**Commercialisation of Solar Energy in Urban and Industrial Areas**

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Invites Request for Selection of Consulting Firms /Chartered Engineer Firms Only

For

**Inspection, Verification and Certification of materials procured for IndiaOne - 1 $MW_{el}$ Concentrating Solar Thermal Power Project with 16 hours of energy storage**

# Terms of Reference

## PROJECT BACKGROUND

ComSolar/ GIZ on behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety in cooperation with the Ministry of New and Renewable Energy, Government of India is supporting World Renewal Spiritual Trust, Mount Abu to implement 1 $MW_{el}$ concentrated solar thermal power plant with 16 hours thermal storage for continuous operation. GIZ is procuring material for the project and has delivered significant quantities of material at the project site in Abu Road, Rajasthan. GIZ is looking for hiring services of practicing chartered engineer(s) on immediate basis as per the below mentioned scope of work.

## OBJECTIVE OF THE WORK

The objective of the assignment is to inspect, verify and certify the quantity and the quality of the material delivered at the IndiaOne project site. The certificates in this regard needs to be submitted to GIZ by a practising Chartered Engineer.

The quantity and quality aspects needs to be assessed with reference to the details as mentioned in the purchase orders. The quality aspects further needs to be ascertained by conducting a random sampling for chemical and mechanical properties, wherever applicable, of the material delivered.

## SCOPE OF WORK

**A) <u>Certification of material delivered in right quantity and quality</u>**

1. <u>Verification of material already delivered</u> – Since April 2015 material is getting delivered at solar thermal power plant project site, the Chartered Engineer (CE) needs to verify the quantities of material delivered until now with the ordered quantities as per PO. This shall be a one-time activity wherein the CE needs to visits the site and conduct the verification of all the material quantities already delivered as per the enclosed bills of material.

2. <u>Verification of material processed</u> – Most of the material delivered until now has already been processed and is undergoing fabrication on daily basis to either form structural part of the ST power plant for instance structural steel, MS solid steel etc. or is getting utilised in the process of fabrication for instance paint. CE along with the project developer WRST shall understand and take/prepare calculation of material utilised in fabricating a finished component for instance solar dish. Based on the calculation CE verifies the quantities processed to form the finished components and/or to be processed at the time of the visit.

3. <u>Verification of material to be delivered</u> – The delivery of material shall continue until end of December 2015, the CE will require to visit the project site on several occasions (randomly) to verify the material from time to time. The visits will be aligned with GIZ

so as to bundle the verification of material being delivered in multiple lots. The objective is to ensure that the right quantities of material is delivered on project site as per PO released by GIZ. At this stage CE verifies the quality of the goods primarily through visual inspection for ascertaining the technical specifications are in line as delineated in PO. The CE shall as well review the commercial documentation (PO, delivery challan, bills, etc.) to double check & review complete delivery.

4. Verification of the inventory – One of the requirements is to maintain the inventory of the material procured. To this effect, CE during its visit for conducting works as described in aforementioned point 1 to 3 shall prepare the inventory list in the prescribed format. It is envisaged that inventory can be reconciled two times during the duration of consulting services. The time for visit shall be decided mutually in consultation with GIZ and shall be aligned along with the visit for material verification points 1-3 above.

   For A) 1 to 4 Consultant will propose an inspection scheme/plan and issue report after each visit within seven working days.

**B) Random Sampling and inspection for an independent quality assessment**

1. Before dispatch of material – there are some material for which PO has been placed and some others where tender is still to be released. For latter items CE would prepare a sampling plan for conducing random inspection at the factory site to verify that the material being delivered is matching the required technical specifications. The verification of quality specification shall include visual and third party lab inspection. The cost towards third party lab, if any, shall be separately borne by GIZ on actuals. CE will align with GIZ for these random visits. The visit could be anywhere in India depending on the supplier location. GIZ will share the works/factory address of suppliers as required. The objective here is to ascertain that the right quality of material is being dispatched and in case any discrepancy is found the material can be rejected in line with our PO terms.

2. After dispatch of material and at the time of receipt at project site – there are materials where mechanical, chemical etc. properties are required to be as per specific Indian/International standards and accompanies with test certificates (TC) from manufacturer test lab. A sampling plan for verifying values as per TC submitted by the manufacturer from an independent test lab approved by NABL/GOI needs to be prepared and random tests undertaken. Such test at third party lab can be undertaken at labs near the project site. The cost towards third party lab, if any, shall be separately borne by GIZ on actuals. These tests needs to be undertaken for both the unprocessed material available at the site and for proposed material delivery. Most of the material delivered is processed. The objective is to ensure right quality of material is delivered by the supplier.

**C) <u>Other verifications</u>**

1. Verification of weighing slips at project site and in few occasions on the supplier side. CE verifies that the weighing is being properly conducted and obtain the calibration certificates. CE certifies that the weigh bridge is appropriately calibrated.

Listed below is a brief description of the material procured/ to be procured. This shall provide the consultant with a basic understanding of the type of materials to be purchased, their quantities and various components under each material type. The total bill of material is annexed to this ToR (refer Bill of Material - Annex). The detailed technical specification with exact quantities shall be provided upon formalisation of the order.

1. **Structural steel** - The reflectors consist out of various sizes of square hollow sections, rectangular hollow sections, MS plate elements, MS round bar elements, MS round pipe elements, MS square bar elements as part of the complete structure of 60 sq. m parabolic solar reflector.
2. **Solid Cast Iron for receiver body** - The metals to be used in casting can be Ingots, pig iron, scrap metal and liquid metal so that the combination is the grey iron casting containing carbon content ranging 3.3% to 3.5%, silicon ranging 1.6% to 2.0 % and Iron.
3. **Interconnecting Piping, Receiver piping & valves** - The Piping material has been quantified with respect to different heads - solar block and power block for various pipelines namely raw water, cooling water, soft water, service air, service water, steam lines, condensate lines, feed water lines, DM water, and instrument air. The Valves and Fittings for aforementioned Interconnecting pipes will be procured as well. The applicable standard in JIS, DIN, BS and European are provided. Some of the pipes and valves confirm to IBR and others not.
4. **Insulation Material** – the materials include ceramic blanket of different densities, resin bonded insulation, aluminium sheet among others.
5. **Cast Iron shots**- of size 0.3mm to 2.0 mm having density in range of 7.0 to 7.5 g/cm3.
6. **Industrial paint**- The structural steel used for parabolic solar reflectors requires special surface protection against climatic changes and corrosion for 25 years lifespan. The paint comprises of three layer of coats comprising shop primer, primer and polyurethane top coat.
7. **Power Cables & Network Cables**- Power cables, Control cables and Instrument cables for solar block, power block and power evacuation system. The cable material shall be designed, manufactured and tested according to the latest applicable Indian standards or IEC's or any international standard acceptable to the purchaser

## DELIVERABLES

The consulting organisation or the chartered engineers firm is expected to cover all the aspects elaborated under the Scope of Work while submitting its deliverables.

Physical site visits to the project site or to the factory/works of the suppliers are required. The estimated number of visits to the project site for verification shall be around twelve (12) and to supplier would be around four to five. These are only tentative number of visit. It is expected that the bidder would assess independently the number of visits as per the requirement/scope of work.

On each visit to the project site following documents will be submitted by the CE:

1. Site report with status on material delivered
2. Certified bill of material towards quantity and quality
3. Quality certificates from third party labs on case to case basis

On each visit to the supplier works following documents will be submitted by the CE:

1. Status report on material assessed
2. Methodology for random sampling
3. Quality certificates from third party labs for the randomly selected material

Sample formats for each of the above deliverables shall be submitted along with the bid. The formats shall be later on upon selection finalised in consultation with GIZ.

As a final deliverable, a detailed report covering all the activities conducted with copies of all the documents submitted at various stages shall be submitted by the consultant/CE firm.

## TIME FRAME

The duration of the contract will be upto 31st Jan'2016

## TEAM PROFILE

The team should comprise of at least one (1) practising Chartered Engineer. The Chartered Engineer must be registered with The Institution of Engineers (India). The membership number and date of membership must be provided along with the bids.

It is highly desirable that the team comprises experts in the field of material and /or structural engineer having sound technical understanding on solar thermal power plants and /or infrastructure project development.