



PNG GRID STABILITY PROGRAM

TERMS OF REFERENCE

ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC)

MOTUKEA 66/11KV SUBSTATION AND DIRIO TO KANUDI 66KV TRANSMISSION LINE UPGRADE

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
- Improving reliability of the electricity supply
- Ensuring that power is affordable for consumers.

PNG Power Ltd (PPL) on behalf of its shareholder Kumul Consolidated (KCH) 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 program aims to build a two (2) 66/11kV Substation, a 66kV switchyard and reconducting of an existing 66kV 22km transmission lines in Port Moresby Grid. The program is a potential catalyzer for improving Port Moresby's electricity grid performance through adequate and reliable access in the capital city and Central Province.

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

The selected projects also assist in integrating new power 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 substation and transmission line capacities. In particular, it will compliment efforts underway for both emergency and long-term measures now being taken to increase power generation.

The PNG Grid Stability Program (PGSP) expansion projects will include:

- (i) 2x20/25MVA 66/11kV Motukea Substation Construction
- (ii) Dirio 66kV Switchyard Construction including one three phase 20MVA 66/11kV Step down transformer and associated distribution line expansions.
- (iii) Dirio Switchyard to Kanudi Switchyard 22km 66kV single circuit transmission interconnection upgrade with associated 66/11kV Motukea substation loop in loop out transmission interconnection construction.
- (iv) Kanudi switchyard 66/11kV expansion and upgrade

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 substations and 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 substation, 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 substations, transmission and distribution 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 power system.

The implementation of the project will expand substation, transmission and distribution capacities in and outside of Port Moresby. In addition, upgrading of the transmission lines along with expansion of substation capacities 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 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 *Engineering, Procurement & Construction* of the whole PGSP program are invited from reputed substation and transmission construction companies.

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 *Engineering, Procurement and Construction (EPC)* of the mentioned transmission lines and substation expansion program under the PGSP. The contractor shall be responsible for the full 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 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:

- Undertake Engineering, Procurement and Construction of the overall PGSP 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 substations, transmission and distribution lines.
- 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 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/upgrade a 22-kilometer (km) of 66 kilovolt (kV) transmission line interconnection single circuit between the new Dirio Gas Fired Power Plant and the existing Kanudi 66kV switchyard via 1.2km of 66kV Loop in loop out transmission line connection to the planned 66/11kV Motukea substation,
- (ii) construct a new 20MVA 66/11kV switchyard/substation near Dirio Power Plant with all associated switchgears and accessories to accommodate two (2) 11kV feeders for local distribution of electricity and future Port Moresby expansions.
- (iii) construct a new 50MVA 66/11kV Motukea substation with all associated switchgears and accessories to accommodate six (6) 11kV feeders for local distribution of electricity and future Port Moresby expansions.
- (iv) upgrade the existing 66kV Kanudi switchyard with all associated switchgears and accessories to accommodate for the upgraded 66kV transmission interconnection,

The project will help to complete the critical important 66kV transmission ring supply and ensure reliable electricity supply to support sustainable economic development along the PNG LNG Economic corridor.

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 along the Motukea Industrial region.

d. Outputs

Substations, Transmission and Distribution capacities in the project areas strengthen and modernized.

The project outputs will be;

- (i) Upgraded 22km Dirio to Kanudi switchyard 66kV transmission interconnection and associated substations
- (ii) Installed 1.2km 66kV Loop in loop out transmission line to Motukea substation
- (iii) Installed 1x20MVA 66/11kV Dirio switchyard/substation and associated 17km of 11kV distribution line expansion
- (iv) Installed 2x20/25MVA 66/11kV Motukea substation and associated 30km of 11kV distribution line expansion
- (v) Upgraded of 66/11kV Kanudi switchyard

e. Implementation Plan

The project is expected to be awarded in 14th January 2022. The project implementation period is 12 months. The project is expected to be physically completed by December 2022.

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.

F. Bid Submission

Proposals are to be submitted

On or before 12:00 am on 7th January 2022 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.