

PETROLEUM CONSERVATION RESEARCH ASSOCIATION  
NEW DELHI

TENDER DOCUMENT FOR

DESIGN, ENGINEERING, MANUFACTURE,  
SUPPLY, INSTALLATION, TESTING  
& COMMISSIONING OF  
SOLAR POWER GENERATING SYSTEM

TENDER NO: PCRA/GB-SOLAR/FA/07-08/01

OFFICE OF

ADDITIONAL DIRECTOR (FA)  
PETROLEUM CONSERVATION RESEARCH ASSOCIATION  
SANRAKSHAN BHAWAN, 10 BHIKAJI CAMA PLACE  
NEW DELHI – 110066

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**NOTICE INVITING TENDER**

**TENDER NO: PCRA/GB-SOLAR/FA/07-08/01**

1. Petroleum Conservation Research Association, New Delhi invites sealed tender under two bid system in the prescribed tender form, from the prospective competent bidders for the job of Design, Engineering, Manufacture, Supply, Installation, Testing & Commissioning of solar power generating system in its HQs located at Sanrakshan Bhawan in New Delhi
2. Brief description of the tender is as below:

1	Brief description	Design, Engineering, Manufacture, Supply, Installation, Testing & Commissioning of solar power generating system
2	Scope of Work	As defined in the tender
3	Completion Schedule	All activities covered in the scope of work should be covered in all respects in four months from date of Notification of award of work
4	Tender fee	1,000/-
5	Earnest Money Deposit	1,40,000/-
6	Sale of Tender Document	From 02.07.07 to 07.07.07
7	Last Date & time for submitting Tender	23.07.07 by 1500 hrs.
8	Date & Time of Tender opening	23.07.07 at 1600 hrs.
9	Validity of Bids	45 days
10	Correspondence address	Addl. Director (FA), PCRA, Sanrakshan Bhawan, 10 Bhikaji Cama Place, New Delhi – 110066

3. Tender documents containing detailed terms and conditions can be purchase on payment of requisite tender fees by way of Account Payee Demand Draft in favour of Petroleum Conservation Research Association payable at New Delhi during office working hours from 02.07.07 to 07.07.07. Tender documents can also be downloaded from PCRA website [www.pcra.org](http://www.pcra.org) and the required tender fees shall be submitted as above with the technical offer
4. Request for tender document if required by post should reach this office during the above-specified period. PCRA will not be responsible for the loss of tender form or for the delay in postal transit.
5. Pre-qualifying criteria:
  - a. The Bidder should have executed at least two major projects as minimum experience during the last five years from the last date of submission of bid of providing consolidated services as asked under this tender. The order value for any of the similar work executed should be of a value not less than Rs. 35.0 lacs. Supporting documents regarding the bidders having experience of successful execution of such jobs are to be enclosed with the application requesting for issue of tender documents
  - b. The Bidder should presently not be banned from dealing with the Government Ministries.
6. Earnest Money Deposit – The EMD of requisite amount shall be submitted along with the technical bid in the form of a crossed demand draft in favour of Petroleum Conservation Research Association payable at New Delhi or in the form of a Bank Guarantee from a Nationalized Bank.
7. Tenders shall be dropped in the Tender Box in the office as mentioned at Sr. No. 2 (10) above on or before last date and time of submission of bid documents.

## General

- 1.0.0 Petroleum Conservation Research Association (PCRA) is a registered society working under the aegis of the Ministry of Petroleum & Natural Gas of the Government of India in the field of energy conservation since 1978.
- 1.1.0 The HQs of PCRA is located in a four storied (including ground floor) building at the following address:
- Petroleum Conservation Research Association,  
Sanrakshan Bhawan,  
10, Bhikaji Cama Place,  
New Delhi –110066
- 1.2.0 The Building has an existing contract demand of 400 KVA, 11 KV electric supply from BSES Rajdhani Power Ltd in New Delhi. The 11 KV supply is stepped down to 415 volts using transformers. The powers is distributed through Power Control Centre/Motor Control Centre to Cater to the lighting, EDP and Air conditioning loads of the building. The electric supply is backed up by a Captive Diesel Generating Sets to meet the power backup requirement.
- 1.3.0 PCRA intends to install a Solar Photovoltaic Power Generating System capable of integration with the existing 11 KV supply from BSES Rajdhani Power Ltd. The available space on the terrace of the building is proposed to house the Solar Photovoltaic panel and their structures and the required integrating panels is proposed to be housed in the basement of the building. The scope of work included in this tender includes the design, engineering, manufacture, supply, installation, testing and commissioning of a Solar Power Generating system capable of supplying 24.5 KWP power. All required works for the execution and integration of the system with the existing system are in the scope of work included in this tender.
- 1.4.0 The job to be executed is to be of best quality and confirming to all relevant national and international standards.
- 1.5.0 The competent parties are advised to visit the site and acquaint themselves with the area where the job included in this tender is to be executed

# Technical Specification

## 2.0.0 INTRODUCTION

PCRA proposes to set up a **24.75Kwp** grid connect Solar Photovoltaic power plant at their office building at with the objective of power generation from Solar Photovoltaics

Typical Bill of Materials per **24.75Kwp** Power Plant shall consist of:

• Solar Array capacity	:	<b>24.75Kwp</b>
• Solar Modules Mounting Structure	:	1 Set
• Power Conditioning Unit – 25 kVA	:	1 Nos
• Data Logging System	:	1 No
• Junction Boxes	:	1 Set
• Cables & Earthing materials	:	1 Set
• Distribution Panels	:	1 set

Others Requirements:

- Control Room
- Installation and commissioning
- Operation and Maintenance.

## 2.1.0 OBJECTIVE

Main objective of setting up the power plant is to support peak electrical load during day time and also to explore the possibility of export of solar array generated power back to grid whenever the load demand is less than solar power generation during holidays and weekends. The solar power plant shall operate on the principle of direct conversion of sunlight to electrical energy by employing photovoltaic technology.

## 2.2.0 BENEFITS

The solar photovoltaic system should have the following benefits:

### 2.2.1 Voltage Support

The PV system will reduce the power drawn from grid and prevent the voltage drop which is generally experienced at the time of switching on of

large inductive loads. The system shall also supply power close to unity power factor there by improving the grid quality and increasing its capacity.

### 2.2.1 Social Benefits

By realization of the untapped Solar energy, carbon dioxide and other toxic gas emission can be lowered by significant quantity and there by saving our environment through mitigation of carbon dioxide emission and subsequently combat climate change

### 2.3.0 LOCATION OF SITE

Location	:	PCRA Building, Sanrakshan Bhawan, 10 Bhikaji Cama place, New Delhi – 110066
Site Access		By Road
Latitude & Longitude	:	28.3 N Latitude & 77.1 E Longitude

Note: The height of support structures shall be such that the there shall be sufficient clearance for solar PV array to remain shadow free, prevent shadow of front structures to fall onto the one installed behind. The row space would also allow easy access to array for cleaning and repairs.

### 2.3.1 Solar Insolation level / Temperature

Modules alignment and tilt angle shall have to be calculated to provide the maximum annual energy output. Average solar insolation (Daily mean Global Horizontal) and ambient temperature (Maximum averaged over month) at site may be assumed to be:

Month	Average Ambient Temperature deg C	Horiz. Radiation kWh/m2/day
Feb	24.30	4.77
Mar	24.90	5.40
Apr	26.90	5.85
May	28.70	6.30
Jun	29.90	6.39
Jul	29.10	4.86
Aug	27.50	3.60

Sep	27.10	3.78
Oct	27.40	4.50
Nov	28.30	5.13
Dec	27.50	4.95

Note: Average solar radiation data source for Delhi (28.3 N 77.1 E) has been mentioned above. Depending on the actual site location, modules alignment and tilt angle shall have to be calculated to provide the maximum annual energy output.

#### **2.4.0 SCOPE OF WORK**

The following section of the document describes the scope of work for 24.75Kwp Grid connect Photovoltaic system at PCRA Building, Delhi. This job involves by means of the enclosed specification, design, manufacture, supply, installation & commissioning of the Solar PV Power Plant with 1 year warranty period.

The Scope of Work shall include the following,

- Design, manufacture, supply of Solar PV Power Plant
- Detailed planning of smooth execution of the project
- Performance testing of the complete system
- Warranty of the system for one-year faultless operation.
- After sales service, directly or through local contractual arrangement
- Risk liability of all personnel associated with implementation and realization of the project
- Training of at least five persons to be nominated by PCRA on the various aspects of design and maintenance of the offered systems at the vendors works.
- The module layout as considered by the Bidder should be on the basis of clear open shadow free space available on the roof of the PCRA buildings
- The Power Conditioning Unit (Central inverter), DCDB, Metering panel, Isolation panel are housed inside the proposed control room, to be housed in the basement of the Sanrakshan Bhawan. The requirement of conditioned air (if any) for these units is to be considered by the Bidder in terms of providing suitable enclosures and air conditioning the same.

## 2.5.0 SYSTEM DESCRIPTION

The Photovoltaic (PV) Grid connect system consists mainly of 3 components: The PV array, Module Mounting Structure and the Power conditioning Unit (PCU). The PV array converts the light energy in to sunlight to direct current (DC) power. The Module mounting structure is used to hold the module in position. The DC power is converted to alternating current (AC) power by the PCU and utilized for requirement within the Building and excess power can be exported to utility power grid.

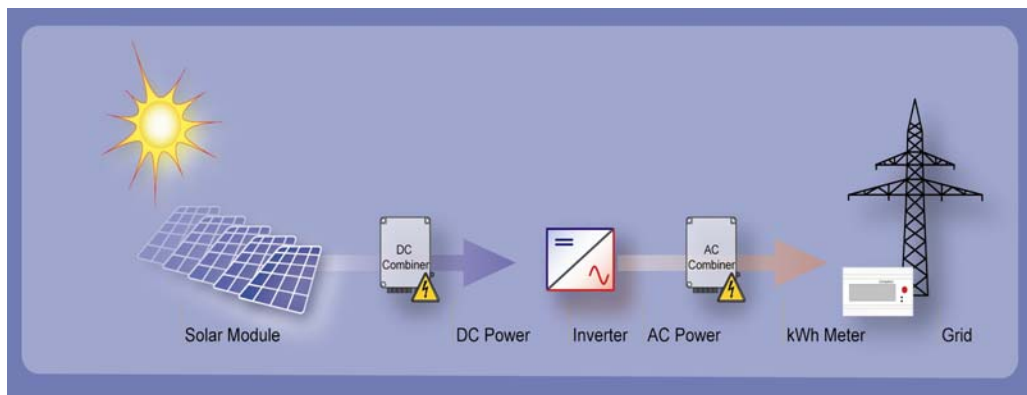


Fig: System Schematic

The multi crystalline solar modules used shall be grouped in an optimum number of strings with module-to module cable connections. The modules shall be held fixed on structures made of galvanized steel structures. The modules shall be inclined at optimum horizontal tilt angle facing due south depending on the site location.

The DC output from the modules shall be fed to Array junction box and the strings are to be paralleled at Sub Main & Main Junction Boxes. The output of the main junction box shall be fed to DC distribution board (DCDB). The DC power output from the DCDB is fed to the Power Conditioning Unit (PCU). The Power-conditioning unit shall be installed in a control room converts DC energy produced by the solar array to AC energy. The AC power output of the inverter shall be fed to the AC Distribution Board (metering panel & isolation panel) which also houses energy meter. The 415V AC output of the isolation panel is fed to the local bus bar it could be stepped up to the required voltage level through power transformer and fed to the grid AC energy is then synchronised with the grid and power is exported to the grid.

### **2.5.1 SYSTEM BILL OF MATERIALS**

Major components of solar power plant shall consist of:

- Multi crystalline solar modules
- 25 kVA Power Conditioning Units (Central Inverter)
- Array /Sub main/Main Junction Boxes
- Support Structures
- AC Distribution Board (Metering panel, isolator panel)

Bidder shall submit details of make, Quantity, relevant standards, technical catalogues etc complete for all the equipments included in its offer to meet the overall technical and operational requirements of the system. The required details as per attached Annexure – I are to be enclosed with Technical Bid.

### **2.6.0 CONTROL ROOM**

The required control room shall be constructed at site in the basement of Sanrakshan Bhawan and necessary drawings for the same are to be submitted by the Bidder for the approval of PCRA.

### **2.7.0 SPARE PARTS**

One set of essential spares for the system being offered shall be included in the offer and details of the offered spares are to be included with the technical bid.

### **2.8.0 DOCUMENTATION**

Two sets of installation manual / user manual shall be supplied along with the each power plant. The manual shall include complete system details such as array lay out, schematic of the system, inverter details, working principle etc. Step by step maintenance and trouble shooting procedures shall be given in the manuals.

## Annexure I

24.75 kWp Grid Connect Solar Power Plant			
BILL OF MATERIALS			
SL	DESCRIPTION	TOTAL	UNIT
No		QTY	
1	Solar Module - 165W		nos
2	10 Module mounting structure		nos
3	Array Junction Box		nos
4	Sub Main Junction Box		nos
5	Main Junction Box		nos
6	Power Conditioning Unit - 25kVA		no
7	Peripherals for Data Logging		no
8	DC Distribution Board		no
9	AC Distribution Board		no
10	1C x 2.5 Sq.mm PVC Cu.Cable		m
11	2C x 10 sq.mm PVC Cu.Cable		m
12	1C x 25 Sq.mm PVC Cu.Cable		m
13	1C x 50 Sq.mm PVC Cu.Cable		m
14	31/2C x 35 Sq.mm PVC arm.Cu.Cable		m
15	Lightning Arrestors		nos
16	Earthing Kit		set
17	Installation kit		set
18	Any other item		

Note: Bidder to submit the above format duly filled with the technical offer.

## **2.9.0 ACCEPTANCE TESTING**

The Acceptance Testing of various components of the system and the Integrated system to be offered by the bidder shall be done at the factory of the successful bidder as per the relevant codes and standards. The successful bidder will submit detailed Test Certificates and Report for each equipment and the system.

## **2.10.0 NOTIFICATION OF AWARD (NOA)**

Prior to the expiration of the period of bid validity, PCRA will notify the successful bidder in writing that its bid has been accepted. The notification of award will constitute the formation of the contract. Upon the successful bidder's furnishing performance security, PCRA will promptly notify each unsuccessful bidder and discharge their bid securities.

## **2.11.0 MOBILISATION PERIOD & COMPLETION OF JOB**

Successful Bidder shall be required to mobilize all required materials, manpower etc. so as to complete the total scope of work as defined in this tender within four months from the date of notification of award.

## **2.12.0 PERFORMANCE SECURITY**

**2.12.1** Within 15 days of the receipt of notification of award from PCRA, the successful Bidder shall submit a performance bank guarantee @ 7.5% of the contract value in a form acceptable to PCRA. Failure of the successful bidder to comply with the above requirement shall constitute sufficient ground for the annulment of the award and forfeiture of the bid security, in which event PCRA may make the award to the next lowest technically acceptable bidder or call for new bids.

**2.12.2** The performance bank guarantee will be released within 90 days of the completion of contract in all respect.

## **2.13.0 PAYMENT TERMS**

- 10% on submission of complete set of system drawings by successful Bidder and approval of the same by PCRA.
- 50% on receipt of complete material at site.
- 10% on successful completion of installation works.
- 30% after successful commissioning and stabilization of operation to the satisfaction of PCRA.

**PRICE SCHEDULE**

<b>Sl.</b>	<b>System</b>	<b>Qty</b>	<b>Price (Rs.)</b>
1.	Design, Engineering, Manufacture, Supply, Install, Testing and Commissioning of 24.75 Kwp Solar Power Generating System, as per specification mentioned above	1No	
2.	Complete set of Spares and consumables for the system required for one year	1 Set	
3.	Training Charges for 5 PCRA Engineers at Vendors Work (Excluding Boarding & Lodging)	LS	

( )  
Signature with Stamp of Authorized person

**Note:**

- (i) Bidder to fill the price in the above table in words and in numerals.
- (ii) All applicable taxes, duties are to be included in the quoted price and the breakup of each price component is to be indicated separately
- (iii) All pages of the Tender Document are to be signed and submitted with the Technical Bid as a token of Acceptance of the Tender Document and specifications. Deviations (if any) are to be clearly indicated separately.