW to 7,300 kW in size. The study identified six schemes, summarized in Table 16, as feasible under the current tariffs and load forecast.

**Table 16: Indicatively feasible hydro schemes in Fiji—JICA assessment**

| SITE | BASIN | ESTIMATED PEAK CAPACITY (KW) | ESTIMATED ANNUAL GENERATION (MWh) |
|---|---|---|---|
| ***Nabiaurua*** | Mba | 1,400 | 8,197 |
| ***Naboubuco*** | Rewa | 2,700 | 15,308 |
| ***Nakavika*** | Navua | 2,600 | 14,205 |
| ***Wainavadu*** | Rewa | 2,500 | 13,749 |
| ***Waisoi*** | Rewa | 2,100 | 11,322 |
| ***Saquru*** | Labasa | 2,000 | 10,660 |

*Source: JICA, The Project for the Effective and Efficient Use of Renewable Energy Resources in Power Supply in Republic of Fiji—Final Report, 2015*

#### Biomass

Fiji has significant biomass potential, particularly with respect to bagasse and wood residue:

- **Bagasse—**The Fiji Sugar Corporation (FSC) is a state-owned enterprise with exclusive rights to produce sugar in Fiji. FSC has already established power plants that generate electricity during crushing season. All investors interested in using bagasse as an energy source would have to negotiate directly with FSC for a fuel source.
- **Wood residue—**A JICA report estimated the generation potential from existing wood mills in Viti Levu and Vanua Levu to be about 10 MW and 3.7 MW, respectively.[79] A Fiji Renewable Energy Power Project (FREPP) report on the feasibility of biomass in Fiji found that although there is still considerable potential for biomass generation from wood residue, the feasibility of potential projects is uncertain due to inadequate grid connections and high transport costs.[80] In 2017, a 12 MW power plant powered through wood pellets and wood residue began operating in Nabou.
- The power plant was the first true IPP (EFL is either a direct or indirect owner of the other biomass IPPs) in Fiji. It has experienced regular operating difficulties due to a lack of feedstock and has had to close for long periods at a time.[81]

77 Government of Fiji, November 2013, Fiji National Energy Policy 2013-2020

78 Energy Fiji Limited, 2018, Offer Document

79 JICA, February 2015, The Project for the Effective and Efficient Use of Renewable Energy Resources in Power Supply in Republic of Fiji—Final Report

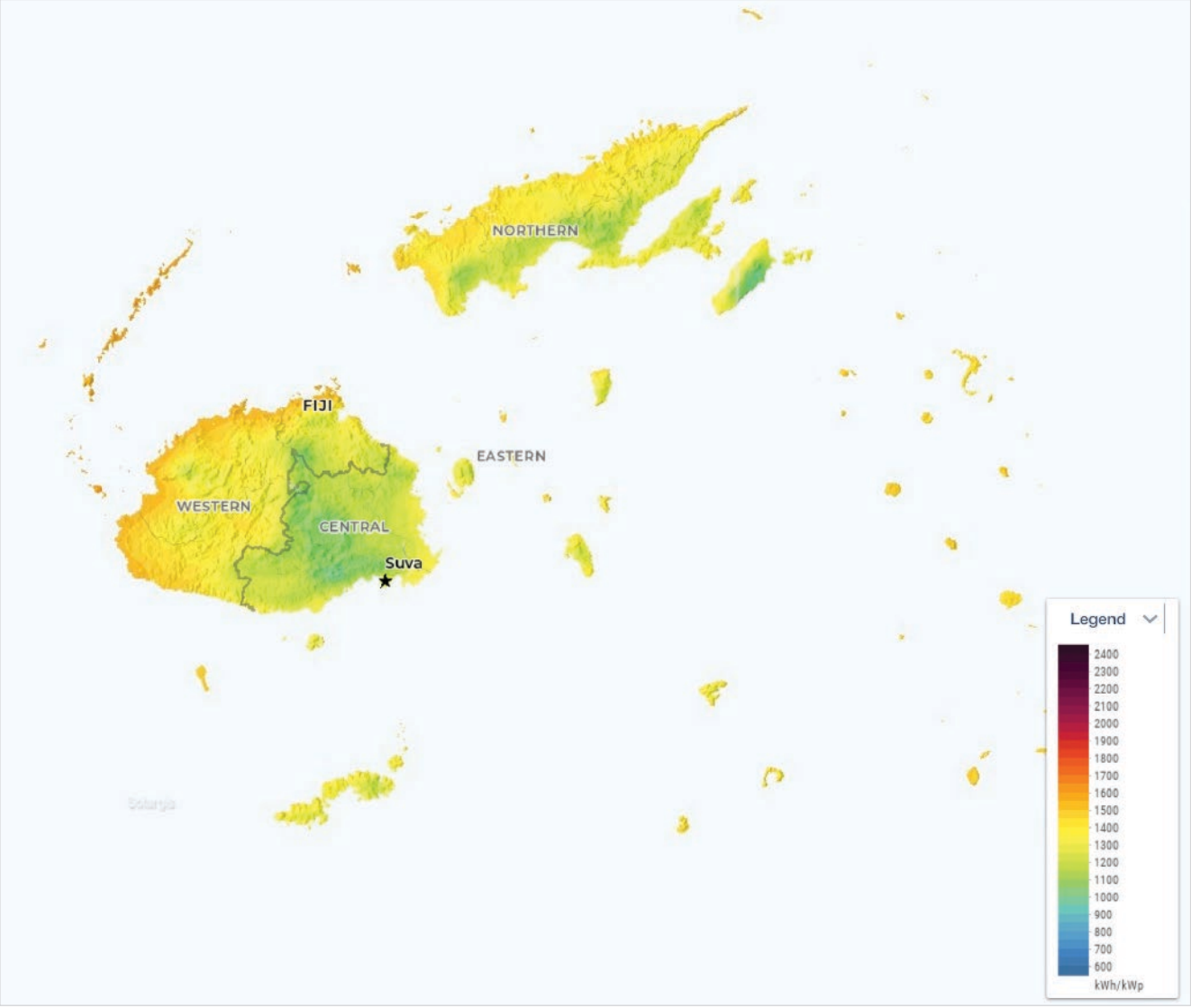
80 Fiji Department of Energy, 2014, Fiji Renewable Energy Power Project (FREP) - Report on Feasibility of Resources and Sites for Waste-to-Energy Power Generation in Fiji

81 Chambers, Charles, "Nabou Power Plant Closed", *Fiji Sun*, 17 April, 2019 https://fijisun.com.fj/2019/04/17/nabou-power-plant-closed/

### *Solar*

Fiji Meteorological Service maintains four measurement stations in Fiji for solar radiation. The stations are located at Nadi airport, Suva/Laucala bay, Nacocolevu, and Rotuma. Solar potential in Fiji can vary considerably: outer islands and coastal areas of the larger islands have good solar potential (annual average of 5–6 kWh/m2/day), while areas such as Viti Levu's interior are subject to considerably more cloud cover and are therefore not as viable (annual average of about 3.7 kWh/m2/day).[82]

**Figure 15: Solar irradiance map of Fiji**[83]




*Source: Global Solar Atlas*

82 IRENA, June 2015, Fiji Renewables Readiness Assessment

83 Solar resource data obtained from the Global Solar Atlas, owned by the World Bank Group and provided by Solargis.

*Fiji Solar (IFC)*

### *Wind power*[84]

There is no comprehensive study on the potential of wind power in Fiji. The DoE has been conducting wind measurements to estimate the generation potential from onshore wind power. Results suggest limited onshore wind potential on Kadavu island and some potential on Suva Peninsula.[85]

EFL developed a 10 MW wind farm in 2007, but the generation outcome has not met expectations with only about 2.7 GWh generated in 2019. This is equivalent to a capacity factor of about 3 percent.

Recent estimates by the World Bank using the Global Wind Atlas suggest there might be good potential to harness offshore wind power. Total technical offshore wind power potential was estimated to be 186 GW.[86] The real potential for offshore wind power would need to be assessed through detailed feasibility studies that have not yet been undertaken.

84 IRENA, June 2015, Fiji Renewables Readiness Assessment

85 Sharma, Kaushik & Ahmed, M. Rafiuddin, 2016. "Wind energy resource assessment for the Fiji Islands: Kadavu Island and Suva Peninsula,"Renewable Energy, Elsevier, vol. 89(C), pages 168-180.

86 World Bank, March 2020 (revised January 2021), Offshore Offshore Wind Technical Potential in Fiji

### *Existing and planned renewable energy projects*

Table 17 provides a summary of the existing grid-connected RE generation projects in Fiji.

**Table 17: Existing renewable energy projects**

| POWER STATION | OPERATOR | GENERATION TECHNOLOGY | YEAR COMM-ISSIONED | NAMEPLATE CAPACITY | ANNUAL GENERATION | STATUS |
|---|---|---|---|---|---|---|
| ***Wailoa (Monsavu dam)*** | EFL | Hydropower | 1983 | 80 MW | 454 GWh (2019) | Operating |
| ***Wainikasou*** | EFL | Hydropower | 2004 | 6.6 MW | 18.3 GWh (2019) | Operating |
| ***Somosomo*** | EFL | Hydropower | 2017 | 2 x 375 kW | | Operating |
| ***Nadarivatu (Korolevu dam)*** | EFL | Hydropower | 2012 | 44 MW | 83 GWh (2019) | Operating |
| ***Nagado*** | EFL | Hydropower | 2006 | 2.8 MW | 3.3 GWh (2016)[87] 12 GWh (long-term average) | Shut down since July 2016. Expected back online in 2021 |
| ***Butoni*** | EFL | Wind power | 2007 | 10 MW | 2.7 GWh (2019) | Operating |
| ***Nabou*** | Nabou Green Energy | Biomass | 2017 | 12 MW | N/A | Operations began in May 2017 |
| ***Tropik Wood*** | Tropik Wood Industries | Biomass | 2008 | 9 MW | N/A | Not operating, under repair. Primarily for self-consumption and surplus sold |
| ***Lautoka FSC*** | Fiji Sugar Corporation | Biomass | 2009 | 5 MW | N/A | Primarily for self-consumption and surplus sold |
| ***Labasa FSC*** | Fiji Sugar Corporation | Biomass | 2013 | 20 MW (6 MW available for export) | N/A | Currently operating below capacity due to malfunction and not able to export to grid |
| ***Coca-Cola Amatil*** | Sunergise | Rooftop solar | 2017 | 1.1 MW | N/A | Grid-connected rooftop solar PV for self-consumption |
| ***Mark One textile factory*** | Sunergise | Rooftop solar | 2014 | 273 kW | N/A | Grid-connected rooftop solar PV for self-consumption |
| ***Radisson Blu resort, Denarau*** | Sunergise | Rooftop solar | 2015 | 420 kW | 600 MWh | Grid-connected rooftop solar for self-consumption |
| ***Various smaller rooftop solar PV installations*** | Sunergise | Rooftop solar | 2012–2017 | ~1.5 MW | N/A | Various smaller rooftop solar PV installations, primarily for self-consumption |

*Source: EFL Annual Report 2019 & Sunergise (www.sunergisegroup.com)*

87 The decreased generation was the result of low water pressure in the pipeline due to leakages and blockages.

Table 18 lists planned RE generation projects currently in later stages of planning. The projects are either being constructed, have PPAs under negotiation, or are securing funding.

### Table 18: Planned renewable energy IPPs

| POWER STATION | OPERATOR | GENERATION TECHNOLOGY | CAPACITY (MW) | STATUS | OPEN TO PRIVATE INVESTORS/OPERATORS |
|---|---|---|---|---|---|
| ***Wainikovu*** | Hydro VL Pty Ltd | Hydropower | 13 | Unsolicited bid by private developer. PPA negotiations under way | Project under development by private operator |
| ***Wainakoroiluva*** | Hydro VL Pty Ltd | Hydropower | 15 | Unsolicited bid by private developer. PPA negotiations under way | Project under development by private operator |
| ***Waivaka*** | Hydro VL Pty Ltd | Hydropower | 4 | Unsolicited bid by private developer. PPA negotiations under way | Project under development by private operator |
| ***Naboro*** | TBC | Waste to energy | 5–10 | Solicited IPP, with procurement first started in 2017 and then halted. New tenders began in Feb 2021. | IPP tendered out to private investors/operators |
| ***Rarawai*** | Fiji Sugar Corporation | Biomass | 40 | Unsolicited bid by FSC. FSC currently conducting feasibility studies | Project under development by FSC |
| ***Lautaka (expansion)*** | Fiji Sugar Corporation | Biomass | N/A | N/A | Project under development by private operator |
| ***Qeleloa Solar*** | Sunergise | Solar PV | 5 | Solicited IPP tendered out by EFL. | Sunergise selected as the preferred bidder. Expected delivery in 2021 |
| ***Mua, Taveuni*** | TBC | Solar PV with storage | 1 | MOU signed between KOICA and EFL. Commissioning expected in 2021 | Project managed by FRL, wholly owned subsidiary of EFL |
| ***Viti Levu solar farms*** | TBC | Solar PV with storage | 3 x 5 | Three projects will be tendered out by EFL. IFC providing financing | IPP tendered out to private investors/operator in 2022 and 2023 |

*Source: Castlerock Consulting, Inception Report, Support for Energy Sector Regulatory Capacity and Electrification Investment Planning, 2017 & EFL Annual Report 2019*

## *Future renewable energy projects*

EFL has a power development plan that it uses for planning. It does not publish it. To develop identified projects, EFL either conducts its own feasibility studies or tenders them out. Table 19 lists the generation options identified by EFL for consideration.

### Table 19: Future renewable energy projects (all types)

| POWER STATION | OPERATOR | GENERATION TECHNOLOGY | CAPACITY (MW) | STATUS | OPEN TO PRIVATE INVESTORS/ OPERATORS |
|---|---|---|---|---|---|
| ***Lower Ba*** | IPP | Hydropower | 23 | EIB contracted to conduct feasibility studies | Operations might be tendered out to a private operator |
| ***Qaliwana—Upper Wailoa Diversion*** | IPP | Hydropower | 25–36 | Pre-feasibility studies completed in 2019, feasibility studies in progress | EFL is open to tendering out operation to a private operator |
| ***Hybrid mini-grids*** | TBC | Solar/diesel hybrid mini-grid | TBC | Currently under development within DoE, will be tendered out | DoE is looking to hybridize existing diesel mini-grids through private electric power corporations and/or operators |
| ***Solar PV*** | IPP | Grid-connected solar PV | 15-20 | EFL is looking into tendering out further solar PV installations | Projects likely to be tendered out to private investors/operators |
| ***Wailevu*** | TBC | Hydropower | 2 | Preliminary design completed by JICA | EFL possibly open to private IPP |

*Source: Castlerock Consulting, Inception Report, Support for Energy Sector Regulatory Capacity and Electrification Investment Planning, 2017 & JICA Hydropower Assessment*

*Monasavu Hydro, Fiji (The Fiji Times)*

## 4.2.3. Legislation, policy, and regulation

### *Electricity Act 1966*

The Electricity Act 1966 established EFL as a governmental entity tasked with regulatory responsibilities along with being granted exclusivity for transmitting, distributing, and supplying electricity. EFL has the authority to set separate tariffs for IPPs based on their cost and geography but has not taken advantage of this. To generate electricity IPPs must hold a generation license issued by EFL. Since EFL holds an exclusive right to sell electricity, all private generation must be for self-consumption or sold to EFL through a PPA.

### *Electricity Act 2017*

Fiji's Parliament approved a new Electricity Act (2017),[88] which was gazetted on October 1, 2019. The new act makes considerable changes to the institutional framework of the electricity sector, with the most notable change being the partial divesture of EFL to private investors.

The government has begun this process by corporatizing FEA as EFL in April 2018 and transferring 5 percent of EFL shares to eligible EFL customers. In 2019, the Fiji National Provident Fund acquired a 20 percent stake in EFL. In 2021, Seven Pacific Pte Ltd acquired the fund's share along with an additional 24 percent share from the Fiji government. At the time of writing, the Fiji government holds a 51 percent share against Seven Pacific's 44 percent share, with the remaining 5 percent distributed among EFL customers.

The government has resolved to undertake the divestment to:

- Meet long-term energy sector development goals while encouraging enhanced private sector participation (particularly with respect to RE)
- Access international expertise in the electricity sector (particularly with respect to RE)
- Align the Fijian energy sector to international best practices

88 Electricity Act, 2017 http://www.parliament.gov.fj/wp-content/uploads/2017/03/Act-13-Electricity.pdf

- Ensure a more stable and affordable supply of electricity
- Increase participation of Fijians in the development of Fiji's capital markets

Other key implications of the Electricity Act 2017 include the following:

- EFL's current regulatory functions will, in principle, be devolved to an **independent regulatory body** (likely FCCC). The new regulator will be responsible for wholesale and retail tariff setting, licensing, and enforcement of technical codes and standards (though FCCC may delegate this last function back to EFL, at least temporarily).
- EFL will operate under a **single buyer model** where IPPs can add and operate generating capacity through competitive bidding, while EFL retains the monopoly in networks and retail (with provisions for regulatory approval of self-generation and other suppliers under certain circumstances).

Several issues have been observed with the new Electricity Act[89]:

- There is an apparent inconsistency in giving EFL exclusivity in generation, transmission, distribution, and retail while also leaving the door open for other participants (under a single buyer model). It remains to be seen how this issue is resolved.
- Section 16 of the act discourages self-supply because it gives EFL the right of first refusal to match the price of supply or eliminate self-supply for a self-generator.
- The Grid Code requires generation facilities greater than 250 kW to have ramping capability, which PV and some other RE intermittent technologies do not have (including wind and run-of-river hydro).

### *Draft Energy Policy 2013*

The 2013 National Energy Policy sets out the government's goals for the energy sector. The policy has not been approved by the Cabinet but has been followed by most stakeholders in the interim.

The key policy goals relating to the electricity sector are:

- Increasing private sector involvement through all types of RE investments
- Establishing a transparent IPP framework
- Establishing a transparent and cost-effective tariff mechanism for retail electricity prices
- Preventing self-regulation by EFL by transferring regulatory powers to an independent regulator
- Developing a national electrification master plan

### *Draft Rooftop Solar Policy*

EFL has reportedly developed a new Rooftop Solar Policy. The policy has not been made public but is expected to provide remuneration options for customers with rooftop solar installations.

The policy may introduce a two-part tariff for eligible rooftop solar customers, consisting of a capacity and an energy charge for consumption from the grid, and an energy charge paid to the consumer for all excess solar energy exported to the grid. Details of the implementation of the tariff have yet to be made public.

### *EFL Grid Code 2011*

The Grid Code was developed by EFL in 2011. It sets out the operation and connection requirements for all generators connected to EFL's grid and is in line with standard international practices.

With the new Electricity Act, the authority of providing technical regulation of the sector is will be transferred to FCCC. It is expected that FCCC will adopt EFL's Grid Code once it assumes the task of technical regulation.

89 Castlerock Consulting, 2017, Inception Report, Support for Energy Sector Regulatory Capacity and Electrification Investment Planning

The Grid Code is divided into the following sections:

- **Planning Code—**Outlines EFL's planning protocol for new generation
- **Connection Code—**Establishes the requirements for new generation connecting to the grid
- **Operation Code—**Establishes the operational requirements for generators
- **Scheduling and Dispatch Code—**Defines the order of dispatch of generators

While not explicitly stated in the text, from a practical perspective the Grid Code only applies to the Viti Levu Interconnected System. Its application to the other three smaller systems (Vanua Levu, Ovalau, and Taveuni) is limited.

### *Other relevant legislation*

- **Commerce Commission Decree 2010—**Part 2 of the decree expanded FCCC's regulatory powers to include price control of electricity. FCCC reports to the Ministry of Industry, Trade and Tourism.
- **Public Enterprise Act 1996, as amended 2002—**Gives the government power to restructure state-owned enterprises. EFL's divesture is authorized through the government's restructuring power under this act.
- **Companies Act (Cap 247)—**Outlines the steps and documents required to establish a company in Fiji. Defines the responsibility of companies and their shareholders.
- **Environment Management Act 2005—**Establishes the National Council responsible for formulating environmental policy and sets out the requirements for conducting an environmental impact assessment.

Foreign investment is governed by the following acts and regulations (see Section 4.3.2 on *Setting up a business in Fiji*):

- Foreign Investment Act 1999
- Foreign Investment Act 2004 (Amendment)
- Foreign Investment Regulations 2009
- Foreign Investment Act 2016 (Budget Amendment)

### *Tariff regulations*

FCCC issued a new tariff methodology in 2019 based on cost-reflective tariff setting that incentivizes efficient operations and consumption. Key points of the tariff include:[90]

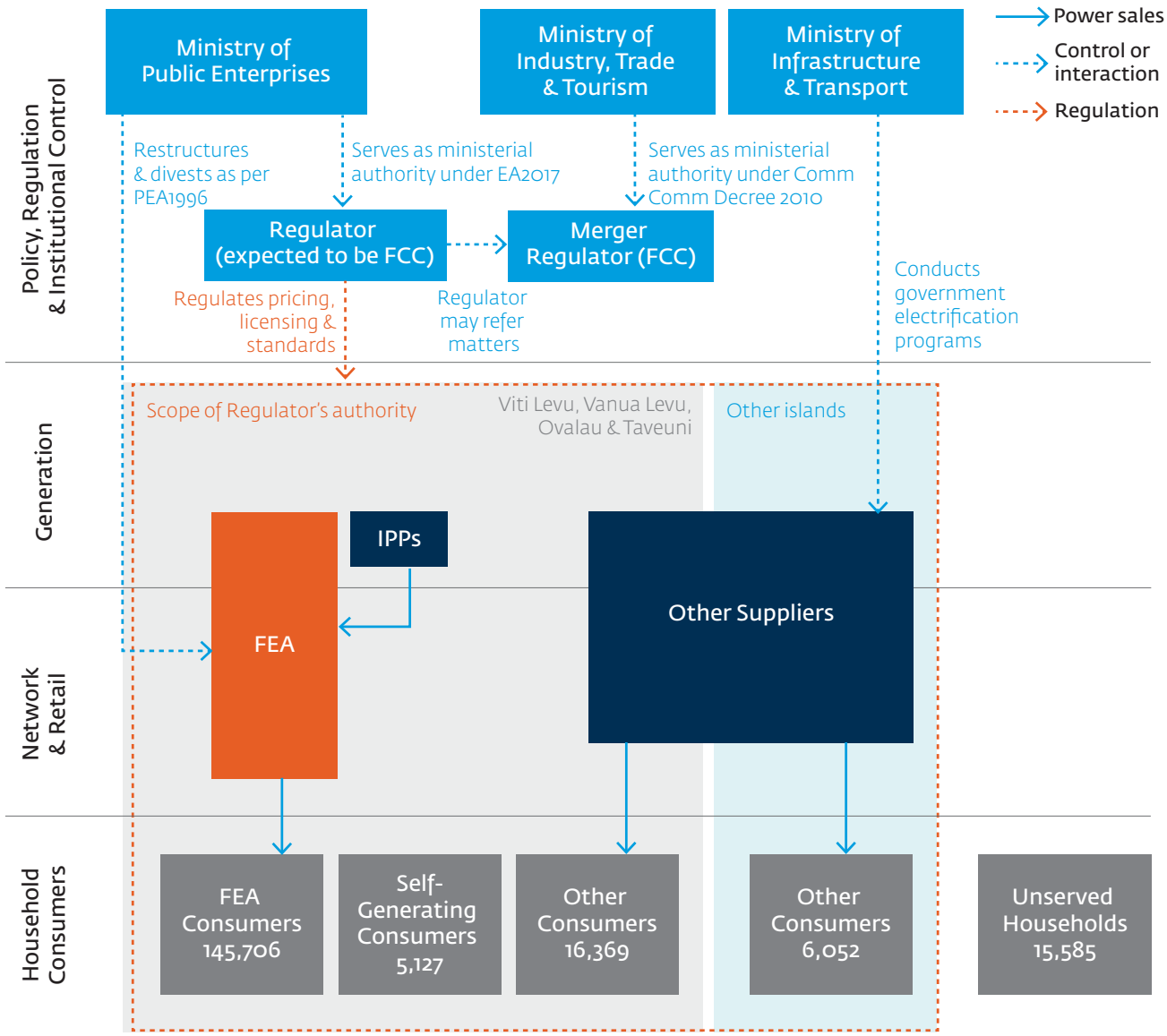
- Tariffs reviewed every four years and set to ensure that EFL recovers its revenue requirement.
- The revenue requirement is calculated based on the building blocks methodology and include operating costs, fuel and IPP costs, depreciation, and return on assets, less non-tariff revenue.
- There will be an annual review of fuel and IPP costs to consider whether a major change in costs requires an adjustment to the tariff.
- Tariff reviews will include a reconciliation adjustment for differences between actual and forecast sales, operating expenditure, and capital expenditure, during the previous four years.
- A tariff adjustment may be applied outside of the four year cycle in the event of an extraordinary event that was not foreseen and largely outside of EFL's control.
- The tariff structure can comprise of three types of charges: demand charge, capacity charge and energy charge.

90 Fiji Competition and Consumer Commission, 16 September 2019, Electricity Tariff Methodology

## 4.2.4. Institutions

Figure 16 provides an overview of the current structure of Fiji's power sector.

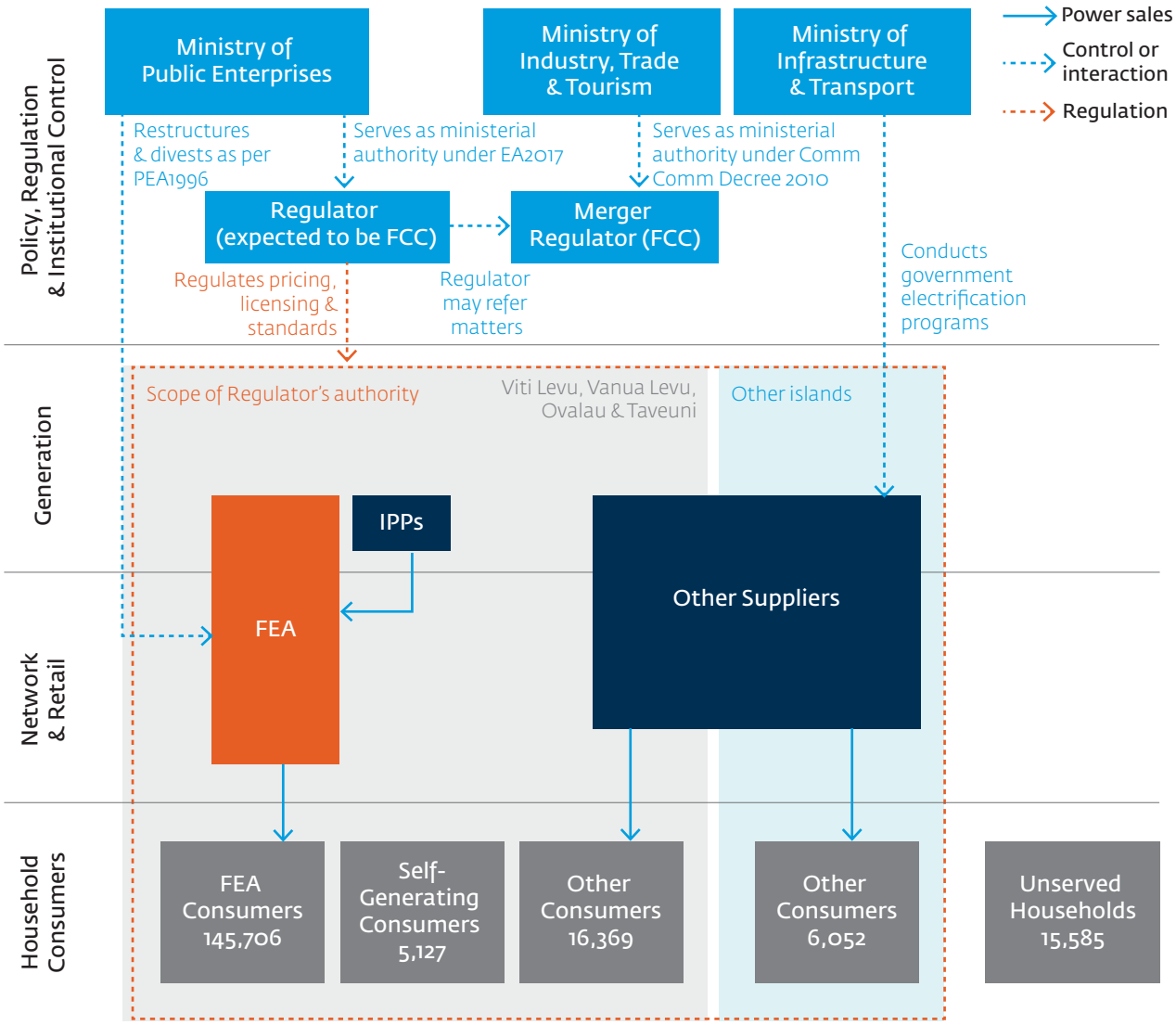
**Figure 16: Current structure of the Fiji power sector**




*Source: ECA edit of Castlerock Consulting, Inception Report, Support for Energy Sector Regulatory Capacity and Electrification Investment Planning, 2017*

As detailed in Section 4.2.3, the Electricity Act 2017 envisages significant changes to the sector. The expected future structure is summarized in Figure 17.

## Figure 17: Future structure of the Fiji power sector




*Source: ECA edit of Castlerock Consulting, Inception Report, Support for Energy Sector Regulatory Capacity and Electrification Investment Planning, 2017*

### *Energy Fiji Limited*

National utility EFL was established in 1966 through the Electricity Act (Cap 180) and operates according to the Electricity Act 2017 and the Public Enterprises Act 1996.

FEA was recently corporatized as EFL, and divesture has been undertaken, as described in Section 4.2.2. The new Electricity Act 2017 will lead to some changes to the utility's functions and responsibilities, most notably its regulatory functions. The 2017 act establishes an independent regulator, which will take on all regulatory functions. FCCC has taken over most of the regulatory roles defined in the act.

Some regulatory functions, such as licensing of qualified electricians, will remain EFL's responsibility for the time being.

EFL also undertakes grid extensions (that is, rural electrification) on behalf of the government and the DoE. When these activities contradict section 13 of the 1966 Electricity Act, EFL receives compensation for the cost incurred.

### *Fijian Competition and Consumer Commission*

FCCC is the competition authority and essential industrials regulator for Fiji. It was established as an independent regulator under section 7 of the Commerce Commission Decree 2010. Its main objective is to encourage fair competition in the sectors falling under its jurisdiction while protecting the interests of consumers.

It has been responsible for controlling retail electricity prices since 2010. In September 2019, it issued its first tariff methodology.

With the enactment of the Electricity Act 2017, FCCC has become the industry regulator. Table 20 summarizes the changes in regulatory responsibilities.

**Table 20: Changes to regulatory functions resulting from the new Electricity Act**

| REGULATORY FUNCTION | CURRENT | 2017 ACT | COMMENTS |
|---|---|---|---|
| ***Tariff setting*** | FCCC/EFL | FCCC | FCCC previously regulated retail tariffs and offered guidance on wholesale prices. The wholesale prices of EFL's current PPAs are below FCCC's guidance price. Under the new act, FCCC will review all PPAs and will have the power to intervene and mediate in PPA negotiations. |
| ***Promoting competition*** | FCCC | FCCC | FCCC is responsible for encouraging competition in all sectors in which it operates. Under the 2017 Electricity Act, one of the main responsibilities of the regulator will be to ensure active competition for the benefit of residents. |
| ***Preparation of technical codes and standards*** | EFL | FCCC | Under the 2017 act, responsibilities for technical codes and standards will fall under FCCC. However, as FCCC has insufficient capacity, EFL's codes and standards will largely be carried over. |
| ***Licensing*** | EFL | FCCC/EFL | Licensing of IPPs has been transferred to FCCC under the 2017 act. This will avoid the current situation of EFL granting licenses to competitors. EFL will continue to issue licenses to qualified electricians. |
| ***Dispute resolution*** | FCCC | FCCC | FCCC acts as arbiter whenever disagreements arise between IPPs and EFL or during PPA negotiations. |

*Source: Electricity Act 2017*

### *Investment Fiji*

Investment Fiji, which operates independently, was established in 1980 under the Economic Development Board Act. It will be the first stop for investors interested in the RE sector in Fiji. [91]

The government of Fiji actively encourages foreign investment in a range of sectors and offers services and assistance to foreign and local investors through Investment Fiji. Furthermore, Investment Fiji acts as a regulatory authority for foreign investments and advises the government.

### *Department of Energy, Ministry of Infrastructure and Meteorological Services*

The DoE—within the Ministry of Infrastructure and Meteorological Services—is responsible for developing and implementing government policies on RE and rural electrification. In addition, the department develops energy policy and strategy.[92]

The DoE is responsible for rural electrification in Fiji, which it implements by subsidizing EFL to build grid-compatible mini-grids. The rural electrification strategy is currently demand-driven. While there is some self-generation as well as supply provided by nongovernmental organizations, rural electrification efforts principally consist of EFL grid extension and electrification provided by the DoE. Sources of electricity supply include the Public Works Department, village diesel plants, village hydro plants, and home solar systems, as outlined in Table 21.

The DoE has installed more than 400 generators and some 100 kilometers of low-voltage distribution. It started introducing PV for supply in 2000 and has developed micro-hydro at some sites. In most cases, the DoE transfers the operation of the systems to the village. In the 2016 budget, a requirement for communities to contribute 5 percent of the investment costs was removed.

**Table 21: Number of electrified households by province and source**

| SOURCE OF ELCTRICITY SUPPLY | BA | BUA | CAKAU-DROVE | KADAVU | LAU | LOMA-IVITI | MACUATA | NADROGA NAVOSA | NAITASIRI | NAMOSI | RA | REWA | SERUA | TAILEVU | ROTUMA | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *FEA* | 47,500 | 67 | 2,488 | 133 | 130 | 1,686 | 10,819 | 9,895 | 33,384 | 680 | 4,167 | 20,628 | 3,488 | 10,641 | - | 145,706 |
| *Fiji Sugar Corp (FSC)* | 317 | - | - | 54 | - | - | 75 | - | 67 | - | 34 | 33 | - | 39 | - | 619 |
| *Vatukoula Gold Mine* | 488 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 488 |
| *Public Works Department (PWD)* | 36 | 120 | 139 | 121 | 70 | 29 | - | - | 11 | - | 49 | - | - | - | - | 575 |
| *Village diesel plant* | 510 | 807 | 1,482 | 1,423 | 1,226 | 1,065 | 372 | 412 | 95 | 570 | 537 | 207 | 58 | 278 | 255 | 9,297 |
| *Village Hhydro plant* | 243 | 22 | 209 | 21 | 22 | - | 25 | 36 | 325 | - | 125 | 218 | - | 27 | 87 | 1,360 |
| *Home solar system* | 554 | 899 | 1,701 | 405 | 407 | 318 | 1,195 | 901 | 151 | 50 | 246 | 269 | 107 | 138 | 66 | 7,407 |
| *Own plant* | 750 | 371 | 1,341 | 113 | 76 | 84 | 584 | 279 | 687 | 46 | 396 | 442 | 50 | 181 | 30 | 5,430 |
| *None* | 3,414 | 879 | 2,699 | 166 | 440 | 316 | 1,744 | 1,248 | 1,225 | 143 | 1,320 | 755 | 340 | 868 | 28 | 15,585 |
| *Other* | 487 | 21 | 301 | 32 | 59 | 85 | 90 | 378 | 292 | 13 | 102 | 223 | 27 | 258 | 4 | 2,372 |
| **TOTAL** | **54,299** | **3,186** | **10,360** | **2,468** | **2,430** | **3,583** | **14,904** | **13,149** | **36,237** | **1,502** | **6,976** | **22,775** | **4,070** | **12,430** | **470** | **188,839** |

*Source: Castlerock Consulting, Inception Report, Support for Energy Sector Regulatory Capacity and Electrification Investment Planning, 2017*

91 "Who we are," About Us, Investment Fiji, https://www.investmentfiji.org.fj/about-us/about-us

92 Castlerock Consulting, 2017, Inception Report, Support for Energy Sector Regulatory Capacity and Electrification Investment Planning, and DoE website, www.fdoe.gov.fj

Many villages are now hoping to switch to solar, and the DoE installed two hybrid diesel-PV systems in 2016. For government stations in particular, the DoE coordinates with EFL to run lines to the settlement allowing EFL services to replace DoE/village diesel operations. The government and other development partners support rural electrification programs implemented by the DoE:

- **Sustainable Energy Financing Program**—A support scheme funded by the World Bank, implemented by the DoE, and managed by local commercial banks. The scheme aims to provide partial guarantees for individuals and companies investing in RE. These partial guarantees help investors receive commercial loans from participating financing institutions.
- **Solar home systems lighting project**—A government-funded program providing rural households with solar home systems. The supply of these systems was tendered out to private suppliers. Bidders maintain the systems and replace batteries while ownership of the systems remains with the DoE.
- **Electricity grid extension**—is not obligated to supply electricity in areas it deems unviable. For EFL to expand the grid to these areas, the DoE offers compensation based on the investment needed for the grid extension. The schemes defined under this program are not limited to grid extension, but also include installing diesel-powered mini-grids in areas far from the main grid.

### *Fiji Revenue and Customs Authority*

FRCA was established under the Fiji Revenue and Customs Authority Act 1998. FRCA publishes the latest information on revenue collection and tax rates on its website, www.frcs.com.fj. Investors must register their business with FRCA and all taxes are paid to FRCA. Most of the required registration forms are available from its website.

### *Development partners*

Multiple development partners operate in Fiji with a focus on RE. These include the following:

- The **World Bank and IFC** are supporting RE generation through projects with the Department of Energy, advisory and transaction support to develop RE IPPs, direct equity investment, supporting local finance institutions with partial guarantees and other instruments.
- The **Asian Development Bank** has shown interest in supporting RE generation in Fiji and has supported various investment studies and investment workshops in the country.
- The **European Investment Bank** has been supporting EFL by offering technical assistance, capacity building, and financial and project management assistance with the development of the Ba River hydropower project.
- The **United Arab Emirates** will support the development of solar-hybrid mini-grids and utility-scale RE projects.
- The **Japan International Cooperation Agency (JICA)** has been active in Fiji's infrastructure sector, providing training and capacity building with the Pacific Power Association.
- **Australia's Department of Foreign Affairs and Trade** has been supporting various advisory and capacity building projects of the World Bank Group and other development partners in the RE sector. DFAT has also been focusing on education and health issues in Fiji but is increasing its involvement with private sector development and good governance.
- **New Zealand's Ministry of Foreign Affairs and Trade** has been supporting various advisory and capacity building projects of the World Bank Group and other development partners in the RE sector. It has also prioritized governance issues, improving economic governance, and education.

### *Commercial lenders*

Commercial banks operating in Fiji include:

- **ANZ**—Fiji's largest bank has been active in providing loans to RE projects. It is managing the World Bank's Sustainable Energy Finance Project (SEFP) pool.
- **BRED Bank**—Has been active in RE lending since opening its first branch in 2013.
- **Westpac**—Has been active in providing loans for RE projects. The sale of Westpac's Fiji business to Kina Bank has been announced and the transaction is expected to take place in the latter half of 2021.
- **Bank of Baroda**—Willing to fund RE projects and offers microfinance to small and medium enterprises.
- **BSP**—Interested in providing loans for RE projects and offers business loans, overdraft, and other services.
- **HFC Bank**—Interested in providing loans for RE projects.

## 4.2.5. Electricity tariffs and renewable energy incentives

### *Retail electricity tariffs*

EFL's tariff schedule is divided into three categories: domestic, small business, and maximum demand tariffs. Current tariffs are summarized in Table 22.

The prescribed tariff is a national tariff. For exemptions (such as mini-grids or other off-grid generation), an application must be submitted to FCCC, which must review and confirm the tariff.

**Table 22: Current tariff schedule**

| | TARIFF (FJD/KWH) VAT EXCLUSIVE | EXCESS REACTIVE ENERGY (FJD/kWh) VAT EXCLUSIVE | DEMAND CHARGE (FJD/KW/MONTH) VAT EXCLUSIVE |
|---|---|---|---|
| **DOMESTIC** | | | |
| *Domestic consumers who qualify for subsidy (<=95kWh/month)* | 0.3401 | | |
| *Domestic consumers (>95kWh/month)* | 0.3401 | | |
| **SMALL BUSINESS TARIFF** | | | |
| *Commercial & Industrial (<=14,999kWh/month)* | 0.4099 | | |
| *Commercial & Industrial (>14,999kWh/month)* | 0.4295 | 0.4295 | |
| **MAXIMUM DEMAND** | | | |
| *Maximum demand between 75kW – 500kW* | 0.2781 | 0.4295 | 35.33 |
| *Maximum demand between 500kW – 1000kW* | 0.3026 | 0.4295 | 3.57 |
| *Maximum demand >1000kW* | 0.3270 | 0.4295 | 39.24 |

*Source: EFL, Tariff Schedule, 2020*

FCCC's tariff methodology is based on cost-reflective tariff setting that incentivizes efficient operations and consumption. A detailed description of the tariff methodology is in Section 4.2.3.

In addition to retail tariffs, FCCC regulates the price paid to IPPs. FCCC refers to this price as a "feed-in tariff." It should not be confused with feed-in tariffs as typically applied internationally, which tend to relate to small-scale, intermittent renewable generation. Price regulation is further described in Section 4.3.7.

### *Renewable energy-specific incentives*[93]

The Fiji Revenue and Customs Service offers several incentives to encourage investment in new business activities in Fiji, some of which are also applicable to investment in RE. These include:

- Taxpayers undertaking a new RE or power cogeneration project are eligible for a five-year tax holiday.
- Equipment and parts for RE generation are exempt from import duty.
- Accelerated depreciation is available for RE projects and machineries—100 percent write off is available in the year the expenditure was incurred.

93 Fiji Revenue & Customers Authority, 2016, Fiji Tax and Customs Incentives 2016/2017

Tax-free regions are another incentive for newly established businesses operating on most Fijian islands, except south Viti Levu and the eastern islands, as shown in Figure 18. The criteria to be eligible for tax exemptions are:

- To be a newly incorporated entity operating a new business
- The business was established in one of the prescribed regions
- The original level of investment was at least 250,000 Fijian dollars

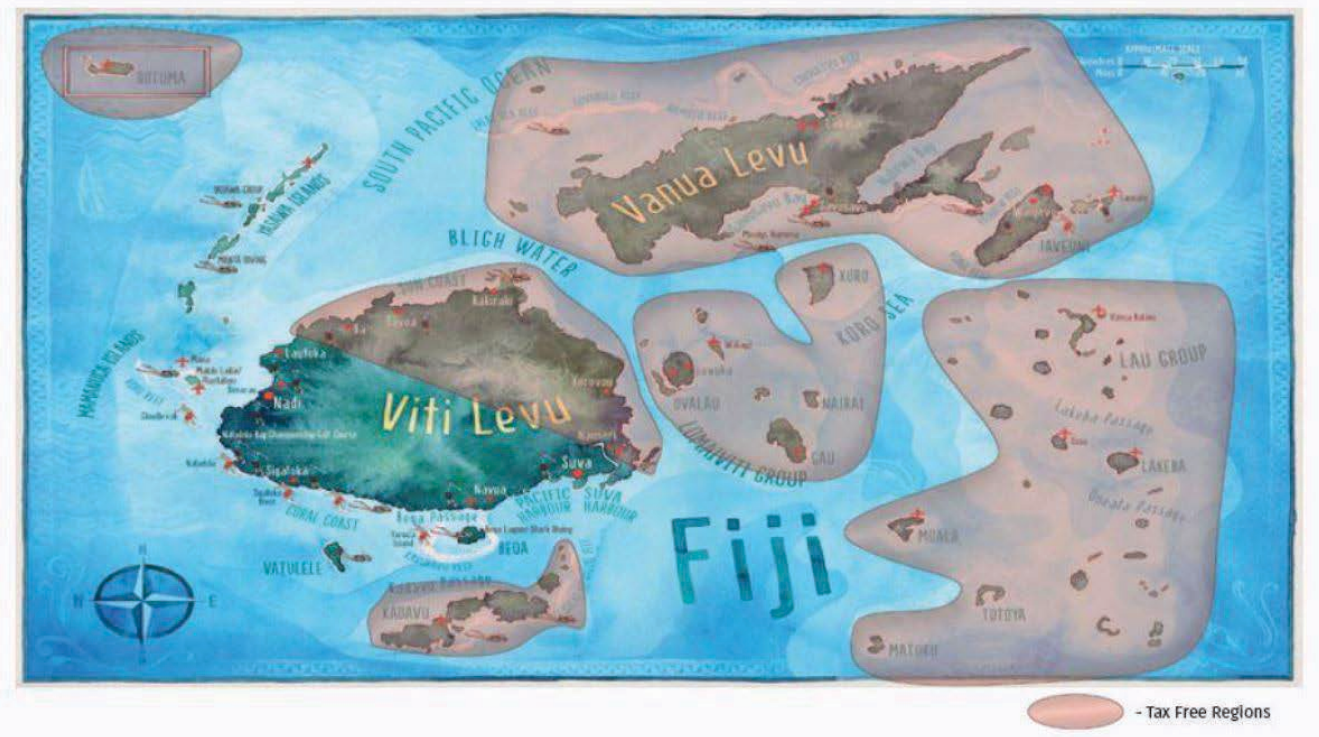
Eligible companies receive import duty exemption, which RE developers receive regardless, and are exempt from income tax based on the size of the initial capital investment:

- Capital investment from 250,000 Fijian dollars to 1 million Fijian dollars for five consecutive fiscal years.
- Capital investment from 1 million Fijian dollars to 2 million Fijian dollars for seven consecutive years.
- Capital investment of 2 million Fijian dollars and above for 13 consecutive years.

Companies that are at least 25 percent owned by indigenous Fijian landowners gain an additional five years of income tax exemption.

Under the current incentive scheme, the tax-free region incentive is only valid for activities approved and established before December 31, 2018.

**Figure 18: Tax-free regions in Fiji**




*Source: Fiji Tax and Customs Incentives 2016-2017*

*Monasavu Hydro, Fiji (The Fiji Times)*

## 4.3 Step-by-step guide to investing

### 4.3.1. Introduction

The detailed description of the steps required to invest in RE power generation projects in PNG focus on three broad categories of RE projects:

- **IPP generation**—Private investors developing generation capacity and selling to the utility. Energy sources are likely to include hydropower, biomass, and solar farms.
- **Own-use solar generation**—Investments in solar PV capacity primarily for own-use by residential, commercial, and industrial customers. This can include rooftop solar installations or ground-mounted solar installations. Excess energy generated may or may not be exported to the grid, depending on the offering of the utility.
- **Off-grid generation (mini-grids)**—Investments in solar PV, hydropower, or hybrid mini-grids. Under this type of project, the developer is responsible for investing in and operating the mini-grid for a period of time.

This guide is not intended to cover the following types of projects, although much of the information may still be relevant:

- **Solar home systems**—These are basic solar systems that are not connected to the grid. They typically do not need to be licensed and can be purchased over the counter.
- **Construction contracts** for RE projects.

## 4.3.2. Setting up a business[94]

The government of Fiji actively encourages foreign investment in a range of sectors and offers services and assistance to foreign and local investors through Investment Fiji.

Fiji ranks 163 out of 190 countries on the World Bank's Doing Business 2020 rankings for ease of starting a business. The process takes about 40 days to complete.

All foreign entities wishing to invest in Fiji must obtain a Foreign Investment Registration Certificate (FIRC) by registering with Investment Fiji.

Investment Fiji's Facilitation Unit was established to help investors liaise with various agencies that issue permits and licenses required for incorporating a company. The unit can explain and assist with any impediments encountered during company incorporation and project implementation.

Table 23 describes the steps required for setting up a business in Fiji.

**Table 23: Starting a business**

| STEP | ORGANISATION | PROCESS | PROCEDURE | COST AND TIME |
|---|---|---|---|---|
| 1 | Office of Registrar of Companies | Reserving company name | • Establish the uniqueness of the company name by searching online through the Companies, Business Names, and Trade Marks Register (www.egov.gov.fj).<br>• Apply for the unique name to be reserved (also through www.egov.gov.fj) and pay the reservation fee.<br>• Once the application is accepted, the applicant has 30 days to complete the company incorporation. | 54.5 Fijian dollars<br>1-2 days |
| 2* | Investment Fiji | Apply for Foreign Investment Registration Certificate (FIRC) | • Fill out and submit an application for an FIRC on Investment Fiji's website, http://www.investmentfiji.org.fj/pages.cfm/for-investors/forms-1/<br>• Additional information and documents to be provided with the application are listed on the application form. | 2,725 Fijian dollars<br>5 days |
| 3 | Office of Registrar of Companies | Incorporating the company | • To finalize the company incorporation, submit Form A2—Business Registration Form (available from www.egov.gov.fj and any government bookshop) and all accompanying documents within 30 days of reserving a company name.<br>• Form A2 requires detailed information on the company such as governance, registered office, principal place of business, office holder's details, details of ultimate holding company, share structure details, and details of its members.<br>• Hiring a lawyer or an accountant to help prepare the required documents is recommended. In addition, all documents must be stamped by the Stamp Duties Office.<br>• The following documents must accompany Form A2:<br>  • Foreign Investment Registration Certificate (FIRC)*<br>  • Articles of Association (can be adapted from the standard articles listed in the Companies Act 2015)<br>  • Tax identification number (see next step) | 49 Fijian dollars (local company)<br>490.50 Fijian dollars (foreign company)<br>7 days |

94 Investment Fiji https://www.investmentfiji.org.fj and relevant legislation

| STEP | ORGANISATION | PROCESS | PROCEDURE | COST AND TIME |
|---|---|---|---|---|
| 4 | Fiji Revenue and Customs Authority | Register for Tax Identification Number (TIN) | • Company registration will not be completed until the company has been registered for TIN.<br>• The TIN registration form must be filled out at FRCA offices.<br>• A copy of Form A2 and accompanying documents, all stamped by the Registrar of Companies, must be submitted to FRCA.<br>• On successful submission of the TIN registration form, Form A2, and accompanying documents, a letter confirming the TIN will be issued.<br>• The letter confirming the TIN must be submitted to the Registrar of Companies to complete the application process. | No charge<br><br>1 day |
| 5* | Department of Immigration | Obtaining work permits | • All foreign investors who wish to invest and work in Fiji must apply for a work permit. This must be completed three months before the issuing of a FIRC.<br>• Information and required forms can be found on the Department of Immigration website, www.immigration.gov.fj<br>• Foreign investors have two options of work permits:<br>  • Investor Permit for Non-Citizen Investors—For investors to be engaged in an approved business project (FIRC already issued).<br>  • Seven Years Investor Permit—For investors who can show proof of investments in Fiji (amounting to a minimum of 250,000 Fijian dollars) according to section 39 of the Immigration Regulation 2007. | 650 Fijian dollars (work permit + issue fees)<br><br>3–7 days |
| 6* | Reserve Bank of Fiji | Issuance of shares to non-residence | • Investors will need to liaise with the Exchange Control Unit of the Reserve Bank of Fiji to apply for the issuance of shares to non-residents. This step needs to be completed within three months of receiving an FIRC.<br>• This is in accordance with the Exchange Control Act 1985, which does not allow the issue of securities to non-residents without the approval of the Minister of Finance (delegated to the Reserve Bank).<br>• Form I.1—Application to Issue Securities to Non-resident Individuals or Entities must be completed and submitted to the Reserve Bank along with:<br>  • A copy of the FIRC.<br>  • Documentary evidence of shareholders' equity contribution. | No charge<br><br>3 days |
| 7 | Relevant city/ municipality council | Apply for a business licence | • The company must obtain a business license from each location where it conducts business. This must be completed within three months of receiving a FIRC.<br>• Forms are available from each council's website.<br>• Information and documents required include:<br>  • Company Registration Certificate.<br>  • TIN Registration Certificate.<br>  • FIRC.<br>  • Consent of Landlord.<br>  • Waste Disposal Certificate (DoE).<br>  • Fire Compliance Certificate (National Fire Authority). | 100–300 Fijian dollars<br><br>Up to 11 days |

| STEP | ORGANISATION | PROCESS | PROCEDURE | COST AND TIME |
|---|---|---|---|---|
| *8* | Fiji National Provident Fund | Register a company with the Fiji National Provident Fund | • All employers are liable to pay the Fiji National Provident Fund contributions for all employees.<br>• Registering a company is done through the website, www.myfnpf.com.fj<br>• The Employer Registration Form must be completed and the following documents submitted with the application:<br>  • Certified copy of Business Registration Certificate.<br>  • Certified copy of passport/driver's license for all associated with the business.<br>  • Articles of Association.<br>  • Certified particulars of shareholders in the company.<br>  • A copy of a utility bill as a proof of address for all those associated with the business. | Up to 11 days |

**Only required when the company includes a foreign investor as defined by section 3(1) of the Foreign Investment Act 1999.*

### Table 24: Legislation relevant to starting a business in Fiji

| FOREIGN INVESTMENT |
|---|
| The Foreign Investment Act 1999 |
| The Foreign Investment Act 2004 (Amendment) |
| The Foreign Investment Regulation 2009 |
| The Foreign Investment Act of 2016 (Budget Amendment) |
| **STARTING AND OPERATING A COMPANY** |
| Companies Act 2015 |
| Employment Relations Promulgation 2007 |
| Health and Safety at Work Act 1996 |
| Workmen Compensation Act (Cap 94) |
| Town Planning Act (Cap 139) |
| **IMMIGRATION** |
| Immigration Act 2003 |
| **FOREIGN OWNERSHIP OF SECURITIES** |
| Exchange Control Act 1985 |

## 4.3.3. Land access and acquisition

Fiji has three types of land that could be leased or acquired for RE projects:

- iTaukei land (native land)—87 percent of total land
- State land (crown land)—5 percent of total land
- Freehold land—8 percent of total land

### *iTaukei land*

All iTaukei land is administered by the iTaukei Land Trust Board (TLTB), established under the iTaukei Land Act (Cap 134). The act states that iTaukei land may only be transferred from the TLTB to the state under the Crown Acquisition of Lands Act (Cap 135). Private investors can only lease iTaukei land.

Leases of iTaukei land have a maximum term of 99 years and must, in all cases, be approved by TLTB and registered landowners. The iTaukei Land and Fisheries Commission maintains a database (Vola ni Kawa Bula) of all registered landowners of iTaukei land.

TLTB defines seven categories of land use: agricultural, industrial, residential, tourism, civic licenses, and special use. Power generation is included as special use of land.

A list of available land for leasing is maintained on TLTB's website (www.tltb.com.fj) along with application forms and checklists.

Administration fees required for application processing can total to about 7,500 Fijian dollars—depending on the type of lease—and the processing time is likely to take up to four months.

**Table 25: Requirements for iTaukei land application—special use**

| ITEM | INFORMATION REQUESTED |
|---|---|
| **GENERAL REQUIREMENTS** | |
| ***Application to lease*** | Investors must complete an application to lease and submit it to TLTB via mail or directly at its office. The form can be acquired from TLTB's website |
| ***Supporting documents*** | Personal ID card of applicant, birth certificate, TIN registration no, bank statements (six months), salary slip, and confirmation of employment |
| ***iTaukei owner's consent*** | Consent of 60 percent of landowners for dereservation if land is within iTaukei Reserve |
| ***Concept of project development*** | Documents that must be submitted include a site plan and artistic impressions of proposed development |
| ***Additional requirements for overseas applicants*** | Investment Fiji Requirements (RPF clearance), FIRC, Department of Immigration approval |
| **RENEWABLE ENERGY SPECIFIC** | |
| ***Feasibility Study and EIA*** | Feasibility of project, information of company structure, EIA, and any impact on or benefiting iTaukei owners relating to local participation in project, financial benefit to landowners, and local culture and custom |
| ***Financing*** | Proof of adequate financing of project, including five-year business plan, projected cash flows, and valuation of existing assets |
| ***Business and marketing plan*** | Any plans relating to future developments of the project and business, including maps and expansion plans |
| ***Business certificates*** | Certificates of Registration of Company and Foreign Investment Registration Certificate |

*Source: TLTB*

### *State land (crown land)*

The definition of state land is established through the Crown Acquisition of Lands Act (Cap 135). The Land Use Decree 2010 was the beginning of the government's ongoing land reforms. It gives the prime minister power to designate all land—with landowners' majority consent—as crown land (section 6). The decree also establishes the Land Use Bank (section 7) for keeping record of all crown land and establishes a Land Use Unit (section 8) tasked with evaluating land and issuing leases.

The Land Use Bank and Land Use Unit were established under the Department of Lands in the Ministry of Lands and Mineral Resources. Available land for leasing is published on the department's website, www.lands.gov.fj.

The use of some land may be tendered out and calls for an expression of interest issued. The calls will be published on the department's website and in local newspapers.

Regardless of the type of lease and land, the following information must be presented:

- Individual or company details
- Proof of adequate financing
- Concept plan for project/construction
- Foreign Investment Registration Certificate (for foreign investors)

### *Freehold Land*

Freehold land can be bought and sold freely for industrial and commercial purposes in Fiji by non-residents according to the Land Sales Act (Cap 137) Amendment 2014 (section 7A 2).

Freehold land can be acquired through real estate agents or directly through the freehold title owner.

**Table 26: Legislation relevant to land acquisition**

| |
|---|
| **NATIVE LANDS** |
| iTaukei Land Trust Act (Cap 134) |
| **STATE OWNED LAND** |
| Crown Acquisition of Lands (Cap 135) |
| Crown Lands (Cap 132) |
| **LAND SALES** |
| Land Sales Act (Cap 137) |
| Land Sales Act (Amendment) 2014 |

## 4.3.4. Social and environmental assessments

An environmental impact assessment (EIA) must be conducted for all hydropower and biomass projects in Fiji according to Schedule 2, part 1 of the Environment Management Act 2005. In most cases, an EIA will not be required for rooftop solar, but larger solar farms might need one. While the content of the EIA will differ depending on the type of project, the steps and process required will be the same for all projects.

The Environment Management Act establishes an Approving Authority (Department of Environment) and an EIA Administrator situated within the DoE. Any project that may "alter the physical nature of the land in any way" (part 1, section 2) is required to submit a proposal to the Approving Authority for screening. The Approving Authority may decide, based on part 4 and Schedule 2 of the Environment Management Act, whether the project requires an EIA to be conducted.

## Figure 19: Process for applying and submitting an EIA


*Source: Environment Management Act 2005, Environment Management (EIA Process) Regulations 2007*

Section 25 of the Environment Management Regulations 2007 lists the information that must be included in a complete EIA:

- Identifying information on the project and the project's proponents.
- A description of the purpose and scope of the proposed development activity, including the background and rationale for the project.
- A description of the environmental setting and a statement of environmental resources and conditions prior to project implementation. This should also include a projection or estimation of the environmental changes that will occur because of the project.
- A description of possible environmental and resource impacts from building, operating, or decommissioning the project.
- A statement of technically and economically feasible alternatives to the project and the reasons for not choosing them.
- A statement listing contingency plans to respond to any adverse effects from construction, operation, and decommission.
- A detailed list of consulted stakeholders who have an interest in or jurisdiction over the project or relevant expertise.

- A summary of results from public consultations.
- Recommendations on mitigation measures, monitoring, and any other studies and analysis that may be required.
- An environmental management plan (if required by the terms of reference).
- A recommendation by the EIA consultants on whether an environmental bond should be taken from the developer.
- Any other matter specified in the terms of reference.

**Table 27: Legislation relevant to Environmental Impact Assessments**

| FIJI LEGISLATION AND REGULATION |
|---|
| Environment Management Act 2005 |
| Environment Management Regulations 2007 |

## 4.3.5. Licensing and permits

### *Current licensing arrangements*

As described in Section 4.2.2, the Electricity Act 2017 established an independent regulatory authority, FCCC, which is tasked with processing license applications for the generation, transmission, distribution, and supply of electricity. Section 9 of the act states that the Minister of Infrastructure and Transport will grant licenses after consulting with the regulator.

Sections 7 to 10 of the act define a licensing and license exemption process. Under section 7, generating electricity for self-consumption is not allowed without a license, an exemption, or a pre-existing exception. "Supply" includes power transmitted through lines unless those lines go to the premises of the licensee (which would include self-supply on a single parcel of land). The act, therefore, appears to also require a license to supply electricity if the generation is sited on a separate parcel of land to the consumer.

While section 8 provides for exceptions, no existing groups or blanket classes of exceptions are in place.

Under section 10 of the Electricity Act, licenses can be issued with conditions. These could either compel or restrict the sale of electricity to any (or more) premises, as well as place limits on the use of the generation plant. These conditions or specifications can be modified at any time for any reason. No "grandfathering" is specified for pre-existing electricity suppliers. License modifications are also allowed for any reason at any time (section 13). This will result in the legal terms of independent power agreements and licenses lacking finality.

As the act comes into force, the implementation and allocation of regulatory powers becomes clearer. FCCC has taken over most regulatory functions from EFL, including issuing generation licenses. However, in 2019 EFL reached an agreement with FCCC to retain the responsibility of developing and enforcing technical standards and issuing licenses for qualified electricians.

**Table 28: Legislation relevant to the issuing of licences and permits**

| ELECTRICITY ACTS |
|---|
| Electricity Act of 1985 |
| Electricity Act of 2017 (has not been gazetted) |

## 4.3.6. Procurement and project approval

### *IPPs*

#### *Identifying new projects to be tendered out*

EFL has expressed interest in increasing the share of electricity generation provided by RE IPPs. All new IPP options will be announced through EFL's online portal. EFL has a power development plan, which is used to schedule investment in new generation capacity and tenders for IPPs. The plan is updated every three years but is not made publicly available.

#### *EFL's process for tendering new generation projects*

EFL's internal procedure for soliciting IPPs is not made public, but the utility has successfully tendered out a few large RE projects in the past. Under the Electricity Act 2017, the new regulator will have the authority to establish formal procurement rules and processes. In the meantime, EFL's procurement procedures have been implemented and others may be introduced in the future.

#### *Specific requirements placed on RE projects*

EFL has strict requirements for intermittent generation such as solar PV and wind power, and the Grid Code requires fully fledged IPPs to have an uptime of 80 percent. This is set out in EFL's Schedule and Dispatch Code, as described in Section 4.2.2. This requirement effectively forces intermittent generators to install battery or thermal backup, putting RE developers at a significant disadvantage. It is unclear whether EFL is still enforcing these requirements, given that it is in the process of contracting new solar IPPs that will not be accompanied by large battery storage.

#### *Process based on a recent grid-connected RE tender*

EFL issued a request for expression of interest for grid-connected RE generation in November 2019. The tender was open to all entities registered in Fiji. The information required as part of the first bidding stage includes:[95]

- Background and capacity of the entity registering interest, including audited accounts, compliance certificates from the Fiji Revenue and Customs Services, certificate of registration from Investment Fiji, past performance of entity, and financial, technical, and commercial capability.
- Description of the type of project proposed, including type of generation technology, fuel source, technical and commercial maturity of the proposed technology, and estimated cost and duration of development.
- Location of the proposed project and impact on environment, local communities, and existing infrastructure.
- Technical details such as targeted installed capacity, expected energy output or deemed quantity, grid connection or power evacuation method, operating regime, details of storage technology, and conceptual layout of the plant and equipment.
- Estimated per unit cost of generation and expected operating life of project.
- Operation and maintenance requirements.
- Any other information that might be useful in assessing the proposal.

All bidders were required to have established a company and received their FIRC (see Section 4.3.2) before submitting their expression of interest. Bidders were not required to have acquired land.

#### *Unsolicited proposals*

EFL has received numerous unsolicited bids for IPPs, but very few have been completed. One such IPP is the Nabou biomass power plant operated by GIMCO, which was commissioned in 2017.

EFL has developed an internal process for handling unsolicited IPP bids, but it is not publicly available. RE IPPs are actively encouraged, but prospective investors must first approach EFL to find out about the procedure and the required documents they need to submit.

EFL will make the Grid Code and other project requirements available when it receives bids from prospective IPPs.

95 Energy Fiji Ltd, 2019, Request for EOI for Development of Grid-Connected Renewable Energy Projects in Vanua Levu, Tender No EOI-01/19

*Sunergise Solar, Fiji (IFC)*

### *Own-use solar*

Around 150 rooftop solar PV installations are already operating in Fiji, accounting for about 580 MWh per year, although the majority of these are very small. EFL expects this to increase to 1,000 MWh in the next year. Sunergise, an energy service company, operates at least four large installations—ranging from 200 kW to 1.5 MW—on behalf of electricity consumers. This is under a net billing arrangement (with a fixed tariff for electricity exported back to the grid) with EFL. EFL has standard technical and commercial terms that it offers to interested parties, but the terms are only available on request.

Procurement and project approval for own-use solar might change with the implementation of the Electricity Act 2017, but details have not been made public. Section 16 of the act discusses self-generation and requires all current self-generators to report to EFL once the act comes into effect.

### *Mini-grids*

The DoE is responsible for rural electrification in areas outside EFL's mandate. It has been tendering hybrid mini-grids as Engineering Procurement and Construction contracts through its online portal, with local authorities operating the schemes. These tenders have only been for building the electrification schemes and not operating them. The DoE is interested in exploring increased private sector involvement through BOT or BOOT contracts.

All procurements of the DoE are conducted through the government's Procurement Office as per the Financial Management Act's Procurement Regulations 2010. All tenders for rural electrification are published on the Procurement Office's website, https://www.fpo.gov.fj/.

The DoE is also open to receiving unsolicited bids for rural electrification from RE sources. Currently, there is no public procedure to manage unsolicited bids and all bids are managed on a case-by-case basis.

Two pilot mini-grid projects are under way, which involve Sunergise installing and operating new mini-grids. These were not competitively procured and have received capital funding from development partners.

## 4.3.7. Commercial terms

### *IPPs*

#### EFL's standard PPA

EFL expects to competitively tender for new IPPs in accordance with its power development plan. EFL uses a standard PPA as the basis for negotiations with bidders, but this is not publicly available.

An alternative standard PPA was recently developed for EFL's benefit under the Fiji Renewable Energy Power Project (FREPP) and is available online.[96] However, it is unclear whether EFL intends to use this PPA.

#### *Regulation of IPP prices*

FCCC formerly regulated the price paid by EFL to IPPs, which was referred to as a feed-in tariff (not to be confused with RE feed-in tariffs as typically applied internationally). However, the regulation was recently removed.

#### *Unsolicited proposals*

FCCC regulates feed-in tariff rates for generation, but the rates are not technology specific. In practice, the commercial terms of all unsolicited IPPs are negotiated on a case-by-case basis. The rates offered by EFL under current IPPs are believed to be lower than the FCCC-prescribed feed-in tariffs.

Developers face the same uncertainties regardless of whether their bid is solicited or not. It is not clear whether EFL will use the PPA developed under the FREPP project or continue using the one it has used for previous IPP negotiations. The process for unsolicited projects is the same as the one for solicited projects, as described above.

The only IPP in Fiji that is fully owned by a third-party investor is the recent biomass IPP, developed by the Korean company GIMCO. The negotiation process took about two years. Future PPA negotiations may take less time given that EFL has now developed more in-house expertise in such negotiations.

EFL had been negotiating the terms of a joint venture with Sunergise for the 5 MW Qeleloa solar PV farm. The project was supposed to be commissioned in 2019 but has been delayed as terms of the contract have shifted away from a joint venture toward a conventional PPA under IPP arrangements.[97]

### *Own-use solar*

As discussed above, EFL offers a net billing arrangement to interested parties, which involves EFL paying a fixed tariff for electricity exported back to the grid (that is below the retail tariff). The exact terms of this arrangement are available on request.

Section 16 of the Electricity Act 2017 requires all current self-generators to report to EFL once the act comes into effect. In cases of reported self-generation, EFL has the right to match the price and take the supply.

As discussed in Section 4.2.2, a new Rooftop Solar Policy is being developed. Once adopted, the policy will provide clear guidance on commercial terms available to own-generators.

### *Mini-grids*

EFL will tender out the construction of mini-grids within areas it manages. Mini-grids have been tendered out under EPC contracts, where EFL takes over maintenance and operation once construction is completed.

The DoE has expressed interest in private companies operating and maintaining the rural mini-grids that it funds, and is open to receiving unsolicited proposals.

The DoE procures all goods and services through the government's Procurement Office as per the Financial Management Act's Procurement Regulations 2010. All tenders for rural electrification are published on the procurement office website, http://www.fpo.gov.fj/.

No standard terms or levels of subsidy exist, so all commercial terms will be competitively tendered and negotiated on a case-by-case basis.

The DoE acknowledges that many rural areas will require a subsidy for mini-grids to be built and operated. The details of the subsidy have yet to be finalized but will be decided by competitive tender.

The two pilot mini-grid projects being implemented by Sunergise, charge customers a two-part tariff (a fixed monthly charge for a fixed monthly allocation of energy and an energy charge per kWh consumed above that allocation) approved by FCCC.

96 http://www.energy.gov.fj/images/FREPP/standardized_ppa.pdf

97 Energy Fiji Ltd, 2019, Annual Report 2019

## 4.3.8. Tax and fiscal regime

### *Taxes applying to renewable energy projects*

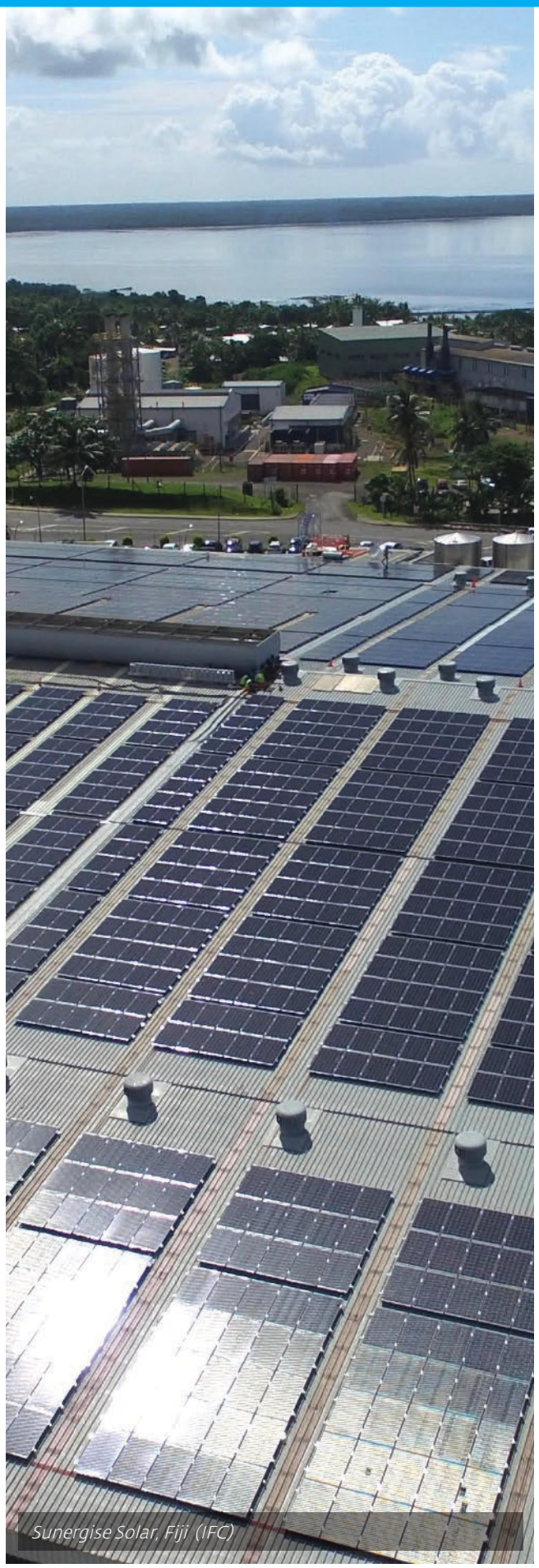
Table 29 lists the taxes that RE projects are subject to. The Fiji Revenue and Customs Service offers incentives through tax exemptions to encourage business activities in Fiji (see Section 4.2.4).

**Table 29: Eligible taxes for RE projects**

| TAX | TAX RATE |
|---|---|
| **OPERATIONS RELATED TAX** | |
| ***Corporate income tax*** | 20% of taxable profit |
| ***Capital gains tax*** | 10% of capital gains |
| ***Tax on interest income*** | 20% on interest income |
| ***Property tax*** | 2% of assessed property value |
| ***VAT on electricity supply*** | 9% on units sold |
| ***Environment Levy*** | RE projects are exempt |
| **STAFF RELATED TAX** | |
| ***Fringe Benefit Tax*** | 25% of fringe benefit |
| ***Employer paid—superannuation fund*** | 10% of gross salaries |
| ***Employee paid—superannuation fund*** | 8% of gross salaries |
| ***Employer paid—training levy*** | 1% of gross salaries |

*Source: Fiji Revenue & Customs Service*

In Fiji income tax for individuals is in the form of a withholding tax (pay as you earn, PAYE). The income tax threshold for residents is 30,000 Fijian dollars a year. Non-residents pay a flat tax of 20 percent on all income.



*Sunergise Solar, Fiji (IFC)*

### Table 30: PAYE, social responsibility tax, and environmental and climate levy tax

| CHARGEABLE INCOME (FJD) | TAX PAYABLE (FJD) | SOCIAL RESPONSIBILITY TAX (INCLUDING ENVIRONMENTAL AND CLIMATE LEVY) |
|---|---|---|
| **FIJI RESIDENTS** | | |
| *0 – 30,000* | Nil | |
| *30,001 – 50,000* | 18% of excess over $30,000 | |
| *50,001 – 270,000* | $3,600 + 20% of excess over $50,000 | |
| *270,001 – 300,000* | $47,600 + 20% of excess over $270,000 | 13% of excess over $270,000 |
| *300,001 – 350,000* | $53,600 + 20% of excess over $300,000 | 3,900 + 14% of excess over $300,000 |
| *350,001 – 400,000* | $63,600 + 20% of excess over $350,000 | 10,900 + 15% of excess over $350,000 |
| *400,001 – 450,000* | $73,600 + 20% of excess over $400,000 | 18,400 + 16% of excess over $400,000 |
| *450,001 – 500,000* | $83,600 + 20% of excess over $450,000 | 26,400 + 17% of excess over $450,000 |
| *500,001 – 1,000,000* | $93,600 + 20% of excess over $500,000 | 34,900 + 18% of excess over $500,000 |
| *1,000,001 +* | $193,600 + 20% of excess over $1000,000 | 124,900 + 19% of excess over $1,000,000 |
| **NON-RESIDENTS** | | |
| *0 – 30,000* | 20% of excess of $0 | |
| *30,001 – 50,000* | $6,000 + 20% of excess over $30,000 | |
| *50,001 – 270,000* | $10,000 + 20% of excess over $50,000 | |
| *270,001 – 300,000* | $54,000 + 20% of excess over $270,000 | 23% of excess over $270,000 |
| *300,001 – 350,000* | $60,000 + 20% of excess over $300,000 | $6,900 + 24% of excess over $300,000 |
| *350,001 – 400,000* | $70,000 + 20% of excess over $350,000 | $18,900 + 25% of excess over $350,000 |
| *400,001 – 450,000* | $80,000 + 20% of excess over $400,000 | $31,400 + 26% of excess over $400,000 |
| *450,001 – 500,000* | $90,000 + 20% of excess over $450,000 | $44,400 + 27% of excess over $450,000 |
| *500,001 – 1,000,000* | $100,000 + 20% of excess over $500,000 | $57,900 + 28% of excess over $500,000 |
| *1,000,001 +* | $200,000 + 20% of excess over $1000,000 | $197,900 + 29% of excess over $1,000,000 |

*Source: Fiji Revenue & Customs Service*

### *Import duties*

All parts and electricity generation equipment (steam and hydraulic turbines) fall under import code 84.06 and are subject to 9 percent value-added tax (VAT) and 5 percent import duty.

However, electricity equipment and parts specifically aimed at generating electricity from RE sources are not subject to any import duty, but will be subject to 9 percent VAT. This is established in the 2016 Tariff Schedule Code 264 and in section 17 of the Customs Tariff Act (Cap 197).

## 4.3.9. Financing

### *Local financiers*

Fiji ranks 165 out of 190 countries on the World Bank's Doing Business 2020 rankings for getting access to credit. This is far below neighbors such as Vanuatu (37), Papua New Guinea (48), and Solomon Islands (104).

This low ranking is mainly the result of the enactment of the Fair Reporting of Credit Act 2016. The act dissolved the Data Bureau, which held all Fijian credit records. This erased all historical credit data on Fijian citizens, making it more difficult to gain access to credit information.

Commercial banks in Fiji are required to hold 2 percent of their deposits in loans to the RE sector.[98]

The commercial banking sector consists of six commercial banks, most of which have experience lending for small RE and energy efficiency equipment, although there are few examples of sizeable RE projects being financed domestically:

- **ANZ—**Fiji's largest bank has been active in providing loans to RE projects. It is currently managing the World Bank's Sustainable Energy Finance Program (SEFP) pool.
- **BRED Bank—**Has been active in RE lending since opening its first branch in 2013.
- **Westpac—**Active in providing loans for RE projects. The sale of all Westpac's Fiji businesses has been announced and is expected to take place in the latter half of 2021.
- **Bank of Baroda—**Willing to fund RE projects and offers microfinance to small and medium enterprises.
- **BSP—**Interested in providing loans for RE projects and offers business loans, overdraft, and other services.
- **HFC Bank—**Interested in providing loans for RE projects.

### *Renewable energy-specific financing products in the Pacific*

The private sector arms of multilateral development banks are very active in the region and are looking to fund larger IPPs and off-grid electrification through solar/hybrid mini-grids. The Annex provides a broad overview of the types of financing available to RE investors internationally.

At present, the only financing mechanism dedicated to RE projects in Fiji is the Sustainable Energy Financing Program, which is a risk-sharing facility funded through the World Bank and managed by ANZ in Fiji. The program established a pool of funds, which can offer partial guarantees (that is, third-party collateral) for RE-based projects, specifically solar PV projects, pico hydro projects, and projects to use coconut oil as a diesel fuel alternative. Potential investors can apply to ANZ, as the pool manager, to receive guarantees. The pool does not provide any direct funding but offers a 50 percent guarantee to other lending institutions interested in funding RE projects. The loans are, however, limited to a one-year term and, therefore, target construction contracts.

Key results of the Sustainable Energy Financing Program include:[99]

- $21.5 million in loans for RE and energy efficiency equipment (over $40 million in total investment)
- 4.3 MW of RE benefiting over 100,000 people and communities
- More than 13,500 units of >10W solar units and over 31,000 units of <10W solar units
- 11 biofuel generators and one biofuel mill
- Around 1.5 million Fijian dollars in technical assistance since 2007

In 2017, Fiji became the first emerging market to issue a green bond ($50 million) to fund RE projects and other investments that build the country's resilience to climate change. IFC and the World Bank provided technical assistance to the government. The bond issuing attracted much interest from both domestic and some international investors and the bond was oversubscribed.

98 Agriculture and Renewable Energy Loans Ration, through section 44 of the Reserve Bank Act.

99 Fiji Department of Energy, 2017, Presentation on SEFP, 2017

## 4.3.10. Design, construction, and commissioning

### *Design and construction permits*

Larger energy projects will require various permits from local authorities and the Department of Town and Country Planning before construction can begin.

The first step is to submit an application for the development permission as governed by section 7 of the Town Planning Act (Cap 139). The granting authority of the development permission depends on whether the local authorities have implemented a Town Planning Scheme. Applications will always have to be submitted to the relevant local authorities.

- In **areas with a Town Planning Scheme**, the Local Authority Council can grant the permission directly.
- In **areas without a Town Planning Scheme**, the application must be submitted to the local authority. The application will be reviewed before being approved by the Department of Town and Country Planning.

A building permit is required for all new construction works, from a staff building or dam to solar PV installations and rooftop solar installations. An application for a building permit can be submitted alongside the application for development permission as long as all required documents are included.

- In **areas with a Town Planning Scheme**, the permits are issued by the relevant local authority following the approval of the Town and City Planner, Engineering Section, and the Health Department.
- In **areas without a Town Planning Scheme**, applications for a building permit are forwarded to the Department of Town and Country Planning where the application will be reviewed before being approved.

All application forms can be obtained from the Department of Town and Country Planning's website (www.townplanning.gov.fj) or from the relevant Local Council or Rural Local Authority.

Following the Regulation of Building Permits Act 2017 coming into force, a Building Permits Evaluation Committee was established within the Ministry of Industry, Trade and Tourism. The committee provides a one-stop fast track through the building permit process and charges a fee of 500 Fijian dollars. The application process is expected to take 45-60 days by going through the committee.

### *Labour market*

The Employment Act (Cap 92) establishes the labor market rules and legislation. It is implemented by the Ministry of Employment, Productivity and Industrial Relations.

The minister releases regulations on minimum wages and the labor market, which are published on the ministry's website.

- The national minimum wage in Fiji is 2.68 Fijian dollars/hour and is proposed by the Wages Council and confirmed by the minister, as defined through the Employment Relations Promulgation 2007.
- The latest labor regulations, which were set through the Wages Regulations 2015, state that:
  - A full working week is either 9 hours x 5 days a week (45 hours) or 8 hours x 6 days a week (48 hours).
  - The total number of public holidays is 11.
  - All workers are allowed 10 sick days, following the provision of a medical certificate.
  - Workers are entitled to 10 days of annual leave.

The regulations also provide the minimum wage and overtime pay for all sectors in Fiji.

A comprehensive study on labor practices in the Pacific, including Fiji, is being prepared by the World Bank.

*Nadarivatu Hydro, Fiji (The Fiji Times)*

### Table 31: Legislation relevant to Design, construction, and commissioning

| DEVELOPMENT AND BUILDING PERMITS |
|---|
| Town Planning Act (Cap 139) |
| Subdivision of Land (Cap 140) & Regulation |
| Regulation of Building Permits Act 2017 |
| **IMPORT DUTIES** |
| Customs Tariff Act (Cap 197) |
| **LABOUR MARKET** |
| Employment Act (Cap 92) |
| Workmen's Compensation Act (Cap 94) |
| Employment Relations Promulgation 2007 |
| Health and Safety at Work Act 1996 |

## 4.3.11. Grid interconnection and operation

The sections relevant to an investor investing in RE generation are described below.

### *Planning Code*

- Generation planning follows a least-cost approach for a 20-year horizon.
- For intermittent generation, planning studies will be conducted to ensure security of supply.
- Solar and wind farms must be able to operate at power factors within the range of 0.95 leading/lagging (may require reactive power compensation).

### *Connection Code*

- To apply for connection the user submits an application to the Transmission Wing, which must respond within 60 days. The Transmission Wing carries out a power systems study to validate the studies accompanying the application. If all studies are validated, an offer is presented to the user, who has 60 days to approve. If an application is successful, a connection agreement, including all conditions for connection, is signed.
- Connected equipment must be able to withstand frequency fluctuations from 47.5 hertz (Hz) to 52.5 Hz for a short time.
- Voltage levels must be in the range of 0.95 pu to 1.05 pu but can range from 0.9 pu to 1.1 pu during disturbances.
- Voltage flicker must comply with IEEE Standard 141, IEEE Standard 519, and IEC 61000-3-7.
- Harmonic distortion must comply with IEEE Standard 519.
- Rapid voltage variations must not exceed 5 percent in general and 3 percent from single regulation.
- Connected equipment must comply with Fiji's standard or appropriate IEC standards, if no Fiji standard exists.
- New generating units must be able to operate at 105 percent output for at least five minutes.
- New generating units must have an automatic voltage regulator and speed governor droop settings of 3 percent to 6 percent.
- Insulation coordination must comply with IEC standards.
- Connection will be agreed with the Transmission Wing and tariff metering for generators is at the power plant switch yard, between synchronizing the breaker and bus on the high-voltage side of the generator transformer.
- Wind farms must avoid introducing resonance at connection points.
- Wind and solar generators must continuously operate within 47.5 Hz to 52.5 Hz and remain connected, with a rate of change of frequency of ≤0.5 Hz/s.
- Wind and solar generators must be able to limit active power output per National Control Centre request and during over-frequency events.
- Generators must provide SCADA controls, indications, alarms, and measurements.

### *Operation Code*

- All wind and solar generators >250 kW must have ramp-up/down capability, and 1 minute and 10 second maximum ramp rates must be conveyed to NCC at the time of commissioning.
- Generators must be able to receive start/stop signals from NCC and respond without delay.

### *Scheduling and Dispatch Code*

- Blocks are dispatched every 30 minutes.
- NCC will prepare a day-ahead demand forecast and generation schedule at 09.00 and 19.00, respectively, and updates will be at 18.00 and 22.00, respectively.
- Generators must submit cost sheets to NCC with startup, no-load, and incremental costs (with up to three slopes).
- Generators must submit dispatch proposal for day-ahead between 08.00 and 13.00, with updates by 17.00 each day.
- Wind and solar generation are excluded from the merit order table and treated as must-run.
- Intermittent generation requires backup reserves decided by NCC (currently at 80 percent reserves).

# 5

*Solomon Islands Credit: Chris McLennan*

# 5. Country investment guide—Solomon Islands

## 5.1 Highlights

### *Investing in renewable energy (RE)-based electricity generation in Solomon Islands: Opportunities and challenges*

There are likely to be some opportunities for independent power producer (IPP) investors selling to power utility, Solomon Power (SP). Due to its heavy reliance on imported diesel, Solomon Islands electricity tariffs are among the highest in the Pacific. This means there is great scope for using new hydro or solar generation—for which there is good potential across many of the country's islands—to reduce the cost of power generation.

In the past, SP has suffered from poor financial and operational performance, but the situation has improved significantly in recent years. SP is now well managed; its efficiency has improved; tariff reductions have begun; its recent financial performance is good; and it has defined a clear process for procuring and connecting new electricity generators.

The current opportunities for large-scale investments in new IPPs are diminished somewhat by the Tina River hydro project, a 15 megawatt (MW) IPP that has been in development for more than 10 years and is now in its early stages of construction. SP does still expect to add about 5 MW of solar capacity to its Honiara grid over the next few years.

### *Development of new mini-grids*

Only 16 percent of households in Solomon Islands have access to grid-based electricity. To respond to this need, the Department of Energy (DoE) and SP, with the support of development partners, have identified over 30 potential locations for priority solar-hybrid mini-grids. SP's ability to implement these in a short time frame is limited, so private sector involvement is being considered.

There are some potential barriers to running privately operated mini-grids in Solomon Islands. One barrier is that the country's legal framework for electricity supply outside SP's mandated area is not clear. The legislation focuses almost exclusively on SP as the national electricity provider. This means that while the legislation does not seem to prohibit new mini-grid suppliers, it does not specifically address them either, as there are no defined procedures for licensing and regulating new electricity suppliers.

A second barrier to private sector involvement in mini-grids is the poor commercial viability of projects outside the capital, Honiara. The low population density and rural nature of the communities outside Honiara make the costs of new mini-grids high. There are no mechanisms to bridge the viability gap through subsidies, for example, by using SP's grid-connected customers to cross-subsidize mini-grid customers who are supplied power by private operators.

SP has already begun tendering out the development of some of these projects as solar-hybrid mini-grids, with financing support from World Bank, ADB and MFAT. SP expects to operate these grids itself.

### *Pilot program*

SP has a net-metering framework in place and is considering a pilot program before opening net-metering to the public. Customers who install more than 50 kilowatts (kW) of generation for self-supply require a license. All hotels, too, require a license. Any customer who wants to install own-use solar while remaining synchronized with SP's grid will need to meet SP's terms and conditions. SP is preparing IPP guidelines and is considering piloting a net-metering program.

SP is in discussion with at least one large commercial customer who intends to install rooftop solar panels, so the technical and commercial terms may soon be standardized. There are only a few sizeable commercial electricity consumers in Honiara.

### *Land acquisition is challenging*

On the one hand, it is easy for an investor to register as a foreign investor and then start a business in Solomon Islands. Most of the required steps can be carried out online and the process usually only takes a few days.

On the other hand, it can be very difficult to access land in Solomon Islands, as about 88 percent is unregistered (customary). Experience shows that the process of voluntary acquisition and long-term leasing can take many years. Investors must be aware of potential issues and plan accordingly.

## 5.2 Country, sector, and renewable energy overview[100]

### 5.2.1. Country and electricity sector overview

***Overview of the country's demographics and economy*** [101]

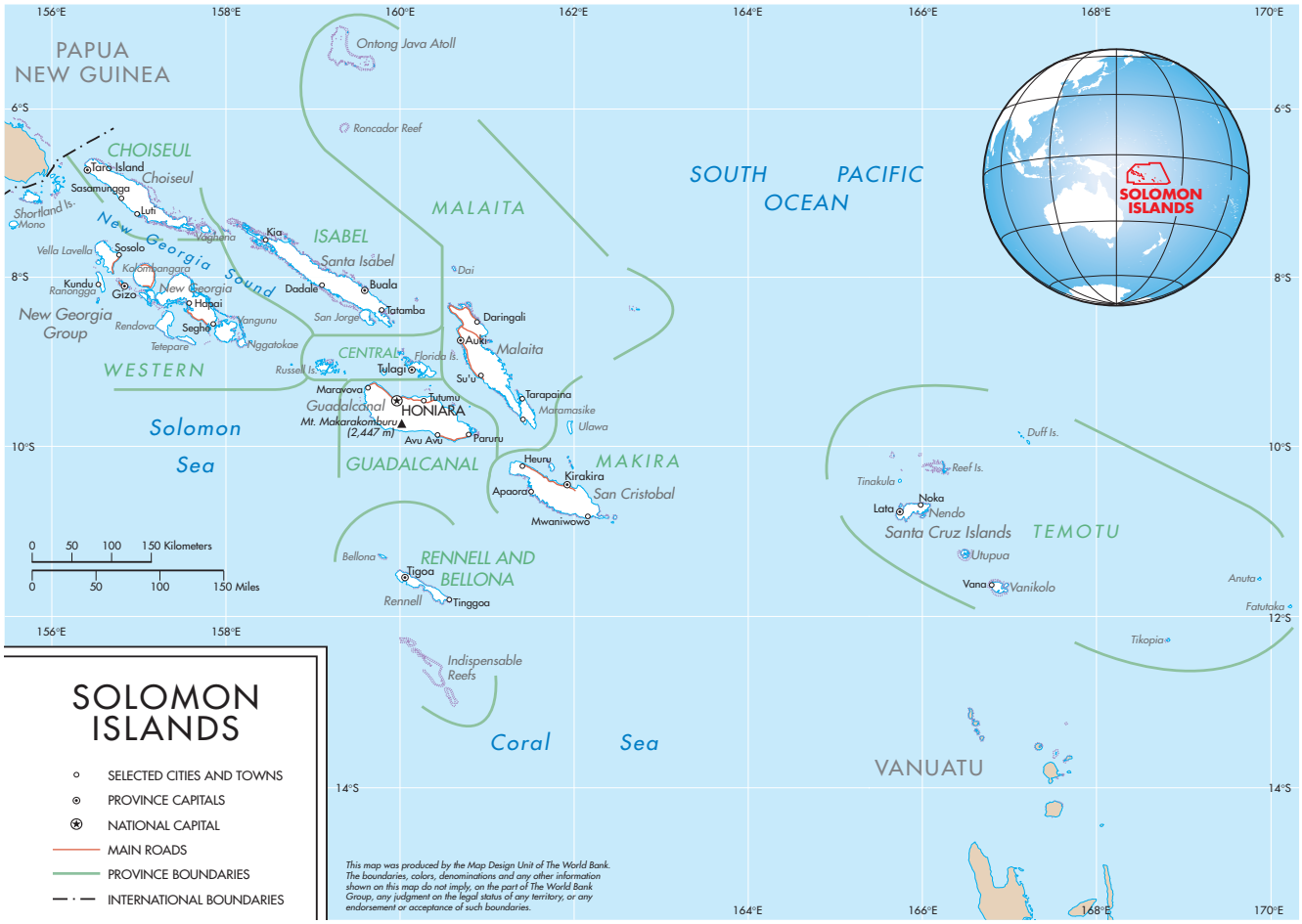
Solomon Islands is made up of almost 1,000 islands, which cover about 28,450 square kilometers (km²), dispersed over 800,000 km² of territory. Only about 100 of the islands are inhabited, and the six largest islands are home to most of the population.

The total population is about 600,000, with 85,000 people living in Honiara. The rest of the population is scattered over multiple islands in small urban clusters and rural villages. The population density is one of the lowest in the world at 18 people/km².

The economy of Solomon Islands is mostly based on agriculture, forestry, and fisheries. About 80 percent of the population is engaged in subsistence farming and the gross domestic product (GDP) per capita is about $2,258.

GDP growth over the last decade has been positive and is primarily driven by commodities such as forestry and minerals. The country's GDP shrunk by 1.2 percent in 2020 and is forecast to return to positive growth in 2021.[102]

**Figure 20: Map of Solomon Islands**




*Source: World Bank*

100 IRENA, September 2013, Pacific Lighthouses: Renewable Energy Roadmapping for Islands (Solomon Islands)

101 World Bank, 2020, World Bank Development Indicators https://data.worldbank.org/country/SB and Economist Intelligence Unit, 2020, Fiji https://country.eiu.com/solomon-islands

102 World Bank, October 2020, "From Containment to Recovery," East Asia and Pacific Economic Update

### *Overview of the country's electricity sector*[103]

Access to electricity in Solomon Islands is severely lacking. Only about 16 percent of the total population has access to grid-connected electricity supplied by SP. Furthermore, there is a clear divide between rural and urban households. About 77 percent of urban households have electricity access—the majority from the Honiara grid—whereas only 5 percent of rural households have access to electricity—mostly generated by their own or community generators.[104]

Before 2016, SP's generation was almost totally reliant on diesel generation, with only a few micro-hydro systems and a 1 MW solar photovoltaic (PV) farm in place, all operated by SP. Since then, SP has carried out work to convert eight of the existing ten outstations to solar-hybrid systems.

The Honiara electricity system (HES) is by far the largest grid in Solomon Islands, supplying Honiara and nine other town centers around the capital. The grid's peak demand in 2019 was 16.0 MW[105] and the total consumption was 87.3 gigawatt hours (GWh), making up about 88 percent of the total energy consumption in Solomon Islands.

Other urban centers serviced by SP are Noro, Gizo, Auki, Kirakira, Lata, Buala, Malu'u, Tulagi, Taro, and Seghe. Only two of these, Gizo and Auki, are still 100% reliant on diesel generators.

The HES grid is supplied almost exclusively through diesel generators. The largest power station is at Lungga, which supplies most of the electricity in the Honiara grid. The only solar power installed in Honiara is a 1 MW solar installation (Henderson) and a small 50 kW rooftop solar installation at SP's head office building (Ranadi). The latter installation is mainly for SP's own consumption and to assess resource potential for solar power. In 2018, the SP board approved the extension of Henderson solar to 3 MW and of Ranadi to 220 kW. At the time of writing, these extension projects are expected to be completed in 2022.

SP's total generation in 2019 is presented in Table 32. All generation capacity is feeding HES, except the outstations that supply smaller urban centers in other provinces.

**Table 32: SP energy generation in 2019**

| POWER STATION | TOTAL GENERATION (GWh) | GRID SUPPLIED |
|---|---|---|
| ***Lungga*** | 83 | HES |
| ***Honiara*** | 2.8 | HES |
| ***Outstations*** | 11.8 | Smaller urban centres |
| ***Henderson Solar*** | 1.5 | HES |
| **TOTAL** | **99.1** | |

*Source: SP Annual Report 2019*

Demand on the HES grid is relatively stable throughout the year, with a peak period between November and March. Demand is lower in late December and early January.

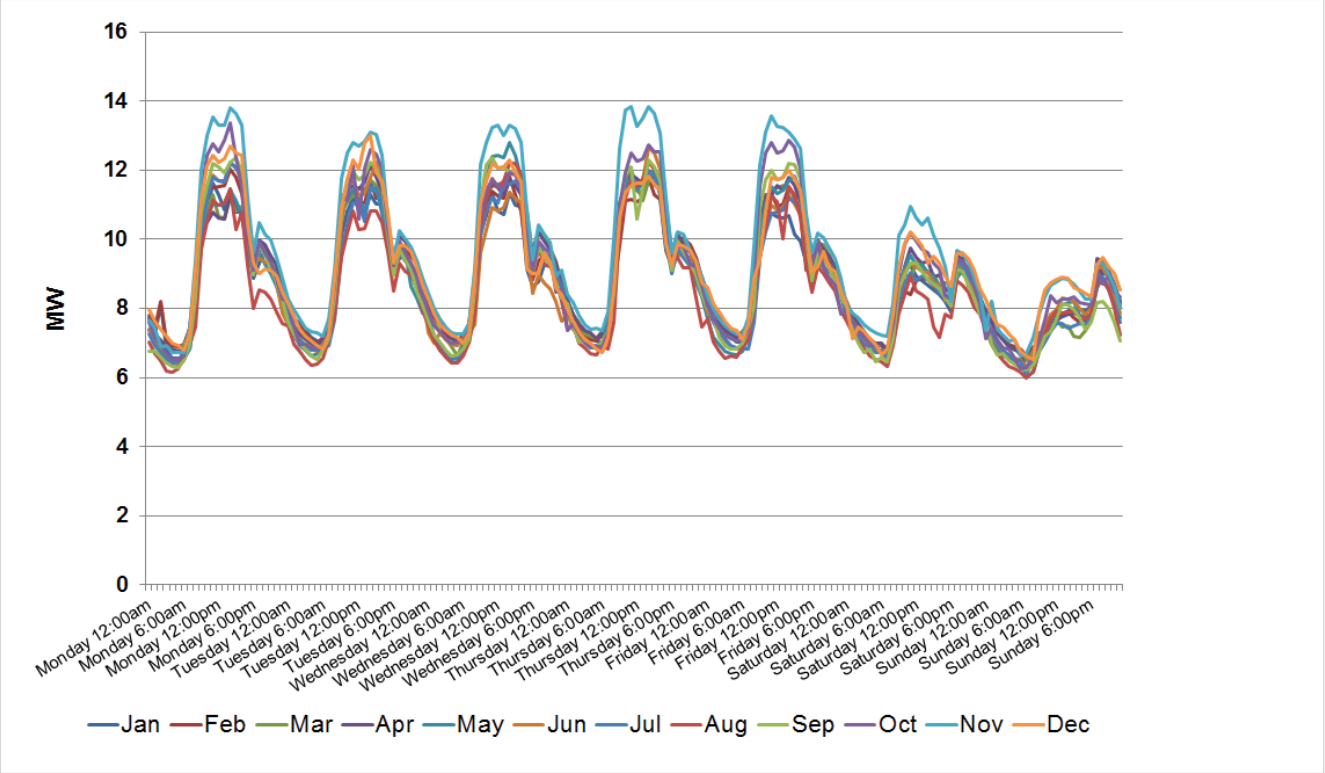
Commercial consumption is the main driver behind the demand, as made apparent by the demand dip over the holiday period. Weekly and daily demand fluctuations show the same correlation with a significant drop on Saturdays, Sundays, and weekday evenings and nights.

103 World Bank, May 24, 2017 Project Appraisal—Tina River Hydropower Development; Solomon Power Least-Cost Modelling of Future Generation Expansion Options for the Honiara Electricity System and World Bank, October 8, 2020 Project Information Document, Electricity Access Expansion Project (P151618)

104 World Bank, 2020, World Bank Development Indicators https://data.worldbank.org/country/SB

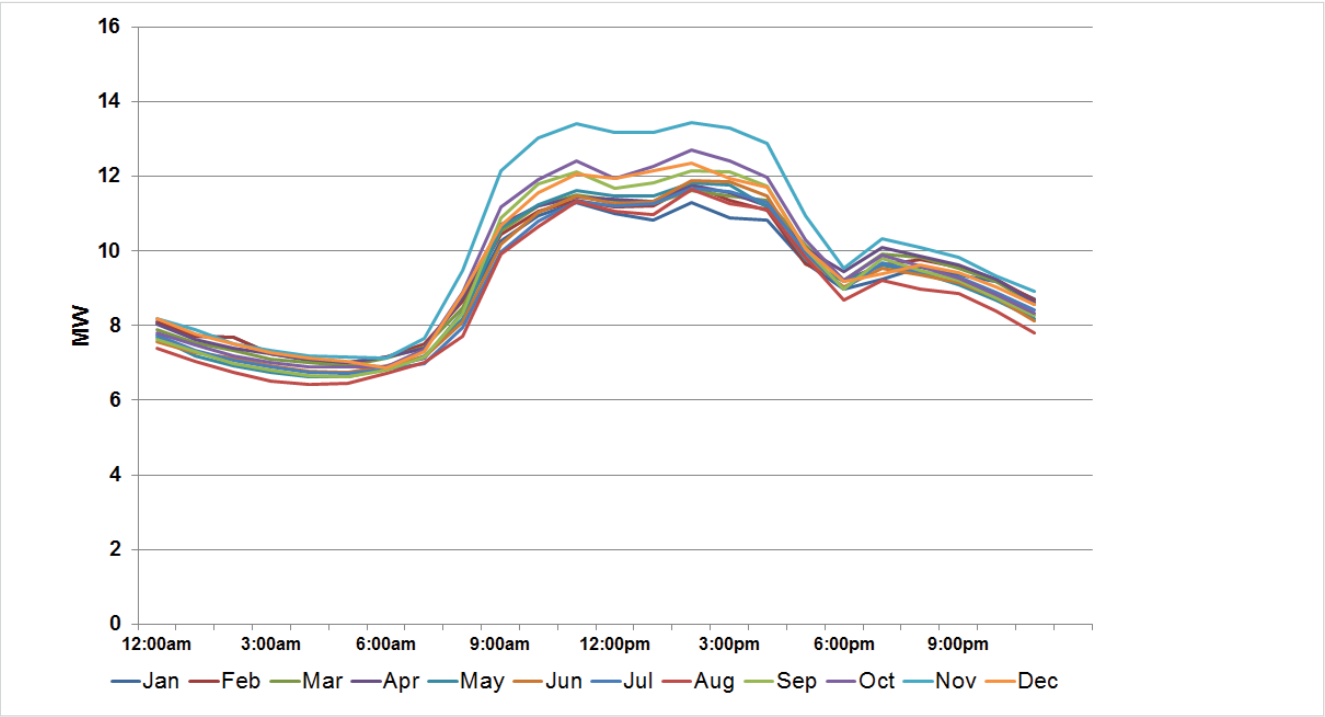
105 Solomon Power, 27 March 2020, Annual Report 2019

## Figure 21: Average weekly demand profile by month




*Source: Solomon Power Least-Cost Modelling of Future Generation Expansion Options for the Honiara Electricity System*

## Figure 22: Average daily demand profile by month




*Source: Solomon Power Least-Cost Modelling of Future Generation Expansion Options for the Honiara Electricity System*

Demand in HES has been growing steadily from 2003 to 2019, with annual generation increasing from 45.1 GWh in 2003 to 99.0 GWh in 2019. SP's generation planning models assume an average annual growth of about 2.5 percent per year, although demand dropped in 2020 due to the COVID-19 pandemic.

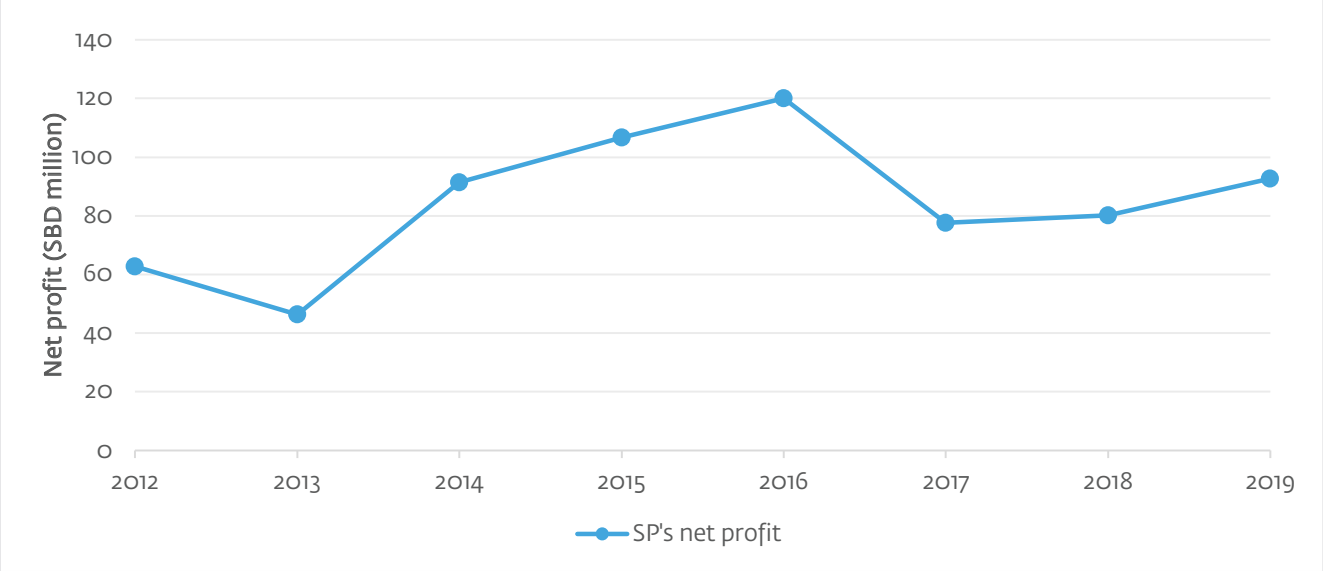
### *Financial performance of the utility*[106]

SP was very close to insolvency in 2010, mainly due to civil unrest, rising oil prices, and unsustainable debt levels. However, following a restructuring of the company and its finances with the help of the government and donors such as the World Bank, its financial performance has been improving.

The utility is now well managed and is financially stable. It has substantial cash reserves and has been making a profit since 2010, with substantial profits earned from 2012 onwards.

With a new retail tariff and the fuel-cost pass-through mechanism, the risk of SP's inability to pay any future IPPs has been reduced significantly.

**Figure 23: SP's annual net profit**




*Source: SP annual reports, 2012 to 2019*

## 5.2.2. Status and potential of renewable energy

### *Current level of renewable energy generation*

About 94 percent of SP's electricity generation is by diesel generation, with only one 1 MW solar farm installed in 2016, a small 50 kW installation at its head office, and eight of the outstations being served by small diesel-solar hybrid or micro-hydro systems.

106 Solomon Power, Annual reports, 2012 to 2019 http://solomonpower.com.sb/annual-reports/

### *Renewable energy targets*[107]

The 2014 Solomon Islands National Energy Policy (SINEP) set RE targets and objectives until 2030. The main targets are:

- Increase electricity access in urban areas to 100 percent by 2020
- Increase the installed capacity of RE to 50 percent by 2020 and 79 percent by 2030
- Increase rural households' electricity access to 35 percent by 2020

The Tina River hydropower plant is expected to be instrumental in achieving these targets. The SINEP expects solar and hydropower to play a major role in rural electrification.

An update to the SINEP was drafted in 2018, but this has not been made public.

In November 2019, SP issued a tender for the development of a new Electrification Strategy and Plan for Solomon Islands, which at the time of writing was still being prepared. It is expected that RE will play a large role in the proposed options for electrification. This plan will provide SP with a suitable pathway to reach 100 percent electrification by 2050, as mandated by the government.

### *Renewable energy potential*[108]

#### *Hydropower*

There is substantial potential for mini/micro-hydro development in Solomon Islands. A few studies have been conducted on hydropower potential:

- A study by the Japan International Cooperation Agency (JICA) in 2000 identified 130 potential hydropower sites with a total maximum capacity of 326 MW. The study assessed resource potential and did not look at the economic feasibility of the schemes. Later studies have shown that not all the 130 sites would be technically and economically feasible.
- Hydro Tasmania Consulting conducted a few feasibility studies for smaller hydro schemes on behalf of the German government. One of the areas studied was the Huro project outside Kirakira, which was determined to be both technically and economically feasible.
- A report conducted for the Asian Development Bank (ADB) in 2010 analyzed the feasibility of a few potential small hydro projects outside the largest urban centers and ranked them based on economic feasibility. The total potential capacity analyzed in that study was under 10 MW.

The main findings in the study conducted by JICA are shown in Table 33.

**Table 33: Potential hydropower sites identified by JICA**

| ISLAND | NUMBER OF SITES | TOTAL CAPACITY (MW) |
|---|---|---|
| ***Guadalcanal*** | 49 | 237.31 |
| ***Malaita*** | 23 | 30.79 |
| ***Santa Isabel*** | 6 | 4.71 |
| ***New Georgia*** | 23 | 5.16 |
| ***San Cristobal*** | 12 | 25.89 |
| ***Choiseul*** | 15 | 22.20 |
| ***Santa Cruz*** | 2 | 0.31 |

*Source: JICA, Master Plan Study of Power Development in Solomon Islands—Final Report Volume 1*

107 Ministry of Mines, Energy and Rural Electrification, 2014, Solomon Islands National Energy Policy

108 IRENA, September 2013, Pacific Lighthouses: Renewable Energy Roadmapping for Islands (Solomon Islands)

## Solar PV

Solomon Islands has high potential for solar PV generation. Insolation values are about 5 kWh/m$^2$/day and current solar PV projects have been showing promising results.

However, no direct measurements on solar insolation levels have been conducted in Solomon Islands and all data comes from National Renewable Energy Laboratory/ NASA global data.

Solar energy generation would fit very well with the demand profile in HES as the daily peak coincides with peak hours of solar PV generation.

SP has identified 35 solar-hybrid mini-grids to be prioritized. Most of these will be open to private investors. SP has begun tendering out the construction of several sites. SP will operate the first sites but is open to also tendering out the operation of solar-hybrid sites or contracting them as IPPs.

## Geothermal

Solomon Islands has some potential for geothermal development. A feasibility study for a 30 MW project on Savo Island was conducted by Geodynamics, an Australian geothermal exploration and development company, in 2014. In a recent study on the development of generation options, SP determined that there was insufficient information on the Savo Island Geothermal Project to include it as a candidate project.

No other known studies have been conducted on geothermal feasibility in Solomon Islands.

## Wind power

Limited studies have been conducted to assess the potential of wind power in Solomon Islands. Wind resource measurements are being conducted by the Pacific Power Association and include ground-based data collection based on LIDAR.


*Grace Kikiribatu an engineer with Solomon Power, Honiara (IFC)*

### *Existing and planned RE electricity generation in the country*

SP's current RE generation consists of about 1 MW of solar PV and various micro hydro schemes supplying small communities. Most of these micro hydro schemes were handed over to SP after breaking down due to a lack of local capacity to maintain and operate them.

**Table 34: Existing and planned RE generation projects**

| POWER STATION | OPERATOR | GENERATION TECHNOLOGY | YEAR COMMISSIONED | AVAILABLE CAPACITY | ANNUAL GENERATION | STATUS |
|---|---|---|---|---|---|---|
| ***Henderson*** | SP | Solar | 2016 | 1MW / 3 MW (planned) | 0.63GWh | Existing |
| ***Ranadi*** | SP | Solar | 2016 | 50k W & 220 kW | <0.01GWh | Existing |
| ***Buala oustation*** | SP | Micro-hydro | N/A | 150 kW | N/A | Existing |
| ***Various outstations*** | SP | Solar-hydro | 2017-2020 | <400 kW | N/A | Existing |
| ***Tina River*** | IPP | Hydro with reservoir | 2025 | 15 MW | 78.35GWh | Under construction |

*Source: SP 2018 Annual Report & Solomon Power Least-Cost Modelling of Future Generation Expansion Options for the Honiara Electricity System*

The main RE project under development is the Tina River hydropower project. It is expected to significantly decrease generation costs in the HES and reduce retail tariffs. Other RE projects at advanced stages of planning and development are in Table 35.

**Table 35: Possible future RE projects**

| POWER STATION | OPERATOR | GENERATION TECHNOLOGY | TYPE | CAPACITY | STATUS | OPEN TO PRIVATE INVESTORS/ OPERATORS |
|---|---|---|---|---|---|---|
| ***Fiu River*** | SIEA | Hydro run of river | TBC | 750 kW | Canceled due to land dispute | Original plan to have SP operate |
| ***Various*** | TBC | Solar PV | IPP | N/A | Solar PV tendering under development | Open to private investors |
| ***Huro River***[109] | TBC | Hydropower | TBC | 120 kW | Updated feasibility study from 2010 exists | Open to private investor |
| ***Luembalele River*** | TBC | Hydropower | TBC | 190 kW | Recent feasibility conducted | Open to private investors |
| ***Mase River*** | TBC | Hydropower | TBC | 2 MW | Recent feasibility conducted | Open to private investors |
| ***Savo*** | TBC | Geothermal | IPP | 10 MW | Pre-feasibility and EIA completed | Open to private investor |

*Source: Renewable Energy Strategies & Investment Plan 2014*

109 Asian Development Bank, July 2019, Solomon Islands: Provincial Renewable Energy Project Completion Report

## 5.2.3. Legislation, policy, and regulation

### *Electricity Act*

The Electricity Act (Cap 128) was passed by Parliament in 1969 and has been amended a few times since. There was a significant amendment in 1996, and in 2017, it was amended to include new Electricity Regulations (as discussed separately in Section 5.2.4). The Electricity Act is due for reform because of its perceived shortcomings.

A new act has been proposed to strengthen the legislative and regulatory framework to enable the private sector to better participate in electricity generation. Preparation has begun, with consultants procured and work currently underway.[110]

The main sections of the Electricity Act are as follows:

- Sections 3 and 4 establish SP as an independent entity with board members appointed by the minister.[111]
- Section 13 lists the responsibilities of SP, with the most relevant being supplying electricity, advising on policy, promoting generation of electricity, and ensuring that safety and efficiency standards are being adhered to.
- Section 14 allows the minister to dictate SP's policies and issue directions to SP.
- Section 15 states that SP has a duty to supply electricity to anyone requiring a connection, to the extent that SP is able to supply the electricity. However, SP is not allowed to supply electricity in areas where other supply licenses apply.
- Section 21 establishes the minister's authority to set electricity tariffs, which are enforced through the tariff regulations.
- Most of the electricity-related laws and orders address conventional retail supply and grid engineering and safety issues, grid connection, metering, and rates for conventional supply. Part IV of the act defines SP's authority to issue supply licenses for their own consumption and under any condition SP might include with the license. Licenses are discussed further in Section 5.3.4.
- Section 30 provides that a license is required to operate any electricity installation or supply electricity to any other person. This would allow for distributed self-generation and supply. Licenses can contain conditions and can be revoked if conditions are not satisfied. Licenses can be issued for any period up to 21 years, can contain conditions, and are non-transferable. This system of licenses seems to cover retail supply for a specific geographic area.
- Section 55 allows the minister to set regulations on various issues, such as standards and specifications, license fees, and SP's tariffs.

Amendments to the act made in 1992 established an exemption for private generators with installed capacity below 50 kW from requiring a license to operate. However, hotels and resorts were not included in this exemption. Also exempted are facilities in existence prior to the amendment's publication in 1992. The exemption allows small rural villages to self-supply electricity if their generation capacity does not exceed 50 kW.

This amendment would also allow rural rooftop solar PV installations as well as small mini-grids to be mounted without a license. However, neither the act nor the amendments specify whether the supplier can charge for the supply, and it is unclear whether the supplier can also remain connected to the grid.

### *Tariff regulations 2016*

New tariff regulations were gazetted by the Minister of Mines, Energy and Rural Electrification under sections 21 and 55 of the Electricity Act (Cap 128) in 2016. The regulations apply to all electricity sold by SP. They established a national tariff for all SP-supplied areas. The tariff regulations were the outcome of a program supported by the World Bank, which introduced a new methodology for calculating retail tariffs.

110 Solomon Power, "Request For Expressions Of Interest (Consulting Services – Firms Selection)" Opportunities http://solomonpower.com.sb/tender/request-for-expressions-of-interest-consulting-services-firms-selection/

111 Minister in this case refers to the Minister of Mines, Energy and Rural Electrification.

The new electricity tariff is determined from a base—which covers operating costs and a return of and on the regulated asset base—and a fuel-related component. Both components have mechanisms for monthly adjustment:

- All changes in fuel price are passed on to the consumer, based on a generation efficiency factor.
- The base component is adjusted with regards to local inflation.

A more detailed discussion of the tariff methodology is provided in Section 5.2.5.

### *National energy Policy 2014*

The 2014 SINEP was developed and presented to the Prime Minister in 2013. The development of the SINEP was supported by the ADB and was built on a process where stakeholders were consulted, and comments were sought from both private and public entities.

The main objective of the SINEP is to unlock the economic potential of Solomon Islands by extending electricity coverage and promoting the efficient use of energy resources. Several obstacles to reaching the goals have been identified, including:

- Further capacity building is required within institutions and communities. This includes stronger leadership of the energy sector, with stronger ties to communities; improving technical capacity within the relevant institutions to ensure stable implementation of technical solutions; and building capacity within financing and public investment-enabling institutions.
- Stronger legislative and regulatory frameworks are needed. This involves updating legislation to improve efficiency and private investment in the energy sector and strengthening the regulatory framework by separating SP from self-regulatory functions.
- Any cultural and land issues posing a major obstacle for electricity development must be addressed. Rural customs and ways of living are not adequately recognized in legislation, which complicates all discussions regarding land ownership.

### *Solomon Islands Renewable Energy Investment Plan*

As part of the Scaling Up Renewable Energy Program, an investment plan for Solomon Islands was developed in 2014 with the assistance of the World Bank and the ADB. It identified the RE potential for Solomon Islands. The most relevant aspects of the plan to draw private investment in RE are:

- The private sector is assumed to take a strong lead in RE generation.
- The weakness of the current legislative and regulatory environment has been identified and the need for reform is emphasized.
- The funding needs for the sector to achieve its goals are quantified.
- Potential funding sources are identified.

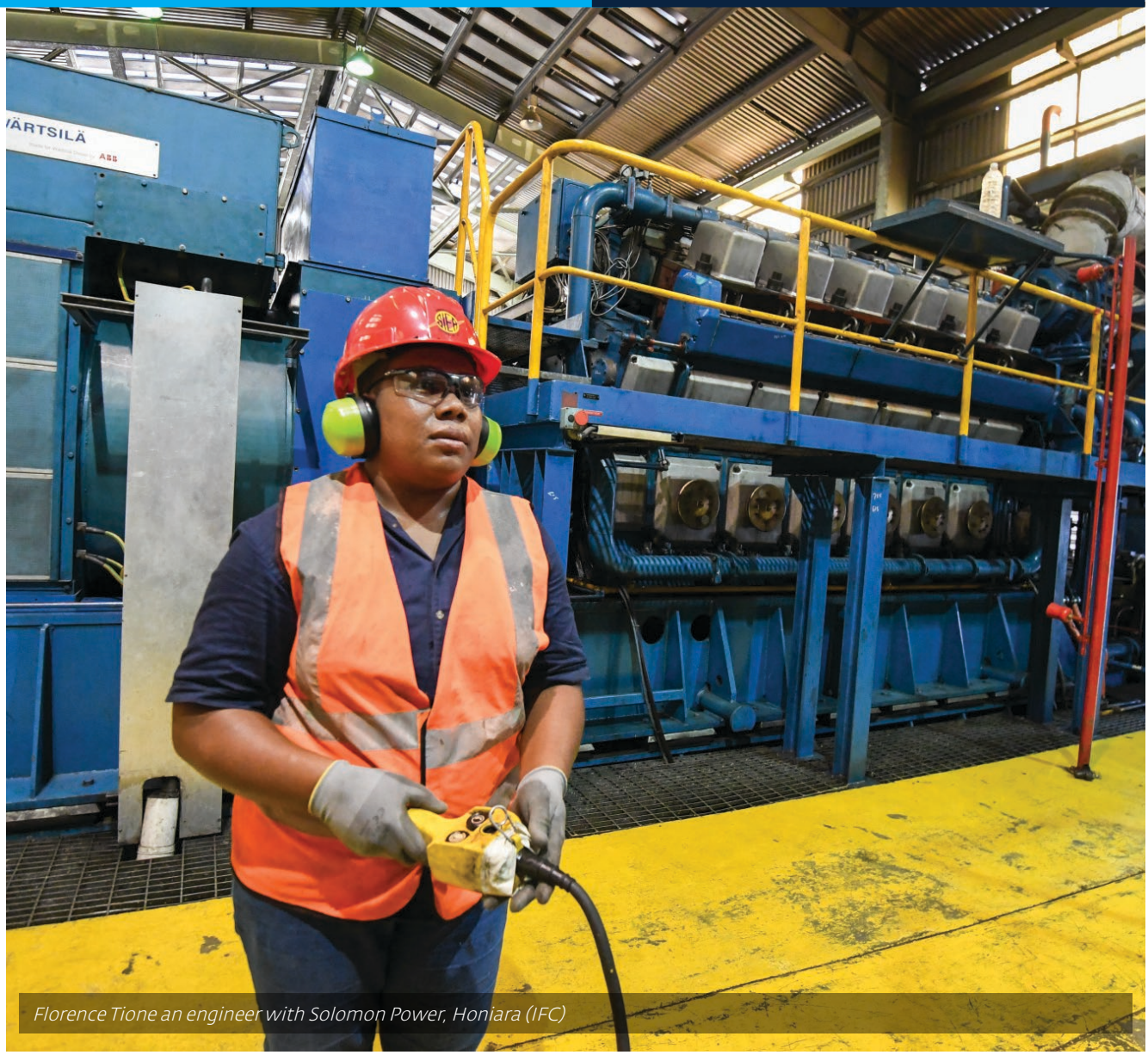
### *Grid code and connection policy*

The Ministry of Mines, Energy and Rural Electrification is responsible for setting technical specifications of the sector, grid code, and connection policy. However, the ministry has not published any regulations or policies. SP's operating standards are, therefore, the de-facto technical specifications for any third party connecting to the grid.

SP's standards are largely based on Australian standards. They are enforced for non-SP generators through SP's licensing regime. In other words, all generators interested in connecting to SP's grid must accept SP's operation and connection requirements. The most relevant standards to RE generation, as well as the generation license application process, are described in Section 5.3.4.

### *Other relevant legislation*

- The **Land and Titles Act (Cap 133)** establishes the formal process for land acquisition in Solomon Islands. Under the act, no private company can become an owner of or lease customary land in Solomon Islands. This requires the government to act as an intermediary, sub-letting land for development. A detailed discussion on the process for acquiring permits is provided in Section 5.3.2.




*Florence Tione an engineer with Solomon Power, Honiara (IFC)*

- The **Environment Act** was passed by Parliament in 1998 and lays out requirements for development and the studies required before construction can begin. For detailed instructions on environmental permits, see Section 5.3.3.
- The **State Owned Enterprise Act 2007** dictates the operational requirements and corporate duties of SP and other state-owned entities. The act states that all state-owned entities should operate as successful businesses and provide their workers with a good and safe working environment.
- The **Foreign Investment Act 1998**, the **Companies Act 2009**, and the **Companies Act Regulations 2010** describe the process and requirements for local and foreign investors interested in starting a company and operating in Solomon Islands. Detailed instructions of the steps required to set up a company and register as a foreign investor are provided in Section 5.3.1.
- The **River Waters Act 1981** establishes the legal framework for river protection and makes it an offence to interfere with a river in any way without a permit. The act is likely only relevant to investors interested in hydropower development.
- The **Town and Country Planning Act 1980** establishes the legal framework for the planning and development of land in Solomon Islands. The act sets out the requirements for the town and country planning boards to be stationed in every province and in Honiara.

## 5.2.4. Institutions

### *Solomon Power*[112]

SP is a state-owned enterprise operating under the name Solomon Power. The company is wholly owned by the government but is required under the State Owned Enterprise Act to operate on a commercial basis.

SP was established through the Electricity Act 1969 to be the national utility. The act requires it to hold a few regulatory functions and, therefore, SP is responsible for issuing generation licenses and for licensing electricians.

SP also advises the government on policy matters.

### *Ministry for Mines, Energy and Rural Electrification*[113]

The Ministry for Mines, Energy and Rural Electrification is the governing entity for the energy sector. The minister is responsible for appointing and removing SP board members and directs SP policy and direction. The ministry is also responsible for regulating SP's tariff, as per the Electricity Regulation 2017.

The Energy Division within the ministry is responsible for setting energy policy and encouraging rural electrification.

### *InvestmentSolomons*

InvestSolomons is the investment promotion agency within the Solomon Islands government. It sits under the Ministry of Commerce, Industry, Labour and Immigration, and operates the Solomon Islands Business Registry.[114]

The main objective of InvestSolomons is to promote, encourage, and facilitate private investment in Solomon Islands. Through the official registry of companies (Company Haus) and the online portal (www.solomonbusinessregistry.gov.sb), potential investors can start a company and register for a business name, and foreign investors can apply for a Foreign Investment Certificate.

InvestSolomons is the agency that foreign investors should visit when first setting up a company. It provides information and assistance with applying for permits and tax.

### *Development partners*

Multiple development partners are operating in Solomon Islands. The largest project being implemented is the Tina River hydropower project, which is being led by the World Bank and supported/financed by six different development agencies: the International Development Association, the Green Climate Fund, Korea's Economic Development Corporation Fund, the Abu Dhabi Fund for Development, ADB, and the Australian government.

The following development partners are currently active, or have recently been active in Solomon Islands:

- Australian Department of Foreign Affairs and Trade
- Asian Development Bank
- European Investment Bank
- Green Climate Fund
- International Renewable Energy Agency (IRENA)
- Japan International Cooperation Agency
- Korean Economic Development Corporation Fund
- New Zealand Department of Foreign Affairs and Trade
- United Arab Emirates Government
- The World Bank/International Finance Corporation (IFC)

### *Commercial lenders*

There are only two commercial banks operating in Solomon Islands:

- **Bank South Pacific (BSP)—**Operations in Solomon Islands began after acquiring the National Bank of Solomon Islands in 2007. BSP took over Westpac's operations in Solomon Islands in 2015. It operates the largest banking network in Solomon Islands.[115]
- **Australia and New Zealand Banking Group (ANZ) Solomon Islands—**The Solomon Island operations of ANZ operates four branches and 14 ATMs.[116]

112 Electricity Act 1969 and State Owned Enterprises Act 2007

113 World Bank, May 24, 2017 Project Appraisal—Tina River Hydropower Development; Solomon Power Least-Cost Modelling of Future Generation Expansion Options for the Honiara Electricity System

114 InvestSolomons, "What InvestSolomons does", Who Is InvestSolomons https://www.solomonbusinessregistry.gov.sb/foreign-investment/who-is-invest-solomons/

115 Bank South Pacific, "History" About https://www.bsp.com.sb/about-us/history/

116 ANZ, "ANZ in the Solomon Islands", About Us https://www.anz.com/solomonislands/en/about-us/anz-solomon-islands/

## 5.2.5. Electricity tariffs and incentives

### *Retail electricity tariffs*

Section 21 of the Electricity Act 1969 states that the retail tariffs SP can charge are set by the Minister of Mines, Energy and Rural Electrification. SP's tariff is set for all electricity supplied by SP and is based on average generation costs. Customers in areas where generation and distribution are cheaper, such as Honiara, are therefore effectively cross-subsidizing rural customers.

Section 55 of the act authorizes the minister to regulate the electricity sector and to define a tariff methodology. The most recent tariff review and methodology was the Electricity Tariff (Base Tariff and Tariff Adjustments) Regulations 2016, which at the time of writing was being updated but was expected to follow a broadly similar methodology. The retail tariff is composed of a base tariff (non-fuel base tariff) and a fuel charge to pass through fluctuations in fuel prices. In addition, non-regular customers (customers who own a generation facility, such as rooftop solar) are subject to a demand charge. The base tariff is updated monthly to reflect inflation.

Section 21 of the act only applies to SP, and private electricity suppliers operating outside SP's areas are not bound by the minister's decision. There are no processes for regulating tariffs for private suppliers, but SP's licensing authority is expected to facilitate.

**Table 36: SP's retail tariffs (June 2021)**

| PREPAID CUSTOMERS | | | | |
|---|---|---|---|---|
| **CUSTOMER CATEGORIES** | **CONSUMPTION BLOCK** | **NON-FUEL CHARGE SBD/KWH** | **FUEL CHARGE SBD/kWh** | **TOTAL ENERGY CHARGE SBD/kWh** |
| ***Domestic*** | < 50 kWh | 3.05 | 2.22 | 5.27 |
| | 50 - 200 kWh | 3.5 | 2.22 | 5.72 |
| | > 200 kWh | 3.96 | 2.22 | 6.18 |
| ***Commercial*** | All | 3.05 | 2.22 | 5.27 |
| ***Industrial*** | All | 2.93 | 2.22 | 5.15 |
| **POSTPAID CUSTOMERS** | | | | |
| **CUSTOMER CATEGORIES** | **CONSUMPTION BLOCK** | **NON-FUEL CHARGE SBD/kWh** | **FUEL CHARGE SBD/kWh** | |
| ***Domestic*** | < 50 kWh | 3.05 | 2.22 | |
| | 50 - 200 kWh | 3.5 | 2.22 | |
| | > 200 kWh | 3.96 | 2.22 | |
| ***Commercial*** | All | 3.05 | 2.22 | |
| ***Industrial*** | All | 2.93 | 2.22 | |
| **NON - REGULAR CUSTOMERS (WITH SELF-GENERATION)** | | | | |
| **CUSTOMER CATEGORIES** | **CONSUMPTION BLOCK** | **DEMAND CHARGE SBD/ KW/MONTH** | **FUEL CHARGE SBD/kWh** | |
| ***Domestic*** | All | 945.69 | 2.22 | |
| ***Commercial*** | All | 945.69 | 2.22 | |
| ***Industrial*** | All | 945.69 | 2.22 | |

*Source: SP Tariff Adjustments for June 2021*

### *Non-fuel base tariff*

Features of the non-fuel base tariff include the following:

- It is reviewed every five years and consists of a network access charge and non-fuel variable charge for regular customers, and a network access charge and demand charge for non-regular customers (customers who own a generation facility).
- The non-fuel revenue requirement is calculated by adding non-fuel operating costs and the regulatory asset base multiplied by a capital recovery factor [Non-fuel OPEX + (RAB x CRF)].
- The capital recovery factor is based on the weighted average cost of capital (WACC) discounted over the useful life of the generation asset.

In May 2021 a new non-fuel base tariff was introduced. It will apply until the end of 2025, subject to indexation to the non-fuel adjustment index described below. The new non-fuel base tariff was the outcome of an independent review which recommended the following average decreases for different customer categories:

- Domestic customers – 22 percent.
- Commercial customers – 27 percent.
- Industrial customers – 5 percent.

### *Non-fuel adjustment index*

The non-fuel base tariff is adjusted monthly according to the following formula:

$$NFAI = NFAF \pm X \pm Z$$

Where:

- NFAI is the non-fuel adjustment index.
- X represents the next five years' expected productivity growth (currently set at zero).
- Z is a component decided on by the ministry and SP.(117)
- NFAF is the non-fuel adjustment factor, which takes local and international inflation into account using the consumer price index and the seven-month average US inflation respectively. Local inflation weighs 39.1 percent of the NFAF, with international inflation weighing 60.9 percent.

### *Fuel charge*

Key features of the fuel charge include the following:

- The fuel charge is adjusted monthly based on the fuel price of the last full month.
- The adjustment includes an efficiency factor to avoid fuel-cost pass-through under inefficient operating conditions.

The fuel pass through formula is:

$$FPT = AFC\ x\left(\frac{THR}{AHR}\right)x\left(\frac{1 - \%AL}{1 - \%TL}\right)$$

Where:

- FPT = fuel pass-through
- AFC = actual fuel cost plus PPA costs
- THR = targeted heat rate
- AHR = actual heat rate
- %AL = percentage of actual energy losses
- %TL = percentage of targeted energy losses

The actual fuel charge placed on energy sales is calculated using this formula:

$$FC = \left(\frac{FPT}{TS}\right)$$

Where:

- FC = fuel charge
- FPT = fuel pass-through
- TS = total sales (kWh/month)

### *Specific incentives for renewable energy*

There are no specific incentives for RE generation or the import of RE equipment.

117 The Z factor is used in response to unforeseen natural disasters or other factors where altering the retail tariff is required.

*Honiara, Solomon Islands (IFC)*

## 5.3 Step-by-step guide to investing

The detailed description of the steps required to invest in RE power generation projects in PNG focus on three broad categories of RE projects:

- **IPP generation**—Private investors develop generation capacity and sell it to the utility. They are likely to use energy sources that include hydropower, biomass, and solar farms.
- **Own-use solar generation**—Residential, commercial, and industrial customers invest in solar PV capacity primarily for their own use. Options include rooftop or ground-mounted solar installations. Any excess energy generated may or may not be exported to the grid, depending on the offering of the utility.
- **Off-grid generation (mini-grids)**—Developers invest in solar PV, hydro, or hybrid mini-grids. The developer is also responsible for operating the mini-grid for a period of time.

This guide is not intended to cover the following types of projects, although much of the information may still be relevant:

- **Solar home systems**—These are basic solar systems that are not connected to the grid. They typically do not need to be licensed and can be purchased over the counter.
- **Construction contracts** for RE projects.

## 5.3.1. Setting up a business[118]

### *Main steps to setting up a business*

To set up a business in the Solomon Islands, investors must follow two steps:

- **Register as a foreign investor** (if applicable). Foreign investors need a certificate of registration for an investment activity if they are to invest in Solomon Islands. They will need a certificate before entering into any negotiations relating to an investment activity. The certificate can be obtained through the Solomon Business Registry online (https://www.solomonbusinessregistry.gov.sb), as detailed below.
- **Register a company.** Once a certificate of foreign registration has been acquired, investors are free to register their company (also with Solomon Business Registry) and acquire any other necessary permits. Business registration has been made simple through an online portal, which meets the requirements of the Companies Act Regulations 2010. Potential investors will have to register for the online portal and can use the same account for:
  - Registering a foreign investment
  - Registering a business name
  - Registering a local company
  - Registering an overseas company

Once a company is registered, the Companies Act 2009 is the governing legislation for companies operating in Solomon Islands. The act establishes the legislation that companies are required to follow and includes model company rules, which companies are encouraged to adopt.

**Table 37: Legislation relevant to foreign investment and starting a company**

| FOREIGN INVESTMENT |
|---|
| Foreign Investment Act 2006 (Amended 2009) |
| Foreign Investment Regulations 2005 (Amended 2016) |
| **STARTING AND MANAGING A BUSINESS** |
| Companies Act 2009 |
| Companies Regulations 2010 |
| Business Names Act 2014 |
| Business Names Regulations 2016 |

### *Step 1: Registering a foreign investment*

A foreign investor is defined in the Foreign Investment Act 2005 as an individual who is not a citizen of Solomon Islands, or as a company in which a non-citizen is entitled to exercise at least one vote or is a shareholder, holding at least one voting share.

The online registration format requires information on the proposed investment activity and, if done properly, will fast-track applications for other permits such as work permits. The application process can be completed within one day. The Solomon Business Registry aims to complete the review and approval of all applications within three to five working days. Applications must be completed within 10 days of starting, otherwise a new application must be started. The steps are summarized in Table 38.

118 Solomon Business Registry, https://www.solomonbusinessregistry.gov.sb & relevant legislation

### Table 38: Steps required to register a foreign investment

| STEP | ACTIVITY/ INFORMATION REQUIRED | DESCRIPTION | EXTERNAL DOCUMENTS AND ADDITIONAL PAYMENTS REQUIRED |
|---|---|---|---|
| 1 | ***General details*** | Allows for registering a foreign investment as a new company, an existing company, a partnership, or other. | For existing companies, provide the registered name of the company |
| 2 | ***Investor information*** | General information on the foreign investor. For investors with an address outside Solomon Islands, a local representative must be provided.<br>For foreign-registered businesses, evidence of incorporation from the companies' registered home country is required. | A copy of the investor's passport and resume<br>For foreign-registered businesses, evidence of incorporation |
| 3 | ***Business activity*** | Provide information and a description of the proposed business activity, including a copy of your business plan.(119) | A copy of the business plan and a description of the proposed business activity |
| 4 | ***Operating locations*** | Provide the principal business location address. | No additional documents required |
| 5 | ***Employment*** | Provide information on the estimated number of jobs for citizens and non-citizens, and information on the type of work the non-citizens will do. | No additional documents required |
| 6 | ***Investment*** | Estimations on investments in the first year of operation, primary origin of funds, and estimated value of exports or sales in the first year of operation. | No additional documents required |
| 7 | ***Declarations*** | Declare that the investor has entered all information correctly. | No additional documents required |
| 8 | ***Review*** | The application is reviewed. | No additional documents required |
| 9 | ***Application fee*** | Pay a fee of 2,000 Solomon Islands dollars at the Treasury Counter or a provincial counter. Present the receipt to Company Haus so the application can be finalized. | A payment of 2,000 Solomon Islands dollars |

*Source: Solomon Business Registry, https://www.solomonbusinessregistry.gov.sb*

### *Step 2: Registering a company*

Registering a new company requires interaction with at least four institutions.

- **Company Haus—**Deals with official registration of the company, shareholder details, and other relevant information.
- **Inland Revenue Division—**Companies must register with the tax authorities.
- **National Provident Fund—**Enables registration as an employer and registration of employees.
- **Local Authority Council—**Local authorities must confirm the registration.

As with foreign investor registrations, company registrations can be done online through the Solomon Business Registry at https://www.solomonbusinessregistry.gov.sb. It should take five to eight days.

The steps for registering with Company Haus are summarized in Table 39.

119 Power generation is under Activity division 35 (electricity, gas, steam, and air conditioning supply) and Activity class 3510 (electric power generation, transmission, and distribution).

### Table 39: Steps required to register a company with Company Haus

| STEP | ACTIVITY | DESCRIPTION | EXTERNAL DOCUMENTS REQUIRED |
|---|---|---|---|
| 1 | ***Company details*** | Information such as the type of company, company name, contact details, company rules, business sector[120] and tax filing month. | Schedules 2, 3, 4, and 5 of the Companies Act 2009 provide model company rules, which applicants are free to use.<br>If applicants choose to use their own company rules, they must upload a copy. |
| 2 | ***Addresses*** | Registered office of company in Solomon Islands. | No additional documents required. |
| 3 | ***Directors*** | Information on all proposed directors. | No additional documents required. |
| 4 | ***Share and shareholders*** | Total number of shares issued and how they are divided among shareholders. | No additional documents required. |
| 5 | ***Signature*** | All directors and authorized persons will be required to confirm the validity of the application. | No additional documents required. |
| 6 | ***Review*** | Application is reviewed. | A fee of 1,250 Solomon Islands dollars must be paid to complete the application process. |

*Source: Solomon Business Registry, https://www.solomonbusinessregistry.gov.sb*

Once an application is completed with the Solomon Business Registry, an investor must register with the Inland Revenue Division, the National Provident Fund, and local authorities. These steps are summarized in Table 40.

### Table 40: Steps following a successful registration with Company Haus

| STEP | ACTIVITY | DESCRIPTION | ADDITIONAL DOCUMENTS AND PAYMENTS |
|---|---|---|---|
| 1 | ***Inland Revenue Division registration*** | A company must register with the Inland Revenue Division using Form IR1, available on its website. The company's tax identification number (TIN) will be issued once the application has been approved. | • Form IR1 must be completed and submitted to the Inland Revenue Division.<br>• No fee. |
| 2 | ***Register as an employer with National Provident Fund*** | The National Provident Fund Act (Cap 109), requires all employers to be registered with the Solomon Islands National Provident Fund Board within 14 days of commencing operations. All required forms are published on the National Provident Fund's website but must be submitted in person. | • Fill out and submit Form NPF3 to register as an employer.<br>• Fill out and submit Form NPF6 to register employees. |
| 3 | ***Receiving a business licence*** | Once a TIN and a business incorporation license have been issued by the Inland Revenue Division and Company Haus, respectively, an application must be made to the local city council. | • A copy of the TIN certificate.<br>• A copy of the Business Incorporation Certificate.<br>• A fee of 2,700 Solomon Islands dollars must be paid. |

*Source: Solomon Business Registry, https://www.solomonbusinessregistry.gov.sb*

120 Electricity generation and supply is not listed as a business sector. Applicants must choose "other".

## 5.3.2. Land access and acquisition

### *Types of land*

Land in Solomon Islands is divided into:

- Unregistered land, otherwise known as customary land (about 88 percent of total land area).
- Registered land (about 12 percent of total land area).

### *Restrictions on land acquisition*

The main legislation governing land acquisition is the Land and Titles Act (Cap 133) and the Customary Land Records Act (Cap 132). Section 241 of the Land and Titles Act states ownership of customary land is only allowed by a Solomon Islander.[121] This excludes private entities from owning land, as well as foreign investors. There are only two exceptions for non-citizen persons: if the person has been married to a Solomon Islander, or has received the land as inheritance.

All development on customary land must, therefore, be through long-term leases, with the land first acquired by the government and then leased to the developer. Land acquisition and leasing land is a major step for developers and can take a substantial amount of time.

**Table 41: Legislation relevant to land acquisition and access**

| REGISTERED AND UNREGISTERED LAND |
|---|
| Lands and Titles Act (Cap 133) 2014 |
| Customary Land Records Act (Cap 132) 1996 |

### *Mechanisms for acquiring land prior to leasing*

The Land and Titles Act defines two mechanisms for acquiring land:

- **Voluntary acquisition—**established through part V, division 1 of the Land and Titles Act.
- **Compulsory acquisition—**established through part V, division 2 of the Land and Titles Act.

#### *Option 1: Voluntary acquisition*

Developers would opt for voluntary acquisition of land when the owner is willing to sell or lease their land. The process requires the land to be transferred or leased to the national government or a provincial assembly, which will, in turn, lease the land to the developer. The executing agency depends on the size and location of the project. For larger energy projects, the national government (through the Commissioner of Land) will be the acting agency.

- An acquisition officer will be appointed by the acting agency to be an intermediary between the different stakeholders. The duties and powers of the acquisition officer are clearly stated in sections 61–70 of the Lands and Titles Act.
- The acquisition officer will mark the boundaries of the land in question and approach holders of customary rights to attempt to reach an agreement with all rights holders.
- The acquisition officer must hold a public hearing where all customary rights holders can come and claim their stake in the land and be a part of the lease/sale negotiations.[122]
- Once all rightful claimants have been identified, negotiations of the terms of sale or lease can begin.
- When an agreement has been reached, the land is transferred to the acting agency, which can lease the land to the developer.

This entire process can become complicated as customary lands often have multiple claimants for customary rights. When the project site covers more than one customary land area, this process must be applied to each area.

#### *Option 2: Compulsory acquisition*

The compulsory acquisition mechanism is applicable to both registered and unregistered land. The mechanism can be applied when acquisition of land is required for a "public purpose."

121 A "Solomon Islander" is defined as a person born in Solomon Islands who has two grandparents who were members of a group, tribe, or line indigenous to Solomon Islands.

122 Customary rights holders are seldom well defined, and this process can take many months and, in some cases, might require judicial rulings.

The condition relevant to electricity project development is stated in the Constitution, section 8.1.a as follows:

- The taking of possession or acquisition is necessary or expedient in the interests of defense, public safety, public order, public morality, public health, town or country planning, or the development or utilization of any property in such a manner as to promote the public benefit.

The process for compulsory acquisition is established in section 71 through section 85, and the power to acquire the land rests with the Ministry of Lands, Housing and Survey.

- Once the minister has declared the acquisition of land, a public declaration will be published.[123]
- The provincial secretary will assist all groups or individuals claiming rights to the declared land to prove their claim.
- All individuals who claim customary rights have three months to claim compensation from the commissioner, and following a process where rightful claims are accepted, a compensation payment will be made.
- The Lands and Titles Act defines the appeal process (section 76), and the rights of occupiers of land to stay for a maximum of three years on the land, once a declaration has been made (section 78).
- Sections 83–85 define how compensations should be assessed and paid out to customary land rights holders.

### *Experience from the Tina River hydropower project*

Land acquisition is a highly sensitive topic and can easily be delayed through various appeal processes. For reference, land acquisition for the Tina River hydropower plant (which was a high priority project with strong government backing) took two years and required a dedicated team of people. Great care was taken to follow the processes prescribed in the Lands and Titles Act.

The government, assisted primarily by the World Bank, used the voluntary acquisition mechanism for land acquisition to encourage open discussions and to cooperate with stakeholders.

A lesson from the Tina River hydropower project (and previous SP land acquisitions) is that a profit-sharing mechanism helps to incentivize land owners to lease their land, ensuring project developments continue as planned.

## 5.3.3. Social and environmental assessments

### *Legislation and policies governing social and environmental assessments*

The Environment Act 1998 established the requirements for developers to receive development approval to start construction. Schedule 2 of the act lists the developments falling under the act's jurisdiction.

If a developer is funded by an institution subscribing to the Equator Principles, additional studies must be conducted to fulfill the requirements set out in the Equator Principles.[124]

**Table 42: Legislation relevant to social and environmental assessments**

| ENVIRONMENTAL REQUIREMENTS |
|---|
| Environment Act 1998 |
| Environment Regulations 2008 |

123 For registered land, the notice will be served to all registered owners. For unregistered land, the notice will be given to "every person or group of persons appearing to him to be, or claiming to be, the owner or owners of interests in any unregistered land or land registered as customary land specified in the declaration" (section 73, Lands and Titles Act).

124 Equator Principles, July 2020, https://equator-principles.com/wp-content/uploads/2021/02/The-Equator-Principles-July-2020.pdf

### *Requirements under the Environment Act*

Hydropower projects are clearly listed under section 9 (Public Works Sector) and require that an application be made to the director[125] prior to development. However, the act is not clear on whether solar or wind farms are included. Section 9(b) mentions "infrastructure development" but the term is not defined any further.

Section 17 of the act distinguishes between two types of documents—the public environmental report and the environmental impact statement—to be submitted as part of the development approval process. The section gives the director the power to decide which type of document a developer must prepare and whether the developer is subject to any additional requirements.

The information required for each type of study is clearly stated in sections 21 and 23 of the act and in the Environment Regulations 2008. Schedule 1 of the Environment Regulations includes an application form for development consent and guidelines on drafting a public environmental report and environmental impact statement.

**Table 43: The steps required to be granted a development approval**

| NO | STEP | | | FEE | SECTION IN ACT |
|---|---|---|---|---|---|
| *1* | Developers submit an application to the director. | | | Application fee of 200 Solomon Islands dollars | 17(1) |
| *2* | Within 15 days, the director must decide whether a public environmental report or an environmental impact statement is required, and other additional requirements. The decision is influenced by the likely environmental impact of the development. | | | No fee | 17(2)<br>17(5) |
| *2a* | A **public environmental report** is prepared and submitted to the director. | *2b* | An **environmental impact statement** is prepared and submitted to the director. | Processing fee of 200 Solomon Islands dollars | 20/23 |
| *3a* | Director publishes public environmental report as they see fit. Stakeholders have 30 days to make written objections. | *3b* | Director publishes environmental impact statement as they see fit. Stakeholders have 30 days to make written objections. | No additional fee | 22/24 |
| *4a* | Director makes decision on whether to approve public environmental report. | *4b* | Director makes decision on whether to approve environmental impact statement. | No additional fee | 22/24 |
| *5* | Developers have 30 days to appeal any decision made by the director to the Advisory Committee. | | | No additional fee | 32 |

*Source: The Environment Act 1998*

### *Contents of a public environmental report*

For the director to accept a public environmental report, the following information must be clearly addressed:[126]

- Describe the prescribed development in summary form, including its objectives and any reasonable alternatives to it.
- Describe any aspects of the prescribed development having or likely to have a substantial or important impact on the environment.
- Describe the environment likely to be affected by the prescribed development and any reasonable alternatives to it.
- Indicate the potential or actual impact of the prescribed development on the environment, and those of any reasonable alternatives to the prescribed development, including any enhancement of the environment.
- Outline the reasons for choice of the prescribed development.

125 This refers to the Director of Environment and Conservation Division, stationed within the Ministry of Environment, Climate Change, Disaster Management and Meteorology.

126 Section 21 of the Environment Act 1998

- Describe and assess the effectiveness of any safeguards or standards intended to be adopted or applied for the protection of the environment.
- State any intended investigations or studies of the possible impact on the environment before the prescribed development is implemented.
- State any intended monitoring and reporting of the impact of the prescribed development.
- Address any further matters that the director may specify.

### *Contents of an environmental impact statement*

For the director to accept an environmental impact statement, the following information must be clearly addressed:[127]

- Contain a full description of the objectives of the prescribed development.
- Analyze the need for the prescribed development.
- Indicate the consequences of not implementing or carrying out the prescribed development.
- Include adequate information and technical data to allow assessment of the impact of the prescribed development on the environment.
- Examine any reasonable alternatives to the prescribed development, including alternative sites for it.
- Describe the environment that is or is likely to be affected by the prescribed development and by any reasonable alternatives to it.
- Assess the actual or potential impact on the environment of the prescribed development and of any reasonable alternatives to it, including the primary, secondary, short-term, long-term, adverse and beneficial impacts on the environment.
- Outline the reasons for the choice of the prescribed development.
- Estimate the time period of any expected impacts.
- Describe the geographic boundaries of the impacts.
- State the methods of predicting and assessing each impact from the construction, operation, and where relevant, the de-commissioning phase of an implemented development and for each alternative presented.
- Justify the prescribed development in terms of environmental, economic, cultural, and social considerations.
- Identify and analyze all likely impacts or consequences of implementing the prescribed development, including implications for the use and conservation of energy.
- Describe measures to prevent or reduce significant adverse impacts and enhance beneficial effects and give an account of their likely success with estimated costs as appropriate.
- Describe residual impacts, which cannot be mitigated or can only be mitigated partially.
- Describe proposed monitoring and reporting schemes with estimated costs as appropriate.
- Describe and assess the estimated cost-effectiveness of any safeguards or standards for the protection of the environment to be adopted or applied, including its implementation, monitoring, and reporting.
- Give an account of the impact on the environment of a similar development series or program (whether implemented or not) over a period of time.
- Give any sources and references of information relied on and outline any consultations with any persons made during the preparation of the report.
- Include a site survey report concerning National Heritage items or traditional artifacts as specified by the director.
- Address any further matters as the director specifies.
- Give a clear and concise summary of the report, printed on a separate page.

127 Section 23 of the Environment Act 1998

## 5.3.4. Licensing and permits

### *Licence to generate electricity*

Section 30 of the Electricity Act 1969 establishes SP and grants it licensing authority for all electricity supply and generation in Solomon Islands. Section 30(7) states that all issued licensees shall have a clearly defined:

- Area of supply
- Declared voltage and voltage variation permitted
- Maximum charges payable by consumers
- Purpose of generation
- Date of expiry
- Any other matter that SP considers necessary

New generators must apply for supply license to SP prior to any generation. This is regardless whether the generation is for self-consumption or to supply others with electricity.

Investors must begin by approaching SP to obtain the generator connection enquiry form. The information required for the form is somewhat routine, as follows:

- Company information
- Whether the generator is new or a modification of an existing connection
- Proposed site location and generation technology
- Preferred connection point with the grid, and preferred connection voltage
- Number of generating units and capacity of each unit.
- Expected annual generation
- Type of generator (synchronous, asynchronous, converter, double fed induction generator, or other)
- Expected start and completion date of construction

The SP aims to respond to completed applications within 90 days of receiving them.

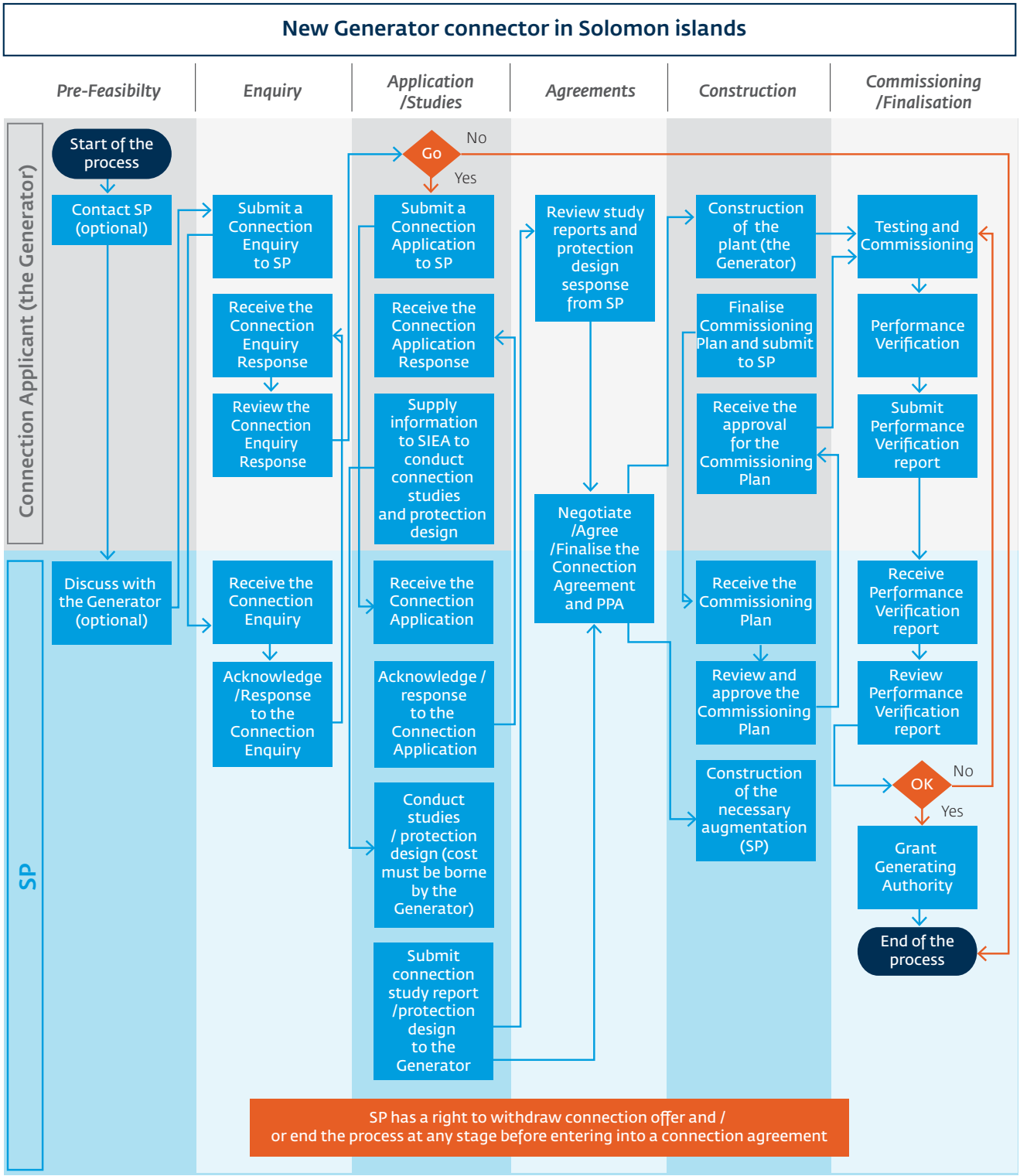
Prior to applying, the applicant should ensure that the project complies with the following acts and regulations and has the following rights:

- Environment Regulations 2008 (see Section 5.3.3)
- Has rights to develop a generating plan on the proposed site according to the Lands and Titles Act (see Section 5.3.2)
- Can achieve SP's voltage and connection requirements (see Section 5.3.10)

During its application review, SP conducts several studies to ensure the new generator will comply with all energy security requirements and will not negatively impact the transmission and distribution grid. The cost of these studies must be borne by the applicant and be paid at the time of submitting the application.

Once all studies have been successfully completed, the applicant and SP enter into a connection agreement and a generation license is issued. All new generators must obtain a license, including rooftop solar installations meant for own use.

## Figure 24: SP connection application flowchart




*Source: SIEA*

### *Licence to sell electricity*

There is no formal process for acquiring a license to sell electricity. SP is willing to grant both generation and retail licenses to competent entities wishing to operate mini-grids in unserved areas. All applications will be dealt with on a case-by-case assessment by SP.

### *Third-party access*

There are no third-party access provisions in Solomon Islands and, in the absence of an independent licensing authority, it is unlikely that SP would grant an IPP a license to supply a customer within SP's existing supply area.

### *Permit to divert water*

This permit allows the holder to interfere with the flow of rivers. The permit will only apply to investors who are investing in hydropower or where construction will affect a river.

The permit is established through section 7 of the River Waters Act (Cap 135), which gives the minister the power to issue the permit. The issuing authority falls under the Ministry of Mines, Energy and Rural Electrification, but no procedure or standard forms exist.

The act states that an application must be submitted to the minister along with information of the development, maps and any plans the minister might require. The minister is then free to issue the permit in any manner he or she chooses.

Private investors interested in developing hydropower must therefore approach the Ministry of Mines, Energy and Rural Electrification to receive the standard forms and information on the documents required.

## 5.3.5. Procurement and project approval

### *IPPs*

#### *Recent experience with Tina River hydro*

At the time of writing, the only RE generation project that had recently been competitively procured by SP was the Tina River hydro project, which was in its early stages of construction. The contract negotiation and project preparation process took over 10 years and was finalized in September 2019. SP was supported by the World Bank during the process. The procurement process was adapted from the World Bank's 2014 procurement guidelines,[128] which helped build SP's procurement capacity. SP will adopt the procurement guidelines for its future IPP procurement.

It is expected that future RE IPPs will follow a similar procurement process as the Tina River hydro. The Tina River hydro project is summarized below:[129]

- The project is funded by a combination of six donor agencies, led by the World Bank. Project procurement followed the World Bank Procurement Framework.[130]
- A detailed procurement plan was developed, listing all contracts to be financed under the project, along with estimated costs, times, and procurement methods.
- The project was tendered out under a BOOT contract by the Ministry of Mines, Energy and Rural Electrification.
- A joint venture between K-Water and Hyundai Engineering Co won the BOOT contract, which is estimated to be a concession of 30 years from commissioning.

#### *Opportunities for future procurement*

During interviews for this report, SP expressed a desire to contract out the design and construction of some new generation projects directly, rather than implement them as IPPs. However, SP also recognized that its capacity to implement and operate several projects is limited and is therefore open to the possibility of contracting an IPP. SP has a least-cost expansion plan and has identified several RE projects.

SP emphasized its challenging experience of acquiring land in the past and, therefore, will be inclined towards investors who have already secured land for development.

SP will publish any future tenders on its website: http://solomonpower.com.sb/careers/tenders.

128 World Bank Group, *Guidelines: procurement of goods, works and non-consulting services under IBRD loans and IDA credits and grants by World Bank borrowers*. Investment climate in practice; no. 5. Business operation and taxation Washington, D.C.

129 Tina River Hydropower Development Project, August 2017, Environmental and Social Impact Assessment

130 World Bank, July 2016, Procurement Regulations for IPF Borrowers

### *Unsolicited proposals*

As stated earlier, SP has expressed an interest in attracting IPP investors. There has not been any successful approach to managing unsolicited bids in Solomon Islands, and no process exists within SP to manage them. All negotiations will therefore be conducted on a case-by-case basis.

### *Own-use solar*

Electricity generation for self-consumption is allowed under a generation license. As described in Section 5.2.5, SP is the license issuing authority according to section 30(3) of the Electricity Act 1969.

Any customer who wants to install own-use solar and remain synchronized with SP's grid (because the customer does not have accompanying battery storage) will need to meet SP's terms and conditions, or SP may disconnect that customer on the grounds that the customer does not meet the terms of the connection agreement. At present, there are no such own-use solar installations that are interconnected to the SP grid, although SP is in initial discussion with at least one large commercial customer.

SP is open to the possibility of its customers installing solar systems, and technical terms of interconnection have been standardized in its net-metering framework, but each application is negotiated on a case-by-case basis. SP is considering piloting a net-metering pilot program, at the end of which standard net-metering terms may be open to the public. An IPP framework, which will cover small solar systems, is being developed.

### *Mini-grids*

The DoE is supporting the development of new mini-grids outside areas mandated by SP. This work is supported by development partners, such as ADB, who have funded feasibility studies on hydro mini-grids. Tendering for the construction of these sites has begun and is being managed by SP. The DoE is open to the possibility of tendering out its construction (with subsidies, as applicable) and mini-grid operation to private sector developers if there is sufficient interest.

The DoE, with the assistance of SP, has identified 35 priority mini-grid opportunities. The DoE and SP recognize that SP has limited capacity to develop all these projects quickly and are therefore open to private sector involvement.

As per Section 5.3.4, private investors interested in owning and operating mini-grids must acquire retail and generation license from SP.

## 5.3.6. Commercial terms

### *IPPs*

According to the Electricity Act 1969, SP holds an exclusive license to transmit and supply electricity within SP serviced areas. SP is therefore the de-facto buyer of all generated electricity for Honiara.

SP does not offer predefined feed-in-tariffs for RE generators. Commercial terms will therefore be negotiated on a case-by-case basis.

SP does have a standard PPA, which will be adopted during RE PPA negotiations. SP is developing an IPP framework, which it will use for negotiations with prospective IPPs.

### *Own-use solar*

As above, SP is open to the possibility of own-use solar installations being interconnected with its grid. There is a net-metering framework in place, but it is mainly focused on technical and connection requirements. Commercial terms are addressed on a case-by-case basis. SP is considering piloting a limited capacity net-metering scheme.

### *Off-grid*

SP's regulated tariff does not extend to private operators, and the Electricity Act does not appear to regulate the tariffs of operators other than SP. However, since all private operators must acquire licenses from SP, it is likely that any restrictions on maximum tariffs would be bound by the license.

In case of a regulated tariff for private operators, it is assumed that a cost-reflective methodology will be applied, like the methodology applied to SP's tariff.

## 5.3.7. Tax and fiscal regime

### *Taxes applying to renewable energy projects*

The Inland Revenue Division (IRD) of Solomon Islands is responsible for collecting tax and administering tax legislation. The tax code is established through legislations and enforced by the IRD. The taxes electricity developers are subject to are provided in Table 44, along with an overview of personal income tax brackets.

There are no specific income or sales tax exemptions for electricity generation. However, the Commissioner of Inland Revenue has the power to grant exemptions to businesses or individuals. The Commissioner heads an exemption committee established to assist with this function.

For more information, the Inland Revenue Division has clear guidelines on which forms to submit and gives details about all relevant tax rates.

**Table 44: Taxes on individuals and companies**

| TAX | RATE | |
|---|---|---|
| | RESIDENTS | NON-RESIDENTS |
| **INDIVIDUALS** | | |
| ***Income tax (SBD)*** | | |
| <15,000 | 11% | |
| 15,000 – 30,000 | 23% | |
| 30,000 – 60,000 | 35% | |
| >60,000 | 40% | |
| ***Withholding tax on:*** | | |
| Interest | 10% | 15% |
| Dividend | 20% | 30% |
| **COMPANIES** | | |
| ***Corporation tax*** | 30% | 35% |
| ***National Provident Fund*** | 7.5% of employee salaries | 7.5% of employee salaries |
| **OTHER** | | |
| ***Sales Tax*** | 10%[131] | |

*Source: Inland Revenue Division's website*

### *Import duties*

The Customs and Excise Act sets the rules for the import and excise duties. Section 8 of the Customs and Excise Act allows the government to sign a Memorandum of Agreement with an investor, exempting certain goods from import duties. Following such an agreement, an application must be made to the comptroller and reviewed by an Exemption Committee assembled by the ministers of Finance and Treasury, and National Planning and Development Coordination.

Importing any electrical equipment and machinery is prohibited unless with written permission from SP, according to section 10 of the Schedule 2 of the Customs and Excise Act. The Solomon Islands Customs and Excise Division manages an import tariff database on its website (www.customs.gov.sb), where potential developers can search for up-to-date import duties. All equipment aimed at generating electricity is subject to a 10 percent import duty and a goods tax of 19 percent.

131 The sales tax in Solomon Islands is defined through the Sales Tax Act (Cap 125). Schedule 1 of the act defines the prescribed goods and services subject to sales tax. Sales of electricity are not included in the definition of goods subject to sales tax.

## 5.3.8. Financing

### *Local financiers*

Solomon Islands ranks 136 out of 190 countries in the World Bank's Doing Business 2020 report, and its best performance is at number 41 in "paying taxes". The ranking comes primarily from the relatively short time required to pay and file taxes. Solomon Islands ranks particularly low in "enforcing contracts", "registering property", "trading across borders", "dealing with construction permits", and "resolving insolvency". The rankings for these categories range from 145 to 172. Of these, "enforcing contracts" and "dealing with construction permits" are probably the most concerning. The low ranking is primarily because of the long time required for judicial courts to process disputes and enforce judgments (about a year and a half, according to the Doing Business report) and the significant difficulties associated with land acquisition.

Solomon Islands has two commercial banks operating in the country, as described in Section 5.2.4. They are BSP and ANZ Solomon Islands.

Financing can be challenging outside Honiara and major urban centers. The rural population has little access to financing, and many communities operate without access to cash. The implementation of mobile financing technologies is under way and has been showing positive results in urban areas.[132]

### *Renewable energy-specific financing products in the Pacific*

The private sector arms of multilateral development banks are active in the region and are looking to support IPPs and off-grid electrification through solar/hybrid mini-grids. A broad overview of the types of financing available to RE investors internationally is provided in the Annex.

Several international financiers are supporting the government of Solomon Islands with RE implementation. Recent examples of specific projects include the following:

- The Tina River hydro project has been funded and supported by six international donor agencies.
- The United Arab Emirates and New Zealand funded the 1 MW Henderson solar farm.
- Several solar-hybrid outstations have been constructed.

## 5.3.9. Design, construction, and commissioning

### *Design and construction permits*

The Town and Country Planning Act 1980 states that all provinces and Honiara should have town and country planning boards that are responsible for land planning. The Minister of National Planning and Development Coordination has the authority to declare local planning areas, which requires the relevant town and country planning board to conduct a study of the area and submit a local planning scheme covering all proposed developments in the area.

- Customary land cannot be declared a local planning area as per section 7(1) of the act and is therefore exempt from requiring development permits.
- The act (Cap 154) includes subsidiary legislation where the current declared local planning areas are listed.

According to part IV of the act, all developments within local planning areas are subject to acquiring development permits prior to any development. Section 14(2) defines development to include building, engineering, mining, or other operations in, on, over or under land. This broad definition would, therefore, include all types of RE development, subject to this guide.

The relevant town and country planning board is the issuing authority for development permissions. Although neither the act nor any regulation describes what information is required to apply for a development, it is not unrealistic to assume that the requirements will require detailed plans of land use, the buildings and infrastructure to be constructed, and technical drawings for all constructions.[133]

132 Central Bank of Solomon Islands, 2015, Solomon Islands National Financial Inclusion Strategy 2016–2020

133 This list is partly based on the required studies for submitting a local planning scheme.

### *Labour market*

The labor market is regulated by the Labour Act 1960. The act allows the Minister of Commerce, Industry, Labour and Immigration to set minimum wages. The most relevant sections relevant to investing in electricity generation include:

- Part I of the act defines electricity generation and transmission as an "industrial undertaking."
- Section 13 defines normal working hours for industrial work as nine hours a day with a maximum of 45 hours a week. For shift workers, daily and weekly limits may be exceeded as long as the three-week average remains within nine hours a day and 45 hours a week. In addition, shift workers must receive 24 hours of continuous rest weekly.
- Section 14 defines overtime pay as 150 percent of the regular hourly rate for time exceeding daily limits or work performed on Saturdays and Sundays. Overtime pay for work on gazetted public holidays is 200 percent of the regular hourly rate.
- Section 30 states that the Minister of Commerce, Industry, Labour and Immigration can fix minimum wages for workers in a specific occupation or a specific region.
- Section 39 states that the employment of women at night is prohibited except for a number of exemptions, none of which relates to electricity generation.
- According to section 42, mothers are entitled to six to 12 weeks of maternity leave and at least 25 percent of their regular salary.
- Employment of children under the age of 12 is prohibited (according to section 46) and employment of children under the age of 15 is not allowed in any "industrial undertaking" (according to section 47).
- The minimum wage for workers relevant to electricity generation is 1.5 Solomon Islands dollars per hour (according to Labour Act Subsidiary Legislation).
- Holidays, sick leave, and passages rules require workers to receive a holiday equaling 1.25 days for every completed calendar month. As per the passage rules, once a year employers are required to pay for a return journey to the worker's home for the worker, their spouse, and a maximum of four dependent children. The route and method of travel shall be decided by the employer and the time taken to travel will not count as part of the paid holiday, but as additional holiday without pay.
- Under the same rule, workers are entitled to 22 leave days during a calendar year.

Schedule 1 of the Labour Act details the process for acquiring work permits for immigrants/non-indigenous employees.

- Part 1—Standard information regarding the type of work, beginning of employment, and skills of the worker.
- Part 2—Information on the employer, location, type of company and operations, number of employees, and salaries offered.
- An application fee of 200 Solomon Islands dollars must be paid.
- Work permit fees range from 150 Solomon Islands dollars for a three-month permit to 500 Solomon Islands dollars for a maximum of a 24-month permit.

A comprehensive study on labor practices in the Pacific, including Solomon Islands, is being prepared by the World Bank.

**Table 45: Legislation relevant to design, construction, and commissioning**

| PLANNING AND CONSTRUCTION |
|---|
| Environment Act 1998 |
| Environment Regulations 2008 |
| Town and Country Planning Act (Cap 154) 1996 |
| Environmental Health Act (Cap 99) 2006 |
| River Waters Act (Cap 135) 1973 |
| **IMPORT DUTY** |
| Customs and Excise Act 2003 |
| **LABOUR MARKET** |
| Labour Act (Cap 73) 1996 |

## 5.3.10. Grid interconnection and operation

### *IPPs*

New generators must apply for a connection license by submitting a generator connection enquiry form, available from SP (see Section 5.3.4).

The technical requirements for connecting with the SP grid are given in the connection agreement. The standard connection agreement and technical requirements do not establish specific requirements for RE or intermittent generation technologies.

#### *Applicability of the connection agreement*

The connection agreement includes a detailed description of the operation requirements for generators connecting to the grid. Many of the requirements will be dependent on the type of generation that is being connected and will be decided during the negotiation process. The connection agreement defines three types, or categories, of generating plants based on their MVA rating:

- Category A: 0.1–0.5 MVA
- Category B: 0.5–3.0 MVA
- Category C: 3.0–20.0 MVA

#### *Technical standards within the connection agreement*

SP's technical standards are mostly based on Standards Australia's technical standards. However, if there is any discrepancy between SP standards and the connection agreement, the connection agreement will be the overruling document.

The following Standards Australia standards have been applied by SP:[134]

- AS 2067-2008: Substations and high voltage installations exceeding 1 kV a.c.
- ENA EG1-2006: Substation earthing guide
- ENA 025-2010: EG-0 Power system earthing guide
- IEEE Std 80-2000 Guide for safety in AC substation grounding
- AS/NZS 3835-2006: Earth potential rise – Protection of telecommunications network users, personnel and plant
- AS/NZS 4853-2012: Electrical hazards on metallic pipelines
- AS 1243-2012: Voltage transformers for measurement and protection
- AS 1531-1991: Conductors – Bare overhead, aluminium and aluminium alloy
- AS 3607-1989: Conductors – Bare overhead, aluminium and aluminium alloy – Steel reinforced
- AS 1675-1986: Current transformers – Measurement and protection
- AS 2650-2005: Common specifications for high-voltage switchgear and control gear
- AS/NZS 3000:2018: Wiring rules (Electrical installations)
- AS 4398-1996: Insulators – Ceramic or glass for voltages greater than 1,000 V a.c.
- AS 60044.1-2007: Instrument transformers, Part 1: Current transformers
- AS 60044.2-2007: Instrument transformers, Part 2: Inductive voltage transformers
- AS 60044.5-2007: Instrument transformers, Part 5: Capacitor voltage transformers
- AS 62271.102-2019: High voltage switchgear and controlgear – Alternating current disconnectors and earthing switches
- AS 62271.301-2005: High voltage switchgear and controlgear – Dimensional standardization of terminals
- AS/NZS 3008.1.1:2017: Electrical installations – Selection of cables
- AS/NZS 3439.1:2002: Low-voltage switchgear and control gear assemblies

134 Solomon Power, 2015, SP Connection Agreement V2 2015

Schedule 6 of the connection agreement includes operating and connection details for generating plants connected to SP's network. The most relevant clauses of the schedule are as follows:

- Schedule 6.2 defines normal operating conditions of the network: A generating plant must be capable of operating within the nominal frequency of 50 HZ and within ±1 Hz without reducing or increasing its active power. At the connection point, the generating plant must be able to operate within ±10 percent of the nominal voltage.
- Schedule 6.3 lists the requirements for generating plants to operate under abnormal operating conditions: A generating plant must be able to withstand sudden phase jumps of up to 25 degrees at the connection point without altering its power output. The generating plant must not be disconnected unless the frequency of the network is higher than 51.5 Hz for longer than four seconds, or lower than 47.0 Hz for longer than 200 milliseconds.
- Schedule 6.4 sets out the synchronizing requirements for connected generating plants: all generating plants must be synchronized with the network, and the voltage difference between the plant and the network must not differ by more than the limits specified in section 6.2.

**Table 46: Generating plant synchronizing limits**

| GENERATING PLANT CATEGORY | MAXIMUM VOLTAGE DIFFERENCE (%) | MAXIMUM FREQUENCY DIFFERENCE (Hz) | MAXIMUM PHASE ANGLE DIFFERENCE (DEGREES) |
|---|---|---|---|
| ***Category A plant*** | 5 | 0.2 | 15 |
| ***Category B and Category C plant*** | 3 | 0.1 | 10 |

*Source: SP connection agreement*

Both manual and automatic synchronizing equipment are allowed, but automatic equipment is preferred. SP must allow manual synchronization and authorize personnel in writing.

- Schedule 6.7 defines the required reactive power capability of generating plants:
  - The reactive power capability of the generating plant will be measured at the rated voltage of the network at the connection point. Generating plant requirements for reactive power capability is to provide between 0.9 and 1.1 per unit of voltage prior to commissioning.
  - Category A plants must be operated in a power factor control mode capable of applying a set point of between 0.95 lagging to 0.95 leading for the active power range of the plant output above 20 percent.
  - Category B plants must be operated in either voltage control mode, power factor control mode, or reactive power control mode, as directed by SP. Category B plants must be capable of applying a power factor set point ranging from 0.93 lagging to 0.93 leading for the active power range of the plant output above 20 percent.
  - Category C plants must be operated in either voltage control mode, power factor control mode, or reactive control mode, as directed by SP. Category C plants must be capable of applying a power factor set point ranging from 0.90 lagging to 0.90 leading for the active power range of the plant output above 20 percent.
- Schedule 6.10 addresses islanded operation and protection: Islanding is not allowed by SP, unless SP's consent is obtained first. In cases where islanding is permitted, certain requirements are set by SP. Category A plants must be fitted with detection equipment for islanded operation, and the generating plant must shut down within 0.5 seconds of commencement of islanded operations. Category B and C plants must also be equipped with detection equipment and must shut down generation within 2.0 seconds of commencement of islanded operations.

*Tina River Credit: NERA Solomon Islands*

In addition to the technical requirements set out in schedule 6 of the connection agreement, SP requires all generator plants to grant access to SCADA channels. The information shown at generator plants must include the following:

- **For Category A plants—**active power output (MW) at the connection point, reactive power output (MVAr) at the connection point, on/off indications for the plant's main circuit breaker(s), and voltage (kV) at the connection point.
- **For Category B and C plants—**active power output (MW) at the connection point, reactive power output (MVAr) at the connection point, power factor, on/off indications for the plant's main circuit breaker(s), and voltage (kV) at connection point; control mode and Echo MV, MVAr and voltage set points.

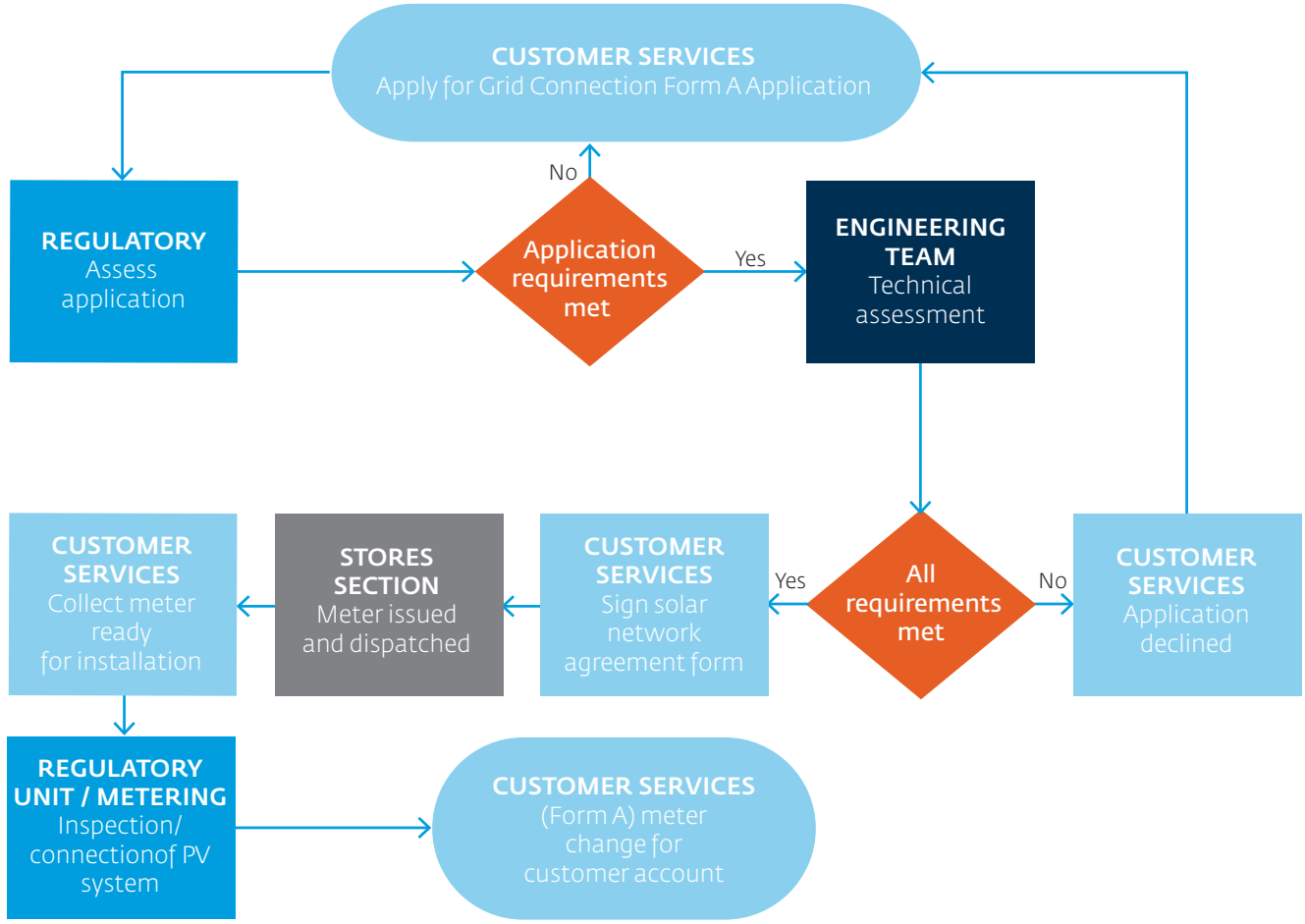
### *Solar PV interconnection*

SP has formalized the technical process and requirements for solar PV interconnections with the electricity grid and published these in the SP Solar PV System Connection Manual.[135] The manual states the installation standards and safety requirements without covering the commercial aspects of interconnection or the type of commercial model (IPP or own-use solar). The process, also shown in Figure 25, consists of eight steps:

1. The customer receives application forms
2. SP provides technical assistance to the customer, equipment is reviewed to make sure it follows SP's technical standards, and any necessary improvements are noted
3. SP's engineering team conducts tests on the equipment and assesses implications for the grid
4. If all tests are positive, the application is approved and signed
5. A meter is issued to the customer
6. The customer collects the meter
7. The new meter is installed and inspected
8. Finalization of meter and data recorded

135 Available at http://solomonpower.com.sb/wp-content/uploads/2019/08/0-Solar-PV-System-Connection-Manual.pdf

## Figure 25: SP's process for connecting solar PV generators




*Source: SP*

# 6

*Iririki Island, Vanuatu Credit: gérard - https://www.flickr.com/photos/35803445@N07/*

# 6. Country investment guide—Vanuatu

## 6.1 Highlights

### *There is already significant private sector involvement in Vanuatu's electricity sector*

Electricity supply in the urban areas is provided under concession agreements held by private concessionaires. The largest is held by UNELCO, which is majority-owned by Engie of France, and has been operating in Vanuatu since the 1930s. The Vanuatu National Provident Fund (VNPF) has increased its share in UNELCO over the last few years. In 2018, it increased its share from about 14 percent to 40 percent, and in January 2020, bought an additional 9 percent from UNELCO Engie. UNELCO Engie now owns a 51 percent share and VNPF, 49 percent.[136]

UNELCO has installed solar and wind generation on the most populous island, Efate, and there is only limited scope to increase the penetration of intermittent renewables on that island further.

Vanuatu Utilities and Infrastructure (VUI), which is owned by Pernix Group Inc (a construction company based in the United States), operates a 1.5 megawatt (MW) system on the island of Espíritu Santo. The initial award of the concession for Espíritu Santo to VUI was contested in court by UNELCO, but VUI was awarded the contract again after re-tendering. The 2020, concession agreement signed by VUI also covers mini-grids on the islands of Maewo, Vanua Lava, and Ambae. In 2020, UNELCO chose not to renew its concession for the islands of Tanna and Malekula. In the interim, those systems are being administered by the Government of Vanuatu and will soon be tendered for concession.

### *Framework contested by UNELCO*

An independent regulator, the Utilities Regulatory Association (URA), was set up in the 1990s. It recently issued several guidelines, including the procurement of new generation, feed-in-tariffs, and net-metering. The procurement/independent power producer (IPP) guidelines describe a process where the URA approves a least-cost development plan and tenders out new generation projects competitively, with concessionaires (and affiliated parties) free to compete against other prospective investors. The guidelines also set out key power purchase agreement (PPA) terms. However, these guidelines are not being recognized by UNELCO, the concession holder in Efate, and has contested them in court.

### *There is scope for private sector investment in mini-grids*

The Department of Energy (DoE) is working closely with development partners and the URA to increase Vanuatu's electrification rate of around 35 percent. The National Energy Roadmap has targets to achieve 100% electrification by 2030. Under a new project, the DoE plans to develop several mini-grids from a priority list of more than 30. The operation of these mini-grids could be tendered out to new private sector investors under a subsidy scheme. While the implementation approach and financing mechanisms have not yet been decided, the assistance of the URA—an independent and well-resourced regulator—will strengthen the DoE's ability to meet the electrification target.

Electricity supply outside Port Vila can be very challenging, causing uncertainty about the feasibility of these mini-grids. This is highlighted by UNELCO choosing not to renew its concession agreement for Tanna and Malekula.

UNELCO and VUI have the exclusive right to sell electricity within their concession areas, although self-supply is allowed by law. Recent experience, however, suggests that UNELCO is not inclined to have own-use solar photovoltaic (PV) interconnect with its grid, and therefore solar PV installations would need to have adequate firm generation (such as diesel) and/or battery storage and to disconnect from the grid altogether. This is the approach that Iririki Resort has taken after prolonged negotiation with UNELCO.

136 Roberts, Anita, "VNPF Acquires Additional 9% Shares in UNELCO", Vanuatu Daily Post, January 4, 2020 https://dailypost.vu/news/vnpf-acquires-additional-9-shares-in-unelco/article_9a822226-3e25-11ea-9a2f-73301c7e561e.html

*Solar farm Iririki Island, Vanuatu (IFC)*

## 6.2 Country, sector, and renewable energy overview

### 6.2.1. Country and electricity sector overview

***Overview of the country's demographics and economy***[137]

Vanuatu consists of 82 volcanic islands, of which 65 are inhabited, covering a total land area of about 12,200 km$^2$ and a sea area of about 71,000 km$^2$ (about 1,300 km across).

The total population according to the 2016 census was 270,459 (ranking 181st in the world), with a population density among the lowest in the world at about 22 persons/km$^2$.

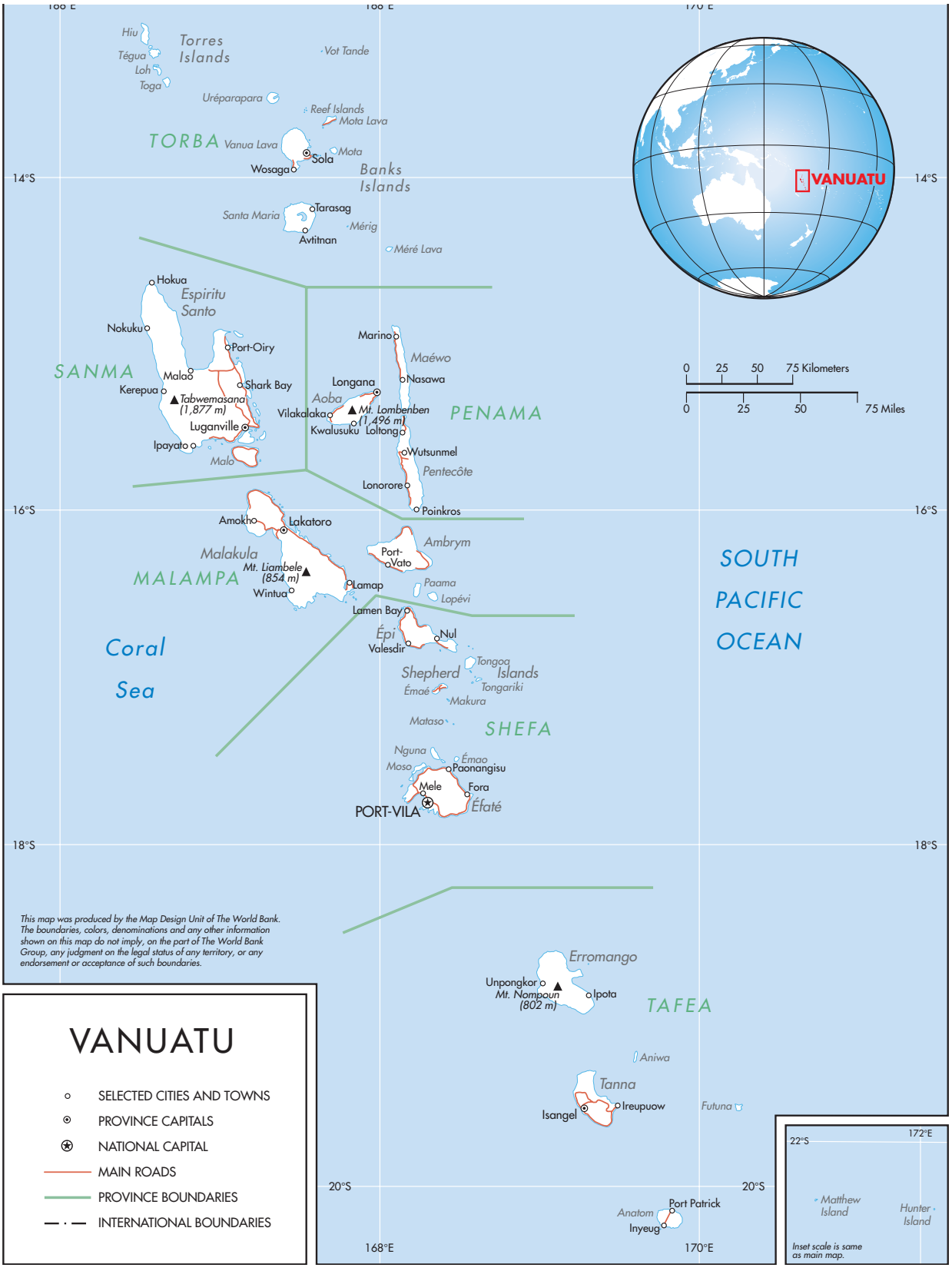
Vanuatu's population is distributed broadly as follows:

- Almost 30 percent of Vanuatu's population lives on the main island, Efate, with the majority in the capital, Port Vila.
- Another 20 percent live on the largest island, Espíritu Santo.
- Other relatively populous islands of Vanuatu are Malakula, Ambrym, Tanna, Pentecost, Epi, and Gaua.
- The average community size on the remaining 57 smaller islands is about 137 households each.

Vanuatu's economy is mostly based on subsistence farming, fishing, tourism, and offshore financial services. The main exports are copra, kava, beef, timber, and cocoa. GDP per capita is $2,783/person, down from over $3,100/person in 2019 before the COVID-19 pandemic.

137 World Bank, Country Profile—Vanuatu, https://data.worldbank.org/country/VU and World Bank, World Bank Development Indicators https://databank.worldbank.org/source/world-development-indicators

## Figure 26: Map of Vanuatu



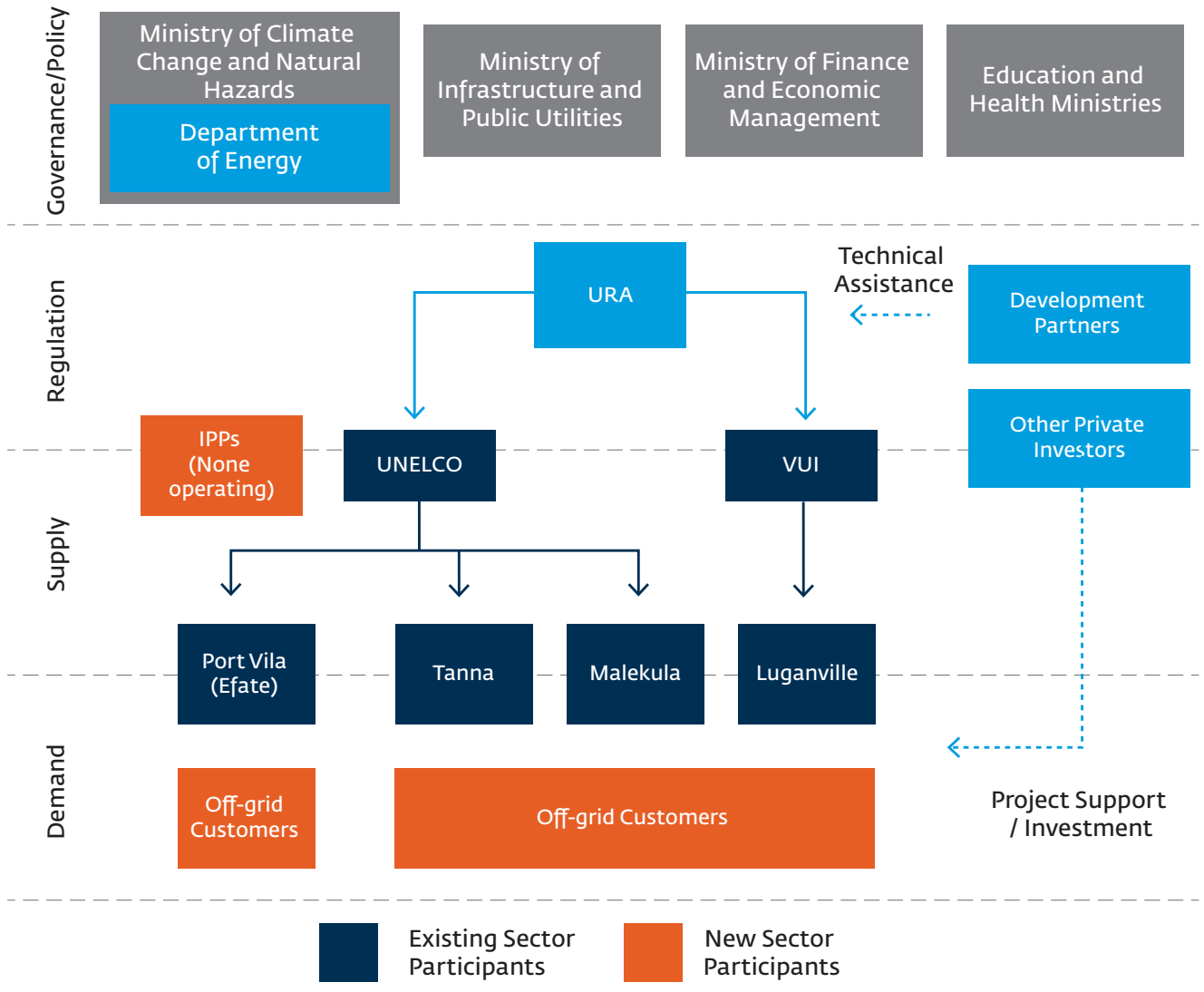

*Source: World Bank*

### *Overview of the country's electricity sector*[138]

Grid-connected electricity is supplied by private entities operating under concession agreements. The URA regulates the electricity market and sets tariffs relating to the concession agreements.

The Ministry of Climate Change Adaptation, Meteorology, Geo-Hazards, Environment, Energy and Disaster Management is the governmental agency responsible for the sector. The Department of Energy is responsible for sector coordination and development outside the four concession areas. Vanuatu's institutional structure is summarized in Figure 27.

**Figure 27: Institutional structure of the electricity sector**




*Note: UNELCO recently decided not to renew its concessions for Tanna and Malekula. Luganville is the main population center on the island of Espíritu Santo.*

*Source: UNDP, Nationally Appropriate Mitigation Action for Rural Electrification, 2015*

138 IRENA, September 2013, Pacific Lighthouses: Renewable Energy Roadmapping for Islands (Vanuatu)

Grid-connected electricity is supplied by private entities (through concession agreements granting them exclusive rights to supply electricity) on four main islands: Efate, Espíritu Santo, Tanna, and Malakula. The four concession areas are operated by two private entities, UNELCO and VUI, and the Government of Vanuatu as a temporary arrangement, as summarized in Table 47.

**Table 47: Overview of Vanuatu electricity grids (2019)**

| ISLAND | CONCESSION HOLDER | CONCESSION EXPIRATION | INSTALLED CAPACITY (MW) | PEAK DEMAND (MW) | ELECTRICITY GENERATION (GWh) | SHARE OF RE (%) |
|---|---|---|---|---|---|---|
| ***Efate*** | UNELCO | 2031 | 22.66 | 12.40 | 66.04 | 17 |
| ***Espíritu Santo*** | VUI | 2031 | 4.32 | 2.21 | 11.98 | 65 |
| ***Tanna*** | Government of Vanuatu (until new tender is completed) | N/A | 0.72 | 0.22 | 1.40 | 3 |
| ***Malekula*** | Government of Vanuatu (until new tender is completed) | N/A | 0.71 | 0.25 | 1.06 | 3 |
| **TOTAL** | | | **32.41** | **15.08** | **80.48** | |

*Source: Concession holders and expiration dates from Vanuatu SREP Investment Plan & URA Monthly Energy Market Snapshots, URA Electricity Fact Sheet 2014-2019*

Electricity provision on each of the four electricity grids is further described below.

### *Efate*

UNELCO has been supplying the capital with electricity since 1939. The Efate concession agreement covers the capital, Port Vila, and most of the island's coastline. Port Vila and the Efate grid is by far the largest grid and supplies over 80 percent of the country's total generated electricity. Electricity is mostly generated using diesel along with a small mix of coconut oil, with some RE in the form of solar PV and wind power. UNELCO has been investing in further RE capacity, and recently installed additional solar capacity.

### *Espíritu Santo*

VUI has been operating the Espíritu Santo concession area since 2011. The Espíritu Santo area consists of two main load centers—Luganville and Port Olry. It is the only area in Vanuatu where most of the electricity generated comes from RE sources, with about 1.2 MW of installed hydropower capacity. The Port Olry system has only 300 customers with a peak load of 40 kilowatts (kW) and is supplied by diesel generators. Luganville customers are cross-subsidizing customers in Port Olry.

### *Tanna*

The Tanna concession area covers the villages on the western coast of the island. The cost of supplying electricity in Tanna is much higher than on Efate due to difficulties in transporting fuel for Tanna's diesel generators. UNELCO chose to reject the government's offer of extending its concession agreement for Tanna. The Government of Vanuatu is temporarily administering the system until a new concession is in tendered in 2021.

### *Malekula*

The Malekula concession area covers the village of Lakatoro and most of the north-eastern coastline. Like Tanna, most electricity comes from diesel generators and the cost of supply is much higher than in Efate. As with the Tanna concession, UNELCO has chosen not to renew its agreement. The Government of Vanuatu is temporarily administering the system until a new concession is in tendered in 2021.

## *Financial performance of the utility*

UNELCO and VUI are both private entities and operate on a commercial basis. Neither has been experiencing serious financial difficulties in recent years, and both utilities are able to charge cost-reflective tariffs. The financial performance of the utilities suggests they should be creditworthy.

## 6.2.2. Status and potential of renewable energy[139]

### *Renewable energy targets*

Vanuatu's RE targets and road map for achieving those targets are published in the National Energy Road Map (NERM), as summarised in Table 48.

The latest update was developed in 2015 and is for 2016-2030. The NERM sets targets for sustainable energy development along with increasing household access to reliable electricity. Recent data from 2019 are also included in the table.

**Table 48: Vanuatu RE and electrification targets**

| ITEM | 2015 (%) | 2019 (%) | 2020 TARGET (%) | 2030 TARGET (%) |
|---|---|---|---|---|
| ***Increase electricity access within concession areas*** | 62 | 62 nationally | 90 | 100 |
| ***Increase electricity access outside concession areas*** | 9 | | 100 | 100 |
| ***Increase the share of electricity from renewable energy sources*** | 29 | 23 | 65 | 100 |
| ***Increase the proportion of electricity generated from biofuels*** | 5 | 2 | 10 | 14 |

*Source: 2015 data and targets taken from Vanuatu National Energy Road Map 2016–2030. 2019 data taken from URA's (2020) Electricity Fact Sheet 2014-2019 and from the World Bank's (2021) Sustainable Energy for All ( SE4ALL ) database*

As Table 48 shows, 2019 data implies that 2020 targets will not be met. For access, this is due to slow progress, and for the share of electricity from RE sources and biofuels, there was a decline between 2015 and 2019. To improve progress towards 2030 targets, solar home systems and mini-grids are expected to play a major role and will be implemented through the Vanuatu Rural Electrification Programs (VREP) I and II (as discussed later in Section 6.2.2).

### *Existing and planned renewable energy projects*

Development of RE in Efate has been picking up in recent years. This increase has been driven by rising diesel and retail prices. The development was supported by international development partners (see Section 6.2.4 6.2.4), including through the Asian Development Bank's Energy Access Project.[140] The main RE generation projects are listed in Table 49. Both UNELCO and VUI have previously taken over the operation of a few hydro micro-grids from local communities. Other community-operated micro-grids have not been maintained and many are not operating today (and are therefore not included in Table 49).

139 Department of Energy, June 2016, Updated Vanuatu National Energy Road Map 2016-2030

140 Department of Energy, 2021, "Brenwei Hydro Project", Projects, .https://doe.gov.vu/index.php/projects-2/item/3-on-grid/8-brenwei-hydro-project

### Table 49: Existing and planned RE generation projects

| POWER STATION | OPERATOR | GENERATION TECHNOLOGY | YEAR COMMISSIONED | AVAILABLE CAPACITY (MW) | ANNUAL GENERATION (GWh) | STATUS |
|---|---|---|---|---|---|---|
| ***Sarakata hydro*** | VUI | Hydro | 1995 | 0.6 | N/A | Operating |
| ***Undine Bay*** | UNELCO | Grid-connected solar | 2016 | 0.51 | N/A | Operating |
| ***Kawene / Devil's point*** | UNELCO | Grid-connected solar | 2017/2018 | 1.5 | N/A | Operating |
| ***Devil's Point*** | UNELCO | Wind turbines | 2009 | 3.025 | 5.4 | Operating |
| ***Parliament/ Ministry of Climate Change and Natural Disasters*** | IPP | Grid-connected solar | 2015 | 0.5 | N/A | Operating |
| ***Loltong Hydro*** | UNELCO | Hydro micro-grid | 2016 | N/A | N/A | Operating |
| ***Talise hydro*** | Community | Hydro micro-grid | 2016 | N/A | N/A | Operating |
| ***Brenwei Hydro*** | Future Malekula concessionaire | Hydro | 2022 | 0.4 | N/A | Under construction |

*Source: Energy Sector in Vanuatu—Current Status & Way Forward, 2016; Vanuatu Project Management Unit, Brenwei Hydro Project tender documents*

## *Resource potential*[141]

### *Hydropower*

There is some potential for hydropower development on the various islands of Vanuatu. Most of the hydropower potential identified consists of smaller sized mini/micro-grid sites, although a few utility-scale sites have been identified. The main obstacles for further hydropower development are:

- Long distances from hydro sites to villages
- Seasonal rains, as heavy rains accompanying cyclones are not optimal for hydropower generation
- Low operational and maintenance capacity within villages

However, with increasing demand, larger utility-scale hydro sites become more feasible. Three large sites have been identified for potential development by private developers.

They are:

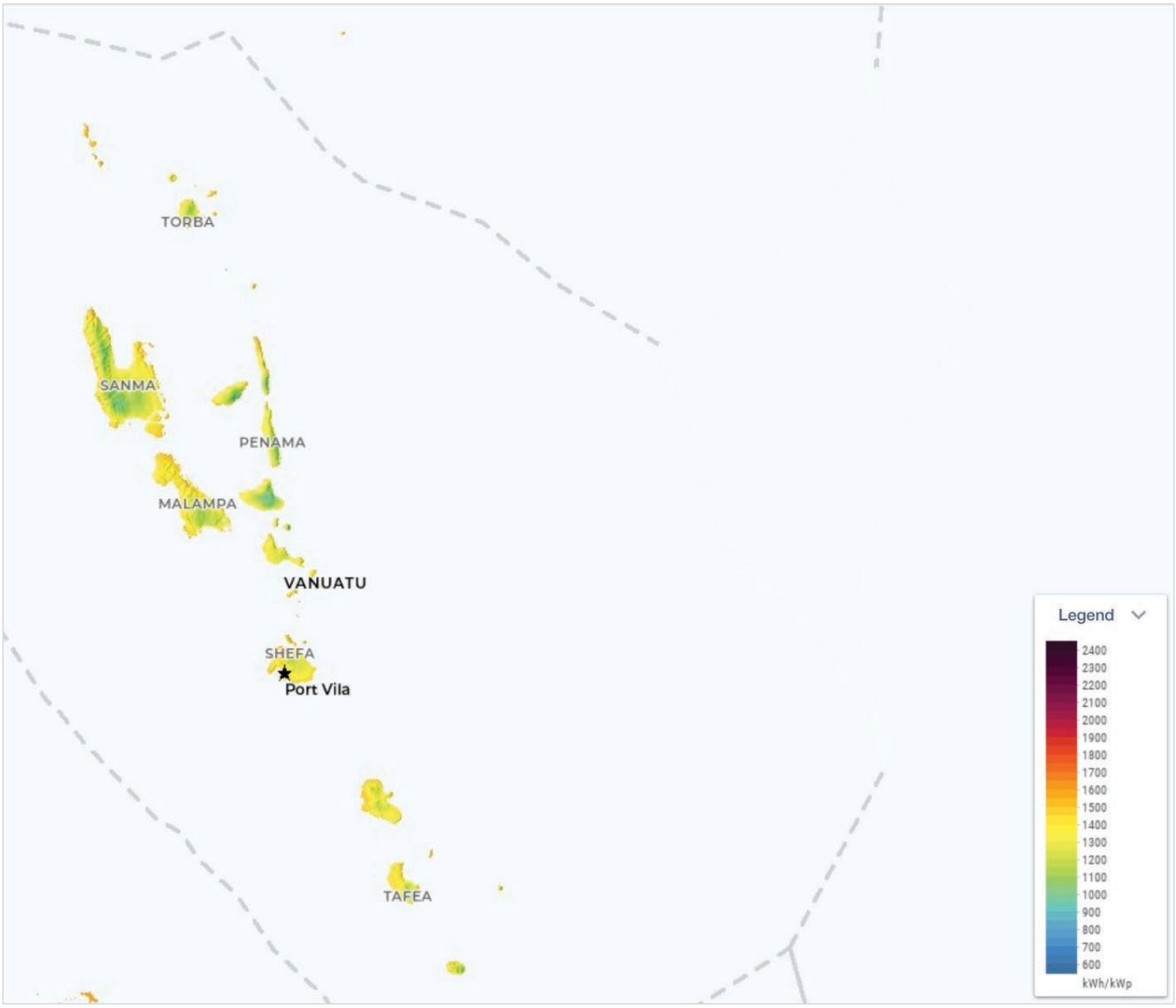
- Malahura hydropower (1.2 MW)—Pre-feasibility studies have been conducted by the ADB
- Wambu run-of-the-river (3 MW)—Pre-feasibility studies have been conducted by the ADB
- Sarakata hydropower (1 MW) – Detailed design to commence in 2021[142]

As with most PICs, Vanuatu has substantial potential for electricity generation from solar PV. Annual sunshine hours are very high at around 2,000-2,300 hours per year, and solar insolation is estimated to be about 6 kWh/m$^2$/day based on satellite data. (There are no official in-country measurements for solar insolation in Vanuatu.) Solar irradiance is shown in Figure 28, based on data from the World Bank's Global Atlas tool.

141 Wade & Johnston, 12 June, 2016, Report 3: Renewable Energy Resources and Prioritized Renewable Energy Projects and Technologies

142 Roberts, Anita, "VT63 million for Sarakata Hydroelectric Power Plant detailed design stage", *Vanuatu Daily Post*, March 13, 2021 https://dailypost.vu/news/vt63-million-for-sarakata-hydroelectric-power-plant-detailed-design-stage/article_e8ed3916-8517-11eb-bd18-97ca0df54149.html

## Figure 28: Solar irradiance map of Vanuatu




*Source: Global Solar Atlas*

### *Geothermal*[143]

Vanuatu consists of a range of volcanic islands. Theoretically, there is considerable potential for geothermal power development. Some feasibility studies have been conducted and geothermal legislation and a licensing scheme have been established. Several of the surface manifestations and volcanic features identified suggest potential for geothermal energy. Potential geothermal projects/sites include, or previously included the following:

- **Efate—**21 geothermal and volcanic features were identified, with the Takara geothermal reservoir identified as the priority. Pre-feasibility studies and early-stage exploration studies were conducted in 2011.[144] Generation potential was initially estimated at 8 MW, but further studies found the project not to be feasible. The government has cancelled the license and the project has been put on hold[145]
- **Tanna—**12 geothermal and volcanic features were identified
- **Vanua Lava—**15 geothermal and volcanic features were identified
- **Other islands** have fewer than 10 identified features

### *Wind power*

Wind energy monitoring has indicated a resource of 7.2 m/s at a 55 m hub height. This indicates that wind power is a feasible generation technology relative to the high local electricity prices. In 2012, UNELCO installed wind turbines with a total capacity of 3,025 kW in Efate.[146] The reported electricity generated from these turbines implies a capacity factor of 20 percent in 2016.[147]

The DoE installed wind meters on the six largest islands in 2012. The meters collected some wind data, but no reports or wind maps were published before the project was reportedly closed due to financial constraints.[148]

### *Future renewable energy projects*[149]

The DoE, with the support of development partners, has identified at least 36 potential mini-grids that will help achieve the RE targets laid out in the NERM for 2016 to 2030. The development of most of these mini-grids is still at a very early stage and many have been identified without conducting any specific feasibility studies. The DoE foresees that capital subsidies will be required to make the schemes viable. No further plans have been made public regarding these potential mini-grids.

From these 36 solar PV mini-grids, five projects were identified as priority projects in the 2015 Nationally Appropriate Mitigation Action (NAMA) on Rural Electrification, supported by the UNDP. The NAMA did not provide funding for the projects' development, but it did develop and propose a timeline for the projects. The second phase of the World Bank's VREP has been approved and will implement these timelines and develop a number of mini-grids, although the exact implementation method has not been decided. The DoE has expressed its interest in working with private or independent operators for these mini-grids. However, due to a lack of private sector interest, there is uncertainty regarding the operation of these mini-grids as UNELCO decided to not seek a renewal of its concession contracts.

A selection of priority mini-grid projects is summarized in Table 50.

143 Geology and Mines Unit, Ministry of Lands, November 12, 2015, A Summary of Geothermal Development in Vanuatu

144 Castlerock Consulting, 17 June 2011, Efate Geothermal Power and Island-Ring Grid Development Framework

145 Makin, Bob, "Geothermal Project Quietly Abandoned," *Vanuatu Daily Post* April 26, 2016 https://dailypost.vu/news/geothermal-project-quietly-abandoned/article_0b41c1f0-81e8-5e77-9748-188b3598cbf5.html

146 IRENA, July 2015, Vanuatu—Renewables Readiness Assessment

147 Consultant calculations

148 Wade & Johnston, June 12, 2016, Report 3: Renewable Energy Resources and Prioritized Renewable Energy Projects and Technologies

149 UNDP, November 20, 2015, NAMA on Rural Electrification

*Vanuatu Parliament (IFC)*

## Table 50: Future RE projects (all types)

| POWER STATION | GENERATION TECHNOLOGY | TYPE | CAPACITY | STATUS | OPEN TO PRIVATE INVESTORS/ OPERATORS |
|---|---|---|---|---|---|
| ***Ipikel – Tanna*** | Solar PV/Diesel | Hybrid mini-grid | 34.5 kW | NAMA / VREP II | Yes |
| ***Ipkangien – Tanna*** | Solar PV/Diesel | Hybrid mini-grid | 22.2 kW | NAMA / VREP II | Yes |
| ***Unmet & Uri – Malekula*** | Solar PV/Diesel | Hybrid mini-grid | 62.1 kW | NAMA / VREP II | Yes |
| ***Loltong – Pentecost*** | Solar PV/Diesel | Hybrid mini-grid | 28.5 kW | NAMA / VREP II | Yes |
| ***Ikaukau - Aniwa*** | Solar PV/Diesel | Hybrid mini-grid | 26.7 kW | NAMA / VREP II | Yes |
| ***Malahura hydropower*** | Hydropower w/ storage | TBC | 1.2 MW | Pre-feasibility studies completed | Yes |
| ***Wambuoo hydropower*** | Run-of-river | TBC | 3 MW | Pre-feasibility studies completed | Yes |
| ***Sarakata hydropower*** | Run-of-river | TBC | 1 MW | Detailed design to commence in 2021 | Yes |

*Source: UNDP, NAMA on Rural Electrification, 2015 & World Bank, VREP II Project Paper*

## 6.2.3. Legislation, policy, and regulation

### *Key legislations, policies, and regulations*

#### *The Electricity Supply Act (Cap 65)*

The Electricity Supply Act allows the Minister of Climate Change Adaptation, Meteorology, Geo-Hazards, Environment, Energy and Disaster Management to enter into agreements with a company for the exclusive rights to supply a concession area with electricity. The concession areas must be clearly identified in the agreement.

Under the original act, only the concession holder could generate and supply electricity within the concession areas. However, a later amendment allowed anyone to generate electricity (the 2010 amendment to section 1B), but only the concession holder could supply electricity. The amendment allowed non-concession holders to supply the concession holder, effectively allowing IPPs to operate only in a wholesale supply capacity.

The act provides for the granting of concessions. Outside of the concession areas, other entities can generate and supply electricity. Penalties are applicable to those who supply power within a concession area, although the act allows any customer to generate power for its own use.

In summary, the act does not allow for a third party to sell or supply electricity to others within a concession area, unless that third party is an IPP supplying to the concessionaire. It would appear to also prevent a third-party on-site distributed generator from selling power to the owner of the premises, as affirmed by the recent experience with Iririki Resort in Port Vila, as described in Section 6.3.5.

#### *The Utilities Regulatory Authorities Act of 2007*

The Utilities Regulatory Authorities Act establishes the URA as the independent regulator responsible for regulating the electricity and water sector. The act's section 5 establishes the URA as an authority with three commissioners, all appointed by the Minister of Climate Change Adaptation, Meteorology, Geo-Hazards, Environment, Energy and Disaster Management.

Part 3 of the act defines the functions and powers of the URA as follows:

- Act in a policy advisory role
- Inform the public of matters relating to utilities
- Issue safety and reliability standards
- Regulate prices
- Help consumers to resolve grievances
- Uphold the legislation laid out both in the act and in the Electricity Supply Act

Section 18 allows the URA to determine maximum prices but does not define how the URA should do this. Later amendments to the act have aimed to strengthen the URA and give it more power to request information and achieve its main functions.

The URA's ability to enforce regulated prices has been successfully disputed by UNELCO in several recent court cases. Most recently, the URA issued tariffs for Port Vila, Malekula, and Tanna, in February 2020. UNELCO disputed the tariffs and at the time of writing the dispute was still in arbitration.

The act is being redrafted by the URA and the government. If the new version of the act is passed, the URA will be granted more powers for enforcing regulation and to regulate the sector.

### *National Energy Roadmap 2016-2030*

The 2016–2030 NERM includes the government's energy policy and RE targets for the period 2016 to 2030. The main vision laid out in the NERM is to energize Vanuatu's growth and development through the provision of secure, affordable, widely accessible, high-quality, and clean energy services for an educated, healthy, and wealthy nation.

In addition to establishing official RE targets, the NERM also proposes how those targets can be achieved and proposed RE projects presented.

The main focus of the NERM relevant to this report is twofold:

- Increase RE generation and grid expansion through utility-scale RE development in Efate and mini/micro-grid development for rural electrification. Concession holders are required to expand their grids to communities that are close to existing grid infrastructure. The added demand is to be met through increased RE development.
- Improve the regulatory and legislative framework for PPP and IPPs through effective policy and risk sharing frameworks. This should increase the URA's power to enforce regulation.

### *URA guidelines*

The URA has issued several guidelines or regulations relating to RE electricity generation. Because of the numerous legal challenges, only some of these are being enforced. The key guidelines or regulations include:

- **Regulatory guidelines for power purchase agreements for generation and supply of electricity**—These guidelines offer guidance to interested independent power producers and set out the URA's recommendations and direction of future legislation reviews and regulations. The guidelines describe a process where the URA approves a least-cost development plan and manages the procurement of specific generation projects (as identified by the concessionaires). The URA will tender projects competitively, with concessionaires (and affiliated parties) free to compete against other prospective investors. The guidelines also describe the key terms of the PPA agreement. UNELCO contested the guidelines, but the court found in favor of the URA.
- **Feed-in tariff and net-metering guidelines**—Defines a FiT and net-metering scheme to simplify and encourage grid-connected rooftop solar. UNELCO contested the scheme with the URA, and the scheme is not currently being enforced.
- **Grid-connected PV systems, system installation guidelines**—Defines technical standards and specifications for own-use solar PV, including wiring safety requirements and cable selection. These standards are mostly based on the Australia-New Zealand standards and list Vanuatu-specific amendments to the AS/NZS standards. The Vanuatu amendments mostly deal with the increased risk of natural disasters and cyclones.
- **Grid-connected PV systems and system design guidelines**—Offers guidelines on sizing and designing grid-connected PV systems; also based on the Australia-New Zealand standards. The guidelines provide information on how to select inverters and how to match array voltage to the maximum and minimum inverter operating voltages. In addition, the guidelines provide peak solar hours for many locations in the Pacific and the ideal solar module tilt angle.

### *Other relevant legislation*

- **Supply of Electricity (Districts) (Amendment) Act 2000**—Allows the government to supply and sell electricity outside the concession areas. The government will remain the sole owner of all generation equipment and be responsible for all maintenance. Schedule 2 of the act defines the allowed tariffs for governmental schemes.
- **Environmental Management and Conservation Act (Cap 283)**—Sets out the process for a preliminary environmental assessment and an environmental impact assessment (EIA). The Director for the Department of Environment Protection and Conservation is established as the authority responsible for determining whether an EIA is required or whether a preliminary environmental assessment is sufficient.
- **Environmental Impact Assessment Regulations**—Establishes the requirements for a successful EIA and the review process.
- **Land Acquisition Act (Cap 215)**—Establishes the government's authority to acquire land for public use.
- **Land Leases Act (Cap 163)**—Defines the proper process and lease agreement procedures and establishes the requirements for such leases.
- **Custom Land Management Act 2013**—Defines the nakamal (a traditional meeting place) as the proper institution to identify rightful customary land owners.
- **Government Contracts** and **Tenders Act 1998 and Tenders Regulations Order 1999**—Dictate the tendering process for the government. Procurement for the concession agreements will be according to the legislation and regulations set out in this act and the regulations.

## 6.2.4. Institutions

### *Utilities Regulatory Authority*

The URA is the independent regulator for both water and electricity services. It was established in 2008 as the sector's regulator and operates according to the URA Act 2007 and its various amendments. The URA is controlled by three commissioners, who are all appointed by the Minister of Climate Change Adaptation, Meteorology, Geo-Hazards, Environment, Energy and Disaster Management.

As the sector regulator, the URA sets maximum tariffs for wholesale and retail electricity, and it sets safety and reliability standards. The URA's regulatory powers are still somewhat uncertain. UNELCO has challenged several of the URA's regulations in court, some of which have been successful, and others not. These challenges have placed significant financial and resource burdens on the URA. As discussed in Section 6.2.3, the URA and the government are drafting an amendment to the Electricity Act that will resolve uncertainties around the legality of the URA's regulatory responsibilities.

### *UNELCO*

UNELCO is a privately held company, partly owned by Engie from France (51 percent) and the Vanuatu National Provident Fund (49 percent). UNELCO holds only the concession agreement for Efate. The agreement expires in 2031.

UNELCO has been operating in Vanuatu since 1939, long before the country's independence in 1980. The utility is responsible for all levels of electricity generation and supply within the concession areas. Under the concession agreements, it is also responsible for water services. UNELCO used to be the sole utility in Vanuatu until it lost the Espíritu Santo concession tender to VUI (which has since been disputed in the courts).

### *Vanuatu Utilities and Infrastructure*

VUI is a subsidiary of the American construction company, Pernix Group Inc. VUI has been operating in Vanuatu since January 1, 2011, after winning the bidding process for the Espíritu Santo concession. It provides both water and electricity supply services.

The Santo concession area is divided into two separate areas, Luganville and Port Olry. The Luganville system is many times larger than the Port Olry system and benefits from economies of scale and hydropower generation. The concession agreement includes a uniform tariff for both areas leading to Luganville cross-subsidizing the Port Olry system.

UNELCO challenged the outcome of the concession bidding process and had to be re-tendered. Following the re-tendering, VUI was awarded the concession contract.

### *Department of Energy*

The DoE sits under the Ministry of Climate Change Adaptation, Meteorology, Geo-Hazards, Environment, Energy and Disaster Management and is responsible for managing the government's electricity generation assets. The Supply of Electricity (Districts) Act allows the government to supply electricity outside the concession areas. The DoE is the acting public institution, which enforces the act and is responsible for rural electrification. It has recently enforced its role by subsidizing solar home systems through the VREP, with assistance from development partners such as the World Bank.

The first phase of the VREP offered 50 percent subsidies for solar home systems to households outside the concession area and areas within the concession area but not likely to receive a grid connection. The second phase of the VREP will expand the focus on various RE hybrid mini-grids and extend the solar home systems subsidies. The second phase of the VREP was approved in 2020, but no further details on mini-grid tendering have been made public.

### *Development partners*

Multiple development partners are operating in Vanuatu and supporting RE development in the country. The institutions most active in the RE sector are as follows:

- The **World Bank** manages the VREP, which is beginning its second phase and will focus primarily on RE hybrid mini-grids and solar home systems.
- The **Asian Development Bank** is actively promoting hydropower development on Santo, Malekula (Brenwei) and RE mini-grids.
- The **Japan International Cooperation Agency** is also active on Espíritu Santo and is looking to expand current hydropower projects.

*Solar farm Iririki Island, Vanuatu (IFC)*

- **New Zealand's Ministry of Foreign Affairs and Trade** is collaborating with the World Bank and provides funding for VREP II.
- **Australia's Department of Foreign Affairs and Trade** is active in Vanuatu, supporting capacity-building activities in multiple sectors.
- The **United Arab Emirates** has been supporting installations of new solar PV capacity and solar-hybrid mini-grids.
- The **European Investment Bank** is active in the region and provides funding for private and public RE projects.

### *Commercial lenders*

The commercial financial services sector in Vanuatu is very limited, with only four commercial banks operating in the country. All four banks offer conventional banking services to their customers and are willing to fund RE projects:

- The **National Bank of Vanuatu** is the largest commercial bank in Vanuatu with 27 branches and agencies across the country. It is the only bank that operates outside Port Vila and Luganville. The bank is owned by the government of Vanuatu (70 percent), Vanuatu National Provident Fund (15 percent), and IFC (15 percent).
- **Australia and New Zealand Banking Group (ANZ)** has been operating in Vanuatu since 1971 and has two branches, one in Port Vila and one in Luganville. ANZ offers the full range of corporate, residential, and small business services.
- **Bank South Pacific (BSP)** acquired Westpac's operation in Vanuatu and offers personal, business, and international banking services.
- **BRED bank**[150] operates two branches, one in Port Vila and one in Luganville. It offers personal, business, and international banking services.

150 BRED (formerly an acronym for the *Banque régionale d'escompte et de dépôts*/Regional Discount and Deposit Bank) is a cooperative bank founded in France in 1919.

## 6.2.5. Electricity tariffs and incentives

### *Retail electricity tariffs*

The Utilities Regulatory Authority Act, section 18, allows the URA to determine the maximum price allowed to be charged for electricity. As discussed in Section 6.2.3, the URA's powers to regulate tariffs relating to existing concession agreements has been challenged in court by UNELCO.

The URA is responsible for setting tariffs across the country and therefore would include any rural mini-grids, although there are none at present (that are not already covered under the existing concession agreements).

The URA conducted a comprehensive tariff review in 2017, following UNELCO's tariff submission in 2016. UNELCO challenged the tariffs but it was overturned in court and the URA published a preliminary decision in September 2017.

Following the court ruling, the URA's attempt at enforcing its tariff regulation has it locked in legal battles with UNELCO. In February 2020, the URA issued new adjusted tariffs, but they were challenged by UNELCO. The dispute was then placed in arbitration and a decision is expected in mid-2021.

#### *UNELCO tariff structure*

The URA calculates a base rate for UNELCO, which is then adjusted to fit within a predetermined tariff structure. The base rate is calculated through the building block approach. The URA provides a detailed discussion on each building block in its latest preliminary decision.[151]

The URA's tariff structure for UNELCO aims to subsidize households with low consumption (<60 kWh) while incentivizing energy efficiency by increasing the rate on high monthly consumption (>120 kWh). The low consumption consumers therefore only pay 34 percent of the actual cost of generation while the high consumption consumers pay three times the base rate.

**Table 51: UNELCO tariff structure (P is the base rate)**

| CUSTOMER CATEGORY | MONTHLY CONSUMPTION RANGE | UNIT CHARGE (VUV/kWh) | DEMAND CHARGE (VUV/kVA/month) |
|---|---|---|---|
| ***Small domestic customer*** | <60 kWh | 0.34 x P | N/A |
| | 60-120 kWh | 1.21 x P | N/A |
| | >120 kWh | 3.00 x P | N/A |
| ***Other low voltage users*** | All consumption | 1.21 x P | 5 x P |
| ***Business licence holders*** | All consumption | 0.87 x P | 20 x P |
| ***Sports fields*** | All consumption | 1.00 x P | N/A |
| ***Public Lighting*** | All consumption | 0.54 x P | N/A |
| ***High Voltage*** | All consumption | 0.70 x P | 25 x P |

*Source: Official Gazette, Final Decision and Commission Order Notice 2017*

151 URA, September 2017, Preliminary Decision and Notice of Request for Comments - UNELCO

The URA's 2017 preliminary tariff decision calculates the cost of service in all UNELCO's concession areas and proposes a base rate of 38.56 Vanuatu vatu per kWh, a reduction of 19.07 percent from the 2011 base rate calculations. The 2017 base rate applies for the period from 2016 to 2021, but with various fuel and inflation-indexed monthly adjustments.

The main monthly adjustment variables included in the UNELCO tariff are as follows (with each one holding a different weighting in the monthly adjustment formula):

- Average diesel fuel price at each of the concession areas
- Average price for coconut oil fuel (for generators using coconut oil fuel)
- The price of any electricity bought under a PPA
- Labor cost index
- Vanuatu vatu exchange rate against the Pacific Franc
- Inflation index

### Table 52: UNELCO base tariff 2016-2021 (Vanuatu vatu)

| CUSTOMER CATEGORY | MONTHLY CONSUMPTION RANGE | UNIT CHARGE (VUV/kWh) | DEMAND CHARGE (VUV/kVA/month) |
|---|---|---|---|
| ***Small domestic customer*** | <60 kWh | 13.11 | N/A |
| | 60-120 kWh | 46.65 | N/A |
| | >120 kWh | 115.68 | N/A |
| ***Other low voltage users*** | All consumption | 46.65 | 192.8 |
| ***Business licence holders*** | All consumption | 33.54 | 771.2 |
| ***Sports fields*** | All consumption | 38.56 | N/A |
| ***Public Lighting*** | All consumption | 20.82 | N/A |
| ***High Voltage*** | All consumption | 26.99 | 964 |

*Source: URA (2018). UNELCO Electricity Tariff Review - Final Decision*

### Table 53: UNELCO base tariff 2016-2021 ($)

| CUSTOMER CATEGORY | MONTHLY CONSUMPTION RANGE | UNIT CHARGE ($/kWh) | DEMAND CHARGE ($/kVA/month) |
|---|---|---|---|
| ***Small domestic customer*** | <60 kWh | 0.12 | N/A |
| | 60-120 kWh | 0.43 | N/A |
| | >120 kWh | 1.07 | N/A |
| ***Other low voltage users*** | All consumption | 0.43 | 1.78 |
| ***Business licence holders*** | All consumption | 0.31 | 7.13 |
| ***Sports fields*** | All consumption | 0.36 | N/A |
| ***Public Lighting*** | All consumption | 0.19 | N/A |
| ***High Voltage*** | All consumption | 0.25 | 8.92 |

*Source: URA (2018). UNELCO Electricity Tariff Review - Final Decision*

### *VUI tariff structure*

The URA's Luganville–Port Olry tariff was established in 2010, at the time when the URA first published its tariff methodology. The methodology laid out a base rate and a fuel cost pass-through. According to the Memorandum of Understanding under which VUI is currently operating, the tariff can be reviewed on an annual basis. The URA provides a detailed discussion on each building block in its latest preliminary decision.[152]

**Table 54: VUI's 2017 tariff structure (Vanuatu vatu)**

| CUSTOMER CATEGORY | MONTHLY CONSUMPTION RANGE | UNIT CHARGE (VT/kWh) | DEMAND CHARGE (VT/kVA/month) |
|---|---|---|---|
| ***Low Voltage*** | <60 kWh | 16.61 | N/A |
| | 60-120 kWh | 38.90 | N/A |
| | >120 kWh | 57.13 | N/A |
| ***Sports Fields*** | All consumption | 36.29 | N/A |
| ***High Voltage*** | All consumption | 29.00 | 962.35 |

*Source: Official Gazette, Final Decision and Commission Order Notice 2017*

**Table 55: VUI's 2017 tariff structure ($)**

| CUSTOMER CATEGORY | MONTHLY CONSUMPTION RANGE | UNIT CHARGE ($/kWh) | DEMAND CHARGE ($/kVA/month) |
|---|---|---|---|
| ***Low Voltage*** | <60 kWh | 0.15 | N/A |
| | 60-120 kWh | 0.36 | N/A |
| | >120 kWh | 0.53 | N/A |
| ***Sports Fields*** | All consumption | 0.34 | N/A |
| ***High Voltage*** | All consumption | 0.27 | 8.95 |

*Source: Official Gazette, Final Decision and Commission Order Notice 2017*

## *Specific incentives for renewable energy*

As described in Section 6.2.3 above, URA has published a feed-in tariff and net metering framework, but these have been successfully challenged in court by UNELCO. There are no other RE-specific incentive mechanisms in place in Vanuatu.

152 URA, February 2017, Preliminary Decision and Notice of Request for Comments - VUI

*Port Vila Vanuatu Credit: Phillip Capper - https://www.flickr.com/photos/flissphil/*

## 6.3 Step-by-step guide to investing

### 6.3.1. Introduction

The detailed description of the steps required to invest in RE power generation projects in PNG focus on three broad categories of RE projects:

- **IPP generation—**Private investors develop generation capacity and sell to the utility. Energy sources are likely to include hydropower, biomass, and solar farms.
- **Own-use solar generation—**Residential, commercial, and industrial customers invest in solar PV capacity primarily for their own use. They can choose rooftop or ground-mounted solar installations. Excess energy generated may or may not be exported to the grid, depending on the offering of the utility.
- **Off-grid generation (mini-grids)—**Developers invest in solar PV, hydro, or hybrid mini-grids. Developers are responsible for investing in and operating the mini-grid for a period of time.

This guide is not intended to cover the following types of projects, although much of the information may still be relevant:

- **Solar home systems—**These are basic solar systems that do not involve interconnection with the grid. They typically do not need to be licensed and can be purchased over the counter.
- **Construction contracts** for RE projects.

## 6.3.2. Setting up a business[153]

Foreign investors must acquire two main licenses before they can operate in Vanuatu:

- A **Foreign Investment Approval Certificate** (FIAC) must be issued to any foreign investor interested in operating in Vanuatu. A "foreign investor" is defined by the Foreign Investment Act 1998 as anyone who is not a citizen of Vanuatu, or as a company where any ownership or shares are controlled by a non-citizen.
- A **business license** is required to establish a business in Vanuatu and prior to starting any operations. Business licenses are valid for one year at a time.

The Vanuatu Investment Promotion Authority (VIPA) is the main contact point and source of information for potential investors.

### *Foreign Investment Approval Certificate*

Section 5 of the Foreign Investment Act establishes the requirement that any foreign investor must acquire an FIAC prior to any investment activity. All contracts and agreements prior to obtaining the FIAC approval would be void.

Section 6 of the act outlines the application process and the information required for investment approval. The certificate-issuing agency is the Vanuatu Investment Promotion Authority. The application form (Application for a VIPA Certificate of Approval by an Investor for a new Investment) can be downloaded from VIPA's website, www.investvanuatu.org.

The application must be completed before being submitted, and the following documents should be submitted with the application:

- Photocopy of business name reservation
- Photocopy of passport and/or ID pages for each investor
- Photocopy of police clearance for each investor intending to reside in Vanuatu
- A business plan, including a plan for training Ni-Vanuatu workers and a complete cash flow/profitability projection for the next three years

The application requires some detailed information on the proposed investment opportunity and investors such as:

- Names and nationalities of each of the potential investors
- Proposed business locations and business activities
- Whether land has been identified and secured
- Potential value of the investment
- Whether the investment will affect the environment

### *Starting a business*

The Vanuatu Financial Services Commission (VFSC) is responsible for operating and managing the Vanuatu Business Registry. It was established through section 2 of the Vanuatu Financial Services Commission Act 1993, with the Commissioner being appointed by the Minister.[154] Section 7 (2) sets out the commission's duties of regulating financial services and managing business registrations.

Registering a company can be done online by registering an account with VFSC on its website (www.vfsc.vu). The process is relatively streamlined and requires the investor to register for an account. All document and information requirements are described online. The application can also be made in person at VFSC offices, but this will incur higher processing fees than using the online portal.

The process and requirements for incorporating companies is established through the Companies Act 2012, part 2. Schedules 1, 2, 3, and 4 of the act define the standard model company rules, which can be adopted by any newly incorporated company. The different model rules correspond to the following corporate structures:

- Private companies
- Single shareholder companies
- Public companies
- Community companies

153 Vanuatu Financial Services Commission, http://www.vfsc.vu/ and relevant legislation

154 Minister refers to the minister responsible for finance, in this case the Minister of Finance and Treasury.

In addition to registering a company, the following steps are needed to legally operate a business in Vanuatu.

- A business license is required for all for-profit companies, as per section 2 of the Business Licence Act 1998. The penalty for operating without a license can be a fine of up to 500,000 Vanuatu vatu and/or imprisonment of one year. Business licenses must be renewed annually. Under the act, Vanuatu Customs and Inland Revenue Department is the licensing authority in Port Vila and provincial governments issue licenses outside the Port Vila municipal area.
- New businesses must register with the Vanuatu Customs and Inland Revenue Department for a value-added tax (VAT) certificate. The sale of electricity requires VAT, and businesses that have a monthly turnover of at least 333,000 Vanuatu vatu need to register for VAT.

Table 56 describes the process for registering a business and the fees involved.

### Table 56: Steps required to register a company with VFSC

| STEP | ACTIVITY | DESCRIPTION | EXTERNAL DOCUMENTS REQUIRED AND FEES (IN VT) |
|---|---|---|---|
| 1 | ***Registering a company name*** | A unique company name must be chosen and registered. Once a unique name has been found, it can be reserved for up to six months if needed.<br>The entire process is completed through the online portal or at VFSC's offices. | • No external documents required.<br>• Confirming name uniqueness: Free (online) /1,000 (in office).<br>• Reserving name: 5,000.<br>• Registering name: 10,000 (online)/ 12,000 (in office). |
| 2 | ***Company rules*** | The company rules must be decided and uploaded. VFSC offers standard company rules free of charge but custom rules may also be used. | • Information on directors and all shareholders is required.<br>• The Companies Act Schedules 1, 2, 3, and 4 offer standard company rules. |
| 3 | ***Company registration*** | Company registration can be completed once all information has been entered and VFSC accepts the application. | • Registration fee 30,000 (online)/ 35,000 (in office).<br>• Total application process will take a few days to complete and be accepted. |
| 4 | ***Business licence application*** | Applications for business in Port Vila must be submitted to the Customs and Inland Revenue Department. | • Application fees depend on business turnover and range from 20,000 to 1,000,000. |
| 5 | ***Registering for VAT*** | VAT registrations are done through registration form CT 201, which is available at the Customs and Inland Revenue Department. | • No charge for VAT registration |

*Source: Vanuatu Financial Services Commission*

### Table 57: Legislation relevant to setting up a business

| FOREIGN INVESTMENT |
|---|
| Foreign Investment Act 1988 |
| **STARTING AND OPERATING A COMPANY** |
| Companies Act (Cap 215) 2012 |
| Vanuatu Financial Services Commission Act 1993 |
| Business Licence Act (Cap 52) 1998 |

## 6.3.3. Land access and acquisition

According to its Constitution, only indigenous citizens of Vanuatu can own Vanuatu land. All developers must therefore lease the land intended for development from customary landowners. 95 percent of total land in Vanuatu is customary land, while the remaining 5 percent is public land owned by the government.[155]

The simplest scenario for RE developers is to lease government-owned land, as it would mean the developer is negotiating with a single entity where ownership is clear and fully established. A second option is to lease land from local religious institutions such as churches, often identified as the customary owner of the land they occupy. If those options are not available, then the developer must lease customary land from a Vanuatu citizen.[156]

### *Leasing customary land*

According to the Land Leases Act (Cap 163), a land owner may lease out the land for a maximum term of 75 years. All leases with a term longer than three years need to be registered with the Land Registry within the Ministry of Lands and Natural Resources.

According to section 39 of the Land Leases Act, the rent price of all lease contracts may be reviewed every five years upon providing a written notification. If no agreement is reached upon rent review, a Lands Referee will be appointed.[157]

The Custom Land Management Act 2013 sets out a clear framework to identify customary land ownership through customary institutions called nakamals.[158] The process makes the land lease negotiation process much simpler by shortening the time it takes to identify the rightful owners of customary land. Part 3 of the act establishes the process for determination of custom owners.

Once the rightful custom land owner has been determined, an application for a Negotiator's Certificate can be submitted to the Department of Land.[159] This is required through section 6 of the Land Reform Act, where only certified negotiators can negotiate for the lease of customary land.

The custom land owners are then free to negotiate with potential investors on land lease under the Land Lease Act.

**Table 58: Legislation relevant to design, construction, and commissioning**

| LAND ACQUISITION |
|---|
| Land Acquisition Act 1992 |
| Land Leases Act 1984 |
| Land Reform Act 2014 |
| Custom Land Management Act 2013 |

155 Meadows, John, 2017, Experiences Implementing Land Reform in Vanuatu

156 World Bank, May 31, 2017, VREP II Project Information Document

157 The Lands Referee Act 1988 establishes the land referee to be appointed by the president and to have the authority to decide on disagreements regarding rent (whether original lease agreements or reviews of existing contracts).

158 Nakamals are places of gathering in villages. Decisions, such as the identification of the rightful land owner, are made in the nakamal and decrease the load on the judicial system.

159 According to section 6 of the Land Reform Act (Cap 123), no negotiations for customary land lease can take place before a negotiator's certificate has been issued.

## 6.3.4. Social and environmental assessments

The Environmental Management and Conservation Act (Cap 283) defines the required studies relating to impact on the environment and social/cultural customs. Section 14 of the act and part 2 of the Environmental Impact Assessment Regulations state that, prior to development, an application must be made to the Director of the Department of Environmental Protection and Conservation. The director will assess the potential impact from the development and decide whether a full EIA is required.

Section 9 of Schedule 1 of the Environmental Impact Assessment Regulations 2011 identifies "Energy generation facilities and other infrastructure services" as activities requiring a preliminary EIA. The director's assessment determines whether a full EIA is required.

The criteria used by the director to assess whether a full EIA is required are listed in section 14 of the act:

- The significance of the identified environmental, social, and cultural impact
- Whether any actions have been proposed to effectively mitigate, minimize, reduce, or eliminate the identified impact

A developer can, therefore, according to section 14 of the act, propose an action or an action plan to minimize the environmental, social, and cultural impacts identified. If the director deems that the proposed action or action plan is enough to minimize the impact, a full EIA will not be required. While this will likely not be the case with larger hydropower developments, a well-proposed action plan following a smaller solar farm or a mini-grid might be enough to avert the need for an EIA. EIAs are discussed in more detail in Section 6.3.5.

### *Environmental impact assessments*

The Environmental Impact Assessment Regulations set out the requirements for conducting and submitting an EIA. All EIAs must be conducted under the direction of the director and to be performed by an independent consultant selected by the director.

Section 8 of the regulations lists the following information as required in any EIA:

- The name and location of the project, proposal, or development activity; details of the project proponent; the date of preparation of the project, proposal, or development activity; the name of person or body responsible for its preparation.
- Copies of project plans and engineering designs with clear units of measurement.
- Proof of identity for any persons who participated in the preparation of the terms of reference, including full contact details.
- A description of the purpose and scope of the proposed project, proposal, or development activity, including the background, rationale, and its intended goals and objectives.
- A description of the environmental setting of the site, including the environmental resources and conditions in the area before the implementation of the project, proposal, or development activity, and a projection or estimation of changed environmental circumstances that may occur as a result.
- Any possible environmental and resource management impacts of the project, proposal, or development activity, including any pollution or waste that may be generated, and any effects of its construction, operation, decommissioning, and abandonment phases.
- A statement of the various alternatives that have been considered, including energy efficiency measures, that are reasonably foreseeable and technically and economically appropriate, including the option of taking no action, and an outline of the reasons for choosing the proposed action.
- A statement about the mitigation actions proposed in respect of any adverse impacts identified in the report.
- Details of individuals, organizations, government offices, ministries, non-governmental organizations, villagers, local councils, and others, who been consulted and who have an interest, expertise, or jurisdiction regarding the project, proposal or development activity.

- Details and copies of any agreements between the project proponent and any villagers, local councils, and others concerning the access, occupation, ownership, and any other rights to the relevant land.
- A summary of the results of public consultations held on the project, proposal or development activity.
- Recommendations on the selected alternatives, mitigation measures, monitoring, other studies, analysis, and any additional consultation that may be required.
- Any other matter specified in the terms of reference.

In addition to an EIA, an environmental management and monitoring plan (EMMP) must be submitted. The EMMP should set out a monitoring and surveillance program and must appoint an environmental monitoring manager to ensure the project is following the agreed protection measures.

Once an EIA has been submitted, a process begins where the director will seek public consultation and appoint a committee to review the EIA. The committee will have 30 days to submit its recommendation.

Once approval has been given, development must begin within 12 months, or a new preliminary environmental assessment application must be submitted.

Costs will include payments to the consultant team, hiring a venue, and advertising for public consultation and other reasonable expenses as established by section 15 of the regulations. The latest fee requirements (in addition to the costs previously mentioned in this paragraph) are in the 2012 amendment to the Environmental Impact Assessment Regulations and are as follows:

- Preliminary impact assessment application—20,000 Vanuatu vatu
- Submission of EIA report—100,000 Vanuatu vatu
- Variation or amendment of preliminary environmental assessment application or EIA report—5,000 Vanuatu vatu

**Table 59: Legislation relevant to social and environmental assessment**

| VANUATU ENVIRONMENTAL LEGISLATION |
|---|
| Environmental Management and Conservation Act (Cap 283) 2002 |
| Environmental Impact Assessment Regulations 2011 |

## 6.3.5. Licensing and permits

### *Concession agreements*

UNELCO and VUI operate under concession agreements that effectively constitute licenses to operate in their concession areas. The concession agreements grant exclusive rights to UNELCO and VUI to sell electricity in their respective areas. According to the Electricity Act, a third party cannot sell electricity to others within a concession area, unless that third party is an IPP supplying to the concessionaire.

IPPs are permitted through the 2010 amendment to section 1B of the Electricity Act, which allows third parties (non-concession holders) to supply the concession holder with electricity.

### *Own-use solar*

Within the concession areas, the Electricity Act does allow electricity generation for self-consumption. Therefore, households or businesses wanting to install own-use solar PV can do so, as long as they meet the requirements set out in the URA's Standards and Rules for Solar Photovoltaic Installations in Vanuatu 2016. Whether or not the installation can be interconnected and synchronized with the existing grid depends on the policies of UNELCO and VUI, as discussed further in Section 6.3.6.

Iririki Island Resort in Port Vila recently installed a solar micro-grid (not synchronized with UNELCO's grid, and with its own battery capacity) to meet its electricity needs. The legality of this was disputed by UNELCO on the grounds that some of Iririki's apartments were owned by Iririki's customers, not by Iririki.

Therefore, Iririki was effectively selling electricity within UNELCO's concession area. The eventual solution to this dispute was for Irikiri to supply its apartments with power from its micro-grid, and for the other accommodation to be supplied by UNELCO.

When interviewed, VUI indicated that it would allow its grid customers to install solar PV for self-consumption, as long as the installation does not impact the stability of VUI's grid (which is small and has limited scope to handle solar PV installations being interconnected with the grid).

### *Outside the concession areas*

As described in Section 6.2.3, the Electricity Supply Act (Cap 65) section 1B states that anyone outside a concession area can generate and retail electricity without a license, as long as they meet requirements defined by the URA. Under the Utilities Regulatory Authority Act 2007, the URA is responsible for regulating all electricity generation, transmission, distribution and supply (all defined as "regulated services" under section 1 of the URA Act). The requirements defined by the URA include:

- Safety standards
- Reliability standards
- Reporting requirements
- Anti-competitive protections

The URA is aware of the lack of licensing process and framework outside of the concession areas and is working on an amendment to the URA Act that would allow the URA to define such a process.

### *Geothermal energy licenses*

Vanuatu distinguishes itself from the other countries covered in this report as being the only country with well-developed legislation and licensing framework for the development of geothermal energy. The Geothermal Energy Act (Cap 197) was passed in 1987 and sets out the requirements for prospecting and production licenses.

The act states that ownership and control of all geothermal energy rests with the government (section 2) and no prospecting of geothermal energy may be done without a prospecting license. An application for a prospecting license must be submitted to the Minister of Lands and Natural Resources and must include information on the applicant and the site to be researched.

Production licenses are issued by the same minister that issues prospecting licenses. Once issued, the licenses clearly define the land on which development is allowed and state the period for which the license is valid. The maximum term for production licenses is 30 years.

The application process for the production licenses is mostly at the discretion of the minister who, according to section 20, must approve the technical specifications and proposed designs. Section 20 sets out the necessary information that must be provided within the application.

A summary of the information required follows:

- The proposed license period
- Information on the applicant and the financial state of the developer
- Details on the operations including technical designs, development schedules, and any programs aimed at reducing impact on nearby land
- Commercial forecasts and estimated capital expenditure and operating expenses
- An inventory of expected imports and goods required

In addition, the Minister of Lands and Natural Resources may ask for further information relevant to the development.

**Table 60: Legislation relevant to licensing and permits**

| ELECTRICITY GENERATION LICENSE |
|---|
| Electricity Supply Act (Cap 65) 2010 |
| Utilities Regulatory Authority Act 2007 |
| **GEOTHERMAL ENERGY** |
| Geothermal Energy Act (Cap 197) 2006 |

## 6.3.6. Procurement and project approval

### *IPPs*

Within the concession areas, UNELCO and VUI are the only off-takers for IPPs. UNELCO produces its own power development plan in which it prioritizes the expansion of generation capacity, but this plan is typically not made public.

As described in Section 6.2.3, the URA has published guidelines on the procurement of new power generation. It describes a process where the URA approves a least-cost development plan and manages the procurement of specific generation projects (as identified by the concessionaires). The URA tenders projects competitively, with concessionaires (and affiliated parties) free to compete against other prospective investors. UNELCO contested the guidelines but the court found in favor of the URA.

The URA has also published feed-in tariff and net-metering guidelines that define a clear first-come, first-serve process for RE investors to install small-scale RE generation that has priority dispatch. However, as described in Section 6.2.3, UNELCO successfully challenged these guidelines in court and therefore they are not being applied.

VUI has a small system and therefore there is limited scope to add new generating capacity, in particular, intermittent renewables.

There is only one IPP operating within the concession areas—a 0.5 MW grid-connected solar PV installation in front of Parliament and the Ministry of Climate Change. The installation is owned by the government and was funded with a grant from the United Arab Emirates government. It was not tendered out by UNELCO.

Both UNELCO and VUI indicated that they are open to the possibility of negotiating with potential IPP investors who have unsolicited proposals.

### *Own-use solar*

The URA has published feed-in tariff and net-metering guidelines that define a clear first-come-first-serve process for RE investors to install own-use solar. However, as described in Section 6.2.5, UNELCO has challenged these guidelines in court and therefore they are not being applied.

### *Mini-grids*

The DoE and the URA have expressed intent to use the private sector to establish new mini-grids in rural areas of Vanuatu. They are expecting to provide subsidies and allow cost-reflective tariffs to encourage private sector interest. The DoE has, with the support of development partners, identified at least 36 potential mini-grids, as detailed in Section 6.2.2. The second phase of the VREP, supported by the World Bank, plans to implement a number of these mini-grids. Owner's Engineer has been recruited to design and implement five mini-grids. The design document suggests demand that is much smaller than initially planned in the five sites identified and the scheme may not be viable. The team is currently discussing possible options with the DoE. The implementation approach therefore has not been decided, but the DoE is considering the following options:

- Bundle them with the existing concession contracts (currently held by UNELCO and VUI). This would effectively allow the new mini-grids to be cross-subsidized by the urban concession areas.
- Tendering out both the construction and operation to new private sector investors under a subsidy scheme. The feasibility of this option hinges on whether or not there is sufficient private sector interest and capability to invest in and operate new mini-grids.

DoE has expressed willingness to receive and consider unsolicited bids for constructing and operating mini-grids.

## 6.3.7. Commercial terms

### *IPPs*

The URA's IPP guidelines define key PPA terms in some detail. However, the guidelines are not being applied. UNELCO has developed its own draft PPA, but it is not published.

VUI has not developed an internal process for tendering IPPs and will most likely base its procedures on the URA's guidelines.

According to the URA Act, the URA should review all PPAs and approve any agreed price.[160] In addition to having to sign off on PPAs, the URA can propose an indicative price based on the generation technology to assist with PPA negotiations. But, given recent court cases challenging the URA's authority to regulate the existing concession contracts, it is unclear whether these provisions of the URA Act currently apply.

### *Own-use solar*

Because the URA's feed-in tariff and net-metering guidelines are currently not being applied, it is unclear what commercial terms, if any, are available to own-use solar installations within the concession areas.

As described above, the Iririki Island Resort in Port Vila recently installed its own-use solar PV. However, Iririki's micro-grid is not synchronized with UNELCO's grid and therefore no commercial terms were agreed upon. No other customers are known to have installed own-use solar while remaining connected to UNELCO's grid.

### *Mini-grids*

The Department of Energy and the World Bank have indicated that they will consider tendering out the construction and operation of RE mini-grids. Although the implementation method has not yet been decided, it is very likely that some subsidies would be offered as part of any tender to make the investment commercially viable.

Because no mini-grids have previously been developed outside of the concession agreements, there is no precedent for the commercial terms available to investors. Therefore, negotiation of any unsolicited proposal would be done on a case-by-case basis.

## 6.3.8. Tax and fiscal regime

### *Taxes applying to renewable energy projects*

The Vanuatu Customs and Inland Revenue Department is responsible for setting and collecting tax. Vanuatu has no corporate tax, no income tax, and no tax on capital gains. The VAT rate is 12.5 percent.

**Table 61: Taxes applicable to RE projects**

| TAX LEGISLATION |
|---|
| Value Added Tax 1998 |

### *Import duties*

Chapter 85 of the 2017 Harmonized Coding System covers the import of electricity generation equipment and parts. The following duties are subject to this report:

- Import VAT—All imports are subject to 12.5 percent import VAT.
- Import duty—Electricity generation equipment is subject to 5 percent import duties, while other parts might be subject to 15 percent import duties.

Schedule 3 of the Import Duties Consolidation Act (Cap 91) lists the goods that are exempt from regular import duties. Section X.62 lists "Soft Techniques of Energy" as being exempt from regular import duties. Instead, solar, wind and hydropower are subject to 5 percent import duty, unless the regular tariff rate is lower. More specifically, the following goods are covered:

- All solar PV equipment, including panels, voltage regulators, batteries and other accessories, and replacement parts
- Hydraulic engines and motors
- Wind turbines

160 The term "regulated services" is defined in section 1 of the Utilities Regulatory Authority Act 2007 and includes all electricity sales. Section 18 of the act gives the URA authority to set the maximum price of all regulated services.

## 6.3.9. Financing

### *Local financiers*

The commercial financial services sector in Vanuatu is limited to four commercial banks operating in the country: the National Bank of Vanuatu, ANZ, BSP, and BRED bank. All four banks offer conventional banking services to its customers and are willing to finance RE projects. See commercial lenders section for more information about the banks.

### *Renewable energy-specific financing products in the Pacific*

The private sector arms of Multilateral Development Banks are active in the region and are looking to fund larger IPPs and off-grid electrification through solar/hybrid mini-grids. A broad overview of the types of financing available to RE investors internationally is provided in the Annex.

The World Bank's Sustainable Energy Financing Program has been extended to Vanuatu. The funds from the Sustainable Energy Financing Program will be channeled through the VREP.

## 6.3.10. Design, construction, and commissioning

### *Labour market*

Companies aiming to hire employees must register as an employer with the National Provident Fund (NPF). Employee contributions to the NPF are 4 percent on employee salaries. Registration forms are provided on the fund's website, www.vnpf.com.vu.

The Vanuatu National Provident Fund Act and Regulations lay out the requirements for employers and the registration process.

The Employment Act is the main legislation governing the labor market. The main sections of the act relevant to RE investors include:

- Part 4—Employment contracts can be written or oral. The employer has a duty to provide a safe working environment and sanitary facilities. Employment contracts shall not be of a fixed term exceeding three years and must include a probationary period of 15 days, which may be extended to six months.
- Part 6—The maximum hours of work by an employee is 44 hours per week and no more than eight hours a day. Any work beyond the 44 hours a week requires overtime pay, as does work on public holidays.
  - On public holidays, overtime pay is 1.5x regular pay.
  - The first four hours exceeding maximum hours worked are subject to 1.25x regular pay.
  - All work beyond 48 hours a week is subject to 1.5x regular pay.
- Part 7—Annual leave accrues at one day for every month of employment.
- Part 8—Women shall not be employed during the night in any capacity relating to this report, except for management roles. Employment of persons under 18 is subject to limitations laid out in sections 38-42.
- Part 9—Employers are required to provide a safe working environment and to report any accidents.

A comprehensive study on labor practices in the Pacific, including Vanuatu, is being prepared by the World Bank.

**Table 62: Legislation relevant to design, construction, and commissioning**

| IMPORT DUTY |
|---|
| Import Duties (Consolidation) Act (Cap 91) 1976 |
| Harmonized Coding System 2017 |
| **LABOUR MARKET** |
| Employment Act 1983 |
| Labour (Work Permits) Act 1985 |

*Vanuatu Solar Station Credit: Michael Coghlan https://www.flickr.com/photos/mikecogh/*

## 6.3.11. Grid interconnection and operation

There are no published terms for connecting third-party generators to the grid. All technical specifications will therefore be defined in the PPA offered by UNELCO or VUI. UNELCO has only signed one existing PPA and the details have not been made public.

There is also no official grid code for transmission or distribution network operations. The URA, since its establishment, has been working towards developing better defined standards and rules.

For the operation of smaller generation units such as rooftop solar, the URA has developed standards and rules for solar PV installations. The standards follow the Australia/New Zealand international standards and are published on the URA's website.

# Annex


*Monasavu Hydro, Fiji (The Fiji Times)*

# Annex—Overview of financing options

This annex gives a broad overview of the types of financing options available to RE investors in the Pacific Island countries, whether local or international.

For debt financing, the main options include:

- **Commercial debt**—from either local or international financiers.
- **Flexible funding**—an investment fund that invests alongside project developers and their financial backers, providing co-investment in either debt, equity, or both to ensure the viability of a project.
- **Concessionary debt**—an investment facility, often in collaboration with a commercial bank, that provides low or zero interest debt. In some cases, competition for concessionary financing is introduced, for example, through a challenge fund where availability of financing is based on the quality of proposals and the team's ability to execute.

Other financing mechanisms include:

- **Guarantee mechanisms**—A program where a development partner provides a guarantee for a developer in the event of a default on a commercial loan.
- **Development capital subsidies**—Payments to developers for third-party costs such as detailed design, environmental impact studies, and other project preparation tasks prior to construction.
- **Third-party collateralization**—A program where a development partner would provide in-country collateral to enable a developer to qualify for corporate finance from a local bank.
- **Non-performing debt buyouts**—Similar to a guarantee program, where a development partner commits to buying non-performing debt in RE projects from commercial banks to reduce the bank's credit risk in lending to developers.

There are also a variety of results-based financing options, which are particularly relevant to investors establishing and operating mini-grids. These include:

- **Top-up tariff scheme**—A scheme where the price of power sold to the consumer is kept low. Meanwhile, a development partner facility remits cash payments on the output of power provided to consumers to the level at which private investment is feasible.
- **Performance grants**—Cash grants from a development partner to a mini-grid developer for each household or electricity consumer to cover the costs of development. Such performance grants are also called output-based aid (OBA).
- **Capital cost reimbursements**—Another instance of output-based aid where cash payments are made to developers to cover the costs of development, wayleave payments, or other hard costs in the development of a mini-grid. The payments are made once the mini-grid is in operation. Upfront payments are also possible, but this would not fall under the rubric of results-based financing.
- **Consumer connection loans**—Microfinance or concessional loans for household consumers to assist them in paying the total unsubsidized cost for connection of a mini-grid.

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