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ENERGY SECTOR REFORM IN PAPUA NEW GUINEA: KEY FOCUS AND CHALLENGES

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Abstract

- The energy policy reform aims to facilitate generation and provision of affordable, reliable and sustainable energy.
- Poor access, unreliability and high costs in providing electricity services continue to be daunting challenges.
- It is important to ensure smooth coordination among key stakeholders, and cohesive and speedy implementation of electrification projects.
- PNG Power Limited's operational and financial performance can be improved through overhaul of its management system, regular maintenance and rehabilitation of network infrastructure, and effective revenue collection strategy.
- Support by donor partners on electrification is essential in pooling the needed capital, technology and expertise to enhance generation capacity and infrastructure upgrade.

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ENERGY SECTOR REFORM IN PAPUA NEW GUINEA: KEY FOCUS AND CHALLENGES

By **Ronald Sofo and Osborne
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Introduction

Papua New Guinea (PNG) is blessed with substantial, diversified portfolio of energy assets including natural gas, hydro, and geothermal (World Bank, 2020). These assets are capable of generating sufficient supply of energy required to support social and economic development in the country. However, it will need pragmatic reform to fully harness these potentials.

Recently, the Government of PNG (GoPNG) endorsed and passed the National Energy Bill (2020) with immediate effect to set up a new National Energy Authority (Post Courier, 2021).

The new entity will now take charge of all energy related matters including implementation of the National Energy Policy (2017-2027), development of renewable resources and electrification roll-out. It appears, the move is driven by overwhelming desire to introduce needed reform in the sector in order to fulfil government's aspiration to deliver affordable and reliable electricity in the country.

The reform being undertaken comes at a time when the country's energy sector continues to face many challenges including the effects of the COVID-19 pandemic, thereby, calling for a drastic action to revive and develop the sector. It is evident that energy has great potential to become a significant catalyst for welfare improvements and economic prosperity in the country. In other words, energy is the power to drive social and economic development in PNG.

Many developing countries have undertaken substantial reforms in their energy and power sector over the years. According to Zhang et al. (2008), the reforms were driven by strong intent to address poor performance of State-owned electricity operators in terms of high costs, inadequate expansion of access to electricity services and unreliable

supply.

Reforms were necessary to reduce escalation of subsidies to the sector as governments held tariffs below cost-recovery levels which led to mounting of fiscal burden that starved the sector of the capital needed to invest in generation capacity and grid extension (Foster and Rana, 2019).

Literature shows that the reform package encompassed the establishment of autonomous regulatory entities, the vertical and horizontal unbundling of integrated State monopoly utilities, private sector participation in generation and distribution, and eventually the introduction of competition into generation and retail segments (Joskow, 2008; Kessides, 2012)

In reviewing the reforms in electricity sector of developing countries in Africa, Middle East, Latin America and Caribbean, Besant-Jones (2006) identified key lessons learned from reforming power markets in developing countries that include:

- Different starting conditions mean that there are no “cookbook” solutions for reform – substantial market restructuring would be infeasible for small, low-income countries.
- The case for unbundling is weakest in small systems in countries with undeveloped institutional capacity and weak economic conditions – economies of scale and scope would be lost without gaining the benefits of competition.
- Change to commercially-oriented governance is fundamental to achieving sustainable reform of power markets – this requires removal of the management and development of power supply from political and bureaucratic control to achieve commercial standards in management practices, financial performance and pricing.
- Credibility for regulation is needed to attract long-term at-risk investment in electricity services – this

requires autonomy, transparency and accountability for the regulator and may require regulation by contract to sustain private investment.

However, Kessides (2012) noted that the standard model, notwithstanding electricity reform in developing and transition economies has been an incomplete, uneven, and irregular process that entails a complex set of interactions between the State and the market. He further noted that while the standard model is a sound guide for restructuring electricity markets, if it is implemented correctly, significant departures from it are likely to lead to performance problems. Furthermore, he found that most developing countries lack key institutional prerequisites, including: commitment to reform; scale of the industry; and legal and financial infrastructure. In response, he noted that a hybrid model has developed where independent power producers (IPPs) play an important role alongside State-owned Enterprises (SOEs) but that the success of IPPs is contingent on a coherent policy framework that pays explicit attention to planning, procurement and contracting issues. He argued that this requires effective regulatory governance characterised by independence, accountability, transparency, predictability and capacity.

Drawing on available information within public domain, this paper discusses the key focus of the energy policy reform, explores the challenges in the reform endeavour in PNG, and suggests policy options to progress reform initiatives in the energy sector.

This paper is based on desk-top review method where existing literature, government documents and related information / data on the energy and electricity sector of PNG were examined. The main approach used to collect the information and data required to address the research question is secondary data collection. Through this approach, data and information have been collected from publications and policy documents such as National Energy Policy, Electricity Industry Act and also drawing on websites of industry player, IPPs and development partners.

National Energy Policy

The National Energy Policy 2017-2027 (NEP) intends to provide an overarching policy platform to facilitate investment and promote growth in one of the key sectors of the economy. The policy outlines the aspiration to produce affordable, reliable and sustainable energy through the harnessing of the energy resources, expansion of electrification, and effective sector planning and coordination. It also highlights the desire to harness the locally produced natural gas for domestic

energy use (Department of Petroleum and Energy [DPE], 2017).

It builds on the existing policies and development plans relevant to the sector such as the Electricity Industry Policy (EIP), 2011, and the PNG Development Strategic Plan (DSP), 2010-2030. In line with the key themes in those documents, the policy emphasises the development of renewable energy to cut down on the use of fossil fuels. It also focuses on improving reliability and expanding access to electricity in a manner affordable to the users. The policy envisages that 70 percent of the population will have access to electricity by 2030 through the implementation of the National Electrification Rollout Plan (NEROP) (DPE, 2017).

The 2011 EIP document has been revised given the recent approval for establishment of the National Energy Authority (NEA) (Post Courier, 2021). Its strategic objectives are consistent with the NEP and the document usefully highlights a number of key issues that are or need to be addressed, along with options for reform. Similar to the EIP, it considers scope for facilitating competition in the relevant segments of the electricity market to provide choice to consumers, places downward pressure on prices and attracts potential investment from the private sector. It calls for upscaling of rural electrification while enhancing technical regulation and sector coordination among key stakeholders as part of institutional reform (DPE, 2017).

Harnessing renewables

One of the significant features in the energy policy is the call for harnessing renewables using appropriate technology. For example, the NEP reiterates the important role of both grid and off-grid renewable solutions in meeting the energy sector's long-term targets (DPE, 2017). This is backed by the DSP which sets a target of meeting all electricity needs through renewable resources by 2050 (Department of National Planning and Monitoring, 2010).

While the country continues to rely on imported fuels for generation of power, it is evident that its endowment in hydro, geothermal, solar, wind and biomass are in abundance and still underutilised. Harnessing these renewables holds great potential in the sustainable and least-cost generation of clean energy.

It is noted that hydropower has a potential generation capacity of 15,000 Megawatts (MW) (DPE, 2017, pp.37). This appears to be a viable option, among other renewables, to feature prominently in domestic energy mix and eventually help reduce the reliance on imported fuel. According to the

NEP, hydropower accounts for 54 percent of the country's generation capacity, representing less than 3 percent of its potential capacity. PNG has an extensive river network both in the mainland and island provinces. Such resource has drawn interest from international investors for potential hydropower projects to meet domestic and regional demand (Thompson, 2020).

According to the NEP, there are plans to use and upgrade geothermal and biomass generation from the existing generation capacity of 7 percent and 1 percent out from the total installed capacity. It is reported that a private sector funded biomass project is set to become a genuine catalyst for the country's drive to embrace clean energy (PNG Biomass, 2017). This would entail wood chips being harvested from eucalyptus tree plantations in the plains of Morobe Province to supply a power plant of 30-MW generation capacity which has potential to feed into the Ramu Grid system under power purchase agreement with PNG Power Limited (PPL). In addition, a new study by the International Finance Corporation (World Bank Group) found that the majority of the rural population is using off-grid solar lighting and battery powered lamps (Engelmeier and Gaihre, 2019). This adds to the investment prospect of solar energy within the renewables and off-grid sector.

All in all, the deployment of these renewables will allow increased access to electricity which is critical in the effort to accomplish the Government's ambitious target of 70 percent electrification.

Electrification drive

Despite its potential, the country is entangled in a web of energy crisis, having the lowest energy intensity and electrification rate at 14 percent of the population, coupled with a deplorable energy consumption compared to global standards (World Bank, 2018). This indicates a dismay and difficult penetration rate throughout the entire country. Regular power outage and the lack of access to affordable and reliable power supply are ongoing challenges, constraining potential development and economic growth in both the urban and rural areas (World Bank, 2020).

At the end of Asia-Pacific Economic Cooperation (APEC) meeting in 2018 (hosted in PNG), an Electrification Partnership was reached by Australia, the United States, New Zealand and Japan to support PNG realise its ambitious goal of reaching 70 percent electrification by 2030. This resulted in the creation of the PNG Electrification Partnership (PEP), with the potential to pool the needed capital, technology and expertise to boost generation capacity, rehabilitate

deteriorating transmission and distribution network, and upgrade existing grid to enhance electrification rates (Post Courier, 2018). It is noted that part of the PEP support will be for introducing off-grid projects to more remote regions of the country, where power plants and grid connections are less bankable. Efforts will be made to support State institutions such as PPL and Independent Consumer and Competition Commission (ICCC) to enhance capacity to deliver electrification program while at the same time to regulate tariffs at a sustainable and competitive level.

Of the total installed power capacity in the country, a significant portion is generated from diesel and fuel oil. The main power grids of Port Moresby, Ramu and Gazelle Peninsula, coupled with smaller centres, are operated by the PPL. The Port Moresby system which serves the National Capital District and surrounding areas, is powered by hydro, thermal diesel power and gas-fired power plants. The Ramu system, which is predominantly supplied by hydro system, serves Morobe, Madang and other Highlands provinces, while the Gazelle Peninsula system powers East New Britain Province through hydro-plant and diesel plants. Other provinces rely heavily on diesel plant for electricity supplied through the PPL network. It is widely acknowledged that most of PPL's plants are ageing and require expensive maintenance, and electricity, where available, is costly for households and businesses (Economist Intelligence Unit, 2019).

Besides the dominant presence of the State-owned PPL, in the generation, transmission, distribution and retailing of electricity throughout the country, independent power producers (IPPs) are participating in the generation space. For example, there are private-owned power stations at Kanudi and Bulolo feeding into the Port Moresby and Ramu grids, respectively. A number of multinational companies operating in the resource sector are setting up their own power stations to meet their needs. For example, Ok Tedi Mining Limited runs 129 MW of hydro and diesel generation, and Newcrest Mining operates a 170 MW thermal power plant at Lihir (PNG Power Limited, 2018).

It is encouraging to note that there are concerted efforts made by policymakers and development partners to address these problems. To expand electrification, GoPNG with the help of the World Bank, developed the NEROP, which takes into account grid connections and off-grid solutions.

Institutional restructure

The Department of Petroleum and Energy is responsible for the overarching energy sector policy and planning. With

the intent to enhance planning and coordination capacity, key institutional reforms as proposed in the NEP are set to be established with the recent endorsement of the National Energy Authority Bill (Post Courier, 2021). Entities with changed responsibilities will be restructured as follow:

- **National Energy Authority (NEA)** – an overarching body responsible for all energy related matters involving the development, conversion and transportation of energy, including the development and implementation of the NEP, the development of renewable resources, the electrification roll-out, and in the long term, the use and deployment of technology to develop new energy products. NEA will aim to become the central policy-making and planning entity for the energy sector.
- **Energy Regulatory Commission (ENERCOM)** – a regulatory body responsible for the economic and technical regulation of the electricity sector and for the promotion of a competitive energy industry, as an independent industry watchdog. These functions are currently undertaken by the ICCC with technical regulation delegated to PPL.

Currently, ICCC sets electricity tariff under the regulatory contract between PPL and ICCC, and issues license for IPP and other private companies that wish to own generation and distribution facilities. This now will change with the current reform.

For PPL, the NEP proposes unbundling to establish separate commercially-oriented entities for generation, transmission, distribution and retailing. The NEP also discusses the need for ENERCOM to set cost reflective tariffs, particularly in the context of unbundling of PPL's functions and differences in costs across regions and the scope for using the tariff to encourage renewable energy generation (DPE, 2017).

Utilisation of domestic gas

In light of the high costs in power generation and supply, there is a growing discussion on transiting from high-cost fossil fuel environment to a low-cost renewables environment. In this regard, natural gas is poised to play a significant role in future energy mix. Given its availability and versatility for uses in different sectors, natural gas has been highlighted in the official public policy document, as a way to diversify the economy away from oil.

PNG is an emerging investment hub for major petroleum companies with its untapped wealth of oil and gas resources. Yet, the country has not develop its downstream base and

still imports large quantities of diesel fuels as inputs to power plants for electricity generation (World Bank, 2018). However, recent development shows that there is potential in harnessing domestic gas for power generation as well as creating the market for local gas. A case in point is the recent establishment of Niupower, a joint venture entity created by Oil Search Limited and Kumul Petroleum Holdings Limited, which operates a 58-MW gas-powered power plant in Port Moresby. The power plant uses gas from the PNG LNG project and supplies the local grid. Another venture is the Dirio Power and Gas Limited, an investment project by Mineral Resource Development Company (MRDC) which will produce total energy capacity of 45-MW for the Port Moresby grid (Post Courier, 2020b). This illustrates emerging opportunities to strengthen public private partnership arrangements and produce input necessary to address the country's ongoing electricity problem.

Challenges faced by the energy sector

Despite positive reforms and developments in the sector, there remain a number of formiable challenges such as the following:

- **Poor access and unreliability**
It is a daunting challenge producing reliable electricity service which is accessible by needed population in an affordable manner. It is noted that the State utility who is tasked to generate and supply power is reported to be riddled with multi-faceted problems ranging from financial constraints, aging infrastructure to poor leadership and mismanagement (Post Courier, 2019). Recent analysis by World Bank (2020) attributed the woes to insufficient PPL's capability which lead to shortcomings in generation, transmission, and distribution assets and system operations, with high system losses. The analysis further points out to poor financial performance arising from a lack of proper investment planning and poor revenue management, including low electricity bill collection, which consequently compel PPL to occasionally reduce fuel purchases, limit power generation, and thereby, shed load (World Bank, 2020).
- **Coordination issue among key agencies**
It is noted that weak enforcement of the energy sector planning over recent years and poor governance arrangement for the implementation of generation projects, combined with PPL's operational inefficiencies, have resulted in the high cost of delivery of electricity (Work Bank, 2018). The proposal to establish the NEA has arisen out of the recognition that there was in effect

no central power planning function, including plans to substantially increase access in rural areas. However, when the NEA setup comes to fruition, there will be an acute need to immediately resource the agency with appropriate skilled manpower and relevant resources to be able to work with relevant government entities, donor partners and private sector to achieve the electrification target of 70 percent by the end of the decade. An important role of NEA will be the coordination of key stakeholders to materialise the PNG Electrification Program's commitment.

According to Fallon and Sofe (2019), power system planning is a highly technical exercise and the main capacity for power planning is at PPL, although, that capacity needs strengthening given NEP goals. It is likely to be extremely difficult for the NEA to develop an effective capacity for system wide planning within the timeframes envisaged in the NEP. Furthermore, the role of the DPE should be policy development and oversight and not technical planning. But the NEA seems to be a replacement for the DPE and it is not clear that the NEA offers the best solution to the need for more effective planning.

- **Delayed implementation of the PNG Electrification Partnership**

In light of its long-term prospective gains, the PNG Electrification Partnership needs to be implemented immediately with a clear and coordinated pathway. It is reported that the Government opted to tap into the opportunity to expand and upgrade existing hydro system and grid facilities rather than focusing on off-grid solutions. This triggers lack of consensus on viable options to increase power generation (Post Courier, 2020a)

It was made clear that contracts undertaken under the deal would have to conform to international standards of transparency, and should be based on the principle of producing and supplying electricity at the lowest possible cost. How relatively possible and swiftly are the funds committed under the PEP be accessible for qualified and reputable industry players engaged in the generation and distribution of power for electrification through the country as intended?

- **Struggle to secure commitment for natural gas**

Over the years, successive Governments have struggled to retain and utilise the country's gas reserves for domestic consumption as part of broader goals to bolster energy independence, local industrialisation and nationwide

electrification initiatives. According to the World Bank (2018), the government has opportunities to influence the way that gas development takes place as major new gas production and LNG projects come on stream.

Policy options to promote needed reform

In light of the challenges, the following policy options are worth taking into consideration to support and progress reform initiatives in the energy sector.

- PPL needs capacity boosting in its management system, maintenance and rehabilitation of network infrastructure, and revenue collection strategy, in order to improve its operational and financial performance. It is encouraging to note the recently announced World Bank's Energy Utility Performance and Reliability Improvement Project, which would provide support to improve the firm's operational and financial performance (The National, 2021).
- It is important to ensure smooth coordination among key stakeholders, cohesive and speedy implementation of electrification projects and securing of commitment for natural gas for domestic consumption.
- There needs to be clarification of the roles and responsibilities of the NEA and PPL with respect to the overall planning of the power system in PNG. There also needs to be clarification of the roles of the NEA, Kumul Consolidated Holdings and the ICCC with respect to monitoring the performance of PPL.
- The PNG Electrification Partnership provides a good opportunity for the Government to expand electricity services throughout the country, and thereby boost accessibility rate. Strong leadership at political front, complemented by effective coordination among PPL, State agencies, development partners and other relevant agencies, are needed to effect implementation of the partnership.
- There is a need to formulate and legislate specific policies on domestic market obligations (DMOs), export market management, local content requirements, third-party access to gas infrastructure, gas revenue management, as well as health, safety and environmental protection. This may be a real challenge because most of the gas produced in the country are exported overseas. The government should affirm its commitment to making DMOs

compulsory in future development agreements, which should form the basis for negotiations of future projects in the oil and gas sector.

Conclusion

The energy policy reform aims to facilitate generation and provision of affordable, reliable and sustainable energy. To achieve it, harnessing of the country's abundant energy resources, expansion of electrification, and effective sector planning and coordination are necessary. However, poor access, unreliability and high costs in providing electricity services continue to be daunting challenges. Further, ineffective coordination among key stakeholders and delayed implementation of the PNG Electrification Partnership are posing formidable threat to progressing energy reform in PNG.

It is important to ensure smooth coordination among key stakeholders, cohesive and speedy implementation of electrification projects and securing of commitment for natural gas for domestic consumption, in order to address pressing challenges in the energy sector. PPL's operational and financial performance can be improved through overhaul of its management system, regular maintenance and rehabilitation of network infrastructure, and effective revenue collection strategy.

Harnessing renewables contributes to least-cost in generating power and thereby, allow increased access to electricity to boost business productivity and consumer welfare. Support by donor partners on electrification is essential in pooling the needed capital, technology and expertise to boost generation capacity, rehabilitate deteriorating transmission and distribution network, and upgrade existing grid.

The Government is committed to promoting domestic consumption of locally-produced natural gas for producing energy, with a view to derive maximum benefit from the development of the country's natural resources. Securing commitments to allocate some gas from LNG projects to meet domestic energy needs must be encouraged.

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