

## TERMS OF REFERENCE

### For Financing, Engineering, Procurement and Construction (EPC)

#### EDEVU TO MOITAKA 132KV TRANSMISSION LINE PROJECTS CONTRUCTION

##### A. Introduction and Background

The Government of Papua New Guinea (GoPNG) identified increasing electricity access as one key element of the Infrastructure & Service Delivery “pillar” of its Vision 2050, and targets at least 70% electrification of households by 2030 under its Development Strategic Plan (DSP 2010-2030) and electricity Industry policy (EIP) of 2011.

PNG maintains high economic growth rate, which means domestic power demand is also forecast to increase in future. Conversely, the country is also subject to chronic power shortages due to aging power facilities and lack of maintenance.

The PNG National and Provincial Plan is based on the EIP to achieve the Government goals of equity and efficiency in the supply of electricity and thus assist efforts to attain the overarching development goals of PNG.

Regarding the power development plan, the goals are defined as follows:

- The goal of equity requires an electricity industry that provides affordable power to as many citizens as possible.
- The goal of efficiency requires the supply of electricity in PNG in the most reliable, cost-effective and expeditious manner, to enhance affordability for low-income consumers and reduce costs for business using electricity as an input.

Accordingly, broad based economic growth is encouraged to improve living standards at grassroots level in PNG.

Three strategic objectives of the Government are addressed to achieve the goal mentioned above:

- Improving accessibility to electricity

Increasing the provision of electricity will help reduce poverty, partly because the lack of access to electricity is a dimension of poverty in its own right. Access to electricity has urban and rural elements, both of which are addressed through the EIP. The Government’s intention through the EIP and the PNG DSP 2010-2030 is to increase the share of the population with access to electricity from the current 13 percent to at least 70 percent by 2030.

- Improving reliability of the electricity supply

Along with affordability and access, reliability is critical in facilitating an environment conducive to economic activity. Improving reliability can thus be expected to pay significant dividends indirectly in terms of national economic growth.

- Ensuring that power is affordable for consumers.

It is necessary to take into account low ability to pay amongst large sections of the population. There is an essential need to decrease costs in electricity supply operations by power companies by boosting efficiency. It is the intention of the EIP to address problems of inefficiency and high service delivery costs in making electricity supplies affordable for all citizens and consumers of electricity in PNG.

PNG Power Ltd (PPL) is currently responsible for the operation of 17 systems at various centres. Three of these systems are hydro based with generation capacity in excess of 10 MW and include Port Moresby, Ramu and Gazelle Peninsula systems. The other systems are mostly isolated standalone diesel operated with a few supplemented by mini-hydros schemes. PNG has currently about 1010 km of transmission lines (TLs) throughout the three main grids (Ramu, Port Moresby, and Gazelle). The proposed project aims to build additional 60 km of transmission lines and substations in Port Moresby Grid and is a potential catalyzer for improving PNG's electricity sector performance through adequate and reliable access in PNG.

This project will set in motion a big step in implementing strategically positioned transmission links and extensions to shift the demand supply intersection towards high access and lower unit cost of supply to all, i.e. hospitals, schools, industry, as well as improving PNG Power's financial performance and ultimately a modernization of PNG's electricity services.

PNG's plans to electrify rural populations from grid extensions and to support for the National Electrification Roll Out Project (NEROP) will contribute toward achieving Government's goal and visions of delivering reliable and affordable electricity services to the people of PNG; however, the majority of the population will not have access to electricity unless PNG develops more of similar projects. By extending our existing power grid PNG is able to achieve these main objectives; (i) promote development of least cost generation sources thus promote NEROP program, (ii) will enable more people in rural areas to have access to electricity service, (iii) promote clean, sustainable and environmentally friendly technology that can benefit PNG.

The selected projects also assist in integrating new generation from Gas and Hydro resource areas into the existing Port Moresby grid. PNG Power also seeks to redress certain deficiencies and operational constraints of the Port Moresby grid so as to allow the efficient dispatch and transmission of power in the existing Port Moresby grid through increase transmission line capacity. In particular, it will compliment efforts underway for both emergency and long-term measures now being taken to increase generation.

These transmission and substation expansions include:

- (i) Edevu Switchyard to Moitaka Switchyard 40km 132kV double circuit transmission line interconnection with associated substation upgrade.
- (ii) Construction of a new Brown River 10MVA 132/22kV Substation
- (iii) Moitaka switchyard 132/66kV expansion and upgradation

It is anticipated that the planned projects if developed will support the National Government achieve its strategic objectives as articulated in its policy documents (MDTS, 2010-2030

Development Plan and 2050 PNG Vision) of providing an effective electricity service and thus address;

- (i) low level of electricity access
- (ii) unreliability of electricity supply and its consequential impact on the economy; and
- (iii) high costs of electricity generation both by private sector and PPL.

Note: While confirming the final routes of the Transmission lines, future plans of PNG Power and other authorities on development and rehabilitation should be considered.

Modernization of existing transmission system is also imperative for PNG Power to improve transmission system stability and to minimize cost of the service delivery. PNG Power is enthusiast to step in modern era of energy sector by introducing transmission and distribution automation, grid substation automation and smart metering. The plan PGSP program will include expansion and upgradation of the transmission system infrastructure, automation of transmission system along with the implementation of advance metering infrastructures which will improve operational efficiency of PNG Power, provide safe and reliable electricity supply at cheaper rate to the customers and in turn improve financial health of PNG Power.

The overall objective of the planned project is to augment the transmission system and to modernize electricity system in order to meet the future demand for electricity for all consumers and to improve reliability and quality of electric supply through advanced control and monitoring mechanisms of transmission system.

The implementation of the project will expand transmission capacity in and outside of Port Moresby. In addition, construction of new transmission lines along with expansion of existing substations will help to meet the growing demand for electricity and accelerate the pace of electrification which increases the economic growth of the country and improves livelihood. This project is also lined up to achieve reliable and efficient electricity for all by 2030 and improvement of energy trade infrastructure

The full scope of the Transmission network and substation expansion program is to secure *Financing* for all preparation required to undertake detailed design and actual implementation of the program under an *Engineering, Procurement and Construction (EPC)* arrangement, set up project implementation plan with suitable packaging and to Procure, supply, construct, test and commission the projects.

### **Invitation for Proposal**

Proposals for *Financing, Engineering, Procurement & Construction* of the whole program are invited from reputed transmission construction companies. The bidders can also propose to assist PNG Power Limited secure funds to finance to whole transmission and substation

expansion program and proceeds of the funding shall be used to fund the EPC Contractor as implementor of the overall program.

The successful bidder shall work closely with PNG Power to carry out the final detail design and to prepare the detailed construction documents. The Contractor will be engaged by PNG Power in accordance with international *Guidelines* through quality- and cost-based selection using simplified technical proposal.

## **B. Project Organization**

PNG Power, the program executing agency, shall establish a dedicated full time Project Management Unit (PMU) within PNG Power under the Project Delivery Office (PDO) led by Director PDO (Project Director). The PMU will be the main point of contact for working communication between the contractor and PNG Power.

## **C. Objective of the Assignment**

PNG Power seeks through this Terms of Reference (TOR) to engage a contractor for the *Financing, Engineering, Procurement and Construction (FEPC)* of the mentioned transmission lines and substation expansion program. The contractor shall be responsible of securing of Financing for the program, as well as detailed engineering design, supply of plants and equipment, construction, installation, testing and commissioning of the transmission lines and associated substations, communication and protection facilities for all the subprojects.

As contractor your aim is at providing high quality professional services in the area of financing, technical and safeguard management (environment and social) to PNG Power. The contractor shall implement, supervise, monitor and undertake reporting of the subproject activities and ensure that the program is completed according to the schedule. The contractor shall ensure that the completed project will deliver the quality, capacity, performance, reliability and economic life as required by PNG Power. PNG Power PMU will support the contractor in implementation of safeguards requirement including monitoring and reporting of the program.

## **D. The Contractor's Terms of Reference**

The Contractor's Terms of Reference:

- Finance or assist PNG Power secure funding equivalent to the total cost of the overall program.
- Undertake Engineering, Procurement and Construction of the overall program.
- Scope of works including survey, design, optimization and detailing of towers/poles, testing, execution of civil works, erection, stringing, testing and commissioning of the transmission line and substations.
- Detailed survey using Total stations, DGPS, etc. As an alternative, the contractor may also use ALTM (Airborne Laser Terrain Modeling) techniques of equal or better accuracy for the detailed survey.

- Design, supply, erection, testing and commissioning on turnkey basis of ACSR conductor with specific conductor details as specified in the recent 132kV Edevu to Moitaka transmission line study report.
- Design, supply, erection, testing and commissioning on turnkey basis of AAAC conductor with bigger size in place of existing ACSR conductor for the 66kV Dirio to Kanudi transmission line.
- Overall planning of the program implementation, routing and permitting, land acquisition, and community and stakeholders' consultation. This shall be done in closed consultation with PNG Power PMU.
- Management of the program implementation, schedule, and budget
- Preliminary works (review site characteristic and project concept, assess ESIA/ESMP with respect to International Guidelines)
- Supervision and management of subcontractors
- Supervision and monitoring of the program implementation of related transmission line and substation works
- Preparation of technical data and inputs to program reports and other program documentation
- Ensure all necessary government permits and license, including expertise opinion, for civil work will be obtained.
- Ensure environmental management plan (EMP) included in bidding documentation and contract document
- Review and clear contractor's site specific EMPs (SEMPs)
- Ensure that the SEMP's contain corona virus disease (COVID-19) health and safety management plan following international good practice and relevant national/local requirements
- Public consultation during program implementation
- Establishment of a grievance redress mechanism (GRM) and act as the GRM chairman to make sure that the GRM operational to effectively handle environmental and social concerns of program affected persons
- Build up and sustain institutional capacity in environmental management
- Supervise contractors in the implementation EMP to ensure compliance

Bidders may however visit the identified line routes to acquaint themselves with terrain conditions, approach/accessibility to the site, salient features of the routes and associated details of existing transmission lines.

Note based on available study report with PNG Power the contractor shall provide Engineering, Procurement and Construction Services for the selected transmission line and substation projects in Port Moresby Grid, PNG. The contractor shall undertake detail design engineering, procurement, supply of plants, construction, installation, supervision, monitoring, test and commission and report the project activities from technical, safeguard and management aspect as described in the detailed tasks. The contractor shall liaise with PNG Power Project Manager and External Contractors or Consultants that PNG Power may recruit separately to avail in depth services related to design, supply, construction, construction management services to ensure timely and quality delivery of PNG Power requirement. The

contractor monitors the project activities and report to the PNG Power and KCH as required. The contractor shall also work with PMU on safeguard (Environment and Social) implementation and management as well as monitoring the safeguard activities and preparing the Report as required by PNG Power and KCH.

#### **b. Detail Tasks**

The Contractor's detailed tasks are as follows:

##### **b1. Project Monitoring and Reporting**

For all the projects list above the contractor shall:

- (i) Review and advise PNG Power on recent study recommended arrangement of the projects to ensure the proposed arrangements are in accordance with PNG Power's requirement and technical specifications. The design optimization shall be of prime focus during such review.
- (ii) Design, supply, installation. test and commissioning.
- (iii) Provide oversight of all aspects of the construction in order to ensure that it is conducted properly and ensuring timely completion with adequate quality and at the stipulated cost.

The project will:

- (i) construct a new 40-kilometer (km) of 132 kilovolt (kV) transmission line interconnection double circuit between the planned Edevu Hydropower Scheme and the existing Moitaka 66kV switchyard,
- (ii) construct a new 10MVA 132/22kV substation at Brown River with all associated switchgears and accessories to accommodate local distribution of electricity and future Port Moresby and Ramu grid interconnection.
- (iii) upgrade the existing 66kV Moitaka switchyard with all associated switchgears and accessories to accommodate for the new 132kV transmission interconnection,

The project will help to complete the critically important 66kV transmission ring supply and ensure reliable electricity supply to support sustainable economic development for PNG.

#### **c. Impact and Outcome**

The impact of the project will be economic and social benefits to residential, commercial and industrial consumers from reliable and sustainable electricity supply for the Port Moresby region. The outcome will be improved reliability of the Port Moresby transmission network and especially the Motukea Industrial region.

#### **d. Outputs**

Electricity Transmission capacity in the project areas strengthen and modernized.

The project outputs will be;

- (i) Construction of a new 40km Edevu Hydropower Scheme to the existing Moitaka switchyard 132kV transmission interconnection and associated substations of
- (ii) Construction of 10MVA 132/22kV Brown River Substation
- (iii) Upgradation of 2 x 60MVA 132/66kV Moitaka switchyard

**e. Implementation Plan**

The project is expected to be awarded in 31<sup>st</sup> December 2021. The project implementation period is 18 months. The project is expected to be physical completed by December 2023.

**E. Document to be Submitted with the Bid**

- i. Proposed Methodology
- ii. CVs of Proposed Team Members
- iii. Track Records of the Consulting Company Highlighting the Similar Work
- iv. Company Registration and the Power of Attorney for Authorized Signature(s)
- v. Company Profile
- vi. Financial Proposal in a separate envelope as indicated below.

**F. Bid Submission**

Proposals are to be submitted

On or before 12:00 am on 31<sup>st</sup> December 2021 and should be addressed to the

Mr Francis Uratun

Director Network Planning

PNG Power Limited

Cnr Ward Road, Cordia Street, Hohola

PO Box 1105 Boroko, Port Moresby

National Capital District

submitted in two (2) separate sealed envelopes marked in upper left-hand corner "PROPOSAL FOR PREPARATION OF THE FEASIBILITY STUDY (FS) FOR TRANSMISSION AND SUBSTATION PROJECT" in respect of:

(i). Technical Proposal

(ii). Financial Proposal

placed in the designated tender box located at the office of PNG Power, Hohola at the address,

Mr Francis Uratun

Director Network Planning

PNG Power Limited

Cnr Ward Road, Cordia Street, Hohola

PO Box 1105 Boroko, Port Moresby

National Capital District

It is earnestly request to adhere to the deadline because, the proposals submitted after the deadline will be automatically rejected.