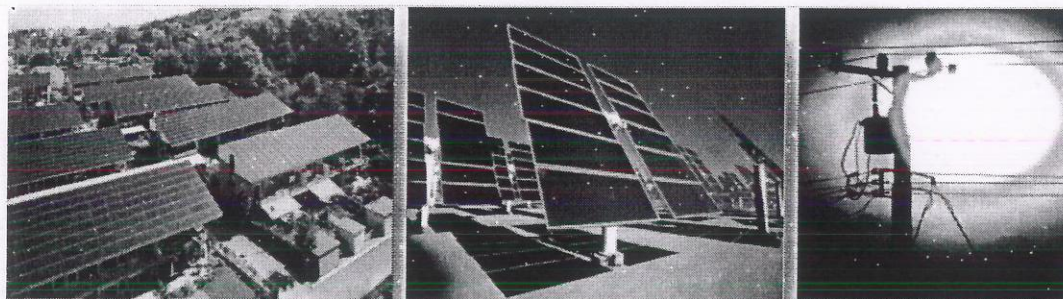


DETAILED PROJECT REPORT

470MW (320 MW at Bhainsara, Jaisalmer and 150 MW at Chhattargarh, Bikaner) GRID CONNECTED SOLAR PV PROJECTS IN RAJASTHAN



एनटीपीसी नवीकरणीय ऊर्जा लिमिटेड

(एनटीपीसी लिमिटेड की पूर्ण स्वामित्व वाली सहायक कम्पनी)

NTPC Renewable Energy Limited

(A wholly Owned Subsidiary of NTPC Limited)

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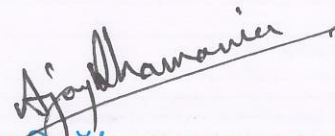
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CHAPTER-I INTRODUCTION & PROJECT DETAILS

1.0 Introduction

The energy and electricity growth in India is closely linked to growth in economy. Electricity is the most common mode of energy utilization because of convenience of use and cleanliness at the user end. At the time of independence in the year 1947, total installed electricity generation capacity was 1,362 MW. It rose to 30,214 MW in the year 1980-81, to 66,086 MW in the year 1990-91 and to 371,054 MW as on 30th June, 2020.

Present installed capacity of NTPC Group is 62,918 MW (including 11,755 MW through JVs/Subsidiaries) comprising of 45 NTPC Stations (24 Coal based stations, 7 gas-based stations, 1 Hydro station, 1 small hydro, 12 Solar PV and 1 Wind based Station) and 25 Joint Venture stations (9 coal based, 4 gas based, 8 hydro, 1 small hydro 2 Wind and 1 Solar PV). The capacity will have a diversified fuel mix by 2032, non-fossil fuel-based generation capacity shall make up nearly 30% of NTPC's portfolio.

NTPC has been operating its plants at high efficiency levels. Although the company has 15.56% of the total national capacity, it contributes 22.74% of total power generation due to its focus on high efficiency.

NTPC Ltd has incorporated a wholly-owned subsidiary, in the name of NTPC Renewable Energy Ltd, under Indian Companies Act 2013 to undertake renewable energy business.

2.0 Project Background

NTPC has won 470MW Project capacity by participating in SECI's tender for 1070 MW Grid-Connected Solar PV Power Projects in Rajasthan (Tranche-III). LOA for the 470MW capacity from SECI shall be sought in favour of NTPC Renewable Energy Ltd.

NTPC had invited online EPC bids for development of 470MW grid connected solar PV Projects in Rajasthan under Domestic Competitive Bidding (DCB). Land and STU (State Transmission Utility) grid connectivity were also in the scope of EPC bidder. Five bids were received for total capacity of 1120MW.

E- Reverse auction (RA) of the tender was conducted on 19.12.2020. Ranking of bidders for eligible award capacity of 470MW after completion of Reverse Auction is presented in following Table. The award of Projects to EPC bidders shall be done through the wholly owned subsidiary-NTPC Renewable Energy Ltd

Table 1.1

Bidder Ranking	Bidder Name	Capacity Won (MW)
L-1	Ashoka Buildcon Limited	150
L-2	Tata Power Solar Systems Limited	320
Total		470 MW

3.0 Land & Location of the Solar Project(s)

Land for the solar project including transmission line should be arranged by bidder in the state of Rajasthan through any of the following methods for not less than 25 years from the date of commissioning of entire Project:

- a) Lease- Only Government/PSU land or MNRE/State Govt Entity Approved Government/Private Solar Park land shall be accepted.
- b) Complete Land transfer (Mutation)-Government and private land shall be accepted.

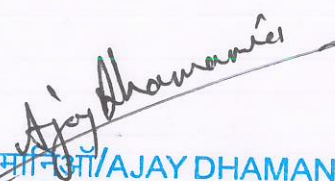
Both the bidders had offered private land for the Solar Projects.

4.0 Generation

Based on the solar insolation level of selected location and Project Capacity, bidders have quoted the respective Annual Generation (in MU) at STU point of interconnection. The solar insolation and quoted annual generation for the two projects is presented in Chapter-3, Table 3.1.

5.0 Power Evacuation

Power evacuation shall be through STU substations located near the solar projects. Bidder shall carryout the erection and commissioning of power evacuation system up to STU substation and facilitate NTPC for applying for grid connectivity.


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CHAPTER II – SITE SELECTION AND OTHER SITE FEATURES

1.0 Site Selection and Other Site Features

Selecting a suitable site is an essential component of developing a viable solar PV project. There are no specific rules for site selection. In general, the process of site selection must take into consideration the constraints of implementation and implication on the cost of electricity generation.

The main factors that need to be assessed include:

1. Solar Resource
2. Local Climate
3. Available area
4. Topography
5. Geotechnical parameters
6. Grid Connection
7. Module Soiling
8. Water Availability/other module cleaning methods

1.1 Solar Resource

Detailed Solar Resource estimation and energy yield prediction is presented in next chapter.

1.2 Land availability & Topography

The topography of the area is almost flat with mild vegetation/shrubs/ bushes/tree etc.

1.3 Grid Connection

The bidder shall arrange land where nearby STU substation is available for power injection. Bidder shall facilitate for the connectivity application by NTPC.

1.4 Module Soiling

If the modules are soiled by particulates, then the efficiency of the solar plant could be significantly reduced. It is, therefore, important to take into account local weather, environmental, human and wildlife factors while determining the suitability of a site for a solar PV plant. The criteria should include:

- Dust particles from traffic, building activity, agricultural activity or dust storms.

Soiling of modules may require an appropriate maintenance and cleaning plan at the site location.

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1.5 Water Availability

Provision for water for the solar plant shall be arranged by bidder. For module cleaning, dry cleaning system can also be used.

The details of Project location identified by bidders is presented in the following table:

Bidder	Capacity in MW	Project Location	Type & Quantum of Land	Grid connecting substation
Ashoka Buildcon Limited	150	Chhatargarh, Bikaner	Private Land/285 Hectares	220/132kV GSS, Chhatargarh
Tata Power Solar Systems Limited	320	Bhainsara, Jaisalmer	Private Land/ 518Hectares	400/220kV GSS Jaisalmer-2

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CHAPTER III – SOLAR IRRADIANCE & ENERGY YIELD PREDICTION

1.0 Solar Energy Resource

Site selection and planning of PV power plants requires reliable solar resource data. The solar resource of a location is usually defined by the values of the global horizontal irradiation, direct normal irradiation and diffuse horizontal irradiation as defined below.

- **Global Horizontal Irradiation (GHI)** – GHI is the total solar energy received on a unit area of horizontal surface. It includes energy from the sun that is received in a direct beam and from all directions of the sky when radiation is scattered off the atmosphere (diffuse irradiation). The yearly sum of the GHI is of particular relevance for PV power plants, which are able to make use of both the diffuse and beam components of solar irradiance.
- **Direct Normal Irradiation (DNI)** – DNI is the total solar energy received on a unit area of surface directly facing the sun at all times. The DNI is of particular interest for solar installations that track the sun and for concentrating solar technologies (as concentrating technologies can only make use of the direct component of irradiation).
- **Diffuse Horizontal Irradiation (DHI)** – DHI is the energy received on a unit area of horizontal surface from all directions when radiation is scattered off the atmosphere or surrounding area.

Irradiation is measured in kWh/m², and values are often given for a period of a day, a month or a year. A high long term average annual GHI is typically of most interest to PV project developers. Average monthly values are important when assessing the proportion of energy generated in each month.

2.0 Indian Solar Resource

Data sources for solar radiation in India are of varying quality. Comparison and judicious selection of data sources by specialists in solar resource assessment is recommended while developing a project. Some of the more accessible data sources include:

- Solargis global climatological database with spatial resolution of 250 m and sub-hourly temporal resolution. Solutions are available for all solar energy assessment needs.
- India Meteorological Department data from 23 field stations of the radiation network, measured from 1986 to 2000.
- NASA's Surface Meteorology and Solar Energy data set. This holds satellite – derived monthly data for a grid of 1°x1° covering the globe for a 22 year period (1984-2005).
- The METEONORM global climatological database and synthetic weather generator. This contains a database of ground station measurements of irradiation and temperature. In cases where a site is over 20 km from the nearest measurement station, METEONORM generates climatological averages estimated by using interpolation algorithms and satellite data.

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3.0 Selection of Solar Resource Data and Energy Estimation

Since the solar PV project can be located anywhere inside the state of Rajasthan, bidder shall calculate the Global Solar Insolation of the site as follows:

Bidder has to submit the latitude & longitude of selected solar plant location. Global solar insolation shall be calculated based on Solargis values for the submitted location.

Bidder has to share multiyear solar irradiation data from Solargis for the proposed site during detailed engineering stage.

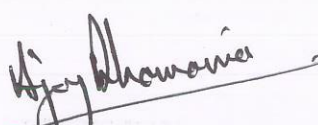
System unavailability of minimum 1.5% in terms of energy shall be considered by bidder in PVsyst for estimation of annual generation. This includes the loss due to data inaccuracy/ data variability also.

Global Solar Insolation and Annual generation quoted by the bidders is presented in Table 3.1.

Table 3.1 Estimate of annual Generation from two projects

Bidder	Project Capacity in MW	Annual GHI kWh/m ²	Egrid (MWh) (Annual) Quoted by Bidder
Ashoka Buildcon Limited	150	1923.9	370000
Tata Power Solar Systems Limited	320	2063.6	807346

Respective bidders shall guarantee the above quoted generation at STU point of interconnection and the same shall be demonstrated during Performance Guarantee test.


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CHAPTER IV – PLANT DESIGN

1.0 Overview

A brief technical description of the solar PV project is described below. The major equipment involved in the Solar PV power plant comprise of two parts. One part is the solar PV system and the other is auxiliaries including power evacuation and grid interface facility.

Figure 4.1 gives an overview of a megawatt scale grid connected solar PV Power Plant. The main components include:

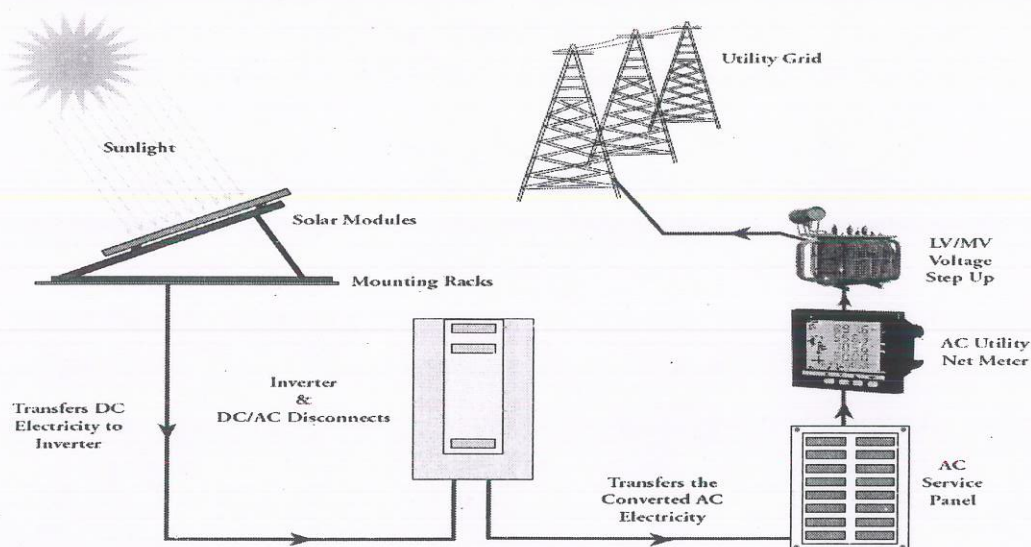


Figure 4.1 Overview of a megawatt scale grid connected solar PV Power Plant

1.1 Solar PV Modules:

Solar PV modules consisting of solar photovoltaic cells connected in series. They convert solar radiation falling onto the semiconductor PV cells directly into electricity through the photovoltaic effect in a silent and clean process. Required numbers of solar PV modules are connected in series to form PV string, further these strings are connected in parallel to form PV array as per DC capacity requirement. PV array is connected in DC side input terminal of solar inverter.

1.2 Module mounting systems:

These are the steel structure mounting frame used to mount the PV modules. In order to optimize O&M activities and avoid possible damage to PV module due to structural movements, fixed tilt type PV module mounting structure shall be used.

1.3 Inverters:

Inverters are solid state electronic devices that convert DC electricity generated by the PV modules into AC electricity, suitable for supply to the grid. In addition, inverters can also perform a range of functions to maximise the output of a PV plant. The output of the inverter is always synchronized with the grid as long as the

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grid is available and works as grid tied inverter and exports the power to the grid. In the event of failure of the grid the inverter will be shut off immediately.

In general, there are two main classes of inverters: Central inverters and String inverters. (Refer Figure 3.3). Central inverters are connected to a number of parallel strings of modules. String inverters are connected to one or more series strings. While numerous string inverters are required for a large plant, individual inverters are smaller and more easily maintained than a central inverter. While central inverters remain the configuration of choice for most utility-scale PV projects, both configurations have their pros and cons. Central inverters offer high reliability and ease of installation. String inverters, on the other hand, are cheaper to manufacture, simpler to maintain and can give enhanced power plant performance on some sites.

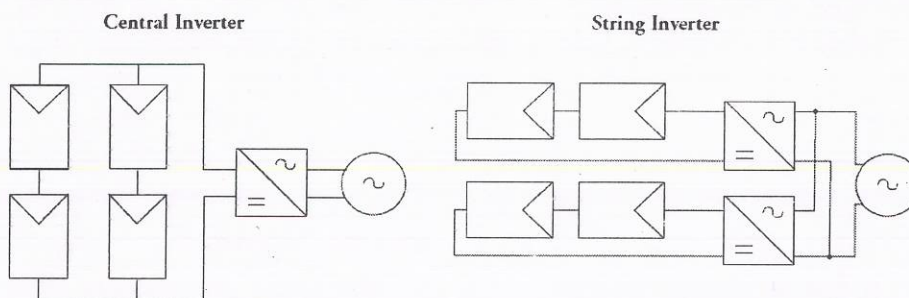


Figure : Central and String Inverters

1.4 Transformer:

The purpose of transformers in a solar power plant is to provide suitable voltage levels for transmission across the site and for export to the grid. In general, the inverters supply power at LV. The inverter power is further stepped to 11 kV or 33 kV. It is required to further step up to 220 kV or 400 kV depending upon the voltage level of interconnecting ISTS substation. It is therefore necessary to step up the voltage using a transformer between the inverter and the grid connection point. The selection of an appropriate transformer should consider several basic issues. These include the required size of the transformer, its position within the electrical system, and the physical location of installation. The size of the transformer, which will depend on the projected maximum power exported from the solar array, shall be specified in MVA.

1.5 Data Monitoring / SCADA:

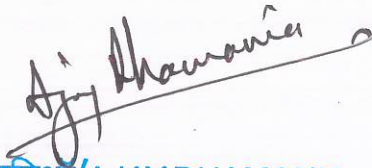
Data Monitoring / SCADA – (Supervisory Control and Data Acquisition) SCADA systems provide control and status indication for the items across the solar plant. Store and representation of solar plant data either in graphical mode or tabular form. All instantaneous data shall be shown in computer screen.

1.6 The grid connection interface:

This is where the electricity is exported into the grid network. The substation will also have the required grid interface switchgear such as circuit breakers and

disconnects for protection and isolation of the PV power plant as well as generation and supply metering equipment. The substation and metering point are often external to the PV power plant boundary and are typically located on the network operator's property.

For solar PV projects to be developed through this EPC package in Rajasthan, point of interconnection and the commercial metering point shall be at STU substation.


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CHAPTER V – PROJECT SCHEDULING & IMPLEMENTATION

1.0 Project Schedule

The date of Award has been reckoned as the zero date of the project.

The scheduled commissioning date shall be 16 months from the date of award. The bidders' scope is detailed in the following section and the works which are not included in bidder's scope, is mentioned at terminal Points & Exclusions.

2.0 Project Management

The scope of the proposal for the Design Engineering, Supply, Construction, Erection, Testing, Commissioning of solar PV plant and power evacuation system, including Three (3) years Operation and Maintenance (O&M) works and Annual Maintenance Contract (AMC) for Ten (10) years.

The salient features of this contract is presented below and elaborated in the next section.

- The land for solar project-To be arranged by bidder
- Basic Engineering of the plant and systems.
- Detailed design of all the equipment and equipment system(s) including civil works.
- Submission, Review & approval of engineering drawings, data, process Calculations, test procedures etc.
- Finalization of sub-vendors, manufacturing quality plans and Field quality plans.
- Complete manufacturing including conducting all type, routine and acceptance tests.
- Packing and transportation from the manufacturer's works to the site including customs clearance & port clearance, port charges, (if any).
- Receipt, storage, preservation and conservation of equipment at the site;
- Reliability and Functional guarantee tests after successful completion of trial operation;
- Supply of spares.
- Installation and commissioning of SCADA, extension of OWS at Central Control room with supply and laying of OFC and associated hardware and software.
- External power evacuation system up to STU point of interconnection.

3.0 Scope of Work in Detail

The detailed scope of work is elaborated below. Any items or works not specified here but required to complete the equipment & systems shall be provided by bidder, unless excluded from the scope specifically.

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ENGINEERING

Detailed design of Grid Interactive Solar PV Plant and its associated civil, electrical & mechanical auxiliary systems includes preparation of foundation drawings, single line diagrams, installation drawings, electrical layouts, design calculations etc. Design memorandum and other relevant drawings and documents required for engineering of all facilities within the scope to be provided under this contract, are covered under contractor's scope of work.

SUPPLIES & ASSOCIATED WORKS

DC SIDE

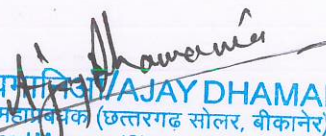
- Solar PV Modules complying IEC test requirements
- DC Cables including MC4 connectors and DWC pipes
- String Combiner Unit
- Power Conditioning unit

AC SIDE

- HT & LT Switchgear
- Inverter Transformer & Auxiliary Transformer
- HT & LT Cables
- SCADA & Time Synchronizing Equipment
- Instrumentation & Communication cable
- Earthing System & Lightning Protection System
- Plant illumination system
- Auxiliary Power Supply System
- Battery and Battery Charger
- UPS
- Inter Connection up to common pooling station at 33kV voltage level.
- EHV Tie transformers and switchyard works
- Grid interfacing complying statutory requirements and CERC/SERC codes.

GENERAL SYSTEMS

- Weather Monitoring Station
- Fire Detection and protection system
- Module Cleaning system


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CIVIL WORKS

- Site Preparation: Works related to site preparation, Site grading, levelling, finishing as required.
- Foundation: Requisite foundation and structures wherever required
- Rooms: Construction of Control room, Inverter rooms/platforms, security room, Gate complex.
- Cable Routing: Requisite cable routing through cable trenches/ trestle and/ or cable trays.
- Roads & Pathways: Construction of Main road, service roads and pathways
- Drains: Design and construction of storm water drainage system.
- Fencing/Boundary: Fencing along the periphery of the complete land
- Rain water harvesting

OPERATION AND MAINTENANCE (O&M)

Comprehensive O&M of the solar PV plant up to the point of STU interconnection, for a period of **three years** from the date of successful completion of trial run is in the scope of the bidder.

PERFORMANCE GUARANTEE (PG) TEST

The performance guarantee tests shall be carried out as per approved NTPC procedure. All special equipment, tools and tackles instruments, measuring devices required for the successful conductance of PG test shall be provided by the bidder, free of cost. All costs associated with the PG tests shall be included in bid price.

The guaranteed generation by bidder shall be demonstrated at the Metering Point which shall be ISTS point of interconnection.

TERMINAL POINT AND EXCLUSIONS

The terminal point under the scope of this assignment shall be up to termination of power transmission system at STU substations including metering systems as per requirement. Bidder shall furnish all relevant data required by the employer at interface points within schedule as agreed prior to award of contract.

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CHAPTER VII – SALE OF POWER

1.0 Sale of Power

NTPC has won 470MW Project capacity by participating in SECI's tender for 1070 MW Grid-Connected Solar PV Power Projects in Rajasthan (Tranche-III). LOA for the 470MW capacity from SECI shall be sought in favour of NTPC Renewable Energy Ltd, a wholly owned subsidiary of NTPC Ltd to undertake renewable energy business.

SECI shall enter into a Power Purchase Agreement (PPA) with the successful Bidder selected based on the RfS for purchase of Solar Power for a period of 25 years based on the terms, conditions and provisions of the RfS. Upon receipt of LOA from SECI, NTPC Renewable Energy Ltd shall be executing the project corresponding to 470MW and shall also sign the PPA with SECI.

Power procured by SECI from the above Project has been provisioned to be sold to the State Buying Entity, i.e. Rajasthan Urja Vikas Nigam Limited (RUVNL), which shall be the Buying Entity under the RfS. SECI shall be an intermediary nodal agency for procurement of power generated by the SPD and sale of such power to RUVNL entirely on back to back basis based on due performance by the SPD as well as the Buying entity.

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Addl. General Manager (Chattargarh Solar, Bikaner)

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(एनटीपीसी लिमिटेड की पूर्ण स्वामित्व वाली सहायक)

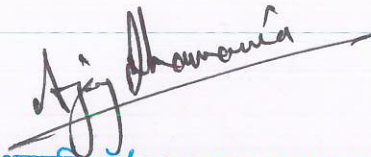
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CHAPTER VIII – OPERATION & MAINTENANCE PHILOSOPHY

OPERATION & MAINTENANCE PHILOSOPHY

The successful bidder shall provide Operation and maintenance of SPV Plant along with power evacuation system up to STU substation for a period of three years from date of successful completion of trial run. After O&M period, NTPC may at its discretion, decide to extend the existing O&M contract on mutually acceptable terms & conditions or undertake the O&M of the SPV Plant on its own. The bidder shall be responsible for supply of all spare parts, repairs / replacement of any defective equipment(s) at his own cost as required from time to time during the O&M period of contract.

The contractor shall be responsible for all the required activities for the successful running, optimum energy generation etc.



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CHAPTER IX – CLEAN DEVELOPMENT MECHANISM BENEFITS

1.0 Introduction to CDM

Kyoto Protocol of United Nations Framework Convention on Climate Change (UNFCCC) has come into force from February 2005. Clean Development Mechanism (CDM) contained in Article 12 of the protocol allows governments or private entities in the industrialized countries (Countries identified as Annex-I of Kyoto Protocol) to implement and / or purchase emission reduction from projects in developing countries (Non Annex-I countries) and receive credit in the form of "Certified Emission Reductions" (CERs). The first commitment period during which Annex I countries had to show the compliance with the targets to reduce the GHG emissions was 2008-12.

In the meanwhile, second commitment period under the Kyoto Protocol, starting on 1 January 2013 and ending on 31 December 2020 had already been adopted. India has tremendous potential for CDM projects. Power generation based on higher efficiency technologies such as super critical / ultra-super critical technology, renewable energy sources like solar, wind, biomass, hydel are some of potential candidates for CDM in the power sector. Energy efficiency and conservation projects also present themselves as eligible CDM projects, as these would also result in energy savings and displace associated CO₂ emissions which otherwise would be produced by grid connected power stations.

In order to facilitate adoption of authentic baseline emissions data and also to ensure uniformity in the calculations of CO₂ emission reductions by CDM project developers, Central Electricity Authority (CEA) has compiled a database containing the necessary data on CO₂ emissions for all grid-connected power stations in India. The database is an official publication of the Government of India for the purpose of CDM baselines. The Baseline would benefit all prospective CDM project developers to estimate the amount of Certified Emission Reduction (CERs) from any CDM project activity. Project developers wishing to benefit from the CDM must use an approved methodology to quantify their emission reductions.

Historically, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states (see Table 2). Since August 2006, however, all regional grids except the Southern Grid had been integrated and were operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids were treated as a single grid named as NEWNE grid from FY 2007-08 onwards for the purpose of this CO₂ Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid.

A small power exchange also takes place with the neighbouring countries Bhutan and Nepal. For each of the two grids, the main emission factors are calculated in accordance with the relevant CDM methodologies. CEA will continue updating the database at the end of each fiscal year.

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2.0 Reduction of Carbon Emission by the Present Scheme

The annual reduction in CO₂ emission in case of 470MW Solar PV Projects is calculated and presented at Table 9.1

Table 9.1: CDM Calculation basis

CDM adopted	Methodology	ACM0002 (Latest Version): Large-scale Consolidated Methodology- Grid connected electricity generation from Renewable Sources.
Calculation method		
Grid Emission Factor in tCO ₂ /MWh		0.9419 (Calculated as per CEA CO ₂ Baseline Database for the Indian Power Sector Version 15.0 December 2018 and Tool to calculate the emission factor for an electricity system published by the CDM Executive Board)
Projected CO ₂ emission reduction		= Emission factor (tCO ₂ /MWh) x net Energy generation (MWh) *(1-System Unavailability) = 0.9419 x Guaranteed MU x 10 ³ *0.98 Tonnes CO ₂ per year or CERs

Project wise Installed Capacity	150 MW (L1)	320 MW (L2)
First Year Generation (MU)	370	807.35
Projected CO ₂ emission reduction	= 0.9419 x 370 x 10 ³ x 0.98 =3,41,533 CER	= 0.9419 x 807.35 x 10 ³ x 0.98 =7,45,234 CER

The Solar power plants to be established by NTPC Ltd through its subsidiary is aimed at achieving the objective of harnessing the solar energy and would generate 470 MW solar power to be supplied to the grid from two projects.

Clean Development Mechanism (CDM) provides an opportunity for the renewable energy project to earn revenue through the reduction of greenhouse gas emissions (GHG), particularly carbon dioxide (CO₂). With the CDM revenue the proposed project activity will be economically attractive.

In order to make the project more financially attractive and also in overcoming risks more comfortably in project implementation and operation stage, CDM revenue will play an important role as it will further ameliorate the project IRR.

Accordingly CDM benefits are proposed to be availed to improve the Project IRR in the sensitive situations such as less generation, delay in execution and higher project cost.


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CHAPTER X – STATUTORY CLEARANCES

1.0 Statutory clearances

The following statutory clearances shall be required for the proposed solar energy project:

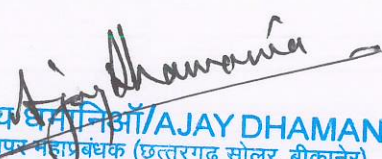
- **Environmental Clearances:**

As per Ministry of Environment & Forest Office Memorandum (OM) dated 13.05.2011, Solar PV Power Project are not covered under the ambit of EIA Notification, 2006 and no environment clearance is required for such project. The same has again been clarified vide MNRE Office Memorandum Reference No. F. No. 320/14/2017-NSM Dated 14.08.2017.

However, consent for establishment is required from respective State Pollution Control Board for the solar PV project.

- **Grid Connectivity and Long Term Access for Evacuation of Power:**

Grid Connectivity shall be obtained by submitting Connectivity application to STU (State Transmission Utility) as per SERC Connectivity procedure. For power evacuation LTA (Long Term Access) shall be obtained for Intra State Transmission System.


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CHAPTER XI – SOCIAL & ENVIRONMENT ASPECTS

1.0 Social & Environment Aspect

The land identified by bidders for the solar projects are in the state of Rajasthan. Solar power plant has positive effect on the neighbourhood due to its zero-carbon emission. Additionally, solar plants will decrease the CO₂ emission/ MWhr for the Indian grid.

2.0 Generation of Employment Opportunities

The solar PV projects, in addition to supplementing the power deficiency shall also generate employment opportunities for the local.

3.0 Environmental Impact

The PV power plant will have no environmental impact on the site due to its operation. There will be no waste products, no requirements for cooling, no moving parts, no noise and no impact on flora and fauna. The largest impact will be visual. There will also be a control building to house electrical protection equipment and for centralized monitoring.

Ajay Dhamania

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DOCUMENT NO: RE-CS-5764-004-9 एनटीपीसी रिन्यूएबल एनर्जी लिमिटेड Page 19 of 20

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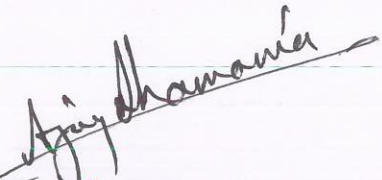
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CHAPTER XII – RECOMMENDATION

1.0 Recommendation

Renewable energy resources are considered important in improving the security of energy supplies by decreasing the dependency on fossil fuels and in reducing the emissions of greenhouse gases (GHG). Message of Kyoto Protocol (1997) and Copenhagen summit (2009) is loud and clear that, for the survival of our planet, renewable energy and energy efficiency must be in centre stage and technology development to exploit such resources should get priority. Setting up of 470MW grid connected Solar PV plants by NTPC Renewable Energy Ltd, will be a noble step toward fulfilling NTPC's commitment to promote green energy.

This Project report establishes the Technical & Financial Feasibility.


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PART MINUTES OF 4TH MEETING OF THE BOARD OF DIRECTORS HELD ON
TUESDAY, JANUARY 12, 2021

Item No. 4.2.6 Setting up of 470 MW (150 MW and 320 MW) Solar PV
Project(s) in Rajasthan - Feasibility cum Investment approval

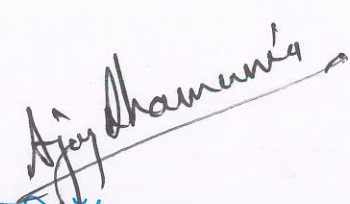
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The Board, after detailed deliberations, passed the following resolution: -

Resolved that the approval of Feasibility Cum Investment for Development of 150 MW Grid Connected Solar PV Project(s) in Rajasthan at M/s Resurgent India Ltd. appraised Estimated Gross Cost of ₹559.99 Crore including Interest During Construction (IDC) of ₹15.25 Crore as of 04th Qtr.' 2020 price level for 150 MW Project, be and is hereby approved

Further resolved that the approval of Feasibility cum Investment for Development of 320 MW Grid Connected Solar PV Project in Rajasthan at M/s Resurgent India Ltd. appraised Estimated Gross Cost of ₹1221.73 Crore including Interest During Construction (IDC) of ₹32.75 Crore as of 04th Qtr.' 2020 price level for 320 MW Project, be and is hereby approved.

Further resolved that Chief Executive Officer be and is hereby authorised to approach NTPC Limited, the holding Company, for equity infusion and prospective lenders to finance debt portion of investment in 470 MW (150 MW and 320 MW) grid connected solar project(s).


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Regd. Office: NTPC Bhawan, SCOPE Complex, 7 Institutional Area, Lodhi Road, New Delhi – 110 003
Telephone Number: +91-11-24360071, Fax Number: +91-11-24360241,
Corporate Identity Number: U40107DL2020GOI371032

Ref.No. SECI/C&P/SPD/RJ1070/T-III/LoA/NTPCL/40554

Date: 28/12/2020

To

M/s NTPC Limited
Room No. 309, 3rd Floor,
Engineering Office Complex Annexe,
NTPC Limited, Plot No. A-8A, Sector-24,
Noida, Dist. Gautam Budh Nagar- 201301 (U.P.)

Kind Attn: Sh. Rajpal Singh

Letter of Award

Sub: Selection of Solar PV Power Projects under RfS for setting up of 1070 MW
Grid-connected Solar PV Power Projects in Rajasthan (Tranche-III): Letter of
Award for a Solar PV Power Project of 470 MW (Project ID: SPD-STU-RJ1070-
T3-NTPCL-P1-470MW) in the state of Rajasthan.

Dear Sir,

Ref: This has reference to the following:

- A. The "Guidelines for Tariff Based Competitive Bidding Process for Procurement of Power from Grid Connected Solar PV Power Projects" vide Gazette Resolution dated 03.08.2017 including its subsequent amendments and clarifications issued by Ministry of Power (MoP) (herein referred to as "Guidelines");
- B. The Request for Selection (RfS) document vide RfS no. SECI/C&P/SPD/RfS/RJ-III/072020 dated 16.07.2020 including draft Power Purchase Agreement (PPA), draft Power Sale Agreement (PSA) and subsequent amendments/ clarifications/ revisions/ notifications issued by Solar Energy Corporation of India Limited (SECI) and uploaded during the process of RfS on ETS portal (<https://www.bharat-electronictender.com>);



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पंजीकृत कार्यालय : प्रथम तल, प्रायस प्लेटिनम, डी-3, डिस्ट्रिक्ट सेंटर,
साकेत, नई दिल्ली -110017

Regd. Office : 1st Floor, PRIUS Platinum, D-3, District Center,
Saket, New Delhi-110017

दूरभाष/Phone : (011) 71989200, ई-मेल/Email : corporate@seci.co.in, वेबसाइट/Website : www.seci.co.in

सीआईएन/CIN : U40106DL2011GOI225263

- C. Your response to the RfS document uploaded on ETS portal vide Organization ID (ETS-IN-2019-RS0000089) against RfS for Setting up of 1070 MW Grid-connected Solar PV Power Projects in Rajasthan (Tranche-III) under Standard Bidding Guidelines;
- D. Your Bank Guarantee(s) towards Earnest Money Deposit (EMD) submitted along with RfS vide BG No 1731320BG0001334 issued by State Bank of India, for an amount of Rs. 24,00,00,000.00/- (Rupees Twenty-four Crore Only).
- E. Your Final tariff (INR/kWh) at the end of the e-Reverse Auction conducted on ISN-ETS portal on 23.11.2020 for the referred RfS for selection of 1070 MW Grid-connected Solar Power Projects in Rajasthan (Tranche-III).

In reference to above and subject to the provisions of RfS, we confirm having accepted your final offer concluded as a result of e-RA and issue this letter of award as per the following details:

Allotted Project ID	Project Capacity (MW)	Applicable Tariff (INR/kWh) in figures	Applicable Tariff (INR/kWh) in words
SPD-STU-RJ1070-T3-NTPCL-P1-470MW	470	₹ 2.01/-	Rupees Two and one paisa only

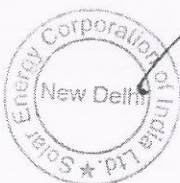
SECI shall purchase the power generated from the proposed Grid-Connected Solar PV Power Project under the above scheme subject to the following terms and conditions as stated in various documents referred above and briefly brought out hereinafter.

- 1.0 The applicable tariff as mentioned above for power generated from the proposed Solar PV Power Project for the term of Power Purchase Agreement (PPA) to be entered into between Project Company or the Solar Power Developer (SPD) and M/s SECI, for the Project, shall be firm for the entire term of the PPA.
- 1.1 The SPD will be free to avail fiscal incentives like Accelerated Depreciation, Concessional Customs, Excise Duties, Tax Holidays, etc. as available for such projects. No claim shall arise on SECI for any liability if the SPD is not able to avail fiscal incentives and this will not have any bearing on the applicable tariff.



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- 1.2 The award of the above Project is subject to the Guidelines including amendments / clarifications issued by Government of India and terms and conditions of the RfS document including its clarifications/ amendments / elaborations / notifications issued by SECI.
- 1.3 No change in the controlling shareholding of the Bidding Company or Bidding Consortium shall be permitted from the date of submission of response to RfS till the execution of the PPA. However, in case the Project is being set up by a listed Company, this condition will not be applicable. Controlling Shareholding (holding more than 50% of the voting rights and paid-up share capital in the Company) of the Project Company of the SPD shall not change until one year after the COD of the Project, except with prior approval of SECI. However, in case the Project is being set up by a listed Company, this condition will not be applicable.
- 1.4 In case of companies having multiple promoters (but none of the shareholders having more than 50% of voting rights and paid up share capital), it shall be considered as a company under joint control. In such cases, the shareholding pattern in the company as submitted at the time of bidding, shall be maintained for a period of 01 (one) year after COD.
- 1.5 The successful Bidder, if being a single company, shall ensure that its shareholding in the SPV/project company executing the Power Purchase Agreement (PPA), shall not fall below 51% at any time prior to 1 (one) year after the COD, except with the prior approval of SECI. In the event the successful bidder is a consortium, then the combined shareholding of the consortium members in the SPV/project company executing the PPA, shall not fall below 51% at any time prior to 1 (one) year after COD, except with the prior approval of SECI. However, in case the Project is being set up by a listed Company, this condition will not be applicable.
- 1.6 The SPD shall pay to SECI, Success Charges of Rs. 1 lakh/MW/project + 18% GST within 30 days of issuance of this Letter of Award (LoA), in line with Clause 12, Section-III of the RfS, towards administrative overheads, coordination with State Authorities and others, DISCOM/ STU/ CTU, pre-commissioning and commissioning expense. Performance Bank Guarantee(s)/ Payment on Order Instrument (POI) for a value of @ Rs 8 Lakh/ MW per Project shall be submitted



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by the SPD at least 07 working days prior to signing of PPA (PPA signing date to be intimated by SECI), in line with Clause 11, Section-III of the RfS.

- 1.7 PPA will be executed between SECI and the SPD as per the breakup of the cumulative Project capacity awarded to the Bidder. This LoA is being issued in line with the Project breakup of the cumulative capacity quoted in the Covering Letter as part of your response to RfS and amended subsequently, as applicable.
- 1.8 The final project configuration, adding up to the cumulative capacity awarded to the bidder may be intimated to SECI at the time of signing of PPA, which shall then remain unchanged subsequent to signing of PPA. Delays in connectivity and/or LTA for the Project(s) on account of such changes in Project parameters, which differ from the details provided in the Covering letter, shall be at the risk and cost of the Successful Bidder. The PPAs shall be valid for a period of 25 years from the scheduled commissioning date of the projects.
- 1.9 The SPD will have to submit the required documents as mentioned below to SECI within 30 days from date of this LoA. In case of delay in submission of documents beyond the timeline as mentioned above, SECI shall not be liable for delay in verification of documents and subsequent delay in signing of PPA:
- 1) Copy of the Certificate of Incorporation of the Solar Power Developer.
 - 2) The details of promoters and their shareholding in the SPD, duly certified by the practicing Chartered Accountant/ Company Secretary in original at least 7 (seven) days prior to date of their document submission (certificate date should be after the date of LoA) along with latest documents filed with ROC).
 - 3) Copy of the Memorandum of Association (MoA) of the SPD highlighting the object clause related to generation of Power/ Energy/ Renewable Energy/ Solar Power plant development.
 - 4) In case the project being executed by a Special Purpose Vehicle (SPV) incorporated by successful bidder, such SPV shall be atleast 76% shareholding subsidiary, in line with provisions of the RfS. Further, the Successful Bidder shall submit a Board Resolution prior to signing of PPA with SECI, committing total equity infusion in the SPV as per the provisions of RfS.



- 5) Copy of Board Resolution from SPV for authorization of signing of PPA and subsequent relevant documents.

Further, the PPA shall be signed only upon receipt of the Success Charges and total Performance Guarantees/ Payment on Order Instrument of requisite value. The EMD submitted shall be released only after receipt and successful verification of the total Performance Bank Guarantee/ Payment on Order Instrument in the acceptable form.

- 1.10 SECI shall have the right to verify original documents of the SPD for which copies have been submitted from the date of submission of response to RfS till date, if required. PPA as per the format given along with RfS has to be signed within 30 days from the date of issue of LoA, if not extended by SECI. In case of unavoidable delays on the part of the SPD in submission of requisite documents prior to signing of PPAs or otherwise, the Effective Date of the PPA shall remain the date as on 30th day from the issuance of LOA, irrespective of the date of signing of PPA. In extraordinary cases of unavoidable delays on the part of SECI in signing the PPAs or PSAs, the Effective Date of the PPA shall then be the date as on 7 days from signing date of PSA for total capacity of respective project.
- 1.11 In case, the SECI offers to execute the PPA with the SPD and the selected Bidder refuses to execute the PPA within the stipulated time period, the Bank Guarantee equivalent to the amount of the EMD shall be encashed by SECI from the Bank Guarantee available with SECI (i.e. either EMD or PBG/POI) as liquidated damages not amounting to penalty, and the selected Project(s) shall stand cancelled and the selected Bidder expressly waives off its rights and objections, if any, in that respect.
- 1.12 The SPD shall meet financial closure requirements for the Project in line with clause 15, Section-III of the RfS document, within 12 (twelve) months from the Effective Date of the PPA. Accordingly, the SPD shall furnish the documents pertaining to compliance of financial closure as per the above provisions.
- 1.13 The SPD/Project Company shall achieve commissioning of full capacity of the Project within 18 months from the Effective Date of the PPA as per the conditions stipulated in Clause 16, Section-III of the RfS and relevant articles of PPA. In case



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of failure to achieve this milestone, liquidated damages not amounting to penalty shall be levied on the SPD as per the above provisions.

- 1.14 You are requested to make it convenient for signing of Power Purchase Agreement (PPA) as per clause 14, Section-III of RfS, failing which, provisions as per Clause 11 and Clause 14, Section-III of the RfS shall be applicable.
- 1.15 All disputes arising out of and/ or in connection with the selection of Solar Power Projects under the said RfS and execution of PPA thereto shall be governed by laws of India and shall be subject to the jurisdiction of Courts of New Delhi.

This LoA is being issued in duplicate and you are requested to kindly acknowledge receipt and acceptance of this LoA by sending the duly stamped and signed duplicate copy of LoA to SECI within 07 days from date of this LoA.

Thanking you,

Yours faithfully,

For and on behalf of Solar Energy Corporation of India Limited

(Biblesh Meena)
Deputy Manager (C & P)




अजय धमानी/ AJAY DHAMANIA Page 6 of 6
अपर महाप्रबंधक (छत्तरगढ़ सोलर, बीकानेर)
Addl. General Manager (Chattargarh Solar, Bikaner)
एनटीपीसी रिन्यूएबल एनर्जी लिमिटेड
(एनटीपीसी लिमिटेड की पूर्ण स्वामित्व वाली सहायक)
NTPC Renewable Energy Limited
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