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PAPUA NEW GUINEA ENERGY SECTOR INVESTOR GUIDE

JULY 2022

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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AFOLU	Agriculture, Forestry and Other Land Use
AIFFP	Australian Infrastructure Financing Facility for the Pacific
APEC	Asia-Pacific Economic Cooperation
ASX	Australian Stock Exchange
AZN PNG	ANZ Banking Group
BSP	Bank of South Pacific
CBAL	Cottage and Business Activities List
C-centers	Community Centers
CEPA	Conservation and Environmental Protection Authority
CIG	Capital Insurance Group
DEC	Department of Environment and Conservation
DFAT	Department of Foreign Affairs and Trade
DNPM	Department of National Planning and Monitoring
DPE	Department of Petroleum and Energy
DLPP	Department of Lands and Physical Planning
EIA	Electricity Industry Act
EMC	Electricity Management Committee
ESPIMC	Energy Sector Program Implementation Monitoring Committee
EUPRIP	Energy Utility Performance and Reliability Improvement Project
GoPNG	Government of Papua New Guinea
GW	Gigawatts
GWh	Gigawatt hours
GST	Goods and services
HDI	Human Development Index
HFO	Heavy fuel oil
IBRD	International Bank for Reconstruction and Development
ICCC	Independent Consumer and Competition Commission
IFC	International Finance Corporation
IMF	International Monetary Fund
IRC	Internal Revenue Commission
IPA	Investment Promotion Authority
IPBC Act	Public Business Corporation of Papua New Guinea Act 2002
IPP	Independent Power Producer
JICA	Japanese International Cooperation Agency
K	Papua New Guinean Kina
KCH	Kumul Consolidated Holdings
KPHL	Kumul Petroleum Holdings Limited
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt hours
LCPDP	World Bank's Least Cost Power Development Plan
LLGs	Provinces and local-level governments
LNG	Liquefied natural gas
MEPSL	Minimum Energy Performance Standards and Labelling
MFAT	New Zealand Ministry of Foreign Affairs and Trade
MP	Member of Parliament
MRDC	Mineral Resources Development Company Limited
MW	Megawatt
NDC	Nationally Determined Contributions
NEA	National Energy Authority

NEMU	National Electrification Management Unit
NEP 2017-2027	National Energy Policy 2017–2027
NEROP	National Electricity Roll Out Plan
NISIT	National Institute of Standards and Industrial Technology
PEP	Papua New Guinea Electrification Partnership
PFM	Public Financial Management
PNG	Papua New Guinea
PNGFP	PNG Forest Products
PNGHDL	PNG Hydro Development Ltd.
PNGX	PNGX Markets Limited
POM	Port Moresby
POMSoX	Port Moresby Stock Exchange
PPA	Power Purchase Agreement
PPL	PNG Power Limited
RE	Renewable Energy
ROGEP	Rural On-Grid Extension Project
S&Ps	S&P Global Ratings
SHS	Solar Home Systems
SIPs	Service Improvement Programs
SMP	Staff-Monitored Program
SOE	State-owned enterprise
STREIT PNG	Support to Rural Entrepreneurship, Investment, and Trade in Papua New Guinea
TEIP	Town Electrification Investment Program
TPA	Third Party Access
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
YTOD	Yonki Toe of Dam

INTRODUCTION

Papua New Guinea (PNG), with a total land area of 46 million hectares, comprises the eastern half of the island of New Guinea and 600 smaller islands. PNG's diverse landscapes, ecosystems and rich flora sustain a population of 8.9 million. PNG's low on-grid electrification rate of approximately 15%, along with the high renewable energy (RE) targets, presents large opportunities for both on-grid and off-grid investments. Based on the Least Cost Power Development Plan (LCPDP) and the National Electrification Rollout Plan (NEROP), more than USD 700 million of funding is required to finance PNG's power sector expansion until 2030.¹

PNG has committed to a headline target of carbon neutrality within the energy sector by 2030.² Achieving this pledge is conditional upon technical and financial support from donors, financial institutions (domestic and international), and the private sector. Investments are also needed to achieve the goal, announced by the Government of Papua New Guinea (GoPNG) in 2018 at the Asia-Pacific Economic Cooperation (APEC) meeting in Port Moresby, of reaching a 70% electrification rate by 2030.

International donors such as the United States Agency for International Development (USAID), the World Bank, Asian Development Bank (ADB), Australia Department of Foreign Affairs and Trade (DFAT), Japanese International Cooperation Agency (JICA), the New Zealand Ministry of Foreign Affairs and Trade (MFAT), and United Nations Development Programme (UNDP) are broadly supporting the PNG energy sector by providing technical and financial assistance. Many of these donors' bilateral and multilateral programs aim to improve the energy sector's readiness for private sector investment, recognizing that partnering with the private sector is essential to achieving PNG's goals for electrification and carbon neutrality. To encourage investments from the private sector, it is critical to provide potential investors with pertinent and updated information on PNG's energy sector as well as guidance on the general and sector-specific investment and regulatory framework.

¹ Most of PNG's new power sector investment over the next 10 years is expected to be organized around projects identified in the LCPDP the NEROP.

² To maintain long-term sustainability of its environment and people, PNG is continuously taking ambitious actions to combat threats posed by climate change. PNG submitted its Nationally Determined Contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) in September 2015. In December 2020, PNG submitted its Enhanced NDC, which embodies the country's target to reduce national emissions and adapt to the impacts of climate change.

ABOUT THIS GUIDE

The United States Agency for International Development (USAID) PNG Electrification Partnership (PEP) Activity is a five-year (2020–2025) project partnership with the GoPNG to advance the country’s journey to self-reliance by contributing significantly to achieving the goal of connecting 70% of PNG’s population to electricity by 2030.

This **Energy Sector Investor Guide** (the Guide) was developed by USAID-PEP in collaboration with PNG’s Investment Promotion Authority (IPA). It aims to catalyze private investments in PNG’s growing energy sector. The Guide provides an overview of PNG’s economy, political environment, regulatory framework, investment climate and energy sector dynamics. It includes a step-by-step process for investors to follow for development and implementation of energy projects. The Guide includes a checklist of requirements from relevant government agencies and information on various permits, licenses, and investment opportunities.

The Guide is intended to serve as an informational tool for potential domestic and international investors. Readers may refer to the Guide’s Directory section, which includes contact information for USAID-PEP and other relevant organizations if additional information is required. The Guide will be updated periodically to reflect the evolving regulations and licensing guidelines in PNG’s energy sector.

Key investment highlights for the PNG energy sector include:

- **Ambitious electrification targets.** Home to nearly 9 million people, PNG is one of the largest countries in Oceania by landmass and population. However, the country’s on-grid electrification rate is approximately 15%, presenting a significant investment need, as PNG seeks to reach 70% electrification by 2030.
- **Major investment opportunity.** Based on the LCPDP and NEROP, more than USD 700 million of additional funding is required to finance PNG’s power sector expansion costs until 2030. Separately, the total addressable market (i.e., total potential revenue) for the off-grid sector (both mini-grids and standalone solar products) is approximately USD 800 million.
- **Private sector role.** The public utility company, PNG Power Limited (PPL), and the GoPNG do not have the resources to meet the investment needs of the energy sector alone, presenting an opportunity for the private sector to fill this gap. In this regard, PPL has a track record of contracting with IPPs to increase its power generation capacity.
- **Large renewable potential.** PNG has enormous untapped RE potential, including solar, wind, biomass, geothermal and hydropower.³ Given that diesel-based generation is used in all of PPL’s main grids and mini-grids, there is significant potential to provide lower cost renewable generation.
- **Donor support.** International donors such as USAID, the World Bank, ADB, Australia DFAT, JICA, New Zealand MFAT, and UNDP are supporting the PNG energy sector through technical and financial assistance to strengthen PNG’s regulatory framework, improve the ease of doing business, and increase the energy sector’s readiness for private sector investments.

³ Based on IFC’s “A Guide to Investing In Renewable Electricity Generation in the Pacific”, PNG has 147 GW in potential wind generation capacity, 4.2 GW in potential hydropower generation capacity. The country also has strong solar, biomass, and geothermal potential.

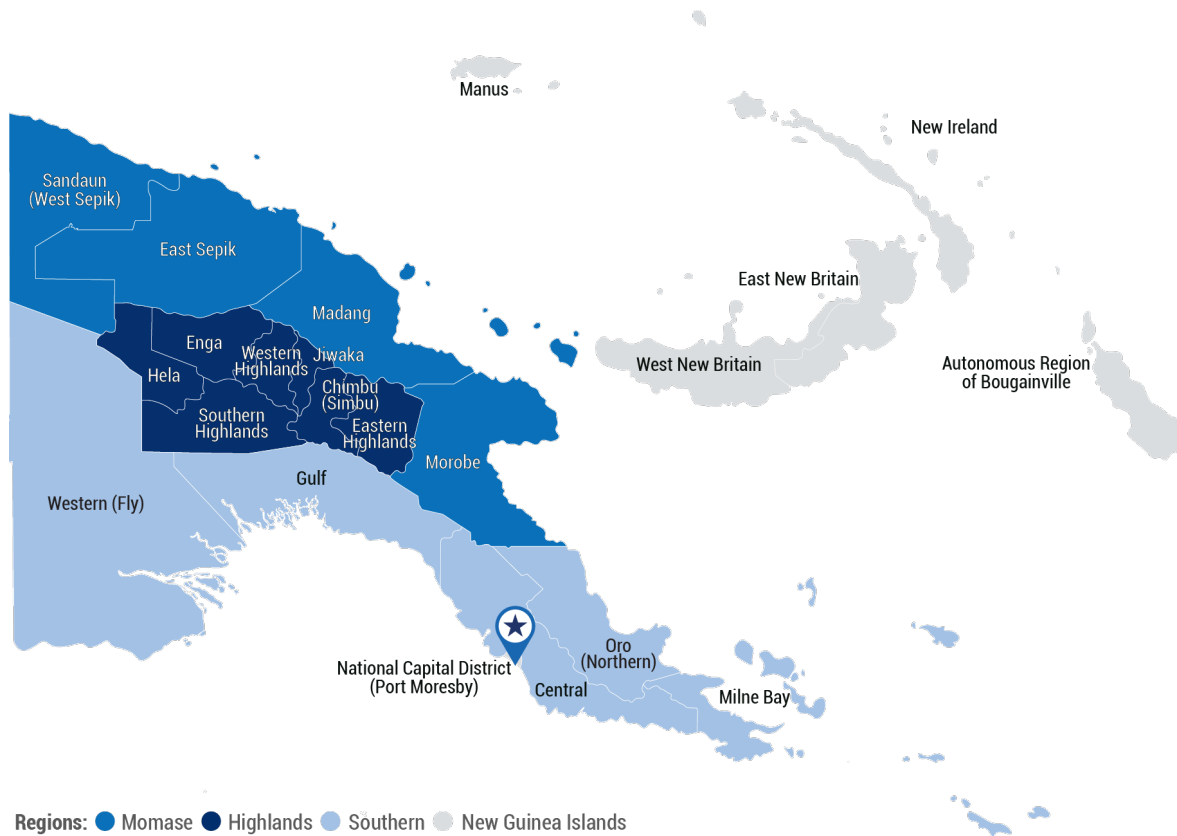
PNG PROFILE

COUNTRY BACKGROUND

GEOGRAPHY AND CLIMATE

PNG is an island country in the South Pacific. It has a land area of 46 million hectares and shares an international land border with Indonesia to the west, maritime borders with Australia to the south, Solomon Islands to the east, and the Federated States of Micronesia to the north. PNG has four regions: the Highlands Region, the Islands Region, the Momase Region, and the Southern Region. Administratively, PNG is organized into 22 province-level divisions: 20 provinces, plus the autonomous Bougainville region and the National Capital District. Port Moresby, the national capital, is in the Southern Region (see Figure 1).

FIGURE 1. MAP OF PAPUA NEW GUINEA'S REGIONS, PROVINCES, AND PROVINCIAL CAPITALS

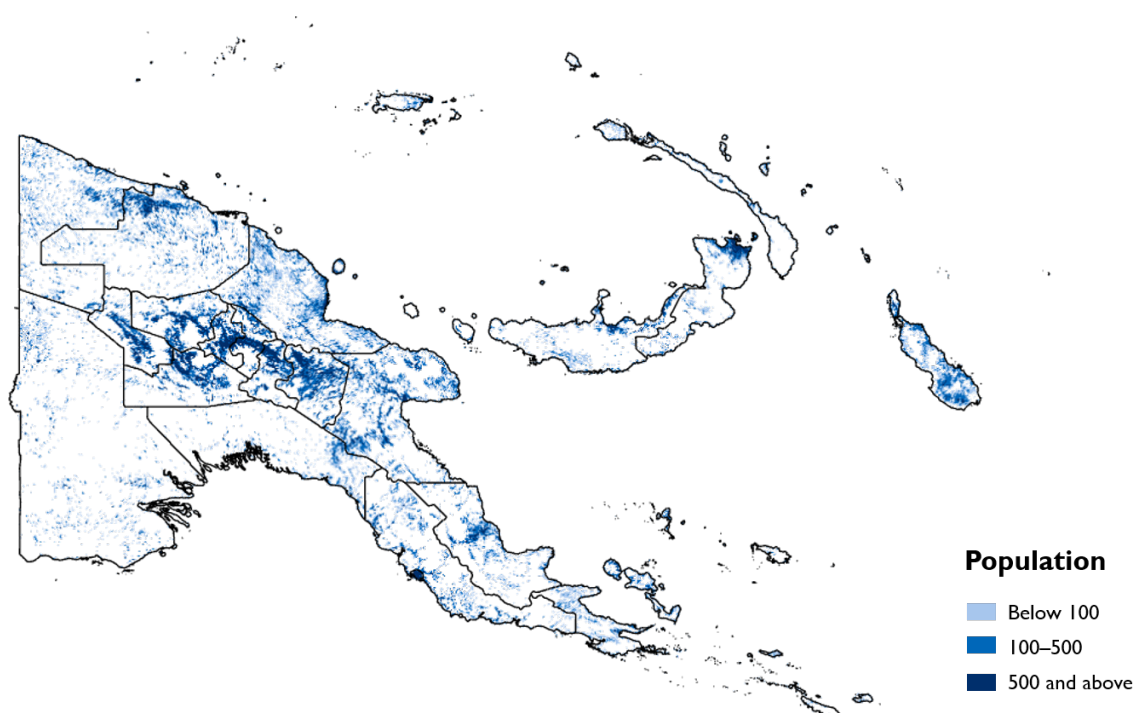


PNG is located in one of the most tectonically active areas in the world, also known as the “ring of fire”. The country experiences two distinctive seasons: wet season from December to April and dry season from May to September. The average monthly rainfall ranges between 250-350 mm, with average temperatures between 26-28 degrees Celsius.

POPULATION

PNG's most recent national population census was organized in 2011. The country's population grew from 3.8 million in 1990 to 7.3 million in 2011, and it was estimated to have crossed 8.9 million in 2020.⁴ More than 85% of the population lives in rural communities, which maintain traditional village structures and depend on subsistence farming supplemented by cash cropping. Around 40% of the population lives in the Highlands Region, 25% in the Momase Region, 20% in the Southern Region and the remaining 15% in the Islands Region. PNG is one of the most culturally diverse countries in the world with hundreds of distinct ethnic groups and around 840 distinct indigenous languages (12% of the world's spoken languages).⁵ PNG has one of the world's lowest population densities (Figure 2).⁶

FIGURE 2. POPULATION ACROSS PROVINCES OF PAPUA NEW GUINEA



Source: Facebook Population Database, 2018; USAID-PEP, 2021.

ECONOMY

PNG is largely underdeveloped, and its economy is dominated by two main sectors (i) agriculture, forestry and fishing, which together engage most of the labor force, and (ii) minerals and energy extraction, which account for most export earnings and GDP. The minerals, timber and commercial

⁴ World Bank. "Papua New Guinea Country Profile".

<https://data.worldbank.org/indicator/SP.POP.TOTL?end=2020&locations=PG&start=1960&view=chart>

⁵ Carmen Ang, "Ranked: The Countries with the Most Linguistic Diversity." <https://www.visualcapitalist.com/the-countries-with-the-most-linguistic-diversity/>

⁶ International Finance Corporation, "Going the Distance: Off-Grid Lighting Market Dynamics in Papua New Guinea."

https://www.ifc.org/wps/wcm/connect/region__ext_content/ifc_external_corporate_site/east+asia+and+the+pacific/resources/lighting+png+market+report

fishing sectors are dominated by foreign investors. The manufacturing and services sectors are underdeveloped.

PNG has not been able to fully harness its rich endowment of natural resources due to its rugged terrain, land acquisition issues, and the high cost of developing enabling infrastructure. The country is rich in minerals such as gold, silver, and copper. PNG's natural gas reserves are estimated at around 155 billion cubic meters. Mineral extraction accounts for two-thirds of export earnings, which totaled USD 11 billion in 2019. The formal sector is small and focuses mainly on export of natural resources.

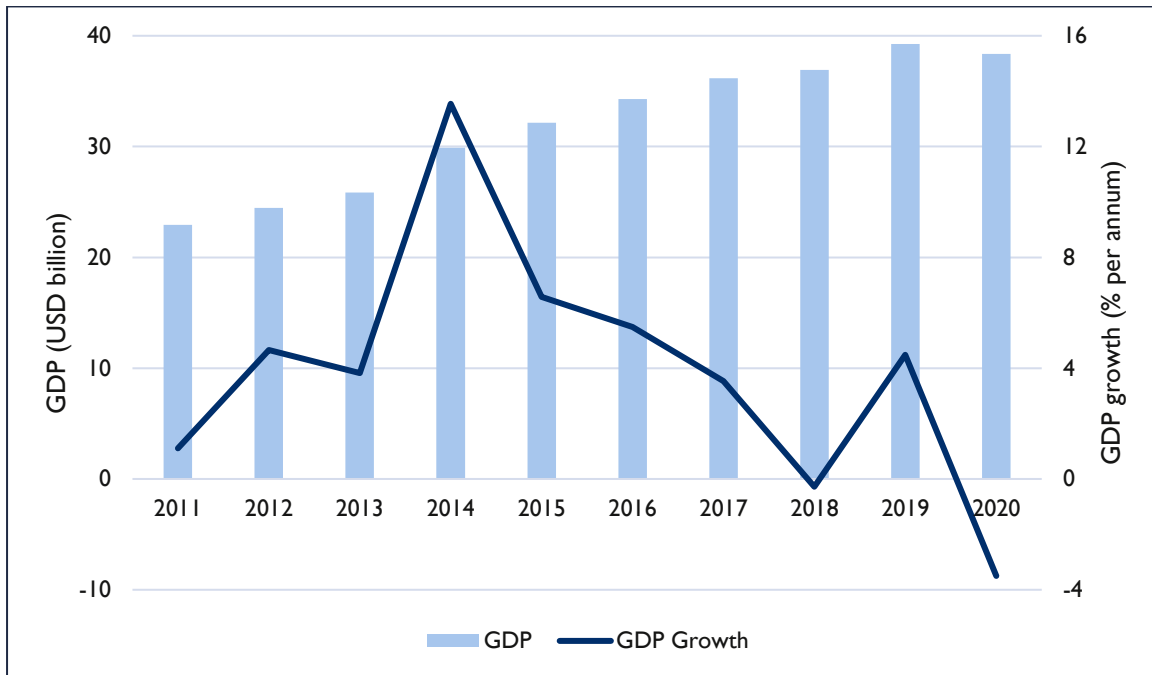
Most agriculture is subsistence, while cash crops are exported. Agricultural products include palm fruit, bananas, coconuts, sweet potatoes, coffee, cocoa, maize, corn, cassava, yams, game meat, roots and tubers, vegetables, and taro. The country also produces natural rubber and tea. Fishing is primarily confined to shrimp, and fishing boats of other nations catch tuna in PNG waters under license. About 40% of the country is forested, but the domestic logging industry has been slow to develop. PNG has the largest yam market in Asia and is world's ninth largest producer of palm oil.

The economy is highly dependent on imports for manufactured goods. Small-scale industries are involved in copra crushing, palm oil processing, plywood production, wood chip production, construction, tourism, livestock (pork, poultry, cattle), dairy products, spice products (turmeric, vanilla, ginger, cardamom, chili, pepper, citronella, and nutmeg), and fisheries products. These industries face challenges including small domestic market, relatively high labor costs, high transport costs, and expensive and unreliable power.

The extraction industries have driven PNG's GDP growth, and real per capita GDP growth has averaged 4% since the mid-2000s. Proceeds from PNG's oil and gas industry are being invested in the country's infrastructure development, which has led to increased international investor attention in major cities like Port Moresby and Lae. PNG is a lower middle-income economy with a GDP (PPP) of USD 38.4 billion in 2020 and a per capita GDP of USD 4,286 (Figure 3).⁷

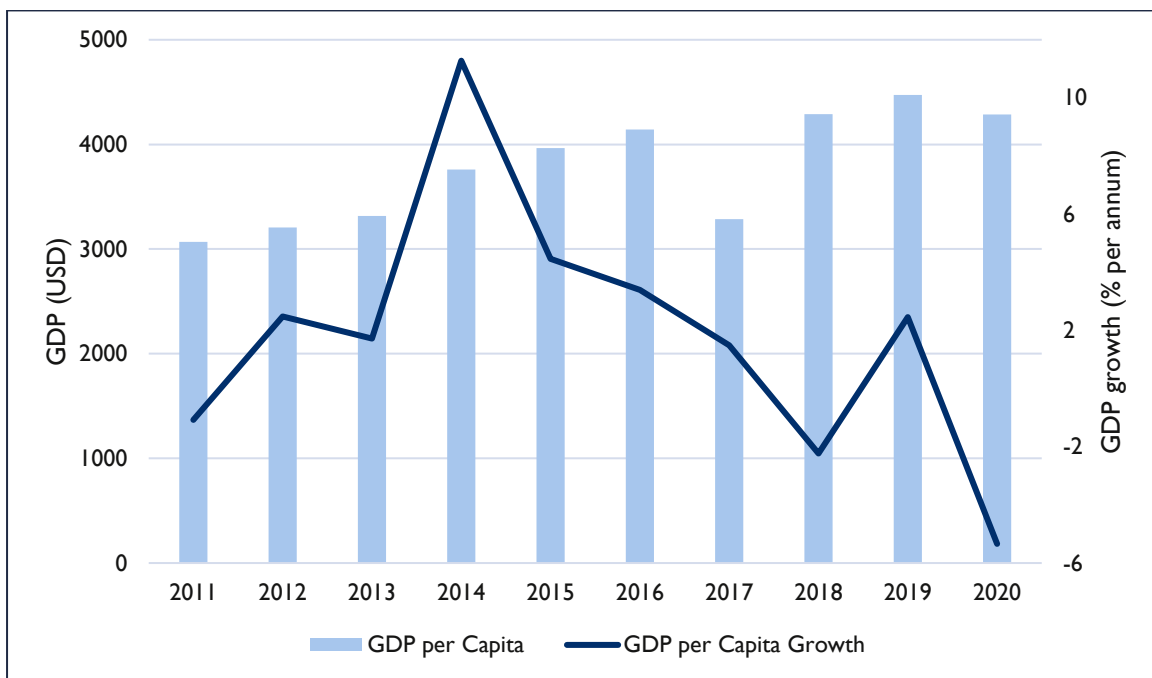
⁷ World Bank. "Country profile: Papua New Guinea". <https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD?locations=PG>

FIGURE 3. PNG'S GDP (PPP) & GDP GROWTH



Source: World Bank Group

FIGURE 4. PNG'S GDP PER CAPITA (PPP) & GDP PER CAPITA GROWTH



Source: World Bank Group

PNG has one of the world's highest current account surpluses and conducts a significant amount of international trade, but lags in foreign exchange inflows, tax revenue, and economic and social

development.⁸ This is largely because only a fraction of export proceeds from extractive industries flow back into the country. The extraction industry is largely foreign-owned and enjoys privileges, such as holding bank accounts overseas for procurement purposes.

POLITICAL OVERVIEW

PNG gained independence from Australia in 1975 and established itself as a constitutional monarchy. It is part of the Commonwealth, with the British Monarch as the Head of State, represented by a Governor-General. PNG has three levels of government: national, provincial, and local. The legislature is a unicameral Parliament with 118 Members of Parliament (MPs) selected from 96 single-member electorates and 22 regional electorates, through national elections that are held every five years. The regional electorates correspond to PNG's 20 provinces, plus the Autonomous Region of Bougainville and the National Capital District. Members from regional electorates also serve as provincial Governors. Provinces have their own legislatures and administrations.⁹

The Prime Minister, elected by Parliament, is the head of government and chooses other MPs to constitute the cabinet. All ministries are headed by a cabinet member assisted by a career public servant. The provincial governments have the power to levy taxes and are responsible for local education, industry, and business development. The local-level governments also have revenue-raising powers, and collect local taxes and fees, receiving transfers from the national government to cover salaries and development projects. They are responsible for water supply and, jointly with provincial governments, for health and environmental protection, waste disposal, roads, and economic promotion.

Historically, the Prime Minister's power has been tenuous due to the changing alliances of political parties and the risk of a "no-confidence vote" that lead to the Prime Minister's dismissal. Since independence, only two of nine elected Prime Ministers have completed their full five-year terms.

MPs control funds that drive provincial, district, and local development. These funds are channeled into Service Improvement Programs (SIPs), which include Provincial Services Improvement Programs, District Services Improvement Programs, and Local-Level Government Service Improvement Programs. These MP-controlled funds lack sufficient oversight.¹⁰

SOCIO-ECONOMIC OVERVIEW

PNG's per capita GDP of USD 4,286 in 2020 places it as a lower-middle-income economy, between many of its neighboring countries in the Pacific and above many countries in sub-Saharan Africa. PNG's Human Development Index (HDI) of 0.54 ranks 155th out of 189 countries, just above Uganda and Benin and just below Pakistan and Cameroon. In most provinces, the health component of HDI is highest, averaging 0.68, the education component averages 0.43, and the income component averages 0.45. In the Highlands Region, the provinces of Hela, Enga, and Southern Highlands have the lowest

⁸ David James. "One Country, Two Economies." <https://www.businessadvantagepng.com/papua-new-guinea-economic-paradox/>

⁹ Department of Foreign Affairs and Trade (Government of Australia), "Papua New Guinea country profile". <https://www.dfat.gov.au/geo/papua-new-guinea/papua-new-guinea-country-brief>

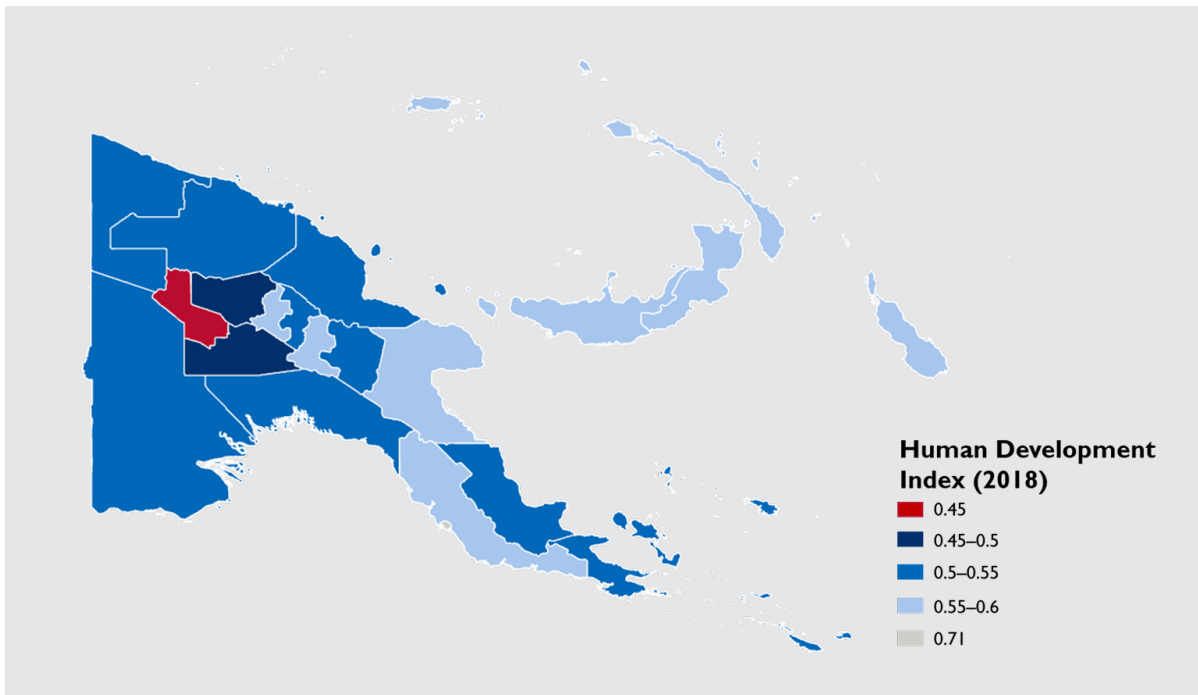
¹⁰ Guande. "Better Monitoring Needed to Transform Slush Funds into Development Funds in PNG." <https://devpolicy.org/better-monitoring-needed-to-transform-slush-funds-into-development-funds-in-png-20200922/>

average HDIs, while the National Capital District, containing Port Moresby, has the highest. PNG ranks thirteenth on the GINI Index, which is a measure of unequal distribution of a country's income.^{11,12}

¹¹ CIA World Factbook. "Gini Index Coefficient – Distribution of Family Income." <https://www.cia.gov/the-world-factbook/field/gini-index-coefficient-distribution-of-family-income/country-comparison>

¹² The higher a country's GINI Index ranking is, the more unequal its income distribution.

FIGURE 5. HUMAN DEVELOPMENT INDEX BY PROVINCE, 2018



Source: Global Data Lab Subnational Human Development Index

In PNG, formal sector workers are often rural residents who have migrated to cities or urban centers in search of employment. There are twice as many men in the formal economy as women. Table I gives an overview of socio-economic indicators in PNG.

TABLE I. PAPUA NEW GUINEA SOCIO-ECONOMIC INDICATORS

SOCIO-ECONOMIC INDICATOR	SUMMARY
Population (2020)	8.9 million (51.1% male, 48.9% female)
Population growth rate (2020)	1.9%
Urban and rural populations (2020)	13.3% urban, 86.7% rural
Population density (2020)	19.8 people per km ²
Urban population growth (2020)	2.6% annually
GDP (Nominal) (2020)	USD 24.7 billion (USD 2,757 per capita)
GDP (Purchasing Power Parity) (2020)	USD 38.4 billion (USD 4,286 per capita)
GDP growth rate (2019)	3.5% ¹³
Population living below National Poverty Line (2017)	37.5% ¹⁴

¹³ Due to Covid-19, PNG's GDP growth rate decreased from 4.5% in 2019 to 3.5% in 2020.

¹⁴ Asian Development Bank. "Poverty Data: Papua New Guinea." adb.org/countries/papua-new-guinea/poverty

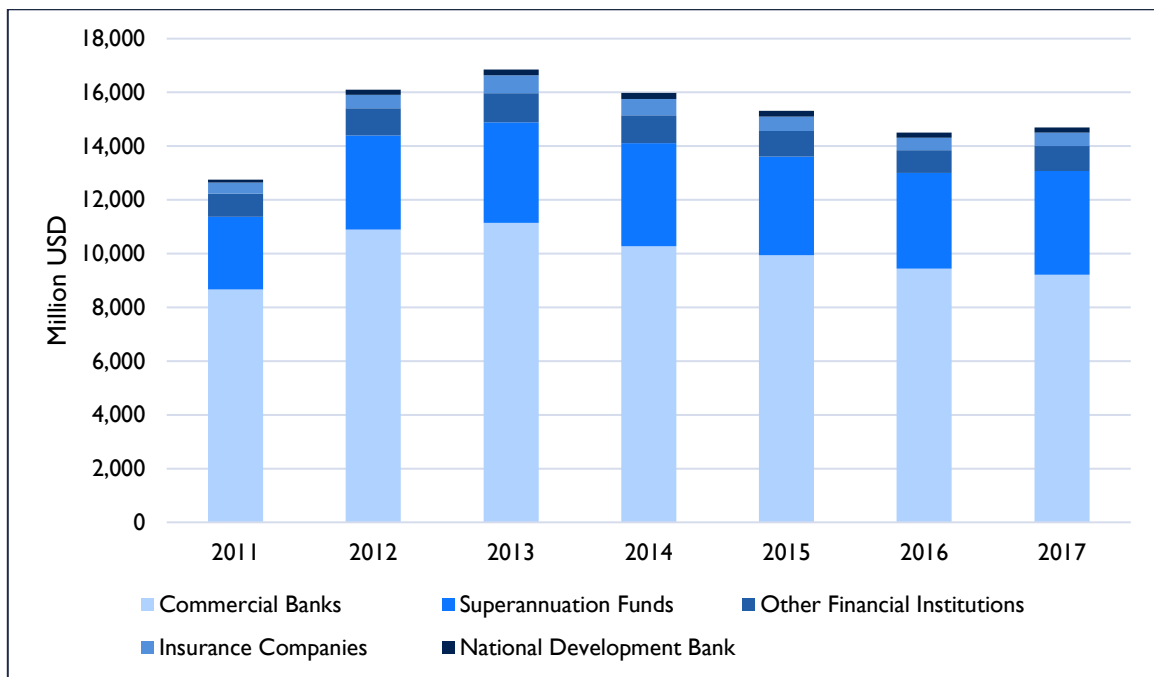
SOCIO-ECONOMIC INDICATOR	SUMMARY
Life expectancy at birth (2018)	64.3 years ¹⁵
Languages spoken	Hiri Motu (official), Tok Pisin, English, 839 indigenous languages
Main exports	Liquefied natural gas, oil, gold, copper ore, nickel, cobalt, timber, palm oil, coffee, spices, seafood

Source: World Bank Indicators, CIA World Factbook

FINANCIAL LANDSCAPE

PNG’s financial sector is more developed compared to other countries in the Pacific region, but trails behind comparable countries in other regions. Unlike most countries in the Pacific region, PNG’s financial sector not only includes the usual institutions such as commercial banks and microfinance companies, but more complex entities like superannuation funds, life insurance companies, and a stock exchange. The Bank of Papua New Guinea (BPNG) serves as the primary government regulator for most financial institutions in PNG. Despite the diversity of institutions, the financial sector needs further development, and the majority of the population do not have bank accounts and are uninsured. The financial sector grew an average of 15% each year from 2011-2013 but has since declined by an average rate of 3.3% per year (Figure 6).

FIGURE 6. PNG'S FINANCIAL SYSTEM ASSETS



Source: Asian Development Bank

¹⁵ The World Bank. "Data." <https://data.worldbank.org/indicator/>

BANKING

BPNG, the Central Bank, regulates the banking sector. PNG has four commercial banks – two of which, Bank of South Pacific (BSP) and Kina Bank, are locally based – accounting for almost 63% of the sector’s total assets in 2017. The two foreign banks licensed to operate in PNG are ANZ Banking Group (ANZ PNG) and Westpac Bank (Westpac PNG).¹⁶ Of the four commercial banks, BSP accounts for half the banking system’s assets, with ANZ PNG and Westpac PNG sharing the bulk of the remainder. BSP dominates domestic and regional banking as the largest bank with the widest network of branches and the broadest customer base.

While retail banking has considerably increased penetration, about 80% of the country remains unbanked, largely due to geographical challenges and security concerns. Financial institutions and non-governmental organizations are working to improve financial inclusion and financial literacy and to encourage more people to be part of the formal financial system. Mobile banking is gaining traction in the market, making banking services accessible even in remote areas. Aside from commercial banks, PNG also has savings and loan societies and licensed financial institutions including microfinance companies, money remitters, money changers, and foreign exchange dealers.

SUPERANNUATION FUNDS

PNG has four authorized superannuation funds – Nasfund, Nambawan Super, Defense Force Retirement Benefit Fund, and the Aon Master Trust. These funds make up the second largest group in PNG’s finance sector, accounting for 26% of financial system assets in 2017. PNG law requires pension contributions to be made for all government and private sector employees in firms with more than 15 staff.

INSURANCE

In 2019, the PNG insurance market comprised 13 general insurance companies, eight general insurance brokers, four life insurers, and four life insurance brokers. Regional firms QBE Insurance and Capital Insurance Group (CIG) are the market leaders in the general insurance market. There are only a handful of companies that provide both general and life products, including CIG, National Teachers Insurance, and Pacific MMI. In 2019, South Korea-headquartered DB Insurance entered PNG’s insurance market with the acquisition of a subsidiary of Century Insurance Company (CIC).¹⁷

As of December 2019, BPNG reported that life insurance assets reached K233.5 million (USD 69 million) and liabilities excluding shares and other equity accounted for K133.1 million (USD 39 million). Assets of life insurance brokers amounted to K118.9 million (USD 35 million), and liabilities totaled K71.5 million (USD 21 million). General insurance assets totaled K595.1 million (USD 176 million) and liabilities, excluding shares and other equity, amounted to K313.1 million (USD 92 million).¹⁸

¹⁶ ANZ sold its retail and small business banking operations in PNG to Kina Bank in 2018 but still provides financial solutions to institutional and large corporate clients. Westpac has been trying to exit their operations in PNG, however, the sale of Westpac’s operations in PNG to Kina Bank was blocked by the Independent Consumer and Competition Commission in 2021.”

¹⁷ Oxford Business Group. “Papua New Guinea Financial Services Overview.” <https://oxfordbusinessgroup.com/overview/staying-afloat-ongoing-reforms-and-large-scale-resource-projects-should-help-boost-insurance>

¹⁸ Ibid.

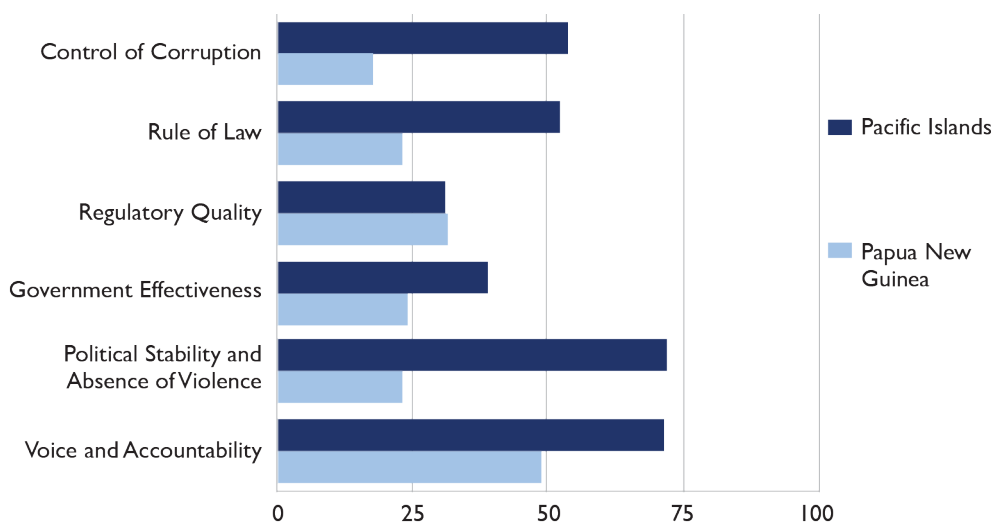
CAPITAL MARKETS

The capital market in PNG is relatively underdeveloped. The Port Moresby Stock Exchange (POMSoX) was incorporated in 1998 and began trading in 1999. In 2019, the POMSoX was renamed PNGX Markets Limited (PNGX). As of February 2022, there are only 12 listed companies covering banking and finance, aviation, mining and exploration, agriculture, and industries. A number of these entities are dual listed, with their primary listing on the Australian Stock Exchange (ASX). Due to the small number of listed companies and the underdeveloped financial sector, PNGX has low levels of liquidity and trading activity.

GOVERNANCE, INSTITUTIONAL CAPACITY, AND PUBLIC FINANCIAL MANAGEMENT

Governance. PNG scores poorly on the World Bank’s governance indicators, including significant constraints in respect of the rule of law, government effectiveness and control of corruption. Policy implementation and effectiveness continues to be bolstered by technical assistance from development partners and multilateral lenders providing support to the government. The risk of expropriation in PNG is moderate, and contract enforceability is weak. A comparison of PNG with other Pacific countries on major governance indicators, compiled by Export Finance Australia, Australia’s export credit rating agency and a statutory corporation owned by the Government of Australia, is shown in Figure 7.

FIGURE 7. PNG GOVERNANCE INDICATORS



Source: Export Finance Australia

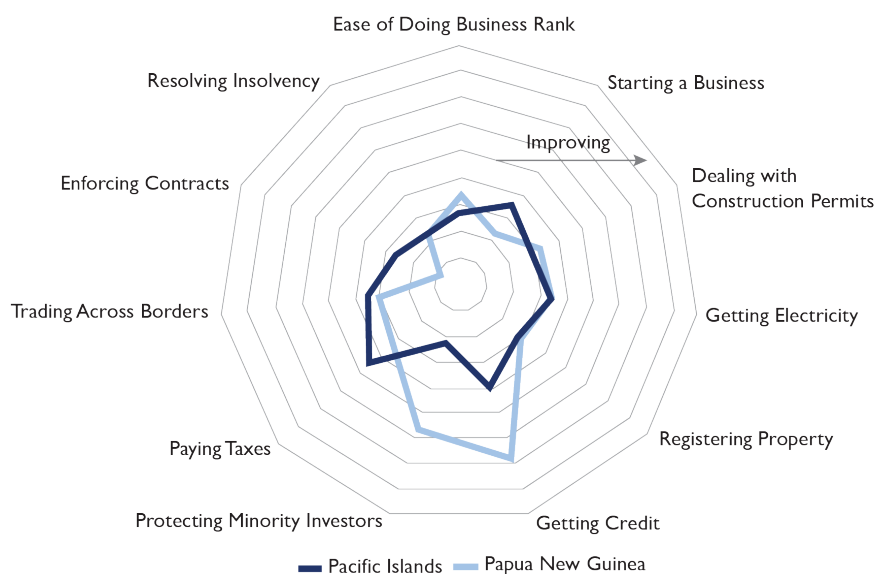
Institutional Capacity. PNG has a comprehensive institutional framework in place for the finance sector; however, its governance remains weak compared with other economies in the Asia-Pacific region.¹⁹ The capacity of government agencies to implement reform measures is constrained by weak management and technical expertise, limited financial resources, and inadequate performance management. Donors’ technical assistance programs indicate a need for capacity development in areas such as procurement, payroll management, and subnational Public Financial Management (PFM) systems, which are critical for budgetary control. In addition, fiscal and debt management remain a central challenge, compounded by the volatile nature of the economy and revenues from the natural resource sector.

Public Financial Management. Public asset and liability management is one of the weakest areas in PNG’s PFM System. Numerous statutory bodies fulfill a range of commercial, social, and regulatory functions together with state-owned enterprises (SOEs). Many of these entities lack a track record of timely submittal of annual financial statements. Budget preparation is fragmented across institutions and only a few departments undertake rigorous economic analysis of proposed public investment projects or provide systematic reports on the physical and financial progress of these projects. The legal basis for borrowing and the issuance of government guarantees is unclear, fragmented and to a certain degree contradictory.

PAPUA NEW GUINEA COUNTRY RISK RATING

PNG has received sub-investment grade sovereign debt ratings from major ratings agencies (Figure 9). The country ranks 120th out of 190 economies in the World Bank’s Ease of Doing Business Survey 2020. Enforcing contracts, resolving insolvency, and starting a business are more difficult in PNG relative to other Pacific island countries. On the positive side, access to credit and protections for investors are favorable compared to regional peers.

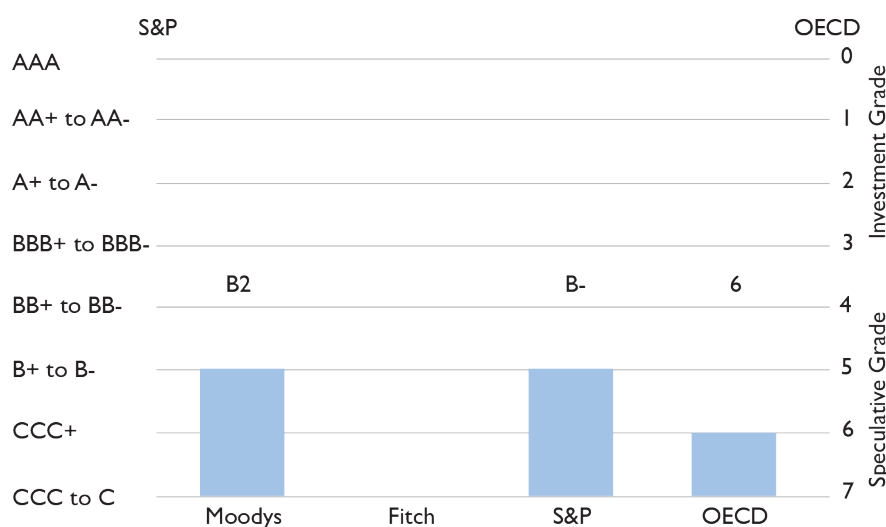
FIGURE 8. EASE OF DOING BUSINESS RANKING



Source: Export Finance Australia

¹⁹ ADB. “Papua New Guinea, 2021–2025 —Achieving Diversified, Sustained, and Inclusive Growth.” 2020. <https://www.adb.org/sites/default/files/institutional-document/644281/cps-png-2021-2025.pdf>

FIGURE 9. PNG RISK RATING



Source: Export Finance Australia

In April 2021, Moody’s Investors Service lowered the outlook on PNG’s ratings to negative from stable and reaffirmed the B2 long-term issuer and senior unsecured ratings.²⁰ In June 2021, S&P Global Ratings (S&P) maintained PNG’s rating at “B-/B”, removing the country from CreditWatch Negative.²¹ However, S&P projected a negative outlook for the economy, as it was expected to contract in 2021, given rising debt and interest payments along with the deteriorating public health situation, adding pressure to economic performance and accounts. PNG’s “B-/B” rating by S&P is three levels below investment grade, indicating that the country’s economy faces major uncertainties. S&P further stated that the rating might be further downgraded in 2022 due to PNG’s weak fiscal position and rapidly increasing debt levels. S&P also forecasted that debt to GDP will increase from 44.6% in 2021 to 49.9% in 2024 due to delays in the government’s fiscal consolidation efforts caused by the COVID-19 pandemic. During the same period, PNG’s fiscal deficit is expected to average 4.4% of GDP.

These investment ratings are, in part, due to the following reasons:

- Access to land and its use as collateral is limited in PNG as customary land owned by tribes, clans, and land groups account for 97% of all land in the country. Since customary land cannot be bought, access for private sector investments is often secured through special agriculture and business leases, negotiated by the government with landowners.
- PNG has a political structure in which the Prime Minister’s power is tenuous due to the changing alliances of political parties and the risk of no-confidence votes that lead to dismissal. Since independence, only two of nine Prime Ministers elected by Parliament have finished their terms. The Parliament ousted three of these with no-confidence votes, and three resigned to avoid such a vote.²²

²⁰ Moody’s Investor Service. “Rating Action: Moody’s changes Papua New Guinea’s outlook to negative from stable; affirms B2 rating.” 2021. https://www.moodys.com/research/Moodys-changes-Papua-New-Guineas-outlook-to-negative-from-stable--PR_443451

²¹ Islands Business. “PNG economy may recover when second LNG project begins, but debt will rise.” 2021. <https://islandsbusiness.com/news-break/papua-new-guinea/>

²² Kabuni. “What It Takes to Change a Prime Minister in PNG.” <https://devpolicy.org/what-it-takes-to-change-a-prime-minister-in-png-20201211-2/>

COVID-19 IMPACT

COVID-19 has significantly stressed PNG's economy, causing both its fiscal revenues and GDP to fall below pre-COVID levels. Lower commodity prices, weaker external demand, disruptions to international trade and supply chains, border closures, suspended international flights, and the impact of a hard lockdown have all depressed growth and reduced revenue expectations. In 2020, GoPNG announced a K5.7 billion (USD 1.5 billion) stimulus package to mitigate the impacts of COVID-19, including a K600 million (USD 162 million) fiscal response. The social and poverty impacts of COVID-19 are wide-ranging, adding to unemployment, increasing food insecurity, and exacerbating gender-based violence.²³ However, PNG's GDP growth for 2022 is expected to bounce back to more than 4% as mining activity resumes and the non-resources sector expands.²⁴

The pandemic's impact on PNG's economy was smaller than on other Pacific economies. While COVID-19 related restrictions negatively impacted PNG's extractive sector (such as gold and LNG production) in 2021, this sector is projected to grow in 2022 and drive the country's GDP growth. By contrast, the non-extractive economy is projected to recover more slowly from pandemic-related disruptions.²⁵

BUSINESS ENVIRONMENT

PNG has been regarded as a challenging place to do business; however, GoPNG has been introducing new reforms and policies to provide a conducive environment for doing business. The World Bank's Doing Business project provides a snapshot of a country's business environment, including objective measures of business regulations and their enforcement across 190 economies and selected cities at the subnational and regional level.²⁶ The report presents quantitative indicators on business regulations and the protection of property rights, with 1 denoting "easiest to do business" and 100 meaning "hardest".

According to the Ease of Doing Business Report 2020, PNG's overall index score was 59.8. The country's rank dropped to 120 out of 190 countries from 108 in 2018, with electricity provision and contract enforcement noted as areas of weakness.

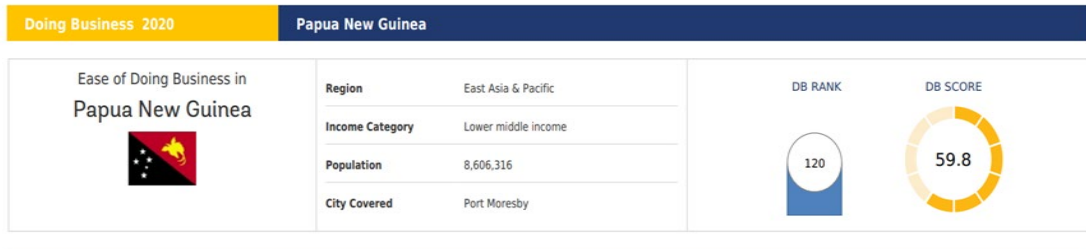
²³ ADB. "Papua New Guinea, 2021–2025 —Achieving Diversified, Sustained, and Inclusive Growth." 2020. <https://www.adb.org/sites/default/files/institutional-document/644281/cps-png-2021-2025.pdf>

²⁴ International Monetary Fund. "Papua New Guinea: Country Report No. 22/55". <https://www.imf.org/-/media/Files/Publications/CR/2022/English/IPNGEA2022001.aspx>

²⁵ The World Bank. "Papua New Guinea Economic Update Navigating a Fragile Recovery." February 2022. <https://thedocs.worldbank.org/en/doc/09b941e576eb6b69f737a726937b4385-0070012022/original/PNG-Economic-Update-February-2022.pdf>

²⁶ The World Bank. "Doing Business 2020 Papua New Guinea: PNG." <https://www.doingbusiness.org/content/dam/doingBusiness/country/p/papua-new-guinea/PNG.pdf>. (The Doing Business product was discontinued in September 2021).

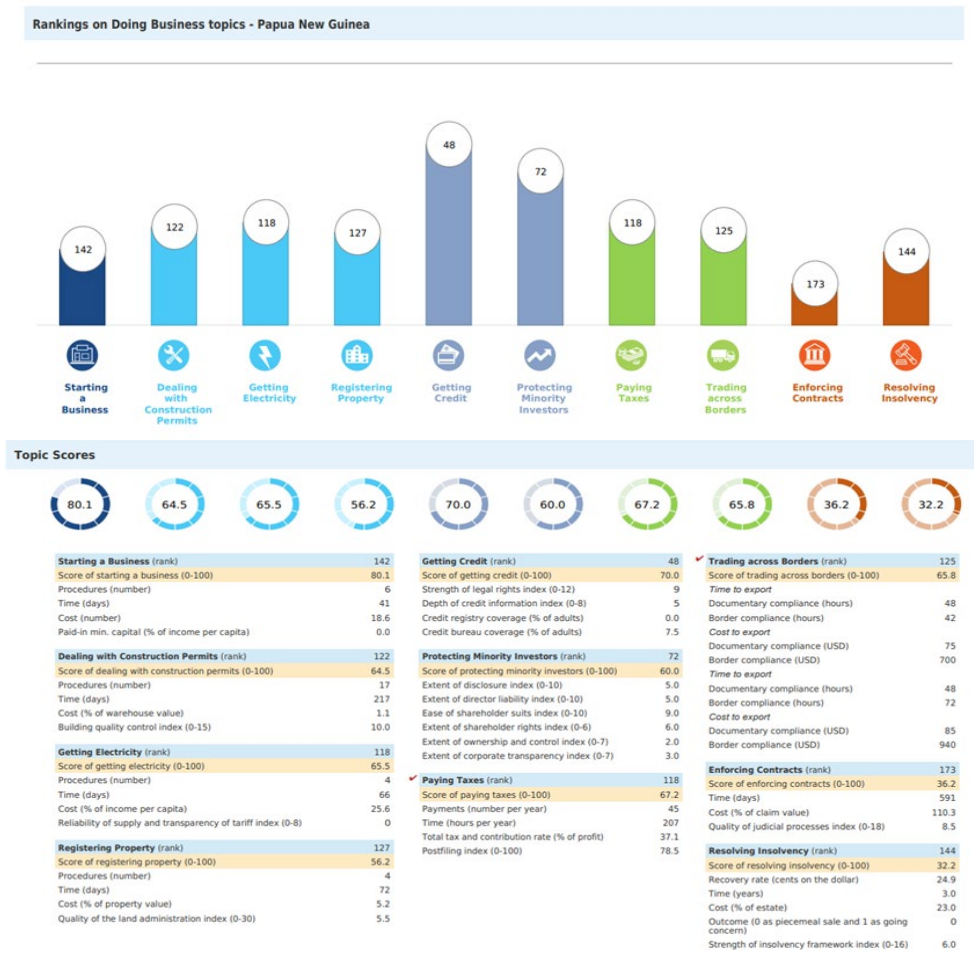
FIGURE 10. WORLD BANK DOING BUSINESS INDICATOR



Source: Doing Business 2020, Economy Profile Papua New Guinea

The 2020 report also covers quantitative indicators covering ten areas of the business environment. PNG ranked 142 out of 190 countries in “starting a business”, a slight improvement from 2018 when it ranked 143. According to the report, it takes 41 days to complete the required procedures to open a business in PNG, about twice the average time as for East Asia and the Pacific. PNG ranked 118 for “getting electricity”, a sharp drop from the previous year’s ranking of 72. The survey only applies to Port Moresby, where electricity is more easily accessible than in rural areas. This underlines the scale of investments needed in PNG’s power sector, and the urgency for government and development partners to implement improvements. The opportunity to invest in the power sector in PNG is very large, growing and aligned with the interests of key stakeholders.

FIGURE 11. PNG'S DOING BUSINESS RANKING BY TOPIC



Source: Doing Business 2020, Economy Profile Papua New Guinea

TAX REGIME

TAXES APPLICABLE TO RENEWABLE ENERGY PROJECTS

In PNG, tax legislation and regulation are relatively well defined and administered by the Internal Revenue Commission (IRC) and PNG Customs. Both institutions fall under the jurisdiction of the Treasurer and 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.²⁷ The main taxes relevant to RE projects are shown below:

TABLE 2. TAXES APPLICABLE TO RE DEVELOPMENT

TAX RATE	RESIDENTS	NON-RESIDENTS
Corporate Tax ²⁸	30%	48%
TAXABLE INCOME (K)		
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%
OTHER TAX		

²⁷ International Finance Corporation. Powering the Pacific: A Guide to Investing in Renewable Electricity Generation in the Pacific.

²⁸ 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.

Goods and services (GST)	10%
Additional profit	2%
Superannuation	25%
Trusts	30%

Source: Internal Revenue Commission Papua New Guinea, 2020

Incentives. The Income Tax Act specifies several tax incentives that could apply to RE developers in PNG. These include:²⁹

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

TAXATION OF COMPANIES

Financial Period

The fiscal year applied to the corporate income tax in PNG runs from January 1 to December 31, unless companies have obtained approval from the Commissioner General to adopt an alternative financial period.

Residence

A company will normally be treated as a resident of PNG in a particular year if it is:

- Incorporated in PNG
- Carries out business in PNG and has either its central management and control or its voting power controlled by PNG resident shareholders

Liability of resident companies

A resident company is taxed in PNG on its world-wide income. Non-resident companies pay tax only on their PNG income.

Calculation of taxable income

Special rules apply to certain sectors, such as mining, petroleum, and gas companies. In most cases, however, taxable income is generally equivalent to accounting income except where the income tax law requires specific calculations to be made.

²⁹ Ibid.

Dividends and deemed dividends

Dividends received by a resident company from any other resident company are included in the assessable income of the recipient. The company receiving the dividends is entitled to a rebate against tax otherwise payable on the dividends received.

A resident company that has paid dividend withholding tax on PNG sourced dividends received can offset the amount against withholding tax payable on dividends it pays. Unapplied dividend withholding tax at the end of the financial year can be carried forward seven years to future withholding tax on dividends paid.

All dividends paid by a resident company are normally subject to a dividend withholding tax of 17% of the dividend paid. This applies to dividends paid to residents and non-residents. The rate of the dividend withholding tax may also be modified as a result of a double tax treaty.

The dividend withholding tax does not apply in a number of circumstances:

- Dividends paid to exempt bodies such as sporting or charitable bodies
- Dividends paid to superannuation funds established for the benefit of employees
- Dividends paid out of pioneer income
- Dividends paid out of capital profits from non-redeemable bonus shares

The dividend withholding tax is payable on deemed dividends including:

- Liquidator distributions of accumulated revenue profits
- Loans to shareholders of private companies
- Excessive remuneration of directors (or their relatives) of private companies
- Shares sold as part of a tax avoidance scheme

Foreign losses

Losses incurred in deriving income from sources outside of PNG are not an allowable deduction from income sourced in PNG. Overseas losses are offset only against foreign-sourced income. These losses can be carried forward for up to 20 years.

Provisional tax

Provisional tax may be paid by companies to ensure that the income tax expected to be payable in a particular fiscal year will be collected during that year. This is accomplished by the Commissioner General issuing a provisional tax assessment based on the last income tax return lodged. If no tax was payable on the prior year's return (or a return was not lodged) the Commissioner General can estimate the payable tax.

Provisional tax is payable in three equal installments on or before April 30, July 31 and October 31. The amounts paid will reduce the company's tax bill when it lodges its income tax return for that year. If the taxpayer believes that the tax due for a particular year will be less than the provisional tax assessed by the Commissioner General, it may apply to have the provisional tax assessment reduced to reflect the estimated tax due. Penalties may apply for variations significantly below what is ultimately payable by the company.

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 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 895.01).

The head of state has the power to exempt or reduce the import duty on 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.

OVERVIEW OF PNG'S ENERGY SECTOR

ENERGY SECTOR OVERVIEW

Only about 15% of PNG's population is connected to the national grid. Due to PNG's geography, the country's power infrastructure is bifurcated into three distinct primary grids (Port Moresby, Ramu, and Gazelle Peninsula) and many regional mini-grids. Around 60% of the population owns at least one off-grid solar product such as solar home systems and solar lanterns.³⁰ Ownership varies by regions and is highest in the Islands Region.

PNG has high RE potential, but solar and wind resource availability varies greatly due to the country's mountainous terrain. Solar resources have high potential in the Western Highlands, as well as parts of Hela, East Sepik, and Madang.³¹ Wind resources are concentrated in the Western Province and the flatter northern part of the main island. PNG also has geothermal and biomass potential but harnessing these resources has proven to be costly and difficult. Due to its high rainfall, PNG has about 15 GW of hydropower potential, although detailed studies on the full potential are lacking.

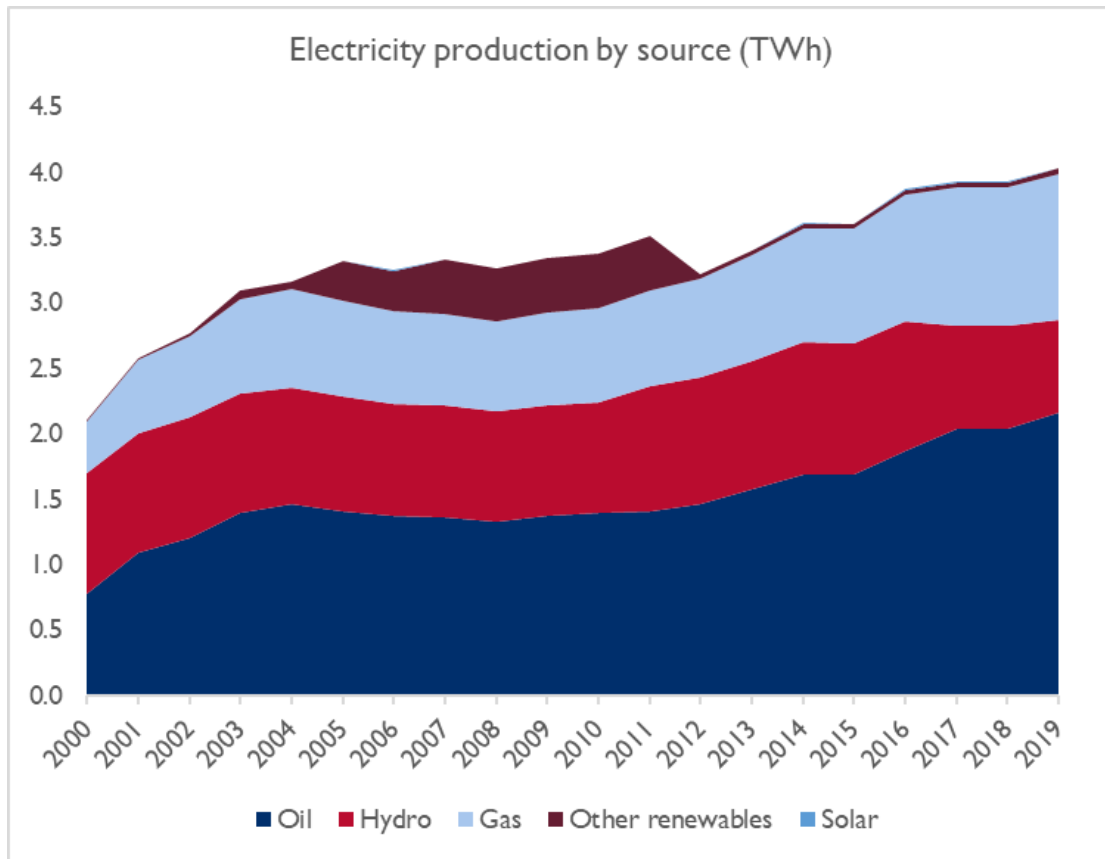
Grid electricity generation is primarily through oil, gas, and hydropower (Figure 12). Biomass constituted a sizeable share of electricity generation between 2004 and 2012 but has declined since 2012. Solar energy is primarily used in off-grid areas.³²

³⁰ International Finance Corporation, "Going the Distance: Off-Grid Lighting Market Dynamics in Papua New Guinea." https://www.ifc.org/wps/wcm/connect/region__ext_content/ifc_external_corporate_site/east+asia+and+the+pacific/resources/lighting+png+market+report

³¹ The World Bank. "Global Solar Atlas." <https://globalsolaratlas.info/>

³² Our World in Data. "Energy - Papua New Guinea." <https://ourworldindata.org/energy/country/papua-new-guinea>

FIGURE 12. ELECTRICITY PRODUCTION MIX IN PNG BY YEARS



* Y axis measured in terawatt hours (TWh), which is equal to 1,000 gigawatt hours

Source: Our World in Data, based on BP Statistical Review of World Energy & Ember (2021).³³

INSTITUTIONAL SETUP

GOVERNMENT INSTITUTIONS

Department of Treasury. The Department of Treasury is responsible for providing sound economic policy advice to the government to support informed decision-making. The department is responsible for developing and implementing the government's annual and medium-term budget frameworks; providing economic, investment, and tax policy advice; and managing the government's public debt. The Department of Treasury provides policy guidance for management of the performance of the PNG economy, as this pertains to the development of the energy sector.

Department of National Planning and Monitoring (DNPM). DNPM leads, plans, coordinates, and facilitates national and international initiatives that address and promote equitable and sustainable development of PNG in accordance with both the nation's long-term vision and the five principles of the National Constitution. DNPM acts as the key central agency advising GoPNG on matters relating to strategic development, development policy, development planning and programming, foreign aid coordination and management, and monitoring and evaluation of national development projects and programs.

³³ Our World in Data. "Papua New Guinea Energy Production and Consumption." <https://ourworldindata.org/energy-production-consumption>

Department of Petroleum and Energy (DPE). DPE is the current overarching agency responsible for energy sector policy and planning. DPE has three divisions: Petroleum, Energy, and Corporate Services. The Petroleum Division is responsible for administration and regulation of petroleum sector, while the Energy Division is responsible for advising the government on energy sector issues, data collection and analysis, and energy policy development.³⁴ The Energy Division heads the Electricity Management Committee (EMC), which is responsible for developing the ‘National Electricity Roll Out Plan (NEROP). This division is also responsible for power sector planning. Lastly, the Corporate Services Division supports and facilitates the other two operational divisions, with a particular focus on development of procedures and human resources.³⁵

National Energy Authority (NEA). In 2017, DPE introduced the PNG National Energy Policy 2017–2027, which aimed to establish an energy entity, NEA, solely responsible for the development and implementation of a National Energy Policy. In April 2021, GoPNG passed the NEA Bill to expedite the development and application of regulations related to all activities in electrification. NEA is/will be an umbrella agency for establishing service standards for transmission and distribution networks, setting electricity tariffs, regulating the sector, issuing licenses to electric sector participants, and enforcing electrical standards. The NEA Act 2021 was gazetted in July 2021. The Electricity Industry Amendment (Chapter 78) Act 2022 was passed by parliament in April 2022, which confirmed NEA as the sole regulator (both economic and technical) of the electricity industry and the energy sector in general. Moreover, any control mechanisms in the electricity sector managed by ICCC have been transferred to NEA by virtue of the NEA Act 2021 and the Electricity Industry Amendment (Chapter 78) Act 2022.

Independent Consumer and Competition Commission (ICCC). ICCC was previously responsible for price regulation, licensing, and industry regulation.³⁶ However, with recent changes in the institutional framework, ICCC will no longer be responsible for establishing electricity tariffs and setting the prices of petroleum fuels, and it will no longer issue licenses to independent power producers and mining companies that own generation and distribution facilities. These responsibilities have been passed to NEA.³⁷

Conservation and Environmental Protection Authority (CEPA). Established in 1985, CEPA’s role is to ensure the management of natural and physical resources in PNG and sustain environmental quality and human well-being.³⁸ CEPA is responsible for assessing the environmental impact of new gas development projects, hydropower infrastructure developments, and mining projects. CEPA also issues relevant environmental permits.³⁹

PNG Power Limited (PPL). PPL is a state-owned entity that serves as the national electricity utility in PNG. The Electricity Commission Privatization Act established PPL as the successor company of the PNG Electricity Commission. PPL is a vertically integrated power authority, meaning that it is responsible for the generation, transmission, distribution, and retailing of electricity. It operates the

³⁴ IRENA. “Pacific Lighthouses: Papua New Guinea.” <https://www.irena.org//media/Files/IRENA/Agency/Publication/2013/Sep/Papua-New-Guinea.pdf?la=en&hash=3E847FD95A91ADAA4CC34614F7A325F80CE36D39>

³⁵ Based on the “National Energy Policy 2017 – 2027, DPE would be restructured into the following three entities: a National Energy Authority (“NEA”), an Energy Regulatory Commission (“ENERCOM”), and a Community Service Obligation Company (“CSO Company”). For financial and capacity reasons, the NEA would handle regulatory functions, though the NEP 2017 notes that “ENERCOM should be established as a separate entity to protect its mandate as a regulator for energy”. The CSO concept is discussed at length, though the CSO Company is only ever mentioned once, as an entity that would be established.

³⁶ ICCC PNG, “Home - Papua New Guinea Independent Consumer & Competition Commission.” <https://www.iccc.gov.pg/>

³⁷ The ICCC retains most sectoral regulatory functions as a transitional measure until the NEA is fully established.

³⁸ CEPA PNG, “Home - Conservation & Environment Protection Authority of Papua New Guinea.”

³⁹ Asian Development Bank. “Energy Sector Assessment CAPE PNG.” <https://www.adb.org/sites/default/files/linked-documents/CAPE-PNG-6-Energy-Sector-Assessment.pdf>

three interconnected transmission and distribution grids in the country as well as many provincial power systems,⁴⁰ providing power and services to residential, industrial, commercial, and government customers. Moreover, PPL has historically taken on the role of technical regulator for the electric sector, approving licenses for electrical contractors, providing certification for models of electrical equipment and appliances, and providing safety advisory services for major installations. Under the NEP 2017–2027, PPL will unbundle itself into generation, transmission/distribution, and retail business arms.⁴¹ ⁴² This unbundling effort is part of the government’s initiative to improve regulatory oversight and increase industry competition in the electricity sector.

Kumul Consolidated Holdings (KCH). KCH, a state-owned corporation, is the holding company for nine SOEs that operate in agriculture, aviation, banking, and financial services, insurance, maritime infrastructure, power, postal services, and logistics, telecommunications, and water and sanitation. KCH also manages infrastructure projects throughout PNG, including hydroelectric power facilities, metropolitan sewerage systems, and port.

Kumul Petroleum Holdings Limited (KPHL). KPHL is PNG’s state-owned oil and gas company. The GoPNG Parliament created it via the Kumul Petroleum Holdings Limited Authorization Act of 2015, to protect and maximize the value of PNG’s petroleum assets. A core commercial interest for KPHL is the ExxonMobil-operated PNG LNG Project, which has a capacity of 6.9 million metric tons per year, producing nine trillion cubic feet of natural gas over the next 20 years. KPHL manages the state’s 16.57-percent equity stake in the PNG LNG Project and is the third-largest partner in this single largest investment in PNG to date. In addition, because KPHL is the legislated state nominee for oil- and gas-related projects, it can exercise its option for a 20.5-percent stake in every project. KPHL is also involved in the Western Pipeline Project for aggregating stranded gas fields in the Gulf and Western Province, as well as the Port Moresby Power Project, which will sell gas from the PNG LNG plant to the 50MW power station.⁴³

⁴⁰ IRENA. “Pacific Lighthouses: Papua New Guinea.” <https://www.irena.org/~/media/Files/IRENA/Agency/Publication/2013/Sep/Papua-New-Guinea.pdf?la=en&hash=3E847FD95A91ADAA4CC34614F7A325F80CE36D39>

⁴¹ Department of Public Enterprises and Department of Petroleum and Energy. “National Energy Policy 2016-2020.” <https://policy.asiapacificenergy.org/node/2676>

⁴² PPL currently maintains a regulatory role delegated by the ICCG, which is expected to be transferred to NEA.

⁴³ Kumul Petroleum Holdings Limited. <https://kumulpetroleum.com/>

PRIVATE SECTOR ENTITIES AND INDEPENDENT POWER PRODUCERS⁴⁴

Papua New Guinea Chamber of Mines and Petroleum. The Papua New Guinea Chamber of Mines and Petroleum is a non-profit industry organization comprised of members from the oil and gas and mining industries. The chamber promotes the growth of the mining and petroleum industries in PNG, is a primary source of information, and represents the industries' interests to the government.

ExxonMobil. ExxonMobil, an American multinational corporation, operates the PNG LNG project and has an equity stake of 33.2 percent. It also has a 37.1-percent stake in the proposed Papua LNG venture and a 49-percent stake in the P'nyang Gas Field development proposal. In addition, the company has stakes in gas resources at the Muruk Field as well as several onshore and offshore exploration permits, including deep-water prospects where no entities have undertaken drilling to date.⁴⁵

Santos Ltd. Santos is an Australian energy company with a 13.5-percent stake in the PNG LNG project as well as equity in the P'nyang development proposal. As of December 2021, Oil Search Limited merged with Santos Ltd.⁴⁶ Oil Search is the oldest company in the country, and with a 29-percent equity stake, is the second-largest equity owner in the PNG LNG project. It also has significant equity in Papua LNG and P'nyang.

Total SA. Total SA, a French multinational company, is a relatively new participant in PNG's petroleum exploration and production industry. It will be the operator of the Papua LNG project.

Twinza Oil. Twinza is an Australian oil and gas company with projects in PNG. The company has conducted appraisal drilling of an offshore gas condensate field, in the Gulf of Papua and expects to host PNG's first offshore field development with production beginning in 2025.⁴⁷

Dirio Power. Owned by Mineral Resources Development Company Limited (MRDC), Dirio Gas and Power is a relatively new power producer that started operations in 2020. It generates 45 MW of power from gas purchased from Exxon's PNG LNG project.⁴⁸ Dirio Gas has a Power Purchase Agreement (PPA) with PPL and supplies electricity to the Port Moresby Grid. Dirio is the first nationally-owned independent power producer in PNG.⁴⁹

NiuPower Limited. NiuPower is a power generation company incorporated in PNG with a focus on natural gas-fired generation. It was founded in 2017 and jointly owned by KPHL and Santos Ltd.⁵⁰ NiuPower operates the 58 MW Port Moresby Power Station, one of PNG's first dedicated grid-connected gas-fired power plants. The company has a long-term PPA with PPL and may be looking at an option to expand the Port Moresby Power Station to 175 MW.

⁴⁴ Some of the entities referred to as IPPs in PNG are partially or fully owned by GoPNG. These include Dirio Power (100% owned by MRDC, which is 100% owned by GoPNG), NiuPower Limited (50% owned by KPHL and 50% owned by Santos). To distinguish these entities, their names are preceded by an "*" in this section.

⁴⁵ Papua New Guinea Chamber of Mines and Petroleum. "Petroleum." <https://pngchamberminpet.com.pg/>

⁴⁶ Post-Courier. "Santos Welcomes Listing on PNGX" 2021. <https://postcourier.com.pg/santos-welcomes-listing-on-pngx/>

⁴⁷ Oil and Gas Journal. "Twinza Nearing FEED for Pasca A Development in PNG." <https://www.ogj.com/exploration-development/article/14195783/twinza-nearing-feed-for-pasca-a-development-in-png>

⁴⁸ Business Advantage PNG, "In Brief."

⁴⁹ Dirio Gas & Power, "Dirio Gas & Power Company Limited: Overview."

⁵⁰ NiuPower, "Home - NiuPower."

PNG Hydro Development Ltd (PNGHDL). PNGHDL is constructing the 50 MW Edevu Hydropower Plant and associated Edevu-Moitaka 132-kV transmission line from the station to Port Moresby.⁵¹

PNG Forest Products (PNGFP). PNGFP Hydro is an IPP that owns and operates three hydropower stations with a combined installed capacity of 14.9 MW at Baiune near Bulolo.⁵² In 1947, PNGFP commissioned the oldest hydropower plant of the three to supply power for the company's forest products production. Currently, all three plants also supply power to local businesses and residential consumers. The 9.4 MW Upper Baiune power station was commissioned in 2013 to supply power to the Ramu Grid. PNGFP Hydro is currently planning and developing two additional hydropower stations to increase electricity supply to PPL, including the 11 MW Baime hydropower project projected to come online in 2023.

POSCO International. POSCO is a Korean company that has built two heavy fuel oil (HFO) internal combustion power plants in PNG: a 25 MW plant in Port Moresby and a 34 MW plant in Lae. The plant in Port Moresby was contracted from 1999 to 2014 and served an additional five years through successful rehabilitation and efficiency enhancement.⁵³ At the end of 2019, when the contract expired, POSCO turned the plant over to PPL. In 2018, the plant in Lae began commercial operation.

INTERNATIONAL DONORS

Asian Development Bank (ADB). In 2019, ADB announced a pledge to invest over USD 1 billion to help countries in the Pacific increase RE generation. This includes expanding transmission and distribution infrastructure in PNG to increase the national electrification rate from 12 percent to 19 percent by 2028.⁵⁴ To date, ADB has funded over 30 energy-related projects in PNG totaling USD 248 million.⁵⁵ Other projects include financing the extension of the Port Moresby Grid and constructing new and renovating existing hydropower plants.

Australia Department of Foreign Affairs and Trade (DFAT). Australia is PNG's largest development partner. To date, the country has offered around K 900 million (AUD350 million) of electrification support to PNG, including bilateral support, and combination grant and loan funding through the Australian Infrastructure Financing Facility for the Pacific (AIFFP).

Australia has committed to upgrading, and transitioning to RE, eight PPL-owned provincial electricity grids; establishing a solar plant in the Markham Valley; supporting small-scale off-grid projects through the Pawarim Komuniti grants program; undertaking improvements to the Port Moresby grid and urgent repairs to the Rouna 2 and Ramu 1 hydropower stations; and completing an extension of the Ramu grid (with New Zealand). Australia is also providing assistance to PPL to improve its business operations, including assisting with the formulation of the fifteen-year PPL Power Development Plan and Corporate Plan. In addition, Australia purchased a DIGSILENT system operations software package for the POM grid and provided training to enable PPL to undertake grid modelling and is also undertaking feasibility studies on the Gazelle grid and for a potential solar plant at the Baiyer River.

Japanese International Cooperation Agency (JICA). JICA has been implementing two major electric sector projects in PNG, the Ramu Transmission System Reinforcement Project (Loan

⁵¹ PNG Power Ltd, "Projects."

⁵² PNG Forest Products, "Hydro Power Experts | PNGFP."

⁵³ IP3, "Members."

⁵⁴ Asian Development Bank, "Investing Over \$1 Billion to Help Pacific's Renewable Energy Transition."

⁵⁵ Asian Development Bank, "Papua New Guinea."

Assistance) and Project for the Improvement of Planning and Operation of Power System (Technical Cooperation). Also, JICA has developed “Ramu System Power Development Masterplan and Lae Area Distribution Network Improvement Plan” in 2016.

New Zealand Ministry of Foreign Affairs and Trade (MFAT). New Zealand has been providing assistance to PNG’s energy sector since 2012. This includes a range of feasibility studies exploring the potential for off-grid generation, primarily in hydro, solar and geothermal to inform the PNG Government and PPL; as well as support for the drafting of PNG’s Geothermal Policy. Over the last six years, New Zealand has focused primarily on working with PPL to increase rural access to electricity by extending the Ramu and Port Moresby grids to connect over 10,000 households, business and public buildings in Central Province and Enga Province. New Zealand has also co-funded the connection of approximately 5,000 households to the grid in West New Britain and Oro Provinces and the Autonomous Region of Bougainville in partnership with ADB and PPL. In delivering these projects through PPL, New Zealand has prioritised technical assistance to PPL’s Project Management Units to improve the utility’s design, procurement, project management and financial management capabilities to meet international best practice.

United Nations Development Programme (UNDP). UNDP is responsible for supporting and financing several energy projects in PNG. These include the USD 3.39 million Support to Rural Entrepreneurship, Investment, and Trade in Papua New Guinea (STREIT PNG), the goal of which is to increase the sustainable and inclusive economic development of rural areas through RE technologies; the USD 3.14 million Facilitating Renewable Energy and Energy Efficiency Project to reduce greenhouse gas emissions from energy production and energy end-use sectors in PNG; and the USD 1.74 million Advancing Papua New Guinea’s National Adaptation Plan to support climate change adaptation efforts, particularly in infrastructure development.⁵⁶

United States Agency for International Development (USAID). USAID supports projects across PNG with a focus on humanitarian aid, disaster preparedness, and climate change adaptation and resilience. At the end of 2020, USAID launched the USD 57 million PEP Activity with the goal of providing electricity to at least 200,000 households across the country. This five-year project will contribute to the broader PNG Electricity Partnership created by PNG, the United States, Australia, Japan, and New Zealand during the 2018 APEC Leaders’ Summit.⁵⁷

The World Bank Group. The World Bank has been involved in many development projects in PNG, including several in the energy sector. The most recently completed project ended in 2019 and provided USD 7.3 million for DPE and PPL to develop an electrification plan to increase rural connections and attract investors for the Naoro Brown hydropower project to supply to the Port Moresby electricity grid. The World Bank supported GoPNG in the development of PNG’s National Energy Policy and National Electrification Roll-Out Plan (NEROP) and subsequently its implementation strategy and investment plan. Currently, the World Bank is financing a USD 30 million International Bank for Reconstruction and Development (IBRD) loan for PPL’s PNG Energy Utility Performance and Reliability Improvement Project (EUPRIP) to support PPL’s operational and financial performance improvement. The International Finance Corporation (IFC), a member of the World Bank Group, has been engaged by PPL as the lead transaction advisor to introduce private sector participation into the investment (hybrid generation systems with renewables component) and O&M aspects of PPL’s five large existing mini grids. IFC has also supported PPL with the development and implementation of a pilot scheme for grid-connected rooftop solar program in Port Moresby. In addition to this, IFC was

⁵⁶ UNDP Papua New Guinea, “All Projects | UNDP in Papua New Guinea.”

⁵⁷ US Agency for International Development, “U.S. Government Delivers on PNG Electrification Partnership Promise.”

involved in the implementation of Lighting PNG, which promoted the use of off-grid solar products reaching 25% of PNG’s population.

LEGISLATION, POLICY, AND REGULATORY FRAMEWORK⁵⁸

National Energy Authority Act 2021. 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 safe and efficient operation of the electricity system. The act created 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. NEA will take over the responsibilities of the Energy Wing of the Department of Energy and Petroleum and ICCC.

The National Energy Authority Act 2021 also introduces new requirements relating to “National Content”:

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

The Electricity Industry Amendment (Chapter 78) Act 2022, passed by Parliament in April 2022, confirmed NEA as the sole regulator (both economic and technical) of the electricity industry and the energy sector in general.

National Energy Policy 2017-2027. In 2017, the Department of Petroleum and Energy (DPE) introduced the PNG National Energy Policy 2017-2027 (NEP 2017-2027).⁵⁹ NEP 2017-2027 describes objectives for promoting RE, across a range of different resources. Strategies include developing a master plan for RE, green energy certification schemes, and feed-in tariff schemes. NEP 2017-2027 reaffirms PPL’s exclusive right to sell electricity to customers with a load of 10 MW or less, and to those within 10 km 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. Anyone can apply for a license to sell electricity

⁵⁸ The regulatory and institutional framework of the power sector in PNG, as well as the overall power market structure, are in flux, with much discussion about sectoral restructuring. There are significant uncertainties about the framework and structure currently and over the near-to-medium term; the vision for the longer term is unclear as well.

⁵⁹ It should be noted that several versions of the National Energy Policy exist. The National Energy Policy 2016-2020 and National Energy Policy 2017-2027, both introduced by the Department of Petroleum and Energy, are accessible online. Various reports refer to the National Energy Policy 2018–2028 (Engelmeier and Gaihre, 2019). According to the Global Green Growth Institute, the DPE confirmed that the National Energy Policy 2018-2028 is identical to the National Energy Policy 2017-2017 (GGGI, 2019).

outside of PPL's exclusive zone or to have a load greater than 10 MW. NEP 2021-2027 generally aims to encourage competition in the electricity sector, and mentions:

- Creating separate commercial entities for generation, transmission, distribution, and retail
- Establishing an independent system operator
- Establishing a competitive electricity market⁶⁰
- Creating transmission interconnectivity with Australia and Indonesia

NEP 2021-2027 also confirms the community service obligations (CSOs) 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 CSO mechanism. So far, 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 different costs of providing services in urban and rural areas and to improve the viability of rural electrification.

Third Party Access Code. The Third Party Access Code was issued in 2014 by ICCC, the previous economic regulator of the electricity industry; enforcement now lies with NEA. The 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 that 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

After the code was published in 2014, PPL submitted power purchase reference prices to the regulator for approval, but the utility has not yet submitted wheeling terms and charges and connection terms and charges. This has led to a situation in which an overarching framework for wheeling and connection is in place, but detailed terms and conditions have not yet been defined. The code only applies to regulated retailers and transmission network operators, and not to distribution-connected generation or grids without a transmission network.

Grid Code. While the Third-Party Access Code focuses on economic and commercial matters, the Grid Code focuses on technical matters. The Grid Code sets out the technical rules for operating power grids in PNG. It applies to PPL (or any other transmission system owner or operator) and IPPs that connect to a transmission network. The code provides guidance on:

⁶⁰ Currently, competition in the electricity industry cannot be achieved as the starting conditions in the industry does not allow for competition. More detail on this topic are discussed in the Discussion Paper Economic Regulation And Electricity Reform In Papua New Guinea authored by Fallon and Sofo in 2019; accessible at: <https://pngnri.org/images/Publications/DPI68.pdf>.

- Technical and performance standards for the grid, including safety, power quality, reliability, system losses, 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

National Electrification Rollout Program (NEROP). 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 GoPNG to prepare a detailed plan for implementing the first stages of NEROP. In addition, the World Bank is preparing a least-cost expansion plan for PNG to identify the generation and transmission requirements necessary to meet the country’s electrification target. As of April 2022, the NEROP Implementation Plan and least-cost expansion plan are expected to be approved by GoPNG in due course.

The NEROP Implementation Plan and least-cost expansion plan clearly indicate the priorities of the GoPNG, PPL, and development partners for PNG’s power sector, as well as investment opportunities in the sector.

Other relevant policies, legislation, and regulations:

Investment Promotion Act & Regulation 1992: This Act established the Investment Promotion Authority (IPA) to facilitate investment and assist with obtaining necessary licenses and permits. In addition, IPA issues certification for foreign investors, maintains a register of foreign investors operating in PNG, and monitors their activities. According to the act, IPA also provides policy advice to the government on all issues related to local and foreign investment. The Investment Promotion Regulation was issued alongside the Act, and defines a list of activities reserved for PNG citizens, direction on foreign certification applications and fees, and official forms required for certification applications.

Land (Ownership of Freeholds) Act 1996: This Act consolidates and amends previous legislation relating to land and repeals various statutes in place under the administration before independence. The most relevant provisions for land acquisition deal with urban development leases. The Act also covers compulsory acquisition of customary land and acquisition of land by agreement.⁶¹

Environment Act 2000: This Act lays out rules on 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 capacity of more than 2 MW as Level 2 and

⁶¹ Around 97% of the land in PNG is customary land held by traditional owners and cannot be sold or leased to foreign investors. If a foreign investor requires access to customary land, GoPNG must acquire the land from its traditional users and lease it to the foreign investor. Source: <https://www.businessadvantagepng.com/landownership-in-papua-new-guinea-explained/>

hydroelectric plants with a reservoir of more than 5 km² as Level 3. This means that the plants are required to submit a Notification of Preparatory Work to the Department of Environment and Conservation (DEC) which will advise on the level of investigation required.

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.

Geothermal Policy 2012: This policy promotes the exploitation, development, production, and use of geothermal resources in PNG.

Public Private Partnership Act 2014: The Act outlays 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, an unincorporated statutory body responsible for helping the government develop, tender, and implement PPPs. The Act also establishes a PPP Steering Group; 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: This provides 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 decides this matter 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: This manual guides national departments and provincial administrations, public bodies, and supply and tenders’ boards to achieve value-for-money outcomes in established contracts. It applies to major contracts, which are defined as K 300,000 or more. The manual 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.

PPL Electricity Regulatory Contract: The detailed terms for the regulation of PPL are contained in the Regulatory Contract between NEA (previously ICCC) and PPL, which is reviewed every five years. The most recent “Electricity Regulatory Contract” for PPL, covering 2013 – 2017, involved tariff increases. However, its implementation by PPL was hindered by GoPNG, meaning PPL’s tariffs have been frozen since 2013.⁶²

ENERGY SECTOR PRIORITIES

PNG’s immediate priority in the power sector is to expand electricity access across the country. The NEROP aims to achieve 70% electrification by 2030 and 100% electrification by 2050 (Vision 2050),

⁶² In early 2021, the ICCC released a “Review of Electricity Regulatory Contract: 2013 – 2017, DRAFT REPORT” (the “ERC Review”), produced with assistance from NARUC, with funding provided by USAID-PEP.

by (i) extending and strengthening the existing grid infrastructure, and (ii) financing and developing new off-grid infrastructure to reach households where grid extension is not cost-effective.^{63,64}

NEROP aims to drive electrification that will generate substantial investment opportunities in on-grid power generation (hydro, thermal, renewables), mini-grids, and off-grid energy services. The total estimated cost of electrification between 2021 and 2030 is estimated at USD 729 million.⁶⁵

In line with the global consensus to mitigate climate change and transition to cleaner and greener energy, PNG also has ambitious RE goals. PNG's greenhouse gas emissions and recent increases are primarily driven by the Agriculture, Forestry and Other Land Use (AFOLU) and energy sectors, which accounted for 13,522 Gg CO_{2eq.} or 89% of net emissions in 2015. Through enhanced NDCs, PNG has committed to a target of carbon-neutrality in the energy sector by 2030. To achieve this, PNG aims to increase the share of renewables in installed capacity for grid electricity generation from 30% in 2015 to 78% by 2030; reduce energy demand by adopting Minimum Energy Performance Standards and Labelling (MEPSL); and establish a framework for offsetting fossil fuel emissions.

Investments in RE generation projects align strongly with PNG's long-term economic needs and policy objectives.

POWER SECTOR OVERVIEW

PNG's electricity sector comprises both on- and off-grid systems. On-grid generation capacity includes government-owned plants (through PPL) and contracted IPPs (see Table 3 for a breakdown of IPP-owned and PPL-owned generation capacity). The on-grid system consists of three major grids (Port Moresby (POM), Ramu and Gazelle) and several mini-grids on islands and in remote locations, all managed by PPL. Several private sector generators are currently operating in PNG. In addition, provincial governments have the responsibility for maintaining a number of stand-alone rural generation facilities (C-centers)⁶⁶, churches provide electricity to some off-grid villages, and larger mining sites sometimes provide power to adjacent communities.

The Ramu system is the largest in geographic expanse and serves most of the towns and centers on the mainland, including Lae, Madang, Goroka, Mount Hagen, Kainantu, Kundiawa, Yonki, Mendi and Wabag. The Port Moresby system is the second largest, serving the National Capital District and Central Province, and the Gazelle system serves East New Britain Province (Figure 13). The mini-grids are located in provincial centers and towns. In recent years, many C-centers have been integrated into major grids, as part of PPL's grid expansion and rural electrification efforts.

Grid extension and improvements, especially to increase the reliability of the transmission system, will increase both the demand for and the profitability of investments in power generation projects.

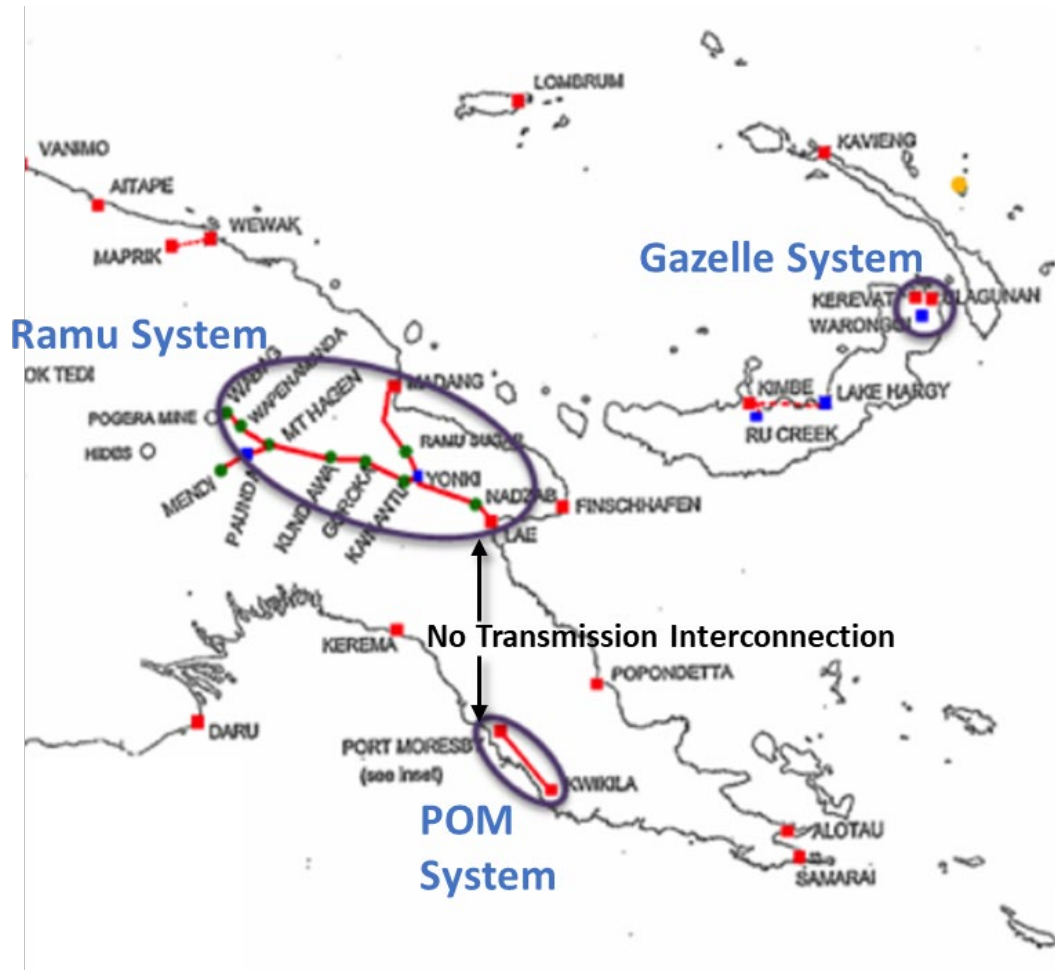
⁶³ NRECA International. "Papua New Guinea National Electrification Rollout Plan (NEROP) Implementation Strategy and Investment Plan: Final Report 2020."

⁶⁴ The Independent State of Papua New Guinea, "PNG Vision 2050."

⁶⁵ Ibid.

⁶⁶ Note that "C-centers" can have different meanings in PNG. However, in this Investor Guide, "C-centers" refers to community centers.

FIGURE 13. LOCATION OF THE MAJOR GRIDS IN PAPUA NEW GUINEA⁶⁷



Source: Papua New Guinea Country Update. Southern Energy Systems. April 2015.

TABLE 3. BREAKDOWN OF PPL-OWNED AND IPP-OWNED GENERATION CAPACITY

GRID	TOTAL CAPACITY	PPL-OWNED CAPACITY		IPP-OWNED CAPACITY	
	(MW)	(%)	(%)	(%)	(%)
POM	187.8	41%		59%	
RAMU	187.1	48%		52%	
GAZELLE	16.5	100%		0%	

Source: Delphos International

PORT MORESBY (POM) GRID

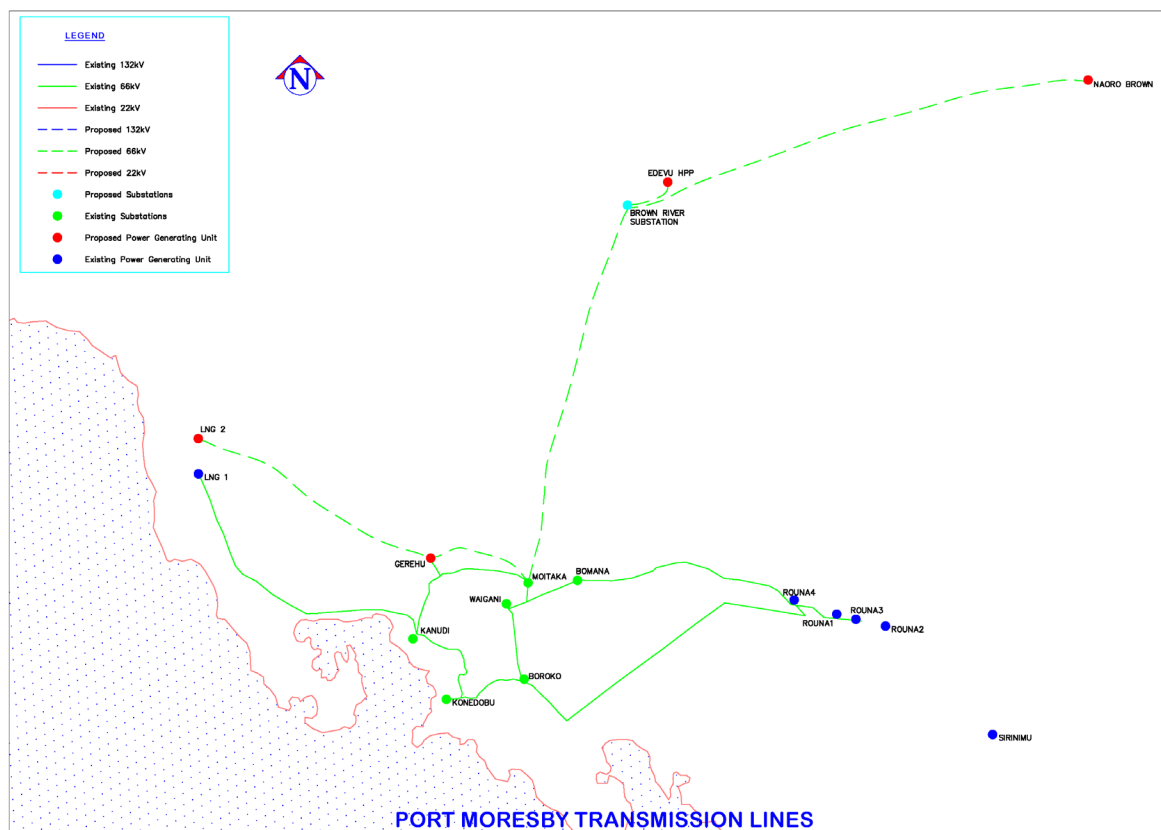
The POM grid is the second-largest in PNG in terms of geographic expanse and serves the National Capital District and surrounding areas of Central Province. The POM grid had a net operating capacity of 150 MW in 2020 and served a peak load of about 130 MW. Available capacity in the grid is significantly lower than installed capacity, due to derating and rehabilitation/maintenance on aging assets. Annual generation in 2020 was about 734 GWh, of which about 36% was delivered by Rouna hydro and over 41% from NiuPower’s gas-fired station. Overall, IPPs supplied over 60 percent of total

⁶⁷ Map used only to indicate locations of the major systems, not system characteristics.

generation in 2020. Fifty-seven percent of generation in 2020 was from gas-fired plants and 7 percent from diesel plants.

The transmission system is primarily composed of 66 kV lines, and the generators and load centers are connected through radial connections. According to the World Bank’s LCPDP 2020 study, the capital region is well-connected, as the major substations are connected by at least double-circuit lines. The transmission system is relatively dense and expands into smaller demand centers. Figure 14, below, shows the POM grid network.

FIGURE 14. POM GRID - INDICATIVE MAP



Source: USAID-PEP

Generation Expansion Plan

Based on the World Bank’s LCPDP, the generation capacity of the POM grid is expected to increase in the near term with the rehabilitation of two of PPL’s hydro stations in the Rouna cascade. Commissioning of the Dirio Gas Power Plant will add another 30 MW of firm capacity (with total capacity of 45 MW). A further 26 MW (average) will be added when the Edevu hydro plant is commissioned, as shown in Table 4.

TABLE 4. POM SYSTEM LEAST COST GENERATION EXPANSION PLAN (BUSINESS-AS-USUAL)

POM Grid	2020	2021	2022	2023	2024	2025	2030	2035	2040
Peak Load (MW)	133.5	139.7	146.1	152.8	159.8	167.3	210.2	252.0	300.0
Available Capacity (MW)	173.6	218.6	218.6	244.6	218.6	218.6	273.2	327.6	390.0
Reserve Margin (%)	30%	56%	50%	60%	37%	31%	30%	30%	30%
1. Existing Capacity									
Rouna_hydro	42	42	42	42	42	42	42	42	42
ExxonMobil_IPP	26	26	26	26	-	-	-	-	-
Kanudi_GT1	10	10	10	10	-	-	-	-	-
Kanudi_GT1_Switch	-	-	-	-	10	10	10	10	10
Kanudi_GT2	10	10	10	10	-	-	-	-	-
Kanudi_GT2_Switch	-	-	-	-	10	10	10	10	10
Sirinimu_hydro	1	1	1	1	1	1	1	1	1
NiuPower_Gas_IPP	57	57	57	57	57	57	57	57	57
2. Capacity Under Construction									
Dirio_Gas_IPP	-	45	45	45	45	45	45	45	45
Edevu_Hydro_IPP	-	-	-	26	26	26	26	26	26
3. New Capacity									
Naoro_Brown	-	-	-	-	-	-	30	78	80
PV_POM_1	-	-	-	-	-	-	-	7	15
Wind_POM_1	-	-	-	-	-	-	25	25	25
POM_New_Diesel	6	6	6	6	6	6	6	6	6
POM_New_Hydro	-	-	-	-	-	-	-	-	52
Hydro_Rehab.(Rouna)	22	22	22	22	22	22	22	22	22

Source: Papua New Guinea Least Cost Power Development Plan Update, December 2020. World Bank.

Transmission Expansion Plan

Based on the World Bank's LCPDP, the transmission expansion plan to meet expected load growth and supply additions in the POM system is expected to cost anywhere from USD 120 million in the business-as-usual (BAU) scenario to USD 142 million in the high-growth scenario (see Table 5).

TABLE 5. POM TRANSMISSION SYSTEM EXPANSION PLAN

Estimated Transmission Infrastructure Additions						
	BAU		Medium		High	
	Transmission line (km)	Transformer (MVA)	Transmission line (km)	Transformer (MVA)	Transmission line (km)	Transformer (MVA)
2021-2025	103	260	128	260	248	260
2026-2030	66	0	76	0	76	0
2031-2035	0	60	60	60	60	60
2036-2040	60	120	2	220	0	120
Total	229	440	266	540	384	440
Estimated Investment Required (USD millions)						
	BAU		Medium		High	
	Transmission line	Transformer	Transmission line	Transformer	Transmission line	Transformer
2021-2025	31.7	27.0	35.1	27.1	51.7	27.1
2026-2030	16.3	0.0	17.7	0.0	17.7	0.0
2031-2035	0.0	11.3	22.1	11.3	22.1	11.3
2036-2040	22.1	11.8	0.3	19.0	0.0	11.8
Total	70.1	50.1	75.2	57.4	91.5	50.3

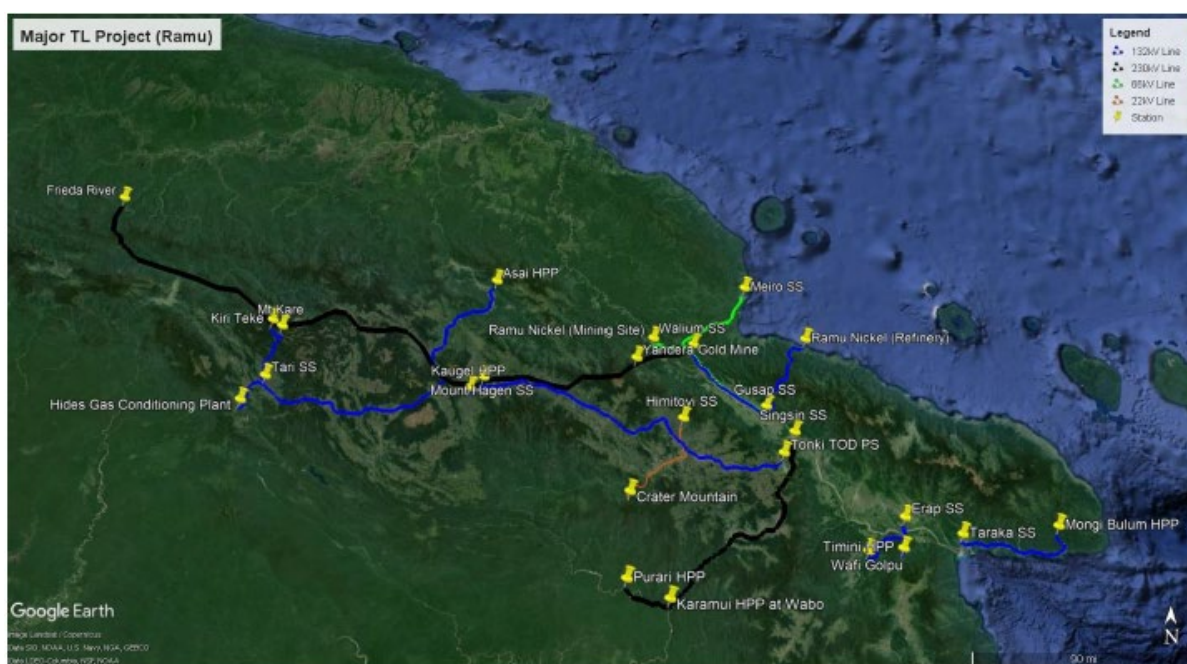
Source: World Bank Least Cost Power Development Plan

RAMU GRID

The Ramu grid is the largest grid in PNG in terms of geographic expanse, running from Lae and Madang in the east to Mt. Hagen and Mendi in the west. The peak demand on the grid in 2020 was around 110 MW, served by 195 MW of installed capacity. Most of the generation on the Ramu grid is delivered by the Ramu, Pauanda, and Baiune hydropower plants, along with the Munum IPP plant. Electricity demand on the Ramu Grid is about 80 percent of that on POM Grid.

The Ramu system, operating at 66 kV and 132 kV, serves the Lae port city area and the Highlands region (Figure 15). Most transmission lines are single-circuit, making the grid vulnerable to transmission-related outages. A key challenge for the Ramu grid is that most of the major generators are in the central part of the system, located far from major load centers like the Lae city area or mines in the Highlands region. Due to this geographic mismatch between load and generation, power is supplied to load centers over long distances, on a weak transmission network. The lack of large generators along the spine of the transmission network results in insufficient reactive power and inertia on the grid, creating reliability challenges in maintaining grid voltage and frequency.

FIGURE 15. RAMU GRID - INDICATIVE MAP



Source: PNG Least Cost Power Development Plan Update, December 2020

Generation Expansion Plan

Based on the World Bank’s LCPDP, the generation capacity of the Ramu grid is expected to increase in the near term, with the rehabilitation of the Ramu I Hydro Station. PPL recently commissioned rehabilitation of the Yonki Toe of Dam station, a project funded by ADB. That station operates at 18 MW but is not reflected in World Bank numbers until the mid-late 2020s. Commissioning of the Baime Hydro Extension (11 MW capacity) is expected in 2023. New diesel capacity is expected to be added after 2025, in addition to the 11 MW wind and 6 MW solar generation capacity addition in Markham Valley (Figure 16).

FIGURE 16. RAMU SYSTEM LEAST COST GENERATION EXPANSION PLAN (BUSINESS-AS-USUAL)

Ramu Grid	2020	2021	2022	2023	2024	2025	2030	2035	2040
Peak Load (MW)	111.6	117.7	123.8	130.7	138.4	147.0	185.2	216.8	266.9
Available Capacity (MW)	145.1	191.1	172.6	184.0	184.0	191.1	240.7	281.8	347.0
Reserve Margin (%)	30%	62%	39%	41%	33%	30%	30%	30%	30%
1. Existing Capacity									
Ramu1	42	42	42	42	42	42	42	42	42
Pauanda_hydro	10	10	10	10	10	10	10	10	10
Baiune_hydro_IPP	12	12	12	12	12	12	12	12	12
Taraka	3	3	-	-	-	-	-	-	-
Tari	1	1	-	-	-	-	-	-	-
Milford	3	3	-	-	-	-	-	-	-
Madang	6	6	-	-	-	-	-	-	-
Wabag	2	2	-	-	-	-	-	-	-
Kundiawa	1	1	-	-	-	-	-	-	-
Goroka	2	2	-	-	-	-	-	-	-
Munum_IPP(Daewoo)_Switch	32	32	32	32	32	32	32	32	32
Hides_Gas_GE_TM2500	-	46	46	46	46	46	46	46	46
Tari_small_hydro_IPP	1	1	1	1	1	1	1	1	1
2. Capacity Under Construction									
Baime_hydro_IPP_Exp.	-	-	-	11	11	11	11	11	11
3. New Capacity									
Gurokor_Timini_Hydro	-	-	-	-	-	-	-	2	11
ASAI Hydro	-	-	-	-	-	-	-	-	28
Hydro_Rehab.(Ramu1)	30	30	30	30	30	35	35	35	35
Hydro_Rehab.(Pauanda)	-	-	-	-	-	-	2	2	2
Hydro_Rehab.(Yonki_Toe)	-	-	-	-	-	2	18	18	18
Makham_Valley_PV	-	-	-	-	-	-	6	6	6
Makham_Valley_Wind	-	-	-	-	-	-	11	11	11
Ramu_New_Diesel	-	-	-	-	-	-	15	55	83

Source: Papua New Guinea Least Cost Power Development Plan Update, December 2020. World Bank.

Transmission Expansion Plan

The Ramu transmission system is already more strained than the POM grid. Due to higher demand-growth expectations, geographic conditions, supply constraints and voltage issues, the expected investment requirements are also much greater for the Ramu grid than for the POM grid. Transmission infrastructure upgrades and additions on the Ramu system are expected to cost anywhere from USD 240 million in the business-as-usual scenario to over USD 1 billion in the high-growth scenario as detailed in Table 6.

TABLE 6. RAMU TRANSMISSION SYSTEM EXPANSION PLAN

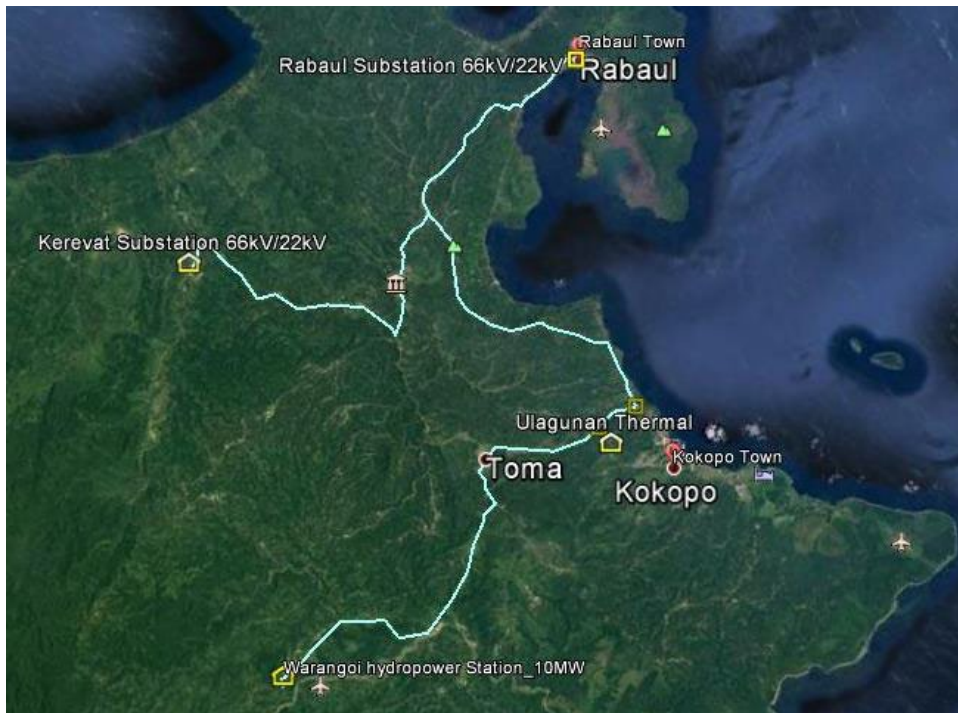
Estimated Transmission Infrastructure Additions						
	BAU		Medium		High	
	Transmission line (km)	Transformer (MVA)	Transmission line (km)	Transformer (MVA)	Transmission line (km)	Transformer (MVA)
2021-2025	323	160	611	220	861	550
2026-2030	30	140	80	170	884	900
2031-2035	0	90	0	90	25	60
2036-2040	120	150	157	210	137	300
Total	473	540	848	690	1,907	1,810
Estimated Investment Required (USD millions)						
	BAU		Medium		High	
	Transmission line	Transformer	Transmission line	Transformer	Transmission line	Transformer
2021-2025	86.0	13.2	160.8	13.4	391.9	40.0
2026-2030	100.1	16.6	33.1	16.6	438.5	68.8
2031-2035	0	8.1	0	8.1	10.9	8.1
2036-2040	0	15.5	26.3	21.0	20.8	24.3
Total	186.1	53.4	220.1	59.1	862.1	141.1

Source: World Bank Least Cost Power Development Plan

GAZELLE GRID

The Gazelle Grid is the smallest of PNG’s three main grids, with peak demand of about 12 MW. Current generation is supplied by the Ulagunan and Kerevat diesel power plants, with combined available capacity of about 6.5 MW, and the 10 MW Warangoi hydropower plant. Total generation on the Gazelle grid in 2020 was about 54 GWh, 83 percent of which was supplied by the Ulagunan plant and the remainder by the Kerevat plant. The Warangoi plant did not contribute to generation in 2020, as it was undergoing rehabilitation. The plant was recommissioned in early 2022 and is back to running at its rated capacity of 10 MW. 66 kV lines link the power plants to load centers in Rabaul, Kerevat, and Kokopo, as shown in Figure 17.

FIGURE 17. GAZELLE GRID - INDICATIVE MAP



Source: PPL/USAID-PEP Team

MINI GRIDS^{68,69}

PPL operates 26 mini grids that supply approximately 15,000 customers with a combined peak load of about 25 MW. Twenty-four of the 26 PPL-operated mini grids are supplied by diesel generators, and two mini-grids in West New Britain – Ru Creek and Lake Hargy – are supplied by a combination of small hydro and diesel generators.⁷⁰

Development Plans

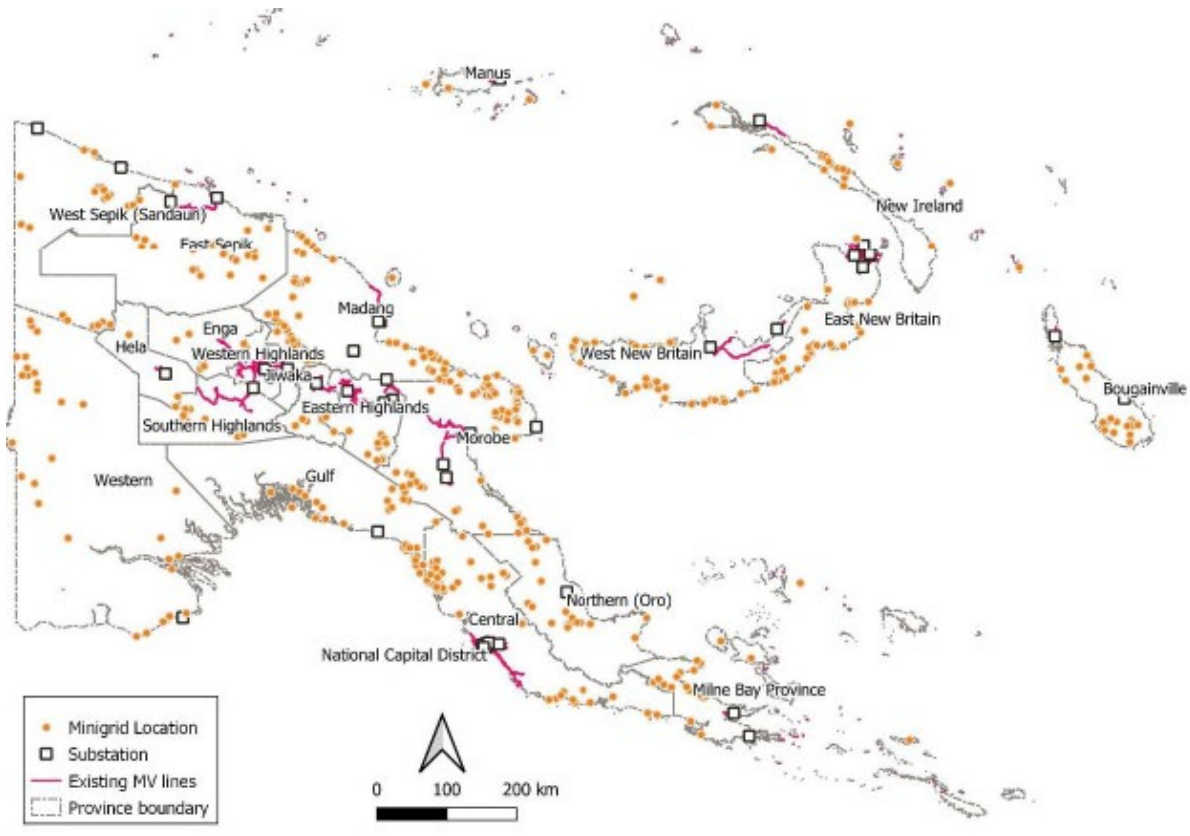
The electrification strategy under NEROP includes mini-grid development, as indicated in Figure 18. Table 7 lists the 100 largest potential new mini grids in PNG.

⁶⁸ USAID-PEP recently authored a related report titled “Papua New Guinea Electrification Partnership: Off-Grid Market Assessment”, which provides further details on the market opportunity for off-grid electrification. The Report was published in April 2022 and can be accessed at: <https://www.climatelinks.org/resources/papau-new-guinea-electrification-partnership-grid-market-assessment>

⁶⁹ USAID-PEP developed a PNG electrification GIS platform to identify potentially viable mini-grid sites in PNG. The GIS platform can be accessed at: <https://png Electrification.org/>. Interested potential investors can request access to use the PNG Electrification GIS Platform via this link: <https://bit.ly/3O8URIT>

⁷⁰ PPL. “PPL Information Handbook.”

FIGURE 18. ILLUSTRATION OF POTENTIAL MINI-GRID LOCATIONS RELATIVE TO MAJOR GRIDS



Source: NRECA International. Papua New Guinea National Electrification Rollout Plan, Final Report. February 2021.

TABLE 7. TOP 100 MINI-GRIDS IN PNG: LOCATIONS, COST, AND CONNECTIONS

PROVINCE	NO. OF MINI-GRIDS	POTENTIAL CONSUMERS	ESTIMATED CAPEX (USD MILLIONS)	AVG. COST PER CONSUMER (USD)
Bougainville	2	435	0.51	1,182
Central	22	19,727	23.89	1,340
East New Britain	12	5,112	6.36	1,202
East Sepik	5	1,348	1.75	1,277
Eastern Highlands	2	587	0.76	1,268
Enga	1	8,338	10.83	1,299
Gulf	12	6,389	7.88	1,193
Hela	1	510	0.73	1,436
Jiwaka	2	430	0.54	1,249
Madang	1	598	0.81	1,357
Manus	1	229	0.27	1,182
Milne Bay	4	2,926	3.83	1,243
Morobe	2	2,531	3.19	1,228
New Ireland	3	1,117	1.42	1,230
Northern (Oro)	1	264	0.30	1,152
West New Britain	6	2,130	2.57	1,161
West Sepik	3	1,852	2.53	1,318
Western	14	10,414	13.21	1,237
Total	100	64,938	81.35	1,252

Source: NRECA International. Papua New Guinea National Electrification Rollout Plan, Final Report. February 2021.

RENEWABLE ENERGY

PNG is endowed with enormous RE potential. While most of this potential is in remote locations with limited demand, and where the resource is not readily exploitable, there is more than sufficient potential for new renewable projects near load centers. The most promising RE sources include:

Biomass: Although two-thirds of PNG is forested, most 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 crop output or processing waste. Log exports amount to 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. Development of the plantation for a new 30 MW IPP at Markham Valley, using a combination of existing trees and newly planted eucalyptus, was expected to demonstrate the potential for biomass generation in PNG. However, the project has been delayed since the PPA was signed in 2015, and there are recent reports that PPL has terminated the agreement.

Hydro: The hydropower potential in PNG is enormous. However, few 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. In 1994, the World Bank estimated the gross potential of large-scale hydro at roughly 20,000 MW and 175,000 GWh/year, with a 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, which presents a sizeable investment opportunity. These estimates exclude micro- and mini-hydro for rural communities.

Geothermal: The geothermal resource potential of PNG is believed to be vast. Exploration studies suggest that the most promising area is the northern coast of New Britain, where there are at least seven geothermal sites, but additional studies are needed to map these resources. Commercial geothermal development has been proven in PNG in Lihir, north of New Ireland, where 56 MW is currently in operation and there is believed to be significant additional potential.

Solar: Like much of the Pacific, PNG has a strong potential for solar generation. The World Bank supported a solar-mapping study in 2018; satellite data indicate that average insolation in much of the country is good, with 4.5 to 8 hours of sunshine daily. Due to the mountainous terrain and associated persistent cloud cover, 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 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 power is particularly attractive in PNG given that the peak load occurs in the daytime.

Wind: A 2019 World Bank-funded wind-mapping study assessed three locations with the highest wind 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. However, a recent World Bank assessment found strong potential for offshore wind power, particularly off the coast of Port Moresby and in the straits between New Guinea and New Britain. Estimated total generation capacity is 147 GW.

PNG has so far exploited around 169 MW of its RE potential, mostly hydropower. Table 8 shows a list of RE plants operating on the PPL grid.

TABLE 8. RENEWABLE ENERGY INSTALLED CAPACITY

POWER PLANT	TECHNOLOGY	GRID	INSTALLED CAPACITY (MW)
Rouna Hydro	Hydro	POM	42
Sirinumu Hydro	Hydro	POM	1
Ramu I	Hydro	RAMU	72
Pauanda Hydro	Hydro	RAMU	10
Yonki Toe of Dam	Hydro	RAMU	18
Baiune Hydro	Hydro	RAMU	12
Tari Small Hydro	Hydro	RAMU	1
Warangoi Hydro	Hydro	GAZELLE	10
Divune Hydro	Hydro	Popondetta	3
Total			169

Source: Delphos International

ELECTRICITY TARIFFS

NEA recently took over responsibility from ICCC for setting retail electricity tariffs. ICCC’s approach, which the NEA is likely to follow, set 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.⁷¹

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 shown in Table 9. 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. Industrial customers pay both an energy charge and a demand charge. Minimum charges also exist, but these are not shown in the table.

⁷¹ International Finance Corporation. “A GUIDE TO INVESTING IN RENEWABLE ELECTRICITY GENERATION IN THE PACIFIC.” 2021.

TABLE 9. SUMMARY OF PPL'S RETAIL TARIFF

TARIFF CATEGORY	ENERGY CHARGE (USD/KWH)	DEMAND CHARGE (USD/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: Delphos International

POWER SECTOR DEVELOPMENT PLAN

Currently, PPL relies on the support of development partners to produce generation expansion plans, as it has for other types of expansion planning. Examples include “The Project for Formulation of Ramu System Power Development Master Plan and Lae Area Distribution Network Improvement Plan Final Report,” produced by JICA in 2016, and the World Bank’s 2018 “Least Cost Power Development Plan” and its 2021 update.

PPL produced a “Fifteen Year Power Development Plan 2016-2030” in March 2016, in which it stated that a new version of the power development plan would be updated every two years. However, there had been no updates until PPL released the latest 15 Year Power Development Plan 2022-2036 in 2022. Between 2016 and 2022, PPL released a Corporate Plan 2021-2023, which states that “PPL agrees with the World Bank’s Least Cost Power Development Plan (LCPDP) and is developing a PNG Power LCPDP (2020-2034) to translate the high-level recommendations of the World Bank LCPDP into specific projects, expand the analysis to include Gazelle and the diesel centers, and calculate the financial impact on PNG Power of different scenarios.”

GENERATION AND TRANSMISSION CAPACITY EXPANSION PLANS

Generation Capacity Expansion. As per the World Bank’s LCPDP, hydropower will play a key role in meeting PNG’s future energy needs. This aligns with PNG’s long-term commitment to reducing emissions from the energy sector. No diesel capacity addition is envisaged on the POM grid in the medium and long term. The Ramu grid, because of its larger geographic expanse and difficulty in transmitting power over long distances (due to difficult terrain), is projected to add 83 MW of diesel capacity. Addition of variable RE (wind and solar) is expected in the medium term, but grid resiliency and operational issues limit capacity addition to 25 MW of wind on the POM grid and 17 MW (6 MW solar and 11 MW wind) on the Ramu grid, as shown in Table 10.⁷²

⁷² The Capacity Addition Plans consider rehabilitation of hydropower projects as a new capacity

TABLE 10. CAPACITY EXPANSION PLAN

GRID	TYPE	UNIT	2020-2025	2026-2030	2031-2035	2036-2040
POM	Diesel	MW	6	0	0	0
	Hydro	MW	22	30	38	54
	Solar	MW	0	0	7	8
	Wind	MW	0	25	0	0
	Total	MW	28	55	55	62
RAMU	Diesel	MW	0	15	40	28
	Hydro	MW	37	18	2	37
	Solar	MW	0	6	0	0
	Wind	MW	0	11	0	0
	Total	MW	37	50	42	65
Total		MW	65	105	97	127

Source: Delphos International

Transmission expansion plans. Along with capacity expansion, transmission network expansion is also needed to serve PNG's growing electricity demand. As per the World Bank's LCPDP, both the POM and Ramu grids require significant transmission network expansion in the short and medium term. These needs are more pressing for the Ramu grid, due to its larger geographic size and the large distance between generators and load centers. Transmission network expansion needs are estimated to range between 229 km and 384 km for the POM grid, and 473 km to 1,905 km for the Ramu grid, as shown in Table 11.

TABLE 11. TRANSMISSION NETWORK EXPANSION PLAN

GRID	SCENARIO	UNIT	2021-2025	2026-2030	2031-2035	2036-2040	TOTAL
POM	Business-as-Usual	km	103	66	0	60	229
	Medium	km	128	76	60	2	266
	High	km	248	76	60	0	384
RAMU	Business-as-Usual	km	323	30	0	120	473
	Medium	km	611	80	0	157	848
	High	km	861	884	25	137	1,907

Source: Delphos International

Along with laying of transmission lines, both grids will require significant transformer capacity addition in the near and long term. Transformer capacity needs for the POM grid range between 440 MVA and 540 MVA, and for Ramu grid between 540 MVA and 1,810 MVA, as shown in Table 12. Transformer Capacity Expansion Plan

TABLE 12. TRANSFORMER CAPACITY EXPANSION PLAN

GRID	SCENARIO	UNIT	2021-2025	2026-2030	2031-2035	2036-2040	TOTAL
POM	Business-as-Usual	MVA	260	0	60	120	440
	Medium	MVA	260	0	60	220	540
	High	MVA	260	0	60	120	440
RAMU	Business-as-Usual	MVA	160	140	90	150	540
	Medium	MVA	220	170	90	210	690
	High	MVA	550	900	60	300	1,810

Source: Delphos International

INVESTMENT REQUIREMENT FOR POWER SECTOR DEVELOPMENT PLAN

Most new power sector investment in PNG over the next 10 years is expected to be organized around projects identified in the LCPDP (generation and transmission investments on the POM and Ramu grids) and the NEROP (electrification nationwide). In addition, there is a need for generation and transmission investment in the other grids. The World Bank and ADB have programs of approximately USD 300 million for transmission and distribution work. Table 13 presents indicative sources and uses of funds for sectoral investments, with the aim of summarizing the scale of incremental financing required. While interpreting the sources and uses of funds, it is important to note the following:

1. Use of funds is based mainly on values in the LCPDP, but assumes that an additional USD 55 million will be required for generation and transmission investments in grids besides POM and Ramu. Investments related to NEROP are only those identified in NEROP as being on-grid, and therefore directly related to PPL.
2. Source of funds assumes that roughly USD 300 million in World Bank and ADB commitments would be disbursed in equal annual amounts over the period. Some work included in the LCPDP may already have been funded, and some substantial additional commitments already exist, as discussed in the next section.
3. The core finding is that large amounts of incremental funding will be required by donors, GoPNG, and the private sector to implement the LCPDP and NEROP. Of the approximately USD 1 billion required, well under half, and perhaps as little as one quarter, has so far been committed.

TABLE 13. INDICATIVE SOURCES AND USES OF FUNDS

Total PPL Expansion Costs, USD Millions	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
NEROP On Grid	19	18	29	39	52	74	75	101	109	126
LCPDP	37	39	41	43	45	42	44	46	48	50
Annual Cost	56	57	69	81	96	115	119	146	157	176
Cumulative Cost	56	112	181	263	359	474	593	739	897	1,072

Sources of Funds, USD Millions	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
World Bank and Other Donors	15	15	15	15	15	15	15	15	15	15
ADB	15	15	15	15	15	15	15	15	15	15
Funding Gap	26	27	39	51	66	85	89	117	127	146
Total Sources	56	57	69	81	96	115	119	146	157	176

Source: Delphos International

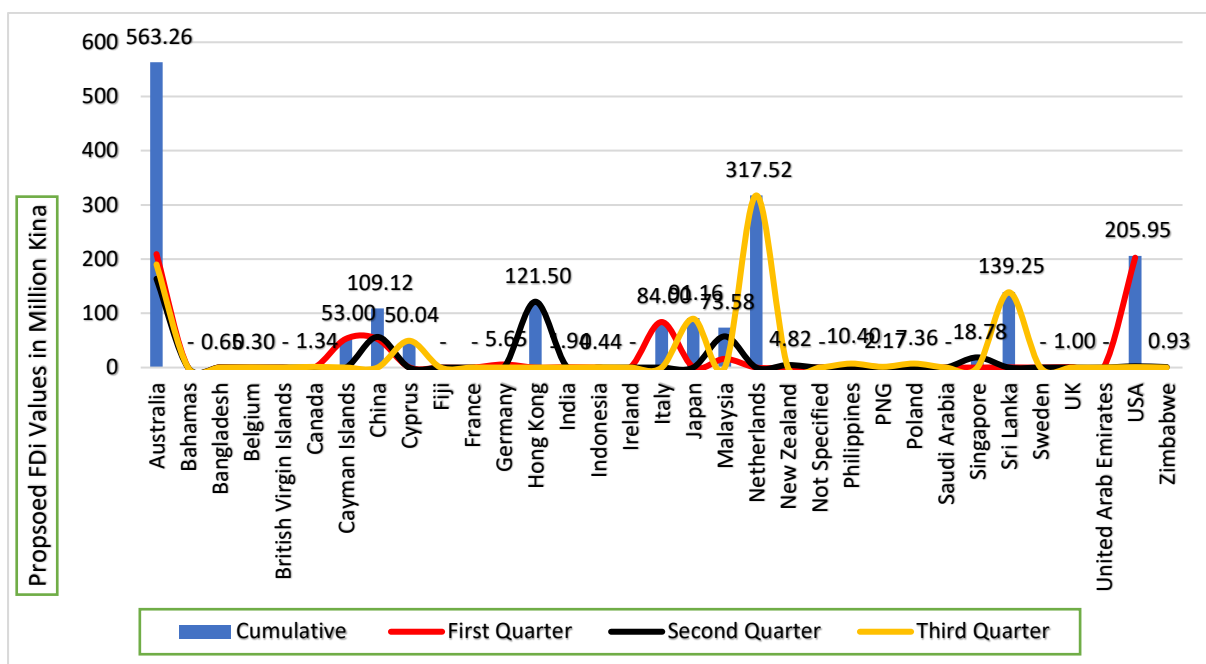
INVESTMENT LANDSCAPE IN PNG

FOREIGN DIRECT INVESTMENT FLOW

GoPNG remains focused on attracting foreign direct investment (FDI) into PNG. PNG aims to increase FDI in the mining and the petroleum/gas sectors from USD 40 million in 2016 to USD 100 million by 2022. PNG’s FDI stock reached USD 4.2 billion in 2016, most of which came from the mining and oil and gas sectors. GoPNG aims to increase FDI stock to USD 10 billion by 2022.

As of September 2021, Australia’s proposed FDI stock in PNG reached K 563.3 million (USD 163.6 million), followed by K 317.5 million (USD 92.2 million) from the Netherlands, K 205.9 million (USD 59.8 million) from the U.S., K 139.3 million (USD 40.5 million) from Sri Lanka, and K 121.5 million (USD 35.3 million) from Hong Kong (see Figure 19).

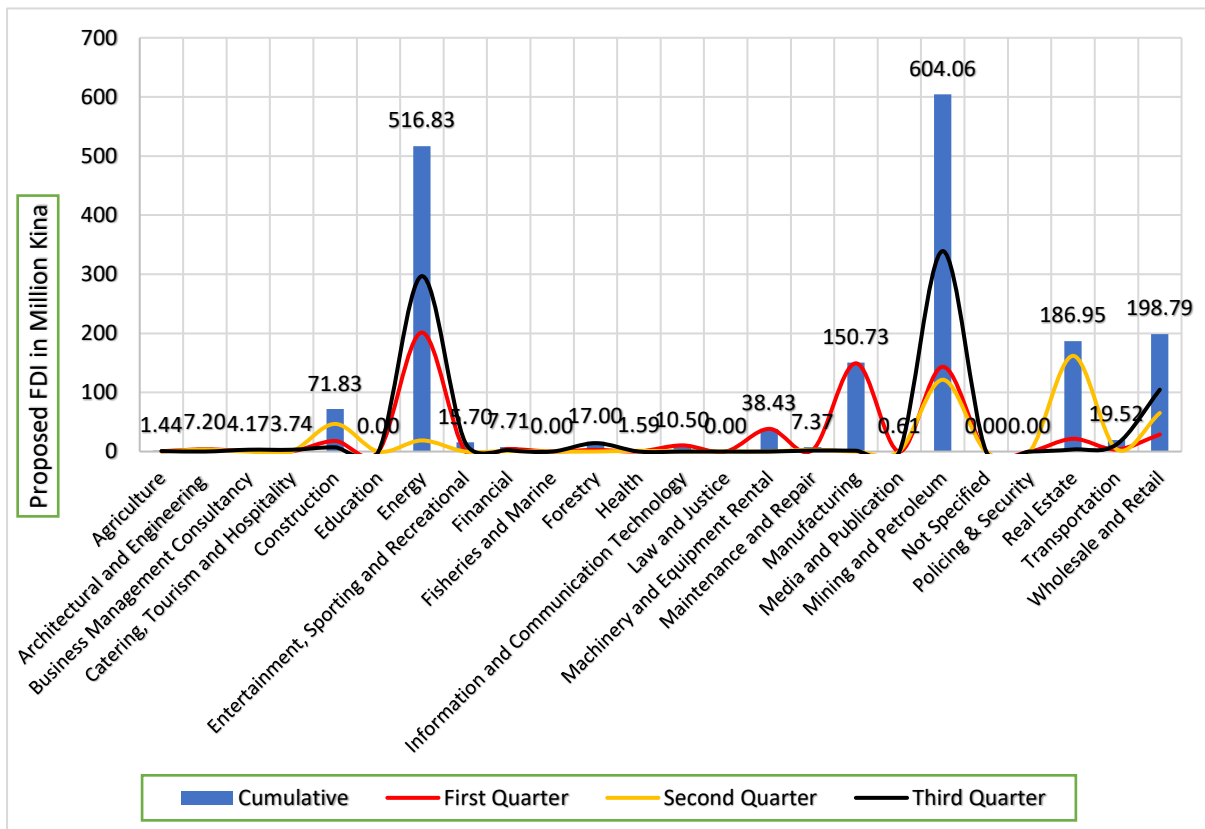
FIGURE 19. PROPOSED FDI VALUES BY COUNTRY AS OF SEPTEMBER 2021



Source: IPA

The top five sectors attracting FDI in PNG are mining and petroleum, energy, wholesale and retail, real estate, and manufacturing. As of September 2021, proposed FDI for PNG’s mining and petroleum sector reached K 604.1 million (USD 175.4 million), followed by K 516.8 million (USD 150.1 million) for the energy sector and K 198.8 million (USD 57.7 million) for the wholesale and retail sector (see Figure 20).

FIGURE 20. PROPOSED FDI VALUES BY SECTOR AS OF SEPTEMBER 2021



Source: IPA

RELEVANT RULES ON INVESTMENT INSTRUMENTS AND REPATRIATION

Foreign investment in PNG is regulated by GoPNG, with the assistance of the Investment Promotion Authority (IPA), which promotes and facilitates foreign investments in the country. While there are no specific restrictions on investment instruments, foreign enterprises are restricted from investing in activities specified in the Cottage and Business Activities List (CBAL), including traditional and small-scale agricultural, forestry and fisheries activities, traditional arts and crafts, alluvial mining, and certain small retail and wholesale activities.⁷³

BPNG is in charge of approving all foreign investment proposals, including debt and equity investments from foreign investors into PNG. Generally, a debt-to-equity ratio of 5:1 is imposed for overseas borrowing, and a ratio of 3:1 is imposed on local borrowing.⁷⁴

In terms of repatriation, subject to taxation and exchange-control laws, a foreign investor is entitled to repatriate capital and remit earnings and certain other payments (including any compensation received from nationalization or expropriation of its investments) overseas.

⁷³ Investment Promotion Authority. "The Infopack." <https://www.ipa.gov.pg/wp-content/uploads/IPA-infor-guide-low-res.pdf>

⁷⁴ U.S. Department of State. "2021 Investment Climate Statements: Papua New Guinea." 2021.

<https://www.state.gov/reports/2021-investment-climate-statements/papua-new-guinea/#:~:text=PNG%20has%20Bilateral%20Investment%20Treaties,Malaysia%2C%20and%20the%20United%20Kingdom.>

STEPS TO SECURE LICENSES & REQUIRED GOVERNMENT APPROVALS

IPA REGISTRATION PROCESS

REGISTERING AS A FOREIGN INVESTOR

The investment process for on-grid and off-grid projects in PNG can be divided into multiple steps (see Annex I for indicative investment-process flowcharts), but all foreign investors and businesses intending to conduct business in PNG must first complete two steps: (i) apply for IPA certification; and (ii) complete the registration process with IPA. The Investment Promotion Act 1992 defines foreign investment by any individual or corporation that is not a citizen. Section 5 of the Act establishes IPA as a legal entity. All foreign investors must be granted a certification by IPA to invest and conduct business in PNG.⁷⁵

Foreign investors can apply for certification on IPA’s website, www.ipa.gov.pg. The application fee is K 2,000 and must be paid before the application is processed. Applicants are required to lodge the application with supporting documents with the Application for Certification (Form 3).

TABLE 14. REQUIREMENTS FOR FOREIGN INVESTORS TO REGISTER WITH IPA

INDIVIDUALS	CORPORATE
<ul style="list-style-type: none"> • CV / Personal Profile • Police Clearance / Character Check Report • Passport copy • Visa copy (if domiciled in PNG) • Work permit copy (if employed in PNG) • Bank reference / statement 	<ul style="list-style-type: none"> • Latest financial statement for the shareholding company (audited if possible) • Latest financial statement for the ultimate holding company • Register of shareholders and directors of the companies (top ten if listed on a stock exchange) • Copies of Certificate of Incorporation • Other supporting documents such as brochures, annual reports, etc.
<ul style="list-style-type: none"> • Copy of Certification of Incorporation or Registration • Budget / cash flow forecast • Comprehensive business plan • Positions and nationalities of staff to be employed • Value of initial capital investment • Copies of agreement (lease agreements, purchase agreements, etc. if any) 	

Source: Investment Promotion Authority

Section 27 of the act gives the Minister for Commerce and Industries the power to prescribe activities reserved for PNG citizens or national enterprises. The Investment Promotion Regulations 1992 include a detailed list of reserved activities in Section 3.⁷⁶

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 foreign investors after certification has been issued.⁷⁷

⁷⁵ IFC. “Powering the Pacific, A Guide to Investing in Renewable Electricity Generation in the Pacific.”

⁷⁶ Ibid

⁷⁷ Ibid

The Act also defines the requirements for applying for certification. The application is made according to Form 3 – Application for certification by a foreign enterprise, and must be 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

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 be downloaded from the website.

The Companies Act 1997 lays out legislation regarding 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.

In addition, Sections 21 to 23 state that all companies must have a unique name to use for all official dealings. Reserving a name is done through the Registrar of Companies, along with submitting the incorporation application.⁷⁸

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 website.⁷⁹

The forms required to register a company are:

- Form 1 – Application for registration of a company (K 400 if online, K 500 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 6 – Application for reservation of a company name (K 150 if online, K 200 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 incorporation or 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
- Information on the class and number of shares held
- A statement setting out the rights, privileges, conditions, and limitations of shares held

⁷⁸ Ibid

⁷⁹ The IPA website also includes information on online payment for applicable fees.

- Relationship of the shares to other classes of shares⁸⁰

TABLE 15. INDICATIVE STEPS FOR INCORPORATION ⁸¹

 Step 1: Incorporation		
 Steps	 Guidelines	 Expected time frame
<ul style="list-style-type: none"> Reserve the proposed company name with the Registrar of Companies. Register the overseas company with Registrar of Companies 	<ul style="list-style-type: none"> The directors of the PNG registered entity will be the same as the company directors in the home jurisdiction. Every overseas company must have registered agent in PNG – this can be a person resident in PNG or a PNG resident company. Every company must have an address for service in PNG. This can be the same address as the company's resident agent or the location where the company is carrying out business in PNG. The address for service should have a readily identified street address and be at a place that is readily accessible during normal business hours. A company carrying on business in PNG under any name other than its own must register that business name with the IPA. 	<ul style="list-style-type: none"> Up to four working days from date of lodgement of documents
 Step 2: Foreign certification		
 Steps	 Reporting requirements post certification	 Expected time frame
<ul style="list-style-type: none"> An application must be made to IPA in the prescribed format. The application must state: <ul style="list-style-type: none"> Shareholder information Main business sector and principal activities of the company Proposed date of commencement Proposed operating location(s) Number of citizen and non-citizen employees Proposed investment by citizen and non-citizen investors (generally a minimum of PGK100,000 will be required) Budget cashflow projection for the first year. 	<ul style="list-style-type: none"> A one-off response to the terms and conditions of certification is required to be submitted to the IPA within six months of the date of issue of the IPA certificate. A report summarizing the details listed below is required to be submitted to the IPA six months after certification and annually (or as determined by IPA) thereafter: <ul style="list-style-type: none"> Location(s) of company Activities of the company Directors of the company Shareholders of the company Capital expenditure incurred Number of citizen and non-citizen employees. 	<ul style="list-style-type: none"> Within 35 working days of the making of a complete and correct application.

Source: PWC: Doing Business in PNG

NEA REGISTRATION PROCESS (FRAMEWORK OF LICENSES)⁸²

Economic Regulation: Electricity Undertaker Licensing

The enactment of the NEA Act in July 2021 gives NEA the powers to regulate the electricity and energy sector in PNG. One of the agency's powers, under its economic regulation function, is to issue electricity undertaker licenses for generation, transmission, distribution, and retail to existing and potential power producers and suppliers in the country. Currently, NEA has yet to develop regulations that provide terms and conditions on how electricity producers and suppliers operate in the electricity

⁸⁰ Ibid

⁸¹ There are two options for foreign entities to set up a company in PNG: i) incorporate a new PNG subsidiary and ii) register the overseas company as it registered overseas

⁸² The NEA licensing guidelines have not been established yet and there are no interim guidelines in place. USAID-PEP is working with NEA on the specifics of all the licencing guidelines. The NEA off-grid regulations are expected to be approved by GoPNG after the 2022 general elections. The Guide will be updated periodically to reflect the evolving regulations and licencing guidelines.

industry. These regulations will provide the framework for registering existing and potential electricity producers and issuing licenses to operate in the electricity industry.

Section 61, subsection 6 (a) and (b), outlines the annual license fees for generation, as outlined in Table 16, below. For installed capacity less than 1 MW, the annual license fee is prescribed under the Off-Grid Regulation, together with the license form.

TABLE 16. ANNUAL LICENSE FEE FOR GENERATION

INSTALLED CAPACITY	ANNUAL FEE
< 1 MW	Prescribed in the Off-Grid Regulation
1 to 10 MW	K 10,000
11 to 20 MW	K 20,000
21 to 50 MW	K 30,000
51 to 100 MW	K 40,000
101 to 500 MW	K 100,000
501 MW and above	K 500,000

Source: USAID-PEP

Section 61(6)(c) and (d) refer to regulations by which annual license fees for transmission, distribution, and retail will be prescribed, associated with projects of 1 MW or higher. The license forms for installed capacity of 1 MW and higher will be developed under a separate regulation. The annual license fees and forms for transmission, distribution and retail for projects associated with installed capacity of 1 MW and higher have yet to be developed in a separate regulation.

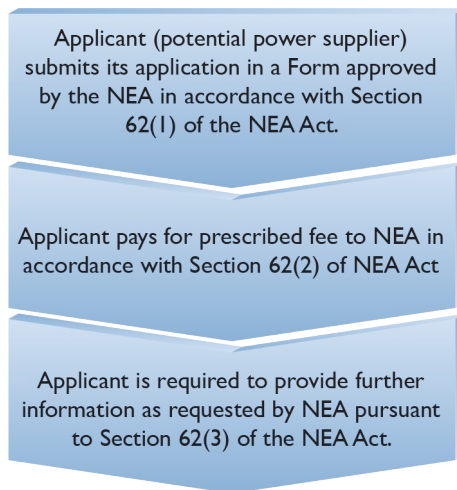
TABLE 17. ELECTRICITY UNDERTAKER LICENSE

TYPE OF LICENSE	ANNUAL FEE	FORM
Generation	<1 MW prescribed under the Off-Grid Regulation. ≥1 MW prescribed under the Act, (see Table 16 above).	<1 MW prescribed under the Off-Grid Regulation. ≥1 MW yet to be developed in a separate regulation.
Transmission	<1 MW not required. ≥1 MW yet to be developed in a separate regulation.	<1 MW not required. ≥1 MW yet to be developed in a separate regulation.
Distribution	<1 MW prescribed under the Off-Grid Regulation. ≥1 MW yet to be developed in a separate regulation.	<1 MW prescribed under the Off-Grid Regulation. ≥1 MW yet to be developed in a separate regulation.
Retail	<1 MW prescribed under the Off-Grid Regulation. ≥1 MW yet to be developed in a separate regulation.	<1 MW prescribed under the Off-Grid Regulation. ≥1 MW yet to be developed in a separate regulation.

Source: USAID-PEP

Registration of license applications is provided generally under Part IV of the NEA Act. More specifically, Section 62 of the NEA Act provides a general process for how applicants can apply for license with NEA. The framework of license applications, in accordance with Section 62 of the NEA Act, is provided in the flow chart below.

FIGURE 21. FRAMEWORK OF LICENSE APPLICATION



Source: USAID-PEP

Annual license fees and forms for generation, distribution, and retail for projects under 1 MW have been developed under the Off-Grid Regulation, which has yet to be approved by the NEA Board and the National Executive Council. The Off-Grid Regulation will be gazetted after NEC gives its approval. USAID PEP is supporting NEA to develop specific regulations for the on-grid and off-grid electricity sector, to enhance NEA’s power to operate effectively and efficiently.

The licensing process for projects under 1 MW are described under the Off-Grid Regulation. The actual process is not outlined here, because the Off-Grid regulation has yet to be approved by the NEA Board and NEC.

Economic Regulation: Unregulated Existing Service Providers

Existing service providers who sell electricity to consumers, but are unregulated, will be issued normal licenses on an interim basis until they are in compliance with the requirements of the Act.

Technical Regulation: Electrician and Electrical Contractor Licensing

Licensing of electrical contractors and electricians is provided for under Section 105, including those licensed under the previous regime. The regulations (yet to be developed) will prescribe the licensing procedures and associated examinations to be conducted.

LAND ACCESS AND ACQUISITION

Types of Land

In PNG, land may be owned or occupied within three systems: i) customary rights; ii) state owned; and iii) privately owned. Ninety-seven percent of land in PNG is customarily owned, which means that the land is owned in common by clans or communities. Individuals only have the “user rights” to land. Much of customary land remains outside the country’s Torrens title system given the absence of a

customary land registration database. Also, there is local resistance to register land under the Torrens system as land ceases to be governed by custom once a Torrens title is issued.⁸³

Options for Accessing Land

There are three options for investors to access customary land:

Compulsory State Acquisition. The Minister of Lands, on behalf of the GoPNG, 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 GoPNG, 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.

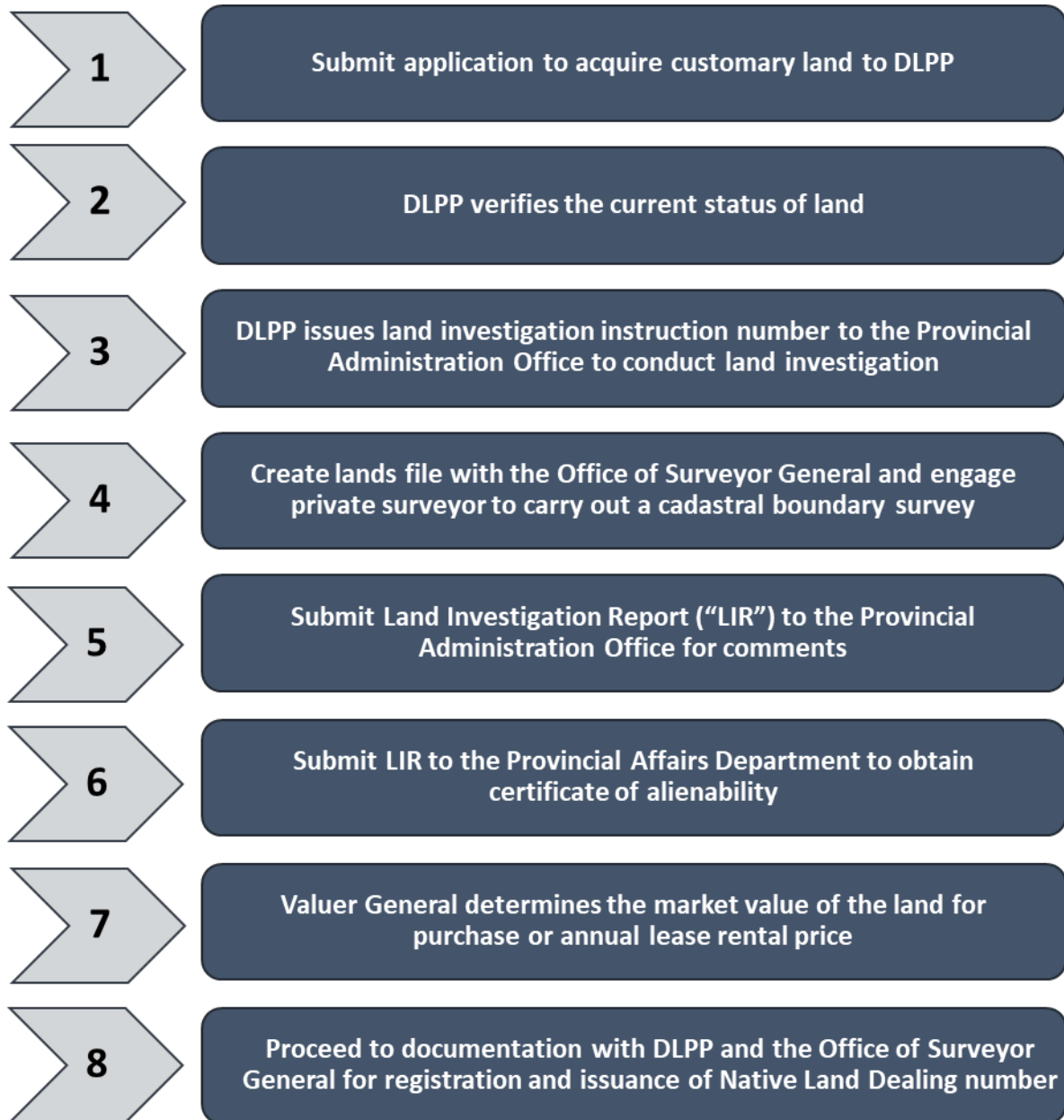
Lease Directly to the Project. Under the Incorporated Land Group Act 1974, the customary landowners establish a legal entity known as the Incorporated Land Group. The Incorporated Land Group applies to the Department of Lands and Physical Planning (DLPP) to register and obtain a title in its name for the portion of the land included in the project site. The group then leases the land directly or indirectly to the project.

Land Acquisition Process

There are two modes of land acquisition under the Land Act 1996, by which the Minister of Lands may, on behalf of GoPNG, acquire both Customary Land and Alienated Land for public purposes, reservation, wildlife and conservation, church and non-government organisations activities, economic and resource development, business and private purposes. The following figures illustrate the steps involved in different types of land acquisition.

⁸³ IFC. “A GUIDE TO INVESTING IN RENEWABLE ELECTRICITY GENERATION IN THE PACIFIC.” 2021.

FIGURE 22. STEPS FOR ACQUISITION OF CUSTOMARY LAND BY AGREEMENT



Source: USAID-PEP

FIGURE 23. STEPS FOR ACQUISITION OF PRIVATE LAND, ALIENATED LAND AND STATE LEASEHOLD LAND BY AGREEMENT



Source: USAID-PEP

OTHER REGULATORY REQUIREMENTS

Economic Regulation: Establishment of Tariffs, Power Purchase Agreements, Fees Levies and Other Charges, Generation Levy

Tariffs. Tariffs are established under Section 56 of the NEA Act, and must address the requirements of accessibility, reliability, consistency of supply, and affordability. Stakeholder engagement and public consultation is required before a tariff system is established. For projects less than 1 MW, tariffs are established between the service provider and the community, under a Community Agreement. Details are laid out in the Off-Grid Regulation.

For both projects under 1 MW and 1 MW and higher, tariff-setting guidelines are required, but have yet to be developed.

Power Purchase Agreements. Approval of PPAs between IPPs and the transmission owner is provided for under Section 57 of the Act. PPAs must comply with the requirements under the Grid Code, the Third Party Access (TPA) Code, and technical standards set by NEA. The Grid Code and TPA Code will be reviewed and updated to be consistent with the NEA Act.

Fees, Levies and Other Charges. NEA can impose fees, levies, and other charges under Section 58 of the Act.

Generation Levy. A levy for the administration of the NEA Act, computed at K0.009 per kWh of energy generated and transmitted, is provided for under Section 61(2). This levy will be reviewed after three years.

Service-Level Standards. Service-level standards for projects under 1 MW are provided for in the Off-Grid Regulation. For projects equal to or greater than 1 MW, service-level standards will be prescribed as license conditions under the licenses for generation, transmission, distribution, and retail.

Technical Regulation: Technical Standards, Safety and Technical Requirements

Electrical Wiring Standards. Electrical wiring standards are provided for under Section 106 of the Act. The existing standard on wiring standards will be reviewed and updated to be consistent with the Act and Australia and New Zealand standards.

Prohibited Appliances. NEA may prohibit certain appliances and products for sale and use, in accordance with Section 108 of the Act. The existing regulation for prohibited appliances will be reviewed and updated in accordance with Section 108 of the Act.

NISIT Standards and Other Standards. Section 121 of the Act provides for the development of regulations to deal with other technical standards, which have yet to be developed. NEA can apply and enforce electricity and energy sector standards adopted by the National Institute of Standards and Industrial Technology (NISIT). The NEA Technical Regulation Executive Manager is a member of the NISIT Energy Technical Committee that recently approved the adoption of IEC test methods and standards for off-grid solar products (IEC 62257-9-5 and -9-8). The standards have not yet been gazetted, but that process is currently under way.

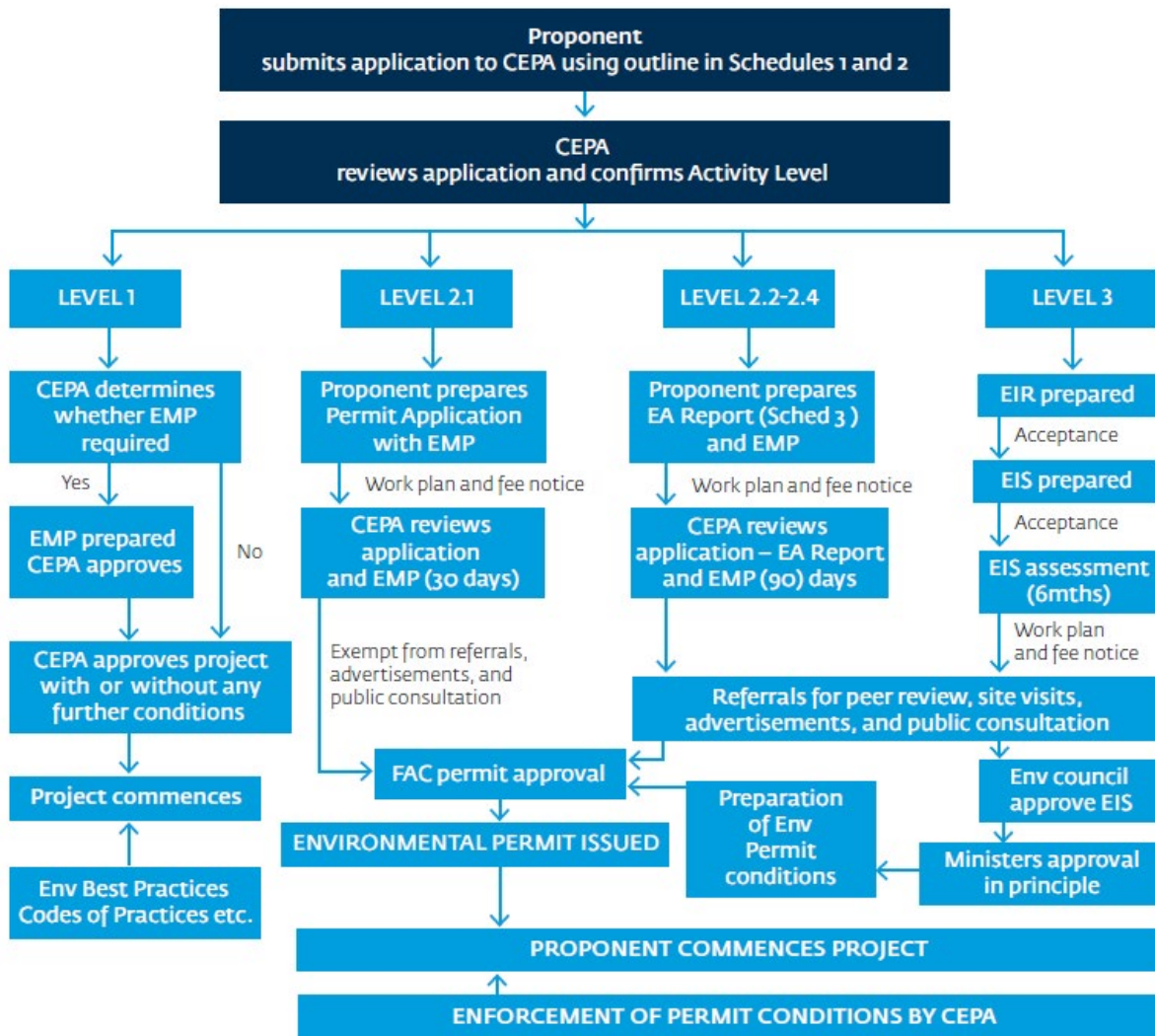
Safety and Technical Requirements. Compliance with safety and technical requirements for works, electrical installations, and equipment is provided for under Sections 102, 103 and 104. The existing regulation will be reviewed and updated to be consistent with the Act.

Environmental Requirements

The environmental requirements for energy development in PNG is outlined in the Environment Act 2000. Sections 16–19 of the Act 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 projects to have an environmental permit before the start of construction and during operation, while Level 1 activities do not require a permit.⁸⁴ The Conservation and Environment Protection Agency (CEPA) is the agency responsible for implementing the Act and issuing permits. Depending on the type of activity, different documents may be required. Figure 24 illustrates the application process for an environmental permit for Level 1, 2, and 3 activities.

⁸⁴ The Environment Act 2000 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.

FIGURE 24. FRAMEWORK OF LICENSE APPLICATION



Source: World Bank Group

National Content

The PNG regulations read as follows:

A National Content Forum shall be convened before commencement of construction of a project, for all stakeholders, including the National Government; and the affected provincial governments; local-level governments; district development authorities; and landowners, to discuss benefit sharing from the project in accordance with Section 80 of the Act. The identification of landowners is prescribed under Section 81.

Under Section 82, a Royalty Benefit of up to 5% is to be provided to the landowners having land rights within a one-kilometer radius of the project facilities and directly affected by a generation, transmission, and distribution license under the Act.

Equity benefit, provided for under Section 83, from generation, transmission and distribution project under section is distributed as follows: up to 10% National Government, provincial & LLG up to 5%,

and landowners up to 5%. Dividend payments to National Government, Provincial Government, LLG and landowners are to be based on annual net profit of the project in accordance with Section 83(6).

Licensee are required to provide employment, training and localization for Papua New Guineans, and priority is to be given to local people affected by the project licensed and approved under the Act (Section 84). This also includes business development opportunities, and Community Development Assistance (such as roads, bridges, schools, scholarships, etc.) for local people affected by the project in accordance with Sections 85 and 86 respectively.

Citizen Companies and Joint Ventures

Based on Section 87 of the Act, projects with installed capacity ranging from 1 to 10 MW are reserved for PNG citizen companies, and those higher than 10 MW must involve PNG companies as joint venture partners.⁸⁵ Small power systems below 1 MW fall under the Off-grid Regulation and are exempted from Section 87. Standby generators are exempt from tariff and licensing requirements.

Appeals Panel

The decisions of NEA can be reviewed by the Appeals Panel, upon application to the panel by an aggrieved party, in accordance with Section 109 of the Act. The procedure is outlined under Section 109. A ministerial intervention is provided for under Section 110. The Appeals Panel has yet to be established.

Exemption Clause

An exemption may be granted from the application of Part III Division 1 and Part IV Division 1 of the Act under Division 7, Sections 111 to 113. Part III Division 1 provides general provisions that state the objectives of electricity and energy service, that electricity supply industry is a regulated industry, that the NEA is not a regulated entity, that the Act does not deviate from the provisions of the Electricity Industry Act 2002 or any other law. Part IV Division 1 deals with the licensing of electricity undertakers. In recent engagements with NEA, it has stated that projects governed under the Off-Grid Regulation will be exempted from the generation levy and the national content provisions.

⁸⁵ While projects with installed capacity ranging from 1 to 10 MW are currently reserved for PNG citizen companies only, foreign investors are advised to explore with NEA the application of the exemption clause to exempt foreign investors from the restriction imposed by Section 87 and allow them to joint venture with PNG companies. NEA has also expressed their desire to amend the Act in the near future, and hopefully the exercise may include reviewing the restriction placed on foreign companies.

DIRECTORY

The following list of contact information is meant to serve as a one-stop shop for energy sector investors seeking additional information:

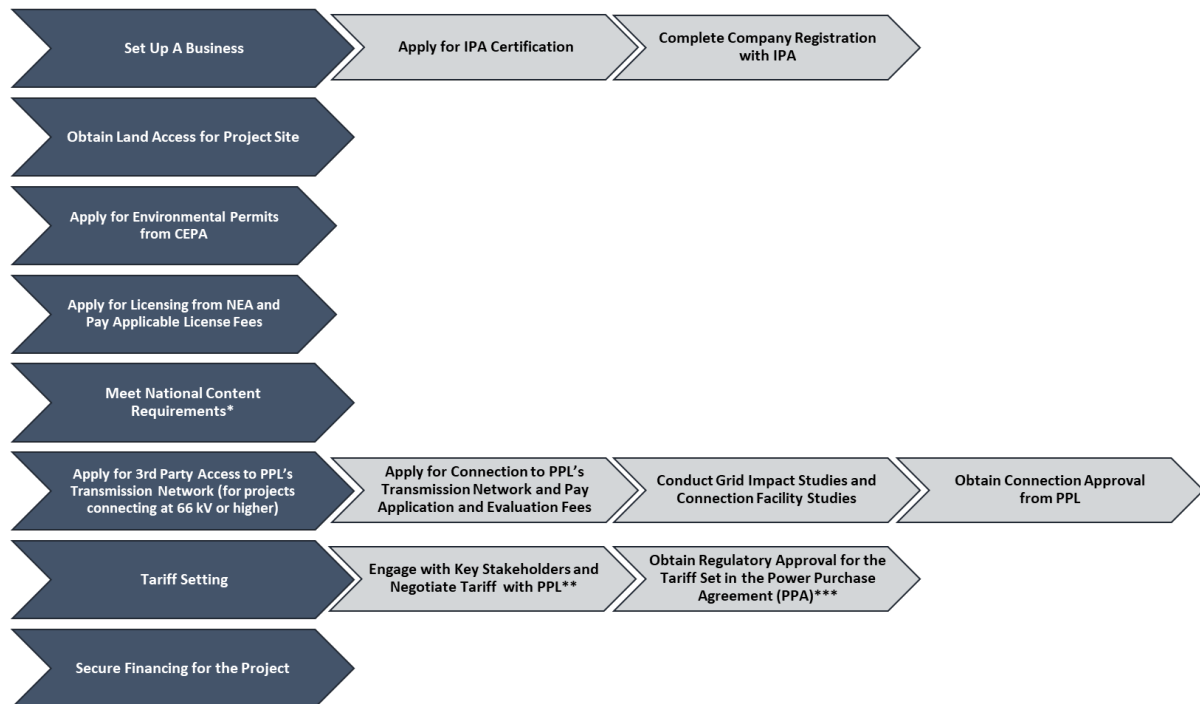
GOVERNMENT INSTITUTIONS	INDUSTRY ORGANIZATIONS AND ASSOCIATIONS
<p>Investment Promotion Authority (IPA) Ph: (+675) 321 7311 / 308 4444 Website: www.ipa.gov.pg</p> <p>National Energy Authority (NEA) Ph: (+675) 325 3233 Email: info@nea.gov.pg</p> <p>Department of Petroleum and Energy Ph: (+675) 323 9307 / 321 1936 Website: www.petroleum.gov.pg</p> <p>Department of Treasury Ph: (+675) 313 3541 / 3682 Website: www.treasury.gov.pg</p> <p>Department of Lands & Physical Planning Ph: (+675) 301 3288 / (+675 301 3294) Website: www.dlpp.gov.pg</p> <p>Department of National Planning and Monitoring (DNPM) Ph: (+675) 308 4013</p> <p>Kumul Consolidated Holdings Limited (KCH) Ph: (+675) 321 2977 / 309 6700 Website: www.kch.com.pg</p> <p>Independent Consumer and Competition Commission (ICCC) Ph: (+675) 312 4600 / 7693 3005 Website: www.iccc.gov.pg</p> <p>Conservation and Environment Protection Authority (CEPA) Ph: (+675) 301 4500 Website: www.pngcepa.com</p> <p>PNG Power Limited (PPL) Ph: (+675) 324 3200 Website: www.pngpower.com.pg</p> <p>Internal Revenue Commission (IRC) Ph: (+675) 322 6905 Website: www.irc.gov.pg</p>	<p>PNG Chamber of Commerce & Industry Ph: (+675) 321 3057 Website: www.pngcci.org.pg</p> <p>Papua New Guinea Business Council Ph: (+675) 320 0700 Website: www.bcpng.org.pg</p> <p>PNG Chamber of Mines & Petroleum Ph: (+675) 321 2988 Website: www.pngchamberminpet.com.pg</p> <p>Port Moresby Chamber of Commerce & Industry Ph: (+675) 321 3077 / 7200 3077 Website: www.pomcci.com</p> <p>Solar Energy Association of PNG Email: chris@solar.com.pg Website: www.seapng.org</p>

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ANNEX I INVESTMENT PROCESS FLOWCHART FOR ENERGY PROJECT DEVELOPERS IN PNG⁸⁶

The following indicative flowcharts outline the various steps involved with the investment process for on-grid and off-grid energy projects in PNG. Note that the steps listed below do not need to proceed linearly and can be pursued in parallel.

FIGURE 25. INVESTMENT PROCESS FOR ON-GRID PROJECTS



* According to the current NEA Act, all projects of 1 MW or greater are subject to the National Content provisions. The provisions include a Royalty Benefit of up to 5% of gross revenues payable to landowners prior to the National Content Forum. Before construction begins, a National Content Forum must be convened between the national government and the affected provincial governments, local-level governments, district development authorities, and landowners, to discuss "benefits sharing from the project". The National Content rules may apply to projects below 1 MW, depending on how the NEA Regulations evolve. Additional changes may be made to the NEA Act and become applicable for 1 MW and above.

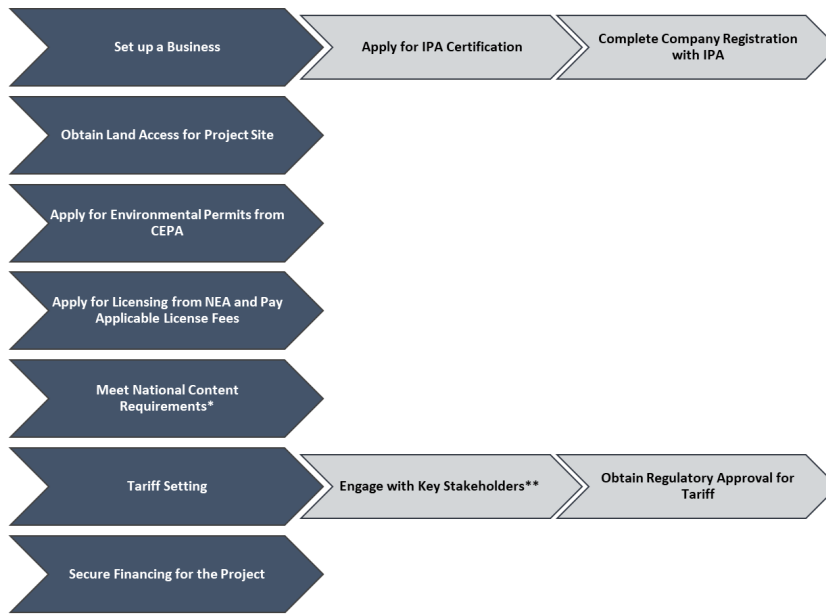
** For competitive procurement projects, the investors will need to conduct public consultations for tariff setting.

*** According to the Third-Party Access Code, 2014

Source: Delphos International

⁸⁶ The flowcharts show indicative step-by-step processes for on-grid and off-grid projects in PNG as many relevant licensing guidelines are still evolving as described in further detail in the Investor Guide. Note that the flowcharts show the investment process for unsolicited proposals but many of these steps would apply to competitive procurement projects as well.

FIGURE 26. INVESTMENT PROCESS FOR OFF-GRID PROJECTS



* The National Content rules may apply to projects below 1 MW, depending on how the NEA Regulations evolve.

** For competitive procurement projects, the investors will need to conduct public consultations for tariff setting.

Source: Delphos International

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