



## TERMS OF REFERENCE (TOR)

PROVIDE MAINTENANCE SUPPORT SERVICES  
FOR PAUANDA UNITS 1 & 2 HYDRO POWER  
PLANT (HPP)

## PERFORMANCE ENGINEERING BUSINESS UNIT

### MAINTENANCE SUPPORT SERVICES

#### 1. INTRODUCTION

PNG Power Limited (PPL) requires the services of qualified and experienced professionals or companies to provide maintenance support and improvement services for Pauanda Hydro Power Plant (HPP). The interested Service Provider must have and demonstrate specialist expertise in engineering and asset management skill set required to improve and maintain hydro turbine generation equipment and associated Balance of Plant (BOP). These skill sets shall also include but not limited to the following:

1. Electro-Mechanical Systems;
2. LV, MV, and HV distribution;
3. Process automation; and
4. DC systems

The technical assistance sought is specialized therefore requires the services of individuals or companies who have specialized expertise with the operation and maintenance aspects of hydro power plants and have record of success in providing similar services to other power utilities.

The key objective of the Service Provider will be to provide effective maintenance support with sound management system for the two (2) hydro units currently in operational condition to enhance the performance of the Hydro Power Station in ensuring 24/7 availability and reliability of the plant and also to maintain and improve the current asset conditions to meet the daily operational requirements of PPL power supply systems..

Details of the two (2) Hydro Turbines which are covered in this TOR are as follows:

Turbine Details							Generator Details						
#	Make	Type	Serial#	RPM	Head (m)	m3/s	Make	Type	Serial #	kV	PF	kVA	kW
1	Toyo Menka	H/Francis	RB101 25.01	500	109.5	6.23	Shinko Electric	B/Synch	PVLKJF2 240-T	6.6	0.8	7500	6000
2	Toyo Menka	H/Francis	RB101 25.02	500	109.5	6.23	Shinko Electric	B/Synch	PVLKJF2 240-T	6.6	0.8	7500	6000

The provision of Maintenance Support and Asset Management Services shall be for a period of 12-months. The key deliverables within this period will be the provision of effective maintenance support including cataloguing and asset entry of all equipment into a current PPL Computerized Maintenance Management Systems (CMMS), definition of preventable maintenance works and inventory referencing and management. It is also expected that all site engineering documentation shall be added into the CMMS for long term retention.

PPL, 3 -month prior to the expiry of the contract will exercise the option of either to extend or terminate the contract.

Due to the current issues with limited foreign currency reserves, **all payments will be made in PNG Kina only.**

## **2. BACKGROUND**

PPL is a Government owned power utility responsible for the generation, transmission, distribution and retailing of electricity in Papua New Guinea. The company is regulated for price and service standards under a Regulatory Contract signed between PPL and the Independent Consumer and Competition Commission (ICCC).

PPL is a vertically integrated business employing approximately 1,750 people, both permanent and casual employees, and operating twenty-one power supply systems (generation, distribution and retailing) and six distributions and retailing centers. The major power supply systems are located in the National Capital District and Central Province (POM System), the New Guinea Mainland (Ramu System) and the East New Britain Province (Gazelle System). These systems combined account for 90% of total power generated and sold. Hydro and diesel fuel are the main sources of energy with hydro power generation contributing 45% of total electricity generation.

PPL also purchases power from Independent Power Producers (IPPs) including 24MWs POM Kanudi Daewoo Power Station, ExxonMobil 25MWs, 10MWs PNG Forest Products, 1MW NBPOL and 32MWs Lae Munum Daewoo Power Station. PPL also has 40MWs of leased generation from LCS Electrical & Mechanical Contractors and Aggreko Ltd.

The Pauanda hydro power generation supplements the Ramu system by 11 MW and maintains system voltage. It supplies electricity to Mt Hagen, Wabag in Enga and Mendi in Southern Highlands Provinces. It also provides power to all other centers and rural establishments that lie along the transmission line route during times when transmission line is down between these centers and Ramu 1, therefore maintaining Pauanda HPP at 95% of its installed capacity is of highest importance to PPL.

Furthermore, good maintenance and operation of the hydro power station is also critical to the environment as it helps cut down on gaseous emissions produced by fossil fuel powered generation that contribute to the notorious greenhouse effect.

## **3. SUSTAINABLE POLICY**

It is PPL's policy that contracts will be awarded to contractors who meet or have the capacity to meet its minimum standards of business performance and can show their operations are conducted in a safe, reliable, environmentally sustainable way, and in the interest of all PNG stakeholders. As such these are some of the requirements:

- a. All companies doing business with PPL are required to be vetted under PPL's supplier vetting process
- b. Preference will be given to PNG companies if they meet PPL's requirements
- c. Foreign companies must detail local participation and succession plans within their proposals
- d. If a PNG company, it must be registered under the Independent State of Papua New Guinea Companies Act 1997

The criteria above are in no particular order, are not exhaustive and will not necessarily be afforded equal weighting.

PPL may at its absolute discretion, following evaluation of the responses to this TOR select the preferred contractor with which to negotiate directly regarding the terms of the Maintenance Service Contract. Progress to negotiate and/or formalise this contract will be at the sole discretion of PPL and PPL reserves the right, to terminate such negotiations for any reason, or to negotiate with any other party.

#### 4. SAFETY

##### a. General

PPL shall provide a secure and safe working environment that safeguards people, equipment and the environment.

##### b. Safety Induction

PPL shall provide a site safety induction as specified by the site or Power Station Manager and the Occupational Health Safety and Environment (OHSE) team. At the minimum, the induction shall cover main site risks and hazards, relevant site rules and procedures, work permit systems and specific protective equipment requirements, safety issues and resolution process, incident reporting requirements, emergency response preparedness, site environmental requirements, relevant chemical material safety data sheet (MSDS), and mandatory protective clothing.

##### c. Stop Work Authority

Either party reserves the right to halt work to ensure compliance with reasonable and safe work practices and with all applicable, state and local laws, rules and regulations.

d. All lifting and rigging operations shall be accompanied with evidence of current and appropriate test certificates and meet legal requirements and adequate to carry out lifting operations safely.

#### 5. DEPOSIT FEES

A refundable deposit fee of **Two Thousand Five Hundred Kina (K2,500)** shall accompany all proposals submitted. Proposals that are submitted without the deposit fee shall not be considered.

The refund of the deposit fee shall be made to all the unsuccessful bidders within three months of the contract award to the successful tenderer.

Copies of the TOR can be obtained from the Tenders Committee as per the addresses in Clause 16 below.

#### 6. SCOPE OF WORKS

The Scope of Works is outlined below in 6.1-10 and on request PPL will provide the relevant documentation and support to assist the Service Provider to prepare and provide their proposal. The proposed Scope of Works shall be but is not limited to the following parts:

##### 6.1 **Operating and Maintenance (O&M) support for Pauanda HPP.**

###### Brief Background

Currently the level and quality of maintenance provided at the Hydro Power Plant is not adequate hence resulting in poor performance and reliability of the plant.

The Service Provider is required to provide proposals for effective maintenance support and maintenance management systems to enhance performance of the power station in ensuring 24/7 availability and reliability of the hydro power plant.

The work includes:

- a. The Maintenance Support Services component will cover planned maintenance and condition based maintenance. In addition; the service provider shall use the current

CMMS (MEX) used on the gas turbines to track the health of the two (2) hydro turbines.

- b. Provide operations support as and when required during the engagement period;
- c. Provide expert field services to help resolve technical issues developed and encountered during the operation of the Pauanda HPP;
- d. Liaise and communicate with the relevant Original Equipment Manufacturers (OEM) for updates on engineering design of the plant and equipment, parts and maintenance;
- e. Provide timely reports to PPL management on the works carried out and the overall status of the unit; and

## 7. INCLUSIONS

These activities/costs are to be included as part of the maintenance support services costs:

- a. All the daily, weekly and monthly inspection reports. The contractor shall provide the details of these inspections;
- b. Daily incident/diary on the operations of the unit(s);
- c. Daily logs on hourly basis on the operations of each of the units;
- d. Scheduled maintenance activities and associated consumable spare parts including their associated costs;
- e. Emergency or unscheduled maintenance and repairs;
- f. All labour to maintain a 5 day/40-hour presence at each site covering mechanical and electrical disciplines;
- g. 24/7 access to specialist engineers with skill base to cover mechanical, electrical and automation issues;
- h. Long term maintenance plan for each asset detailing consumables including lubricants and lubricating oils required to maintain or improve asset condition;
- i. Consumables based on run-hours or condition including Generator and turbine oil filters;
- j. All allowances including meals, per diems, and accommodation etc.;
- k. Life cycle planning including major overhauls of the plant. The contractor shall provide details;
- l. Where specialist services are undertaken by sub-contractor(s). E.g. machine core rebuilds, generator rebuilds and major component replacement;
- m. Miscellaneous cost including equipment hire, specialist tools and other necessary associated costs;
- n. Freight and import clearance costs for critical and strategic spares; and
- o. Training costs including training calendar and schedules.

## 8. EXCLUSIONS

The activities NOT included as part of the total maintenance support costs and will be taken care of by PPL:

- a. Disposal of all waste including waste oil and spares;

- b. Grass control around the power station;
- c. Water and electricity for the contractor's site offices and facilities; and
- d. Program for oil analysis.

## 9. TRAINING/KNOWLEDGE TRANSFER

The contractor shall ensure that PPL staff fully participate in all the works covered in this TOR, especially those that will be performed on site. While this is expected to provide value added input to the deliverables, it is also considered very important that the knowledge and skill level of staff are enhanced to the extent that their knowledge and skill levels have more direct impact in the hydro turbine operation and maintenance. The proposal must specifically address this aspect and provide a training regime to achieve this outcome.

## 10. EXPECTED DELIVERABLES AND OUTCOME

The expected outcomes of this TOR are to ensure:

- a. These two (2) units are fully maintained with guaranteed 10MW output.
- b. Both units are available, reliable and fully operational to support both Ramu system on a 24/7 operational basis;
- c. Daily diary and log sheets for the plant;
- d. Warranty statements including performance guarantee and quality of service guarantee;
- e. Reports provided stating the quality and standards adopted relating to the works carried out;
- f. Development or care of Operating and Maintenance manuals in electronic formats and uploaded to the CMMS;
- g. The planned maintenance schedules weekly, monthly, bi-annually and annually are developed and executed;
- h. The maintenance works are optimized to best practice standards to meet the following KPI's;

Description	Target / Goal	Remarks
Plant Availability	>95%	Includes both planned and unplanned
Plant Efficiency	+/- 1% within benchmark	To be maintained with 1% benchmark of the initial benchmark performance test
Safety	0	There are to be no incidences consisting of First Aid Incidence (FAI), Medical Time Incidence (MTI) and Lost Time Incidence (LTI)
Environment	0	There are to be no events that may cause damage to the environment

- i. All operating and maintenance Standard Operating Procedures (SOPs) and Safe Work Procedures (SWP) relating to the operating and maintenance of the hydro turbines are developed and implemented;
- j. To move away from reactive maintenance practices and move to good maintenance and engineering practices using the current PPL networked CMMS;
- k. Critical spare part inventory list created with costs, lead times and minimum and maximum levels in place; and
- l. PPL staffs are trained and acquire the required knowledge and skills to perform their expected duties.

## 11. PROJECT DURATION

The duration of the contract will be twelve (12) months from the date of the Official Contract Order (CO). The decision with the option to extend the contract will be made three (3) month prior to the expiry of the contract.

## 12. AGREEMENT AND ACCESSIBILITY

The successful contractor will be advised through a Letter of Acceptance (LOA) however commencement of contract and site procession will be upon issue of the Official Contract Order (CO). Any expense incurred prior to receipt of an Official Contract Order will be at the contractor's expense.

## 13. PENALTY FOR FORCED OUTAGES

PPL will enforce penalty fees for unavailability of the turbines due to forced outages, where it is deemed that the forced outage situation occurred as a result of the contractor's negligence or failure to perform preventative maintenance in accordance with this TOR. The contractor will cover all costs required to return the asset to operating condition. The penalty fees will be calculated on daily rate basis from the agreed monthly maintenance service fees for the duration of the outage. These penalty fees shall be deducted from the respective monthly invoices.

PPL shall have the prerogative to terminate the contract or seek legal redress if the contractor fails to comply with the above.

The applicable law shall be the PNG legal and judiciary systems for any legal redress.

## 14. METHOD OF PAYMENT

Terms of Payment (TOP) is 60 days from the receipt of the invoices. Also, due to the current issues with limited foreign currency reserves, **all payments will be made in PNG Kina only.**

## 15. CONTACT PERSONS

Requests for clarification and additional information should be directed to;

Mr. George Win on Tel: (675) 324 3318 or Email: [gwin@pngpower.com.pg](mailto:gwin@pngpower.com.pg)

Mr. Augustine Efi on Tel: (675) 324 3465 or Email: [aefi@pngpower.com.pg](mailto:aefi@pngpower.com.pg)

Mr. Ephraim Hau on Tel: (675) 324 3410 or Email: [ehau@pngpower.com.pg](mailto:ehau@pngpower.com.pg)

## 16. PROPOSALS

The Service Provider to submit proposals to:

Tenders Committee  
PNG Power Ltd  
P.O. Box 1105 Boroko, NCD, Papua New Guinea  
Email: [supplyhelpdesk@pngpower.com.pg](mailto:supplyhelpdesk@pngpower.com.pg)

The period for submission of proposals shall be four (4) weeks from first date advertised in the PPL Website and the local daily newspapers. Unless time extensions are approved for the submission of proposals, all proposals received after the closing date will not be considered.

Signed: \_\_\_\_\_



Date: 20 / 09 / 2017

George Win  
A/GM Performance Engineering