REQUEST FOR PROPOSAL
INVITATION OF BIDS FOR SUPPLY AND CONSTR (S&C) OF FIELD ELECTRIFICATION (SOLAR HYBRID 150 KW) FOR THE FY 2025-26

PART I: GENERAL INFORMATION

1. Online Bids are invited by 62 Engineer Regiment for and on behalf of the President of India for **Supply and Construction of Field Electrification (Solar Hybrid 150 KW) (Qty-01 Nos)** for the FY 2025-26 Job No 6178/25-26 (S&C) at different locations under the AOR of HQ 3 Inf Div.

2. The address and contact numbers for seeking clarifications regarding this RFP are given below:-

(a) Bids/queries to be addressed to - CO, 62 Engineer Regiment

(b) Postal address for sending requisite documents - 62 Engineer Regiment,
PIN- 914062
c/o 56 APO

(c) Name/designation of the contact personnel - Commanding Officer

(d) Telephone numbers of the contact personnel
(i) Primary Contact No : **86690 11353**
(ii) Secondary Contact No : **88998 40899**

(e) E-mail id of contact personnel : **spsingh.176m@gov.in**

3. **Placement of order**. The purchase order will be placed on successful conclusion of negotiations with L1 firm.

4. **This RFP is being issued with no financial commitment and the Buyer reserves the right to cancel/change or vary any part thereof at any stage. Buyer also reserves the right to withdraw the RFP or Supply Order before delivery of stores, should it become necessary at any stage.**

5. FOR delivery of items will be as under:-

Ser No	Qty of Field Electrification (Solar Hybrid 150 KW)	Distance of Delivery From Leh City
(a)	01	350 KM Radius from Karu, Leh
Total	**01**	

6. Delivery Schedule. Stores will be delivered as per GeM instruction of placing of supply order at locations given in Para 5 above with the following stipulations.

(a) 50% of the stores for **Field Electrification (Solar Hybrid 150 KW)** will be delivered within 45 days of issue of contract/ supply order.

(b) Bal 50% of the stores for **Field Electrification (Solar Hybrid 150 KW)** will be delivered within 90 days of issue of contract/ supply order

(b) Before delivery of stores testing of all major items will be carried out when the store is ready for dispatch.

PART-II : TECHNICAL SPECIFICATIONS

Ser No	Description of work	Auth	Drg	Brief Description of 01 x Off-Grid Hybrid Solar and Wind Power Plant of 150 KW capacity	A/U	Qty
	Provision of Off-Grid Hybrid Solar and Wind Power Plant of 150 KW capacity			1. **OFF-GRID HYBRID SOLAR AND WIND POWER PLANT.** **(NOTE: PROJECT TO BE SUPPLIED AND EXECUTED AS PER LATEST MNRE GUIDELINES)** Supply, installation, commissioning and testing of Field Electrification (Solar 123 KWp & Wind 27 KW capacity) with PV panels comprising Mono crystalline half cut of minimum module efficiency of more than 20%, Low iron tempered glass, High transmission, Anti reflective coating (min 3.2 mm), in any combination, to meet 123 KW mounted on two fixed tilt angle based on maximum sunlight absorption, one for summers & one for winters (varying as per site condition), Vertical Axis Wind turbines, in any combination, to meet 27 KW, Battery Energy Storage System (BESS) of Gel based VRLA batteries with temperature control and inverter. **Note: The layout, circuit design of complete system as per the technical specification will be vetted by IIT/ NIT. Vetted shall be submitted by L-1 vendor within 30 days of award of Supply Order.** 2. **Environmental Conditions:** (a) Ambient temperature - (-) 40^0 C to (+)40^0C (b) Altitude - 4000 – 5500 Mtr (c) Solar irradiance & irradiation - As obtainable in Ladakh (d) Wind speed ≥ 200 Km/ hrs 3. **Solar PV Sub System.** Photovoltaic module will be as per the Approved List of Models & Manufacturers (ALMM) of MNRE, monocrystalline half cut panels of 123 KW, having efficiency more than 20%. The panels will be set up in series & parallel combination, based on output voltage and current. The PV subsystem to include, modules, sub – array field, electrical interconnection, foundation, mounting structure, protection devices and earthing. Each solar module shall consist of redundantly interconnected photovoltaic cell and peak power rating shall not be less than 400 W. However, higher wattage module shall be preferred.	No	01
				Make: - Make: - Make of PV panel will be as per the latest Approved List of Models & Manufacturers (ALMM) on MNRE site. Same shall be furbished by participating bidder during document submission for verification of Accepting Officer at TEC stage. Any bidder failing to submit the same shall be disqualified during TEC.		

4. **Following will be the parameters of the PV Modules.**

S No	Item	Specification
(a)	Peak power Pmax (Wp)	As per design to match the total 123 KWp
(b)	Cell Technology	High efficiency Monocrystalline half cut silicon cell / TOPCON
(c)	Glass type	High transmission, low iron tempered glass with anti-reflective, anti-soling, hydrophobic nano – coating & snow load certified with minimum 3.2mm thickness.
(d)	Load rating	Snow load rating ≥ 5400 Pa & Wind load rating ≥ 2400 Pa
(e)	Encapsulation	Potential Induced Degradation (PID) free Ethylene Vinyl Acetates (EVA)
(f)	Connector type	IP 68 rated MC4, compatible, UV & frost proof.
(g)	Certifications	IEC 61215, IEC 61730, IEC 62804 (PID), IEC 62716 (Ammonia), IEC 60068-2-68 (dust/ sand), IEC 61701 (Salt mist resistance), IEC 17310-1&2, IS 14286, IEC 62892 (Lead% test), IEC 61730 – 2 : 2016.
(h)	Dimensions of PV panels	Within 2.30 m x 1.30 m
(j)	No of PV panels	As per design
(k)	Degradation	1st year max 0.7% and Year on Year max upto 25 years module will only degrade max 20%
(l)	UV resistance	All material, coating & insulation must be rating for high UV exposure
(m)	Modules performance under low light condition should be atleast 50% of performance under normal condition.	
(n)	Module should be tested for high altitude & extreme temperature condition.	
(o)	**Module Mounting Structure**	
	(i) Two positions of tilt angle (winters & summers). Modules alignment and tilt angle shall be calculated to be provide the maximum annual energy output at site.	
	(ii) Specific for site.	
	(iii) Anodized Aluminum (marine grade) frame.	
	(iv) Structurally designed to withstand wind speed ≥ 200 Km/hr and snow load ≥ 2.4 KN/m^2.	
	(v) Nord lock washer system.	
	(vi) IP 65 or above.	
	(vii) GI strip/ copper-based earthing with lightening conductors with suitable surge protection for PV arrays & power electronic.	
	(viii) Minimum ground clearance will be 500mm.	

				<u>Note:</u> The above parameters need to be verified in the vetting by IIT/ NIT. 5. **<u>Protection System.</u>** (a) **<u>Lightening arrestors for Array and Wind turbine</u>**. Conventional franklin rods with copper tube ≥ 3 m above highest solar array point covering full array area using rolling sphere method. The down conductor will be directly bonded with earth grid with saddles clamp above 1.5 m & air gaps at thermal expansion joints. It will consist of same system as given below in S No 5 (b). Similarly, the lightening conductor for Wind turbine will be atleast 1.5 m above the highest point of the turbine assembly. Total quantity will be as per design vetted. (b) **<u>Lightening conductor with earthing for Housing of Invertor & Battery Energy Storage System:</u>** Lightning Conductors made of copper tube 150 cm long x 25 mm dia with five copper prongs of length 15 cm each fixed to copper ball of dia 50mm and 4mm thick with securing arrangement. Bottom 40 cm portion of the copper tube will be covered with PVC insulating material to avoid direct contact between the building and the lightening conductor. GI plate **of 90cm x 90cm x 6.5mm** will be provided for earthing purpose and will be buried directly in ground (earth pit not less than **2.75** metres deep below ground level) with top edge of the plate not less than **1.75 meters** below normal ground level, connected to galvanized earth lead wire 4.0mm dia **by means of taper pin driven into reamed hole and riveted over or a copper stud screwed into a tapped hole & riveted. Joint should be protected by a heavy coat bitumen**. GI conductor wire will pass through PVC conduit pipe to avoid direct contact between building and GI wire. Necessary insulated MS clamps for fitting PVC conduit pipe with building will be provided. For effective earthing of the lightening, moisture near earth pit needs to be maintained. Moisture will be maintained by covering GI plate with 15cm alternative layers of 25 kg wood charcoal granules size not less than 10 mm (in HDPE bags), 25 kg edible rock salt granules (in HDPE bags) complete as per details given in the drawing attached. Two GI funnels fixed with 2 X 20mm dia GI pipe of length 3 m will be provided for passing GI conductor wire and supplying water at **2.75 m** depth. Man-hole will be covered by using PVC/CI (cast iron) cover of size 45cm x 45cm over PCC pit. Test point terminal block made of gun metal or phosphorus bronze size 75x75x25mm drilled and screwed including 3 nos 8mm dia 25mm long hex head screw for fixing GI conductor wire coming from copper tube and GI plate with suitable nuts and bolts, will be provided at plinth level to check the resistance of the earthing. Schematic layout of lightening conductors attached.		

				(c) **Surge Protection Device** Type 1 & Type 2 as per IEC 61643 – II installed at:- (i) Main AC distribution board (ii) Invertor AC output (iii) Combination box DC output (iv) Battery DC terminal (v) All instrument/ data terminal (vi) The surge protection device nominal & more discharge current along with response time & protection modes will be given & design be vetted by IIT/ NIT. (d) **Earthing** (i) **Earthing for Housing of Inverter & BESS.** 02 Sets of earthing of building (for distribution boxes) will be provided using 4mm dia GI earth wire connecting to main board to GI plate of **90cm x 90cm x 6.3mm** will be provided for earthing purpose and will be buried directly in ground (earth pit not less than **2.75** metres deep below ground level) with top edge of the plate not less than **1.75 meters** below normal ground level, connected to galvanized earth lead wire 4.0mm dia **by means of taper pin driven into reamed hole and riveted over or a copper stud screwed into a tapped hole & riveted. Joint should be protected by a heavy coat bitumen**. GI conductor wire will pass through PVC conduit pipe to avoid direct contact between building and GI wire. Necessary insulated MS clamps for fitting PVC conduit pipe with building will be provided. For effective earthing moisture near earth pit needs to be maintained. Moisture will be maintained by covering plate with 15cm alternative layers of25 kg wood charcoal granules size not less than 10 mm (in HDPE bags), 25 kg edible rock salt granules (in HDPE bags) complete as per details given in the drawing attached. GI funnel fixed with 2 X 20mm dia GI pipe of length 3 m will be provided for passing GI conductor wire and supplying water at **2.75** m depth. Man-hole will be covered by using PVC/CI (cast Iron) cover of size 45cm x 45cm over PCC pit. Test point terminal block made of gun metal or phosphorus bronze size 75x75x25mm drilled and screwed including 3 nos 8mm dia 25mm long hex head screw for fixing GI conductor wire coming from MCB distribution box and GI plate with suitable nuts and bolts, will be provided at plinth level to check the resistance of the earthing (ii) **Earthing for Array** Earthing to Solar array and Wind Structure will be provided as per IS-3043:2018. It will be similar as given at 5 (d) (i) above. Quantity will be as per design but not less than three numbers.		

				Battery Energy Storage System. (a) Battery Technology : Maintenance free Gel based VRLA (b) Battery bank : 800 V 1200 Ah (c) Battery enclosure : Double walled structure with suitable insulation for cold regions. Two heating pads of 500W each provided for each battery enclosure room. The heating pads will function through PV modules and will haver auto cutoff when enclosure temperature reaches 20^0 C. The pads will not be placed on batteries but on a metal sheet placed on side of battery and the sheet will be in accordance with size of the battery. (d) Depth of discharge : 80% (e) Backup time : 96 KW for 8 hr @ 150 Amps (f) Operating temperature : -40^0 C to 60^0 C with heating pad. (g) Heating requirement : Active heating with auto cut off (h) Protection : Smart BMS with Short circuit, over voltage, over charge, under voltage, under charge, from energy due to load fault. (j) Minimum Cycle life : 5000 cycles with each cycle 80% DOD. Replacement of batteries will be carried out once life of battery is over till 5000 cycles are completed. Cost of the replacement will be part of project. (k) Warranty : 5 Years (l) Design catering to environmental effect & Peukert's effect. (m) Self discharging : < 3% per month. (n) Test report from Govt recognized testing center (i.e. NISE, CIPRI, ERTL etc) conforming testing under industry standard. **Note: The above parameters need to be verified in the vetting by IIT/ NIT, (Specially type of battery and output per battery) incase alternate and better battery options are available the same will be justified and approved by contract accepting officer.**		

				7. **Inverter Subsystem**. Inverter will convert the power available from various sources into usable AC power: - (a) Type - 150 KW Hybrid Inverter with Modbus communication technology to interface with battery energy storage system. (b) Charge Control Type - Maximum Power Point Tracking (MPPT). (c) Nominal Output Voltage - 230 V (+/-1%). (d) Nominal Frequency - 50 Hz (+/-3Hz). (e) Output Capacity - 150 KW. (f) Overload at Nominal Voltage - 110% for 5 Sec. (g) Charging Stage - Float, Bulk, Absorption. (h) Compatibility - PV array, Wind Turbine Generators, DG & BESS with source sequencing logic with seamless switching to & from any source (both import & export). (j) Characteristics - (i) MPPT algorithm must support solar irradiance smoothing and power rate control to avoid sudden surges in PV output. It should prevent inverter heating or reverse power flow when DG or wind is in action. (ii) The inverter shall have high conversion efficiency from 25% load to the full rated load. The efficiency of the inverter shall be more than 90% at full load and more than 80% at partial load (50% - 75%). The supplier shall specify the conversion efficiency in the offer.		

				(iii) Ensure proper sharing of load & prevent instability in islanded or weak grid scenarios. (iv) Blend renewable solar, DG, Wind & battery for optimization. (v) Programmed to support real power curtailment, frequency watt & voltage watt features & action island detection. (vi) Should ensure solar output reduction safety when battery is full or DG is running lightly loaded, avoiding over-charging or inverter trip (vii) Should include or be interfaced with microgrid controller that manages synchronization with DG, wind & battery system. (viii) Prevent phase/ frequency mismatch during source switching. (ix) Ensure storage of excess wind/ solar energy into battery and blend with DG set for optimization. (x) Output moderation based on battery state of charge. (xi) Avoid unnecessary charging cycles or PV clipping when battery is full & load is met by other sources. (xii) Thermal compensation for charge voltage adjusted via temperature compensation. (xiii) Float voltage set point determined by programable voltage & current thresholds. (xvi) Absorption time base on charge current taper not fixed duration. (xv) Cater for higher output voltage in subzero temperature and cater for inverter shutdown. (xvi) Altitude derating curve. (xvii) The inverter shall be designed for high altitude and extreme temperatures of the Ladakh region. (xviii) The inverter shall have provision for input and output isolation.		

				(k) Invertor will be connected through DC convertor & dump load for wind turbine generators and through array junction box for PV Array. (l) Source priority & load sharing protocol - Priority logic of solar-wind-battery-DG. (m) Cater for jerk load, protection against fluctuation, overload short circuit, array reverse, battery reverse & thermal fluctuation. (n) <u>Protection</u>. (i) PV Side - Reverse polarity, PV Power limit, Surge protection (MOV). (ii) Battery Side - Reverse polarity, over/ under voltage, current limit. (iii) DG Side - Over/ under frequency, surge protection (MOV). (iv) Load Side - Overload, short circuit, surge protection (MOV). (v) System Protection - Temperatures. (o) <u>Display</u> - Display data as follows:- (i) PV Module - Voltage, charge O/P Amps, Power, Cumulative energy (specific, monthly & annual). (ii) Battery Side - Voltage, current, battery state, string heterogeneity, battery terminal temperature. (iii) DG Side - Phase voltage, frequency, power, power factor. (iv) Load Side - Voltage & Current, frequency, power, export KWh. (v) System Protection - Mode of operation, action faults, status mimic. (p) Power source sequencing & integrate logic – To prevent source conflict of the following :- (i) Solar PV priority use with excess after base load for charging the battery if State of charge of battery <100 %. (ii) If load more than more than solar generation, battery discharges to bridge gap. (iii) Wind turbine adds power to supply load or charge battery. Operates in synchronized or droop controlled mode with solar. (iv) If load not met signal to start DG set & auto synchronized relay. (q) Adequate source channel. (r) Additional Safety & Monitoring:-		

(i) Remote monitoring & fault logging.
(ii) AC Fault detection.
(iii) Manual & auto by pass.
(iv) Insulation resistance monitoring.
(v) Operate with only solar power even if battery connected or battery voltage is very low.

Note: The above parameters need to be verified in the vetting by IIT/ NIT.

8. **WIND TURBINE GENERATOR TECHNICAL DETAILS. (**Low Voltage directive 2006/95/EC(LVD) Electromagnetic Compatibility 2004/108/EC/(EMC). Functionality and safety as per IEC 60670)

S No	Item	Minimum specification required
(a)	Capacity	Vertical Axis Wind Turbine Generator to meet 9 KW capacity.
(b)	Quantity	As per design to match total 9 KW power
(c)	Starting wind speed	Not more than 1.3 m/s
(d)	Cut-in wind speed	Not more than 2.5 m/s
(e)	Rated Wind speed Rated voltage (DC)	Not less than 15 m/s and not more than 17 m/s
(f)	Cut-out wind speed	Not less than 30 m/s
(g)	Design wind speed (m/s)	Maximum wind speed >= 55m/s
(h)	Generator Control System	Three phase permanent magnet suspension motor Electromagnet
(j)	Mount Height(m)	Not less than 5m from surrounding ground level
(k)	Work environment humidity	IP 54, VAWT ≤90%, Controller and inverter≤80%
(l)	Overspeed protection and Overload protection	Electromagnetic brake and unloading Unit
(m)	**Makes**	**As per MNRE specifications. Type certificate will be provided by vendor. Type testing and certification shall be carried out only by Internationally Accredited Testing and Certification body only.**
Note: The above parameters need to be verified in the vetting by IIT/ NIT.		