Annexure-I

TECHNICAL SPECIFICATIONS

HYBRID WIND TURBINE AND GROUND-MOUNTED SOLAR PV SUPPORT STRUCTURES WITH DETAILED DRAWING

1. GENERAL REQUIREMENT

Hybrid (truss and monopole) support structures and resilient support structures are required to be designed for 5 kW wind turbine systems (2 no's) and 1 kW ground-mounted Solar PV systems (2 no's), respectively, as per the attached drawings. Two numbers of hybrid towers (5 kW + 5 kW) and two numbers of ground-mounted support structures (1 kW + 1 kW) need to be fabricated at CSIR-CMERI Durgapur and then transported, erected, and commissioned at Ghoramara project site. Further, the two 5 kW wind turbine systems and two 1 kW photovoltaic modules with accessories (dump load, charge controller, wiring, guy wire, etc.) are required to be installed and commissioned on the respective structures as per the instructions and guidance of CSIR-CMERI at Ghoramara Island demo site (South 24 Paraganas), West Bengal, India.

TECHNICAL SPECIFICATIONS/PARAMETERS

Sl. No.	Item	Minimum Technical Requirements
1.	Ground-mounted PV Module support structure (2 Nos) along with the installation of 2 no's of 1 kW Solar PV systems	• Two columns (100 mm x100 mm x 5 mm hollow sq. bar) having a height of 5 feet (1.524 m) need to be attached over the foundation (details are given in the annexure) to keep the PV module support structure. • The distance between the columns should be 1.1 m. • Two PV modules must be installed and commissioned on the two structural members (60 mm x 40 mm x 2.6 mm hollow sq. bar), which will be connected with two vertical columns by roller ball bearings. • The gap between PV modules should be 320 mm. Two stoppers (Front and back) need to be connected with a bolt to each vertical column to arrest the movement of the solar PV panels. Further, stoppers should be attached with the required vertical distance (the stopper center of the slot should be 100 mm below the top of the column) to maintain the angle of 68° to align the PV modules according to the latitude of the demo site. • Two special passive aerodynamic structures must be added on both ends of the PV support frame. Complete structures need to be provided with anti-rusting paint coating to prevent rusting. • Arranging solar PV modules (4 no's of 500 W each) along with the supply of all materials for the fabrication of support structures is within the scope of CSIR-CMERI. • The details of all structural members and assembly drawings are attached. • Foundation work for solar PV support structures is in the scope of the bidder, and a detailed drawing of the minimum foundation required for these structures is given in the attached Annexure. The foundation specifications are as follows • Plain Cement Concrete (PCC) has to be 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) • Centering and shuttering with block board or steel shuttering • Reinforcement for RCC works shall be done with the dimension specified in the drawing • Reinforced cement concrete (RCC) has to be 1:1.5:3 (1 cement: 1.5 coarse sand: 3 graded stone aggregate 20 mm nominal size)

2.	Hybrid wind turbine support structure with a ladder (2 Nos.) along with the installation of two no's 5 kW wind turbine systems on top of the tower	• The four legs of each bottom truss structure need to be attached with the required foundation (details are given in the annexure) as per the drawing. • The height of the bottom truss structure is 12 m above the ground level. The height of the monopole is 6 m. The overall height of the hybrid structure is 16.8 m over the ground). • The main load-bearing vertical members (6 m, 3 m & 3 m) of each tower need to be connected with one another with angle sections (as per the drawing & dimensions) using nuts & bolts. • All structural members (Cross and horizontal members) of the hybrid tower having different dimensions need to be connected by bolting joints. • The monopole structure has a wind turbine system that needs to be rested 1.2 m below the top of the truss tower. The bottom of the monopole needs to be rigidly connected with a truss structure with a base plate using nuts & bolts. Additional rigidity is provided on the monopole with the help of a hollow pipe with a length of 1 m attached to the truss structure. Eight numbers of guy wires also need to be provided at a height of 1 m from the top of the monopole. • A The platform needs to be prepared with fencing for people to stand on for the maintenance of the tower. A ladder with safety fencing also needs to be provided to claim over the truss structure. • The 5 kW wind turbine systems (2 no's) need to be mounted over the monopole along with their electrical connection till the charge controller is under the supervision of CSIR-CMERI. • Arrangement & supply of wind turbines (2 no's of 5 kW each) along with accessories (i.e., dump load, charge controller, cables, etc.) and supply of all materials for the support structure are in the scope of CSIR-CMERI. • Details of different components and their dimensions are given in the annexure. Complete structures need to be provided with anti-rusting paint coating to prevent rusting. • Foundation work for wind turbine support structures is in the scope of the bidder, and a detailed drawing of the minimum foundation required for these structures is given in the attached Annexure. The foundation specifications are as follows • Plain Cement Concrete (PCC) has to be 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) • Centering and shuttering with block board or steel shuttering • Reinforcement for RCC works shall be done with the dimension specified in the drawing • Reinforced cement concrete (RCC) has to be 1:1.5:3 (1 cement: 1.5 coarse sand: 3 graded stone aggregate 20 mm nominal size)

2. **TRANSPORATION, INSTALLATION, AND COMMISSIONING**: The complete support structures for Wind turbine and PV, wind turbine systems (2 x 5 kW), and Solar PV systems (2 x 1 kW) are required to be fabricated at CSIR-CMERI Durgapur and then transported, installed, and commissioned at Ghoramara Island Project Site (South 24 Paraganas), West Bengal. The mode of transportation from the nearest mainland (i.e., Kakdwip, Lot 8 jetty) to Ghoramara Island is a ferry boat (approximate distance of 4 km). Further, supplying all the required materials and accessories up to the project demo site is in the scope of the vendor/bidder.

3. **TRANSIT INSURANCE IS UNDER THE SCOPE OF THE VENDOR.**