



## **TERMS OF REFERENCE**

### **REHABILITATION AND CONDITIONING OF THE ELECTRICAL POWER SYSTEM FOR APPARI RADAR STATION**

#### **I. BACKGROUND**

Voltage fluctuations in the power system can lead to various technical issues, particularly affecting electronic equipment. Unstable voltages may cause nuisance tripping, fault logging, system shutdowns, and delays in operations. Furthermore, prolonged power instability can result in equipment failure, necessitating unplanned maintenance.

At the PAGASA Aparri Radar station, frequent voltage fluctuations occur, possibly due to the long distribution line of the Cagayan II Electric Cooperative, Inc (CAGELCO II). To protect the electronic equipment at the radar station, a diesel engine generator set is currently utilized to ensure a stable power supply. However, this solution proves costly due to the expenses associated with diesel procurement and the operation and maintenance of the generator set.

To mitigate these challenges, it is recommended to install an Automatic Voltage Regulator (AVR) on the main power supply. This will ensure a regulated voltage for the electrical and electronic systems, thereby enhancing their reliability and reducing the need for costly generator operation.

#### **II. APPROVED BUDGET FOR THE CONTRACT (ABC)**

The approved budget for the project amounts to Ten Million Pesos (**PhP 10,000,000.00**) inclusive of VAT and all applicable government taxes.

#### **III. QUALIFICATIONS OF THE BIDDER**

The complete requirements for a prospective bidder to qualify may be referred to Section II. Instructions to Bidders, the Bid Data Sheet, and Checklist of Eligibility and Technical Requirements of the Bidding Documents.

Prospective bidders who are not manufacturers or producers and acting merely as suppliers, distributors, and the like of the goods and services that are subject to this bidding must be duly authorized by the manufacturer or producer of the goods and services and must be able to show valid proof of such authorization during the opening of bids.



#### **IV. DELIVERY PERIOD AND PLACE OF DELIVERY**

The winning bidder shall supply, deliver, install, test, and commission the unit to the **PAGASA Aparri Radar Station, Brgy. Punta, Aparri, Cagayan** within **One Hundred Eighty (180) calendar days** commencing from the date of receipt of the Notice to Proceed (NTP).

#### **V. BID PROPOSAL CONTENTS**

The prospective bidder is expected to comply and respond in accordance with the specific instructions to bidders and submit all the documentary requirements under the Checklist of Eligibility, Technical and Financial Requirements. The submission of documentary requirements must be properly arranged in order and with a label.

The prospective bidder shall respond paragraph by paragraph and shall clearly indicate compliance to all the required specifications (*Please see Section VII. Compliance Matrix*) and shall specify the number of days or schedules within which to complete the delivery of all the goods required.

The prospective bidder shall be required to include in this proposal, original descriptive literature and unamended brochures of all equipment/materials to be supplied and must likewise be provided.

These details will allow the PAGASA-Bids and Awards Committee to fully evaluate and determine compliance from the prospective bidders.

#### **VI. TECHNICAL SPECIFICATIONS**

The winning bidder shall supply, deliver, install, test and commission the following equipment specified below:

##### **1. ELECTRO-DIGITAL VOLTAGE STABILIZER, 150KVA, 3P, 230V, 60HZ**

###### **A. Input**

- Input Voltage:	230 V
- Input Voltage range:	± 20%
- Input Power factor:	At full load >1.0
- Input Frequency:	60Hz
- Input Connection:	Delta 3P+PE
- Input Connection:	Single Input
- Technology:	Servo-type
- Harmonic Distortion: THDI:	No
- Cable Connection:	Bottom



#### B. Output

- Output Voltage: 230 V
- Output Voltage range: 3%
- Output Frequency: 60Hz
- Output Connection: Delta 3P+PE
- Efficiency: >98%
- Recovery & Auto start: No delay
- Overload Capacity: 125% load 1 minute
- Cable Connection: Bottom

#### C. Additional Details

- Bypass: Manual Bypass
- Unbalance Load: Each phase separately controlled

#### D. Standards

- Performance: EN62040-3 (VFI-SS-111)
- EMC/LVD: EN62040 – 2 / EN62040 – 1 & EN60950

#### E. General

- Storage & Running Temperature: 0°C – 45°C
- Electrical Protection: Over & Low Frequency, Over & Low Voltage and Over Current
- Protection Class: IP20
- Chassis: Anti-static anti rust coated painting protection
- Cabinet Color: RAL7035
- Emergency Power Off (EPO): Standard for IP20

#### F. Equipment Capabilities

- Auto Restart
- Emergency Power Off
- Advance User Interface
- SNMP ready

#### 2. ISOLATION TRANSFORMER, 150KVA, 3P, 230V, 60HZ

- Primary Voltage: 230 V
- Secondary Voltage: 230 V
- Insulation: Class H
- Mounting: Floor-Mounted



- Installation: Indoor type with high grade silicon core at 150°C temperature rising in NEMA 1 enclosure.

### 3. EXTERNAL MAINTENANCE BYPASS SWITCH, 3P, 230V, 60HZ

- Circuit Breaker type or better.

## VII. SCOPE OF WORKS

The scope of work covers the supply, delivery, installation, testing and commissioning of Voltage Stabilizer. The works and services to be performed under this contract shall essentially consist of, but not limited to, the following:

### 1. ELECTRICAL WORKS

- a) Supply, delivery, installation, testing and commissioning of 150Kva, 3P, 230V Electro-digital Voltage Stabilizer and Isolation Transformer.
- b) Replacement of existing Service Entrance.
- c) Replacement of existing and installation of new 200AT, 3P, Circuit Breaker in NEMA 1 Enclosure.
- d) Supply and installation of 3 – 125mm<sup>2</sup> THHN + 1 – 22mm<sup>2</sup> THW Copper Wire in the following:
  1. New Main Circuit Breaker (MCB) to new Isolation Transformer (IT)
  2. Isolation Transformer to External Maintenance Bypass Switch (EMBS)
  3. EMBS to Voltage Stabilizer
  4. Voltage Stabilizer to EMBS
  5. EMBS to new MCB (load side)
- e) Supply and installation of two 1.0Hp split-type air-conditioning unit with manual transfer switch inside the stabilizer room.
- f) Installation of conduits, boxes, lighting fixture, switch and convenience outlets.
- g) The winning bidder shall assist PAGASA in processing and coordinating with the local Electric Cooperative to arrange the shutdown of the main power supply for disconnecting the existing service entrance and connecting the new service entrance.
- h) Testing and commissioning of the whole system.

### 2. CIVIL WORKS - Construction of Equipment Shelter

- a) The concrete shelter must be built according to Philippine government office standards, including proper electrical grounding.



- b) The concrete shelter must protect the Voltage Stabilizer System from external air, temperature fluctuations, and moisture.
- c) The shelter must accommodate two technicians, allowing them to work on the electronics inside while being protected from the weather.
- d) Recommended dimensions: 5.3 meters x 3.8 meters.
- e) Cables must be protected within conduits and buried where feasible.
- f) The winning bidder will be responsible for all civil, electrical, cabling, and networking works required for the installations. This includes securing necessary permits, with PAGASA providing assistance in the application process.
- g) Bidders are required to conduct an on-site survey to obtain accurate information and assessments. A certification from the local area verifying the completion of the inspection and assessment must be presented by the bidders.

### 3. GENERAL NOTES

Prior to the undertaking of the project, the winning bidder should submit, provide, and comply with the following:

- a) Kick-off meeting must be conducted in coordination with the end-user in which the details of the project will be discussed. The schedule and venue will be advised by the end user.
- b) Coordination with the Engineering and Technical Services Division and NLPRSD personnel of PAGASA before and during the implementation of the project.
- c) List of personnel that will undertake the project (Engineers, supervisor, project manager, etc.)
- d) Submit proposed technical plans, manuals, brochures, and other essential project documents in both hard and soft copies. Provide two (2) professionally bound hard copies and accompanying digital versions.

## VIII. REQUIREMENTS FROM BIDDER

- a) The Bidder must be Authorized Service Partner or Certified Service Sales Partner of the product offered to ensure of its technical expertise on the offered solution.
- b) The Bidder must provide certification from the Manufacturer that equipment to be supplied is brand new and intended for Philippine market.
- c) The Bidder should provide certificate that has 24x7 technical support capabilities. Winning bidder should identify the person responsible for restoring service due to outages and provide his contact details i.e. contact person, position, contact numbers and email address.
- d) The Bidder shall provide user training within the warranty period; Training shall include equipment, course materials, certification (for the training on installation, configuration and operations of the equipment) and meals. Training maybe at either site of PAG-ASA or winning bidder preferred site; all cost relative to the conduct training shall be at the expense of the winning bidder.





- e) The bidder shall submit the resume of the following personnel that has been employed by them for at least two (2) years and who shall undertake the works:
  - Registered Electrical Engineers
  - Technicians experienced in the supply, installation, and operation of Voltage Stabilizer.
- f) Bidder must submit the following minimum certification requirements for the manufacturer of the Voltage Stabilizer:
  - ISO 9001: 2015 or ISO 14001:2015

## **IX. WORK SCHEDULE**

- a) Work can be performed from Mondays to Fridays starting from 8:00 a.m. to 5:00 p.m.

## **X. WARRANTY**

- a) Two (2) year warranty against factory defects and workmanship reckoned from the date of project acceptance.
- b) All components, system software, and parts provided and installed by the contractor shall be warranted against defects in materials and workmanship for two years from the date of substantial completion.
- c) Labor to repair, reprogram, or replace these components shall be provided by the contractor at no charge during the warranty period.
- d) The Contractor shall conduct comprehensive preventive maintenance twice a year during the warranty period at no cost to PAGASA and shall be available 24/7 to perform repairs if the system is found to be non-operational. Please refer to Annex A for the checklist for comprehensive preventive maintenance.

## **XI. FACTORY ACCEPTANCE TESTING (FAT)**

The Factory Acceptance Testing (FAT) will be conducted at the factory site and witnessed by three (3) PAGASA personnel. The FAT, including travel time, will be completed within seven (7) days covering all relevant aspects will be provided for three (3) qualified PAGASA personnel involved in managing and maintaining the digital voltage stabilizer. All expenses related to the FAT and training-such as airfare, transportation, lodging, training materials, and daily allowances based on UNDP-DSA rates will be covered by the winning bidder.

The purpose of the test is to verify the performance of the software and hardware in accordance with the specifications and functional requirements.



a) Visual Inspection

- Overall dimension
- Nominal Data and Nameplate
- Degree of protection of enclosures
- Clearances and creep age distances
- Protection against electric shock
- Presence and correctness of internal components, provisional interrupting devices and fuses
- Cabinet and control panel integrity
- Lock and keys
- Lifting means
- Absence of foreign parts

b) Integrity of Protective Circuit

c) Mechanical Operation Test

d) Dielectric Properties Test

- Dielectric strength
- Insulation resistance

e) Wiring and Operational Performance and Function

- Off-load Test
  - a. Input and output voltage measurements
    - a.1. Minimum and maximum values
    - a.2. Operating range and accuracy
  - b. Input and output Frequency measurements
- On-Load Test at 25%, 50%, 75% and 100% unbalanced load
  - a. Input and output voltage measurements
  - b. Input and output current measurements
  - c. Input and output Frequency measurements
- Simulation Test (introduction of voltage fluctuation at  $\pm 15\%$ )
  - a. Measurement of input/output voltages
  - b. Measurement of input/output currents

f) Control Board Setting (Thru PC)

g) Voltage Regulator Protection Circuit

h) Under/Over voltage test

i) Alarm notification (LED and acoustic) test

- Minimum and maximum voltage
- Maximum current
- Over temperature
- Ventilation failure



## **XII. SITE ACCEPTANCE TEST, TRAINING AND INSPECTION**

The Site Acceptance Test (SAT) can be conducted simultaneously with the On-Site Training (OST) and Inspection. The SAT, OST, and Inspection shall be attended by four (4) technical personnel and one (1) inspector for three (3) days. All expenses that will be incurred on SAT, OST, and Inspection including all travel-related expenses (roundtrip airfare & local transportation) and accommodation for the technical personnel who will be coming from the PAGASA Central Office in Quezon City shall be borne by the winning bidder. Training materials and meals shall be provided to the participants by the winning bidder.

a) Site Acceptance Test

- Insulation resistance test of installed cable
- Check input and output electrical values
- Power quality test (Input and Output)

b) Site Training

- Two-day onsite training of at least five (5) operators in the operation, maintenance of AVR. All expenses on the training will be shouldered by the contractor.
- Supply of Two (2) sets of Operation and Maintenance manuals.

c) Inspection

- The inspection should be conducted by a member of the Inspection Committee together with the Interim committee (Chief Meteorological Officer), and provided with an Inspection and Acceptance Report in compliance with COA's acceptance procedure..

## **XIII. SYSTEM COMMISSIONING**

After the satisfactory conclusion of the Site Acceptance Test, the winning bidder shall demonstrate the capability of the whole system of the Voltage Stabilizer which will be operated continuously for a 3-day period. The successful demonstration thereof shall mean that the Voltage Stabilizer has been commissioned.

## **XIV. AFTER SALES SUPPORT**

The winning bidder shall include in its bid a commitment for at least five (5) years support to PAGASA for the repair and maintenance of the Voltage Stabilizer system to be supplied.

It shall include in its commitment a provision of a reliable, swift and efficient on-site support, available 24/7 trouble and ticketing and response system and ensure a quick and readily available supply of spare and replacement parts.





**XV. SYSTEM DOCUMENTATION**

The winning bidder shall likewise provide PAGASA with the Voltage Stabilizer's system installation, operations and maintenance manuals. Said manuals shall contain among others the complete and detailed schematic diagrams, theory of operations, calibration and maintenance procedures.

In addition, the winning bidder shall provide a complete list of deliverables and installation materials, such as but not limited to mechanical, electrical, structured cabling, etc.

The winning bidder shall submit Electrical as built drawings signed by a licensed Professional Electrical Engineer upon completion of installation and commissioning of the AVR.

