1. **Delivery Schedule:**
   (i) Vendor has to submit make, Data sheet(TDS) and drawing of equipments along with Bid.
   (ii) Material should be delivered at Nalanda University- Rajgir, Bihar, within **30 days** from the date of Purchase Order.

2. **Payment terms:** 100% of the payment shall be released after receipt of the materials at Nalanda Site.

   **Note:** Payment shall be released within 45 days from the date of submission of verified bill subject to acceptance of material.
   Following documents will be required for processing of bills.

   (a) **Invoices:** 1 No. Original + 3 Nos. Extra copies
   (b) **LR/GR/RR:** Original Copy + 3 Nos. copies
   (c) **Certificate:** Test Reports & Calibration Certificates.
   (d) **Guarantee/Warranty Certificate**

3. **Performance Bank Guarantee (PBG)**

A PBG of 5% of the Purchase Order value shall be submitted. PBG shall be valid for the period of 5 years with a claim period of 6 months. Payment shall be released after receipt of Bank Guarantee.

PBG shall be encashed in case of: -

- Poor performance of items supplied.
- Lack of response against complaint made for repairing /replacement the faulty items during entire Warranty/Guarantee period.

4. Other Terms & condition (including time extension) shall be standard as per BHEL's prevailing practice.

राजेश बाबू
अभियन्ता (अक्षय ऊर्जा समूह)
बी.एच.ई.एल., रुद्रपुर
उत्तराखण्ड-263153

Rajesh Babu
Engineer (Renewable energy Group)
B.H.E.L., Rudrapur
Uttarakhand-263153

**Annexure A**

## 1. Qualifying Criteria (Technical)

| Sl. No | Description | Bidder to Confirm/Specify |
|---|---|---|
| 1 | Acceptance to **REG2122-20210459 Rev00 and Annexure-A.** Submit signed & stamped/digital signature on each page of all tender documents. | **Agree**/Disagree** |
| 2 | Copy of supply order of any one of the given items during the last Three (03) Years.<br>1. Pyronometer (for minimum 2 Nos.) OR<br>2. Temperature sensor (for minimum 2 Nos.) OR<br>3. Anemometer (for minimum 2 Nos.) | **Agree/Disagree** |

**** If bidder mentions "Agree", it will be treated that bidder has confirmed to meet the respective PQR and has accepted all the related conditions and there is NIL DEVIATION. In case of mentioning "Disagree", it shall be treated that bidder is not meeting the said PQR criterion and offer shall be liable for rejection.**

राजेश बाबू
Rajesh Babu
Engineer (Renewable energy Group)
B.H.E.L., Rudrapur
Uttarakhand-263153

Signature and seal of Bidder

# TECHNICAL SPECIFICATIONS FOR SUPPLY OF WEATHER MONITORING SYSTEM

राजेश बाबू
अभियन्ता (अक्षय ऊर्जा समूह)
बी.एच.ई.एल., रुद्रपुर

Rajesh Babu
Engineer (Renewable Energy Group)
B.H.E.L., Rudrapur

## 1. INTRODUCTION:

This specification defines the scope of the Bidder for supply of "weather monitoring system including data logger as per annexure-1, with 05 years of on site warranty at Nalanda University –Rajgir, Bihar".

## 2. PLACE TO DESPATCH:-

6.5 MW (DC)/ 5 MW(AC) grid connected
Ground mounted solar power plant
Nalanda University- Rajgir, Bihar

## 3. BIDDER'S SCOPE:

**The Scope of bidder is as follows:**

a. Supply of Weather monitoring system with calibration certificate valid for 01 minimum year from the date of PO.
b. Freight & Transit insurance.
Delivery Condition : Free On Road (FOR) destinations.
c. On site warranty for 05 years for sensors after installation at site or 05 years 06 months after delivery of material at destination, whichever is earlier.

| Sl. No | ITEM DESCRIPTION | Qty | UOM | MAKE |
|---|---|---|---|---|
| (i) | Secondary standard Pyranometers (For horizontal irradiation) with minimum 05 meters communication cable and mounting structure & accessories | 01 | No. | DYNALAB/ ZONNER/ METONE/ TRINITY / KIPP -ZONEN/ WEBDESIGN |
| (ii) | Sensor for ambient temperature, humidity & relative humidity with minimum 05 meters communication cable and mounting structure & accessories | 01 | No. | |
| (iii) | Temperature sensor for module temperature with minimum 05 meters communication cable and mounting structure & accessories | 01 | No. | |
| (iv) | Anemometer for wind speed with wind vane with minimum 05 meters communication cable and mounting structure & accessories | 01 | No. | |
| (v) | Tipping bucket rain gauge with bounce- free Reed contact with cable and mounting structure & accessories | 01 | No. | |
| (vi) | Data Logger with mounting structure & accessories | 01 | No. | |

**Note:**

a. *Bidder shall provide installation & commissioning manual for each item and shall also provide free of cost telephonic assistance, if required.*
b. *All equipments shall be RS 485 compatible and should be compatible with offered data logger. Output of data logger shall be fed to SCADA.*

Rajesh Babu
Engineer (Renewable Energy Group)
B.H.E.L., Rudrapur
Uttarakhand 263153

c. The technical particulars, recommended installation procedures and drawings of the equipments shall be submitted for approval to BHEL before procuring.
d. Only the listed makes of equipments shall be acceptable.
e. Test Certificates and calibration certificates of as per relevant standards/IEC shall be submitted to BHEL alongwith material supply.

## 4. TECHNICAL SPECIFICATION

### (i) PYRANOMETER (Secondary standard):-

Pyranometer meter should be Secondary standard as per ISO – 9096:1990 and IEC 60904. It should have appropriate moddbus protocal for the connecting to SCADA. It should also be highly sensitive with the fast response time, low power consumption & good stability of output.

Other technical parameter for Pyranometer the are as below:-

| S.No. | Technical Parameters | Range |
|---|---|---|
| 1. | Spectral Range | Bidder to specify |
| 2. | Analouge Output | |
| 3. | Analouge Output Range | |
| 4. | Serial Output | Rs-485 Modbus |
| 5. | Response Time | Bidder to specify |
| 6. | Directional Response | |
| 7. | Spectral Selectivity | <3% |
| 8. | Tempreture Response | <2 deg. (-20°C to 70°C) |
| 9. | Accuracy at bubble level | <0.1° |
| 10. | Field of view | 180° |
| 11. | Power Supply | 5V DC -30 V DC |
| 12. | Power Consumption | <150mW |
| 13. | Operating Tempreture | -20°C to 80°C |
| 14. | Detector Type | Thermopile |
| 15. | Spectral Sensivity | <3% |
| 16. | Humidity Range | 0-100% non condensing |
| 17. | Ingress Protection | IP 67 |

**Principal of operation**:
The pyranometer measures radiation on a horizontal surface from both the sun the sky. When exposed to Radiation, the temperature of the blackened horizontal surface rises. The equilibrium temperature reached by this blackened surface is a measure of radiation. This temperature is measured by a thermopile. A thin metallic film blackened with a special paint (which is sensor). A multi element copper constantan thermopile is in thermal contact with this thin metal film. Alternate junction of this thermopile are in thermal contact with this massive body of the instrument at ambient temperature which server as the cold junction. This way a millivolt output

proportional to the radiation received develops across the thermopile. The instrument typically has a time constant less than 25 seconds. The pyranometer shall be calibrated against a secondary standard whose accuracy can be traced to international standards.

**(ii) SENSORS FOR AIR TEMPERATURE, HUMIDITY, RELATIVE HUMIDITY & PRESSURE:-**

Sensor for the air tempreture, humidity, relative humidity & pressure should be highly sensitive with the fast response time, low power consumption & good stability of output. Sensor can also intregrated tempreture humidity air pressure at the same time.

It also should be built-in the water proof and anti UV shelter. Other technical parameter for the sensor are as below:-

| S.No. | Technical Parameters | Range |
|---|---|---|
| 1. | Power Supply | 5V DC -24 V DC |
| 2. | Current Consumption | <20mA |
| 3. | Operating Tempreture | -20 deg. C to 80 deg.C |
| 4. | **Range & Resolution** | |
| | Tempreture Range & Resolution | -20 deg. C to 60 deg.C ±0.1C |
| | Humidity Range | 0-100% RH ± 0.5% RH |
| | Pressure Range | 10-100 kPa 0.1 hPa |
| 5. | **Accuracy** | |
| | Tempreture | ±0.5 deg.C |
| | Humidity | ± 3% RH |
| | Pressure | ± 1hPa |
| 6. | Output Signal | Bidder to specify |
| 7. | Communication Protocol | RS485 |
| 8. | Radiation Shield | Bidder to specify |

**Principal of operation:**

The sensor used for measurement is an RTD. Here the resistance of the element varies with temperature (increases with temperature), approximately 3.9 ohms/degree Celsius. The weather shield is provided to avoid direct heating of the sensor by sun's radiation and to protect it rain and snow.

राजेश बाबू
अभियन्ता (नवी.ऊर्जा समूह)
बी.एच.ई.एल., रुद्रपुर
उत्तराखण्ड-263153

Rajesh Babu
Engineer (Renewable Energy Group)
B.H.E.L., Rudrapur
Uttarakhand-263153

### (iii) SENSORS FOR MODLE TEMPERATURE:-

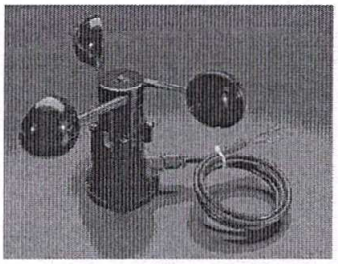
Sensor for the module tempreture should have high accuracy, precision with the fast response time, low power consumption & good stability & linearty, strong load capacity, long transmission distance and good anti inferference ability.

Sensor shall also be esay to install and have strong corrosion resistant ability. Other technical parameter for the sensor are as below:-

| S.No. | Technical Parameters | Range |
|---|---|---|
| 1. | Power Supply | 5V DC -24 V DC |
| 2. | Sensing Element | Bidder to specify |
| 3. | Measuring Range | Bidder to specify |
| 4. | Accuracy | ±0.5°C |
| 5. | Operating Tempreture | -40 deg. C to 80 deg.C |
| 6. | Output Signal | Bidder to specify |
| 7. | Load capacity | Bidder to specify |
| 8. | Communication Protocol | RS485 |
| 9. | Ingress Protection | IP65 |
| 10. | Mounting | Bidder to specify |

### (iv) ANEMOMETER:-

1. **Wind speed Sensor**: 3 cup anemometer
2. **Sensing**: 3 Cup assembly mounted on friction free shaft and coupled to a chopper.
3. **Starting threshold**: Bidder to specify
4. **Range:** 0 to 75 meter/sec
5. **Distance constant**: Bidder to specify
6. **Accuracy**: Better than 0.5 m/s
7. **Tolarance range in all parameters-** Less than 5% (Specially in operation)



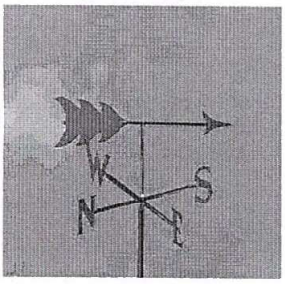
*(Indicative image of anemometer)*

**Principal of operation:**

Anemometer is a fast respond low threshold opto electronic anemometer. When rotated by wind, a chopper on the anemometer shaft interrupts an infra red light source, generating pulses from a photo transistor. The single is amplified and fed through a line driver. The frequency is proportional to wind speed. The anemometer is provided with a 3 pin connector for easy replacement and comes with approx. 10 meter of shielded cable.

**WIND VANE:-**

1. **Wind direction sensor:** Wind Vane.
2. **Starting threshold:** Bidder to specify
3. **Range:** 0 to 357 degree or better(3 degree electrical gap in potentiometer.
4. **Output:** Bidder to specify
5. **Operating temperature**: Bidder to specify
6. **Tolarance range in all parameters**- Less than 5% (Specially in operation)




*(Indicative image of wind vane)*

**Principal of operation:**
Wind vane is a counter balanced, low threshold wind vane. A Linear, wire wound endless potentiometer is coupled to the vane by an SS shaft. As the vane turns, it rotates a stainless steel shaft which is coupled to the potentiometer. This potentiometer has excellent linearity, very low starting torque.

The north of the wind vane is marked on its body. This line is to be aligned with actual north with wind vane help of prismatic compass, at the time of installation. Sensor gives minimum resistance at north (i.e., 0 degree approximately 20 ohms). The resistance output linearly proportional to the position of the wind vane.

**(v) RAIN GUAGE:-**

Tipping bucket rain gauge with bounce- free Reed contact (normally closed) shall be supplied by the bidder. Rain guage should meet the following parmeters:-

| S.No. | Technical Parameters | Range |
|---|---|---|
| 1. | Dimesion | ø150- 165 mm, height upto 300 mm |
| 2. | Resolution | 0.2 to 0.5mm |
| 3. | Capacity | Bidder to specify |
| 4. | Accuracy | 3% |
| 5. | Operating tempreture | -40 deg. C to 80 deg.C |
| 6. | Output Signal | Bidder to specify |
| 7. | Colloecting Area | Minimum 200 Sqcm |
| 8. | Communication Protocol | RS485 |
| 9. | Maximum Switch Rating | Bidder to specify |
| 10. | Mounting | Bidder to specify |
| 11. | Maximum Intensity | Up to 350 mm/h |

राजेश बाबू
Rajesh Babu
Engineer (Renewable energy Group)
B.H.E.L., Rudrapur
Uttarakhand-263153

| | | |
|---|---|---|
| 12 | Cable Length | As per requirement |

**(vi) DATA LOGGER:-**

Data Logger to be used for gathering of data from various weather sensors and fed to SCADA. Data logger must be compatible with the weather monitoring items as well as SCADA. It should be modular & compact and easy to handle. It should also have:-

- High functional density
- Expandable memory
- Real time monitoring
- Time synchronization through SCADA
- MCB/Fuse/ SPD should be provided to [rotect connected devices
- HMI display for realtime monitoring

Other technical parameters for data logger are as below:-

| S.No. | Technical Parameters | Range |
|---|---|---|
| 1. | Operating Tempreture Range | -20°C to 70°C |
| 2. | Degree of protection | IP65 Enclosure |
| 3. | Input Signal | RS485 |
| 4. | Communication Mode | Interfacing with SCADA with TCP/IP Modbus protocal |
| 5. | Program Memory | 512 kbyte & above |
| 6. | Expandable Memory | Bidder to specify |
| 7. | Number of supported device | Bidder to specify |

## 5. DRAWINGS & MANUALS:-

Bidders shall provide technical data sheets and test reports for the equipment giving details of the specifications alongwith Bid for approval.

One set of Installation and Maintanance manuals are to be supplied at the time of dispatch. One set shall be submitted in soft copy to BHEL Rudrapur.

## 6. INSPECTION:-

Test report and Inspection reports/TCs as per applicable IEC shall be submitted by bidder to BHEL. Bidder will have to raise an inspection call to BHEL before dispatch of material.

राजेश बाबू
अभियन्ता (अक्षय ऊर्जा समूह)
बी.एच.ई.एल., रुद्रपुर

Rajesh Babu
Engineer (Renewable Energy Group)
B.H.E.L., Rudrapur

## 7. WARRANTY AND GUARANTEE:-

The Bidder shall warrant that the goods supplied under this contract are new, unused, of the most recent or latest technology and incorporate all recent improvements in design and materials. The bidder shall provide warranty/guarantee covering the rectification of any defect in the material including spare parts OR replacement for a period of 5 years from the date of commissioning or 5 years and 6 months from date of receipt of material at BHEL, whichever is earlier. The successful bidder has to transfer all the Guarantee/ Warranty of the different components to BHEL. Undertaking from bidder and warranty certificate shall be provided along with the supplies.

Following requirements shall be ensured for the equipment supplied under the guarantee/warranty obligation:

(i) Performance as per technical and other parameters mentioned in the specification and contract. Performance data furnished/ specified for the equipment should be actually obtainable when the equipment is installed and tested at site.

(ii) Quality and strength of materials used in the manufacture of the equipment considering the applicable codes of practice and regulation.

(iii) Adequate factors of safety for all parts of the equipment to withstand the mechanical and/ or electrical stresses developed therein under specific operating conditions.

**Note:**

**(a)** During the warranty period bidder has to provide Name, address, mobile number and email address of the service Centre to be contacted in case of failure or complaint.

**(b)** During warranty or guarantee period bidder shall arrange site visit for maintenance on its own. No extra cost on this account including repairing/replacement of faulty parts (or items) shall be payable to the bidder.

## 8. PACKING:

Each package shall be marked with warning inscriptions: Top, do not turn over, category of cargo, etc.

Rajesh Babu
Engineer (Renewable Energy Group)
B.H.E.L., Rudrapur

Annexure-1

## Bill of Quantity

| Sl. No | ITEM DESCRIPTION | UOM | UOM |
|---|---|---|---|
| (i) | Secondary standard Pyranometers (For horizontal irradiation) with minimum 05 meters communication cable and mounting structure & accessories | No. | 1 |
| (ii) | Sensor for ambient temperature, humidity & relative humidity with minimum 05 meters communication cable and mounting structure & accessories | No. | 1 |
| (iii) | Temperature sensor for module temperature with minimum 05 meters communication cable and mounting structure & accessories | No. | 1 |
| (iv) | Anemometer for wind speed with wind vane with minimum 05 meters communication cable and mounting structure & accessories | No. | 1 |
| (v) | Tipping bucket rain gauge with bounce- free Reed contact with cable and mounting structure & accessories | No. | 1 |
| (vi) | Data Logger with mounting structure & accessories | No. | 1 |

Notes:-

1. Part Consignment are not allowed. All sensors alongwith respective accessories must be delivered through single consignment.
2. On-site rectification & replacement shall be bidder's responsibility, packing, forwading, freight & insurance for such replacement shall be under bidder's scope and bidder shall not be compensated in any manner.

राजेश बाबू
Rajesh Babu
Engineer (Renewable Energy Group)
B.H.E.L., Rudrapur
Uttarakhand-263153

**Report ID:** GEM/GARPTS/24012022/JPYP7S12KARE
**Report Name:** WEATHER MONITRING SYSTEM
**Generated By:** Alok Kumar , Department of Heavy Industry , Ministry of Heavy Industries and Public Enterprises

**Generated On:** 24/01/2022
**Valid till:** 23/02/2022

## GeM Availability Report and Past Transaction Summary

GeM Availability Report and past transaction summary report is generated based on the specifications searched by the Buyer. The specification may be modified appropriately for searching relevant categories on GeM. Buyer may navigate to GeM category page by clicking on the category link to view category specifications and products/services available in the category.

*Order Count and Order Value displayed is on a cumulative basis since GeM inception.*

**1. Search String: WEATHER MONITRING SYSTEM**

Search type: Product

1. There are categories available on GeM matching your requirements (as listed here). You can create a bid on GeM with a product closest matching your required specifications and add additional parameters in specifications through Corrigendum using RMS functionality.
2. If you feel that category TP needs updating you can submit category updating request also through RMS.
3. If you do not want to use any of the above option and want to proceed for procurement outside GeM, please suggest the specifications of the required product for creation of new category on GeM for future procurement.

Search Result: Category available/suggested on GeM but marked as "not matching requirements" by the buyer with undertaking as under:

*It is certified that I have thoroughly checked all probable categories suggested by GeM and I am satisfied that the product required is not covered / does not fall in any of the suggested categories and can not be procured under any of these categories even after inclusion of List of Values( LOV) wherever possible in category specifications of suggested categories. It is also certified that the technical specification requirement are such that these can not be covered even by adding specification parameters using ATC in any of the GeM suggested categories. This is a one-time requirement hence new category creation is not proposed / or requirement is recurring but request for new category creation will be submitted separately post generation of GeMARPTS.*

| Category Name | Catalog Count | Order Count | | | Order Value (in Lakhs) | | |
|---|---|---|---|---|---|---|---|
| | | Direct Purchase | Reverse Auction | Bid | Direct Purchase | Reverse Auction | Bid |
| Automatic weather station | 60 | 27 | 0 | 8 | 52 | 0 | 65 |
| Potable water purification system Reverse Osmosis or UV based | 20,207 | 13,233 | 119 | 1,209 | 8,394 | 739 | 4,782 |
| Compact Weather Station | 9 | 32 | 2 | 3 | 10 | 1 | 5 |
| Men's Shirt Cold Weather Thermal Under Garment for Glacier Region (Polypropylene ) - Defence | 30 | 2 | 4 | 0 | 0 | 71 | 0 |
| Pocket Weather Tracker | 12 | 5 | 4 | 9 | 0 | 3 | 6 |
| Modular Work Stations | 11,489 | 4,650 | 65 | 1,002 | 9,565 | 548 | 6,394 |
| Mask Face, Extreme Cold Weather- Defence | 26 | 62 | 0 | 3 | 16 | 0 | 49 |
| Flameproof And Weather Proof Exhaust Fan-IS:2148 | 30 | 225 | 1 | 4 | 38 | 0 | 2 |
| Movable File Storage System (Compactor) | 6,653 | 1,918 | 66 | 485 | 6,432 | 634 | 3,230 |
| Mens' Drawers Cold Weather Thermal Undergarment for Glacier Region (Polypropylene) | 29 | 16 | 0 | 0 | 9 | 0 | 0 |