4MW Ground Mounted SPV System with BESS and Induction based cooking system

at

NETRA, Greater Noida

Project Document Title:

Technical Specification

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PART A Project Information, Scope, Terminal Points , Basic Design data and Engineering Parameter of SPV, BESS and Induction Cooking system, Warrantee and Spares

PART B Detail Technical Specification Civil, Safety and Quality Requirements

PART A

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A-1 PROJECT INFORMATION

1.0 INTRODUCTION

NTPC Ltd is India's largest energy conglomerate and a premier Maharatna Public Sector generating electricity via thermal, hydro and renewable energy sources. NETRA is a R&D wing of NTPC Ltd carrying out research in various aspects of power generation. NETRA, in order to demonstrate various new upcoming technologies, proposes to convert R&D campus into electrically self-sustain micro grid set up with the installation of approximately 4 MW ground mounted solar PV plant along with 1 MW /1 MWHr Battery Energy Storage System to meet the power requirement of the campus. NETRA, also proposes to convert its conventional PNG based canteen into solar powered Induction based cooking canteens. The solar power project along with BESS and Induction cooking system shall be implemented as EPC Package under Domestic Competitive Bidding.

2.0 PROJECT DETAILS

Name of the Project	4MW Ground Mounted Solar Photo Voltaic System with Battery Storage and Load and Source Prioritization with the existing electrical System and Induction based cooking system at NETRA, Greater Noida
Solar Project Capacity	4MW Ground Mounted (Seasonal Tilt MMS)
Battery Storage Capacity	1MW / 1MWhr Rated AC Capacity
Terminal Point	33 kV Bus as per Scope of Work
Metering Point	33kV side of 33000/415V Transformer In LT MCC Room

3.0 LOCATION AND APPROACH

District	Greater Noida, Gautam Budh Nagar, UP
Latitude and Longitude	28° 26' 52" N, 77° 31' 29" E
Nearest Railway Station	Dadri - Distance 20 Kms
Nearest Commercial Airport	New Delhi – Distance 50 Kms

4.0 LAND AVAILABILITY

Approx. 14 Acre of Land is available at NETRA Campus for this project. The tentative plot plan is in the tender drawings no NETRA-GC-PROPOSED AREA-TD-001.

5.0 PROJECT BRIEF

The project is basically converting the existing R&D centre of NTPC into a self-sustain microgrid comprising of different power generation sources such as Solar PV, Battery, DG set, MSW catering to various electrical loads of the campus in phased manner.

Entire NETRA campus is divided into two phases Phase I and Phase II which at present are independently fed by two different grid connection at 11kV and 33kV voltage levels. (Refer Tender Drawing no NETRA-GC-SLD-TD-002). Existing facilities at Phase 1 includes renewable generation of approximately 250kWp (including 110kWp microgrid) and 1200 kVA DRUPS system for power back up in case of grid failure. Facilities at Phase II includes DG sets for power back up along with Renewable generation of 150 kWp, 3 nos of 300 kVAR capacitor banks at LT bus along with various LT loads. A 400 kW (24x7) MSW power generation facility is going to be connected in the LT panel of Phase II however this is not in the scope of this tender.

This project is intended to set up a micro grid with various distributed energy generation sources (DG/Solar/MSW etc) along with 4 MWp Ground mounted Solar PV system and 1MW/1MWhr BESS system to be connected to 33kV bus of Phase II as per Chapter A-2 of part A of technical specification.

6.0 PERFORMANCE GUARANTEE

The performance guarantee test (PG test) for BESS and SPV shall be carried out as specified elsewhere in the specification and as per the approved PG test procedure which shall be submitted by the successful bidder for the approval of the NTPC. All special equipments, tools tackles, instruments, measuring devices etc required to perform the PG test shall be provided by the bidders free of cost. All cost associated with the PG test shall be included in the bid price.

7.0 OTHER DETAILS

NTPC will provide storage space, water and power requirements during construction phase of the project. However safety and security of the material shall be in the bidder's scope till the project is handed over to NTPC. All the clearances, approvals, permissions etc (Environmental Clearance, Chief Electrical Inspector clearance, SPCB Clearance, MNRE Clearance etc) as applicable for this project shall be in the bidders scope.

8.0 WARRANTY

The complete system have 12 months warranty for the whole system from the date of successful commissioning. However, equipment's supplied, under the contract shall have standard manufacturer's warranty and shall be in the name of the owner at the time of handover. During warranty period, the successful bidder has to attend any fault /failure of the main system or sub system components and maintain the entire system (including man and material) except cleaning without any financial implication to NTPC.

The warranty period shall commence from the date of successful completion of trial run as specified elsewhere in the document.

During warranty period of the system the bidder shall deploy a skilled manpower (24x7) at site for operation and emergency handling of the system.

A-2 SCOPE OF SUPPLY, SERVICES AND TERMINAL POINTS

1.0 GENERAL

The scope shall be Design, Engineering, Fabrication, Supply, Transportation and handling custom duty (and any other duties), Freight, Insurance, Unloading, Storage, Construction, Erection, Integration with the existing system, Testing and Commissioning of 4 MWp Ground Mounted Solar Photo Voltaic System with 1 MW / 1 MWhr Battery Storage System (BESS) along with supply installation and commissioning of Induction based cooking system at NETRA, Greater Noida on turnkey basis completely covering the following activities and services in respect of all the equipment & works specified under various sub sections of technical specification.

All equipment, materials and services whether explicitly stated or otherwise and that are necessary for the satisfactory operation of the Solar PV system, Battery Energy Storage System and its integration with the existing AC system along with induction cooking system as described in the technical specification read in conjunction with the scope of supply and services shall be deemed to be included in the scope of work of the Contractor and shall not be limited to the following:

i. Design, Supply, Installation and commissioning of 4MWp Ground mounted Solar PV system complete with all technical requirement.

ii. Design, Supply, Installation and commissioning of 1 MW / 1 MWhr Li ion based battery energy storage system (BESS) with BMS EMS and other requirements

iii. Detailed design of all the equipment and equipment system (s) including civil works as per technical specification

iv. Providing, Review and approval of engineering drawings, design calculations, performance test procedures, single line diagrams, electrical layouts, Equipment layout, Drawings/Data sheets of bought out items, Civil Drawings etc.

v. Providing Operation & Maintenance/ instruction manuals, as built drawings and other information;

vi. Providing training of Employer's personnel

vii. Providing, Review and approval of sub-vendors, manufacturing quality plans and Field quality plans.

viii. Complete manufacturing including conducting all type, routine and acceptance tests of the equipments

ix. Packing and transportation from the manufacturer's works to the site (NETRA) including logistic, customs clearance (including reconciliation with customs authorities, as required) ,port clearance, port charges, (if any).

x. Receipt, storage, preservation and conservation of equipment at the site; Fabrication, pre-assembly, (if any), erection, testing, pre-commissioning and commissioning and putting into satisfactory operation all the equipment including successful completion of initial operation and trail run

xi. Installation, commissioning and integration of the SPV and BESS system with the existing system as per the technical specification

xii. Civil works to the extent applicable including geo technical survey (if required), construction of drainage arrangements, module cleaning system etc

xiii. Compliance with statutory requirements and obtaining clearances from statutory authorities, wherever required and to obtain all clearances / sanction / license / certifications from statutory authorities on behalf of NTPC, wherever required

xiv. Supply installation and commissioning of Induction cooking system as per technical specification

xv. Supply of spares – as per BOQ

xvi. Providing warranty of Solar PV and BESS along with its associated equipments as per technical specification

xvii. Supply of any special equipments and tools required for operation and maintenance of the plant

xviii. Satisfactory completion of the contract.

2.0 ELECTRICAL SCOPE OF SUPPLY & SERVICES

Detailed design of Grid Interactive Solar PV System along with BESS and induction cooking system, its associated civil, electrical & mechanical auxiliary systems (if applicable) including preparation of foundation drawings, single line diagrams, installation drawings, electrical layouts, design calculations, other relevant drawings and documents required for engineering of all facilities within the scope, interconnection with the existing system, protection coordination etc to be provided under this contract, are covered under contractor's scope of work.

Submission of following document also must be included:-

- Design Philosophy of whole system
- Detailed design documents, layout, SPV panels technical data sheets etc of SPV System and its components
- Detailed Battery & BMS schemes, logic diagrams, Architecture, technical data sheets etc, of Battery and BESS and its components
- Battery system sizing calculation for all different functions
- EMS/SCADA control logic diagram, schemes, architecture
- Submission of Simulated study of BESS as per specification for solar generation smoothening and other application requirement considering all possible operating condition
- Earthing design and ventilation design calculation along with all associated civil design report for BESS
- WMS , Fire fighting and Module Cleaning System
- Detailed O & M Manuals (02 copy) of every equipment
- Document on Safety hazard to environment and personnel and procedure of safe disposal/handling.

Ownership of packing materials (except of mandatory spares) shall be of the bidder. Hence, responsibility of removal and disposal of the packing material shall be in the scope of bidder.

Necessary tests & survey required for design of solar PV system is in the scope of bidder. The reports shall be submitted to NTPC.

Supplies and Associated Works (to be read in conjunction with the relevant chapters of technical specification)

DC SIDE	
•	Solar PV Modules
•	Module Mounting Structure (MMS) along with Foundation
•	DC Cables including field connectors and DWC pipes
•	String Combiner Box(if applicable)
•	Power Conditioning unit (PCU) / Inverter
•	Complete Battery Energy Storage System (BESS)
•	Li ion based complete BESS
AC SIDE	
•	LT Switchgear
•	HT Switchgear
•	Inverter Transformer
•	LT Cables
•	HT Cables
•	EMS , SCADA & Time Synchronization Equipment
•	Instrumentation and Communication cable
•	Earthing System
•	Lightning Protection System
•	Auxiliary Power Supply System
•	Battery and Battery Charger
•	UPS
•	Induction Cooking System
GENERAL SYSTEMS	
•	Weather Monitoring Station
•	Fire Detection and protection system
•	Module Cleaning system
•	Engineering cum Operator work station workstation (EWS+OWS) (Desktop & Monitor)

3.0 CIVIL SCOPE OF SUPPLY & SERVICES

The broad scope of work under this package shall include Civil works related to but not limited to the following areas. Bidder is advised to visit the site for better understanding of the quantum of civil work required before bidding.

S.No.	Scope of Work
1.	Site investigation-Topography survey & geotechnical investigation, if required
2.	Site Preparation: Site grading including slope protection, ground preparation/ filling/ levelling (if required) of the Identified area including cutting , clearing and transportation of bushes /vegetation/ plants etc
3.	Construction of requisite foundation and structures wherever required for Module Mounting structure, transformer, BESS and any other associated equipment, system including material supply and other related activities
4.	Cable Trenches / Trestle including any Cable Tray supporting facility
5.	All Equipment Supporting Foundation and Structures for Solar PV, BESS and Induction cooking System
6.	Construction of Internal Roads and pathways
7.	Design and construction of Drainage system as per General Layout & Topography
8.	Transformer foundation , soak pit (if required) , Fencing etc
9.	Central Monitoring and Control Station (CMCS) Air-Conditioned with complete electrical works and required furniture's for use as Office during construction period & later during normal operation of the plant as per bidders proposal.
10.	Design, supply and installation including any requisite Construction works of Module Washing system. Water supply arrangement for washing including supply and installation of Module cleaning system.
11.	Other miscellaneous civil works

4.0 TRAINING OF THE EMPLOYERS PERSONNEL

The bidder shall provide the training (free of Cost) to the personnel of NTPC for 7 days for BESS design testing and O&M. All the expenses towards travel, lodging and boarding and other expenses for the personnel shall be borne by NTPC.

5.0 The work to be carried out as per the above scope shall be all in accordance with the requirements, conditions, appendices etc. given in Technical Specifications together with those stated in other Sections/Sub-sections of Bid Documents, which shall be considered as a part of this volumes completely as if bound herewith. It is not the intent to specify herein all aspects of design and construction nevertheless, the equipment and civil works shall conforming all aspects to high standard of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in a manner acceptable to the Employer, who will interpret the meaning of the specification and drawings and shall have a right to reject or accept any work or material which in his assessment is not complete to meet the requirements of this specification and/or applicable Indian / International standards mentioned elsewhere in this specification.

6.0 Bidders are requested to carefully examine and understand the specifications and seek clarifications, if required, to ensure that they have understood the specifications. Such clarifications should be sought within the time period as stipulated in section ITB. Bidder's offer should not carry any sections like clarifications, interpretations and/or assumptions. However, if the bidder feels that, in his opinion, certain features brought out in his offer are superior to what has been specified, these may be highlighted separately.

7.0 Failure of any equipment to meet the specified requirements of tests carried out at works or at site shall be sufficient cause for rejection of the equipment. Rejection of any equipment will not be held

as a valid reason for delay in completion of the works as per schedule. Contractor shall be responsible for removing all deficiencies and supplying the equipment that meets the requirement as per technical specification.

8.0 Before submitting his bid, the bidder should inspect and examine the site and its surroundings and should satisfy himself as to the nature of the ground and subsoil, the quantities and nature of work, materials necessary for completion of the work and their availability, means of access to site and in general shall himself obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect his offer. No consequent extra claims on any misunderstanding or otherwise shall be allowed by the Employer.

9.0 Ownership of packing materials (except of mandatory spares) including all types of empty cable drums (except steel items) shall be of the bidder. Hence, responsibility of removal and disposal of these items shall be in the scope of bidder.

10.0 TERMINAL POINTS

The Contractor shall be responsible for making all connections at the terminal points specified below, and shall supply necessary all the necessary material and tools required for this purpose.

a) Termination of Solar PV inverter transformer output to the existing 33kV bus in the switchgear room as indicated in the single line diagram

b) BESS to be connected with Solar plant 33 kV Main switchgear or at the LT side of Solar PV as per bidder offered system.

11.0 POWER EVACUATION SYSTEM

Power evacuation shall be at 33kV level. Feeder from Solar PV and BESS plant shall be interconnected with existing 33kV bus through suitable transformer , HT cables of size and length meeting the requirement of HT cables technical specification specified elsewhere in the document and any other equipment / accessories as per bidder offered design of the system as indicated in tender drawing no NETRA-GC-SLD-TD-002). All equipment/hardware including protection requirement on AC and DC side as well as equipment support structure and civil works, Supply and installation of metering panel along with control cable shall be under scope of bidder.

12.0 TESTING

During detail engineering the contractor shall submit for owner's approval, the reports of all the type tests as listed in this specification. Unless specified, the type test should have conducted within last ten years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.

However, if the contractor is not able to submit report of the type test(s) conducted within applicable period or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client /owners representative and submit the reports for approval.

All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.

13.0 CODES AND STANDARDS

All works shall be carried out as per the standards/codes (IEC, IS etc) referred in the specification. All standards, specifications and codes of practice referred to shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those codes/standards referred the former shall prevail.

Equipment complying with other internationally accepted standards such as BS, UL, DIN, VDE etc. will also be considered, if they ensure performance and constructional features equivalent or superior to standards listed in the specification. In such case the Bidder shall clearly indicate the standards adopted, furnish a copy in the English of the latest revisions in force as on date of opening of bid and shall clearly bring out salient features for comparison.

14.0 TENDER DRAWINGS

The list of drawings listed in Section H of Part B of the Technical Specification shall form part of the specification and shall supplement the requirements specified in these technical specifications. These drawings are preliminary drawings for bidding purpose only and subject to changes that may be necessary during the detailed engineering keeping the basic parameters as specified. Various parameters for building and other equipment specified in the tender drawing are the minimum required & any increase in these parameters if required to meet the system requirement shall be made by the Bidder without any additional cost implication to Employer.

15.0 SPARES

The Bidder shall include in his scope of supply all the necessary Mandatory spares as described in Section I of Part B of the Technical Specification.