SOLAR AND WIND POWER PROJECT BY NTPC LIMITED

Document Prepared by Infinite Solutions

Project Title	Solar and Wind Power Project by NTPC Limited
Version	03
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Monitoring Period	01/07/2018 to 30/09/2020 (Inclusive of both days)
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable solar and wind energy sources. The project activity involves installation of 50 MW solar project in Anantapur district of Andhra Pradesh, 260 MW solar project in Bhadla- Rajasthan, 250 MW solar project in Mandsaur district of Madhya Pradesh and a 50 MW wind power project in Gujarat state of India.

Over the 10 years of first crediting period, the project has replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 940,891 tCO2e per year, thereon displacing 974,716 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel based power plant. The details of the project and their location of installation are mentioned in the table below: -

Name of Investor	Capacity in MW	COD	Connection with Grid	State	Usage
NTPC Limited	50 MW	10/08/2016	Indian Grid	Andhra Pradesh	Sale to State DISCOM
	260 MW	08/03/2017		Rajasthan	
	250 MW	06/06/2017		Madhya Pradesh	
	50 MW	10/11/2017		Gujarat	

The project is promoted by NTPC Limited.

Sectoral Scope: 01 - Energy industries (renewable / non-renewable sources)

Project Type: I - Renewable Energy Projects

Project Category: Grid-connected electricity generation from renewable sources

ACM0002- Version 18.1

Tools referred with above methodology are: Tool to calculate the emission factor for an electricity system[1] - Version 06.0 (EB 97, Annex 07)

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity, is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Baseline Scenario:

As per the applicable methodology, a Greenfield power plant is defined as "a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity". As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per paragraph 22 of Section 5.2.1 of applied methodology is the following: If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system". Hence, pre-project scenario and baseline scenario are the same.

Total emission reductions achieved in this monitoring period:

During the Current Monitoring Period from 01/07/2018 to 30/09/2020 (First and last date included) the project activity has supplied 2,164,760 MWh of electricity, and thus contributing to the GHG reductions 2,089,638 tCO2e.

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

Sectoral Scope : 01 - Energy industries (renewable / non-renewable sources)

Project Type : I - Renewable Energy Projects

1 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf

Project Category: Grid-connected electricity generation from renewable sources ACM0002-Version 18.1[2]

The project is not a grouped project activity.

1.3 Project Proponent

Organization name	NTPC Limited
Contact person	Mr. N.S.P Singh
Title	AGM - RE
Address	Sector-24, Engineering Office Complex Noida Uttar Pradesh Pin code: 201301
Telephone	+91-120-2410333
Email	npsingh@ntpc.co.in

1.4 Other Entities Involved in the Project

Organization name	Infinite Solutions
Role in the Project	Project Consultant
Contact person	Mr. Jimmy Sah
Title	Head – Sustainability
Address	214-215 Milinda Manor, Opp. Next Treasure Island, 2 RNT Marg, Indore – 452001,India
Telephone	+91-9644130430
Email	jimmy@infisolutions.org

1.5 Project Start Date

Start date of the project activity is the earliest date of interconnection with the grid i.e., 10/08/2016. This is the date of commissioning of 50 MW solar PV project activity by NTPC Limited at Anantapur, Andhra Pradesh. The details of the commissioning dates of the individual project activity are mentioned in the section 1.1 of this report.

2 http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V8OD9SFYVAMFFWNP

1.6 Project Crediting Period

Crediting Period Start date : 10/08/2016

Crediting Period End date : 09/08/2026

The project activity adopts renewable crediting period of 10 years period, which can be renewed for maximum 2 times.

1.7 Project Location

The details of the project locations are mentioned in the table below:

1. **Anantapur (50 MW): -**

Name of Investor	NTPC Limited
Capacity (MW)	50 MW
Village/Tehsil / Mandal / District(s) / State	P Kothapalli and NP Kunta, Anantpur District, Andhra Pradesh
Latitude (N)	14°1'7.45" & 14°3'21"
Longitude (E)	78°25'7.59" & 78°24'41"

2. **Bhadla (260 MW): -**

Name of Investor	NTPC Limited
Capacity (MW)	260 MW
Village/Tehsil / Mandal / District(s) / State	Bhadla, Bap, Jodhpur District, Rajasthan
Latitude (N)	27°29'41.4456"
Longitude (E)	71°54'54.7704"

3. **Mandsaur (250 MW): -**

Name of Investor	NTPC Limited
Capacity (MW)	250 MW

Village/Tehsil / Mandal / District(s) / State	Runija and Gujakhedi Village, Suvasara, Mandsaur District, Madhya Pradesh
Latitude (N)	24°05'13.2288" & 24°05'37.2228"
Longitude (E)	75°47'41.1792" & 75°48'05.3208"

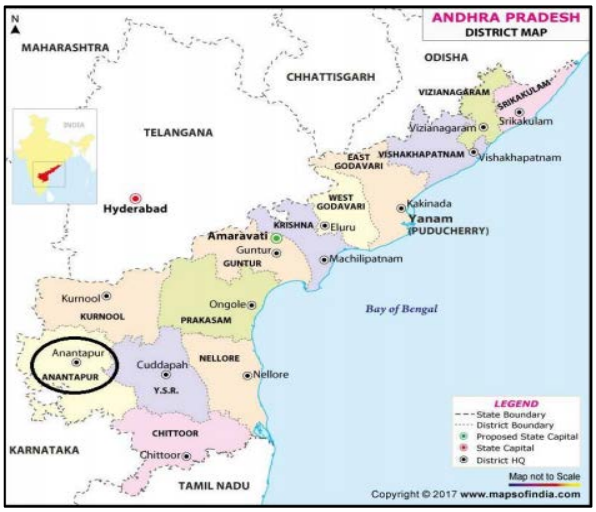
4. **Rojmal (50 MW): -**

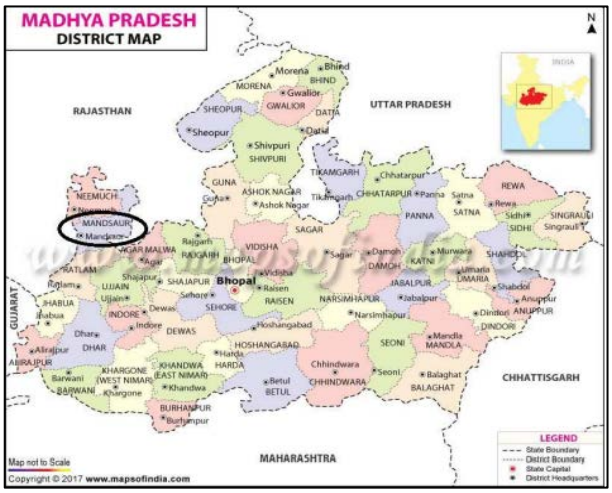
Name of Investor	NTPC Limited
Capacity (MW)	50 MW
Village/Tehsil / Mandal / District(s) / State	Amrapur, Kalasar, Ambaradi, Vanala, Kotda, Itariya, Rampara, Taiwadar, Kidi, Anlaka, Isswariya, Chanvad, Sukavada & Shivrajpur Village, Vinchiya, Jasdan, Gadhada, Babra & Lathi Tehsil, Rajkot, Amreli & Botad District, Gujarat

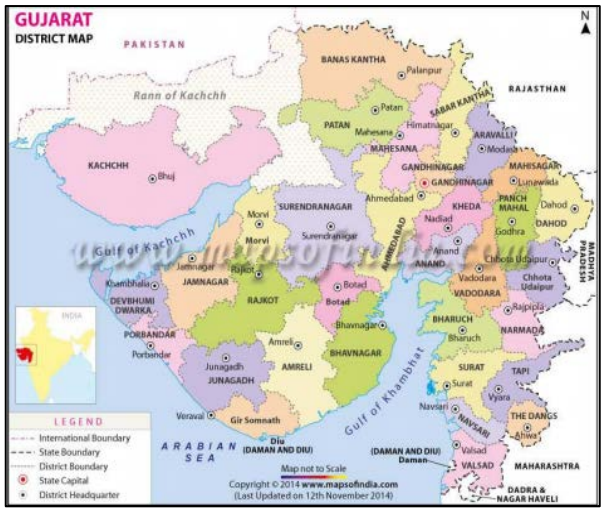
S.NO	WTGs ID	Latitude (E)	Longitude (N)
1	RJ6T-36	21°92'42.3"	71°38'78.8"
2	RJAT-42	21°93'96.3"	71°37'76.4"
3	RJAT-44	21°93'54"	71°38'09.3"
4	RJAT-45	21 °92'82.3"	71°37'77"
5	RJPT-142	21°91'06.9"	71°43'52.4"
6	RJAT-11	22°01'42.6"	71°29'94.3"
7	RJAT-15	22°03'62.1"	71°30'68.8"
8	RJAT-16	22°02'42.4"	71°30'71.8"
9	RJ8T-135	21°88'51.6"	71°40'73.2"
10	RJ9T-110	22°17'88.9"	71°34'04.3"
11	RJPT-12	21°99'23.6"	71°34'03.2"
12	RJPT-28	22°02'95"	71°40'92.7"
13	RJPT-29	22°02'44.9"	71°39'29.8"
14	RJPT-188	21°92'84.7"	71°24'80.4"
15	RJPT-196	21°94'73.6"	71°25'20.2"
16	RJPT-197	21°94'14"	71°25'65.3"
17	RJPT-198	21°95'20.9"	71°25'39.7"
18	RJPT-199	21°95'60.7"	71°25'91.5"
19	RJPT-200	21°95'87.3"	71°25'96"
20	RJPT-140	21°83'74.5"	71°39'26.4"
21	RJPT-141	21°83'69.6"	71°40'88.8"
22	RJAT-43	21°93'89.4"	71°38'10.4"

23	RJPT-125	21°96'44.4"	71°31'46.1"
24	RJPT-119	21°93'04.8"	71°27'28.7"
25	RJ8T-022	22°00'45.5"	71°30'70.2"

The project locations have been shown in the map below:







1.8 Title and Reference of Methodology

Title : Grid-connected electricity generation from renewable sources

Reference : The project activity meets the eligibility criteria of large-scale project as it is more than 15 MW

Methodology : ACM0002: Grid-connected electricity generation from renewable sources - Version 18.1[3]

Type I : Energy industries (renewable / non-renewable sources)

Category : Approved Consolidated Methodology (ACM0002)

Tools referred with above methodology and applicable for project activity are:

- Tool to calculate the emission factor for an electricity system [4]- Version 07.0 (EB 100, Annex 04)
- Methodological Tool- Tool for the demonstration and assessment of additionally[5] - Version 07.0.0 (EB 70, Annex 08)

1.9 Participation under other GHG Programs

The project proponent hereby confirms that the project has not participated under other GHG Programs.

The undertaking from PP has been submitted for no any double accounting for current monitoring period and project activity is not participated any other GHG program other than VCS.

1.10 Other Forms of Credit

The project activity is not availing any REC benefits and the same can be confirmed from publically available link of REC generators.

Web-link: https://www.recregistryindia.nic.in/index.php/general/publics/registered_regens . PP has also submitted undertaking for not availing other forms of environmental credit for the current monitoring period under consideration.

3 http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V8OD9SFYVAMFFWNP

4 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

5 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

1.11 Sustainable Development

Contribution to sustainable development:

Ministry of Environment, Forests and Climate Change, GOI, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

- **Social well-being:** This project helped in generating employment opportunities during the construction and operation phases. The project activity is lead to development in infrastructure in the region like development of roads and may promote business with improved power generation.
- **Economic well-being:** The project is a clean technology investment in the region, which, have been taken place in the absence of the VCS benefits the project activity also help to reduce the demand supply gap in the state.

  The project activity generates power using zero emissions solar energy based power generation, which helps to reduce GHG emissions and specific pollutants like Sox, NOx, and SPM associated with the conventional thermal power generation facilities.
- **Technological well-being:** The successful operation of project activity lead to promotion of solar power generation and encouraged other entrepreneurs to participate in similar projects.
- **Environmental well-being:** Solar being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the Project, activity also helps in avoiding significant amount of GHG emissions.

2 SAFEGUARDS

2.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of the solar PV panels/WTGs interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

The report on “Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects” prepared by MNRE dated September 2013. This report clearly mentioned that

solar PV project activity operations do not result in direct air pollution, noise pollution. Please refer below web link for the same[6].

Thus, there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity.

2.2 Local Stakeholder Consultation

The project has already been registered under VCS mechanism. The Local stakeholder consultation process was conducted during the validation stage. Hence it is not applicable.

There were no negative comments received during the meeting and stakeholders appreciated proactive efforts taken by project proponent towards reducing emissions.

For ongoing communication, the PP has also placed a grievance register onsite where in the stakeholder can put down his/her complain and the same if found genuine will be addressed immediately.

However, there is no negative feedback has been reported within this monitoring period.

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project activity involves the installation of Solar PV and wind project. The total installed capacity of the project is 560 MW of Solar PV plant and a 50 MW Wind project located at different states in India. The project is promoted by NTPC Limited.

The Project activity is a new facility (Greenfield) and the electricity generated by the project and it exported to the Indian electricity grid. The project displaces an equivalent amount of electricity, which would have otherwise been generated by fossil fuel dominant electricity grid. The Project Proponent plans to avail the VCS benefits for the project.

The project resulted in replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 940,891 tCO2e per year, thereon displacing 974,716 MWh/year amount of electricity from the grid over the 10 years crediting period.

6 http://164.100.94.214/sites/default/files/uploads/report-on-developmental-impacts-of-RE.pdf

Solar PV Project Technology Details –

The project activity aims to harness solar energy through installation of Solar PV project with total installed capacity of 560 MW and harness wind energy from 50 MW wind power project.

The technical specification of 50 MW solar plant interconnection with grid on 10/08/2016 by NTPC Limited at Anantapur are as follows:

Sl. No.	Technical details of the equipment	Description
1	Technology Used	Solar PV technology
2	Module capacity and number of the modules of each capacity	Total no. of modules- 932596 Module Ratings -240,243,245,246,249, 250,252,255,258,290,295,300,305,310, 315
3	Number of Inverters and its capacity	100 Inverters of 1 MW capacity each (ABB make), 120 Inverters of 1.25 MW capacity each (Hitachi Make).
4	Number of Transformers and its capacity	25 Nos of 4 MVA Inverter Transformers (Raychem/Sudhir). 60 Nos of 2.5 MVA Inverter Transformers (Kirloskar/Raychem).

The technical specification of 260 MW solar plant interconnection with grid on 08/03/2017 by NTPC Limited at Bhadla, Rajasthan are as follows:

Sl. No.	Technical details of the equipment	Description
1	Technology Used	Solar PV technology
2	Module capacity and number of the modules of each capacity	Total no. of modules- 842220 Module Ratings- 281,288,291,294,295,297,297.5,300,3 02.5, 303,305,306,307.5,309,310,312,312.5, 315, 317.5,320,322.5
3	Number of Inverters and its capacity	65 Inverters of 1 MW capacity each (ABB make), 156 Inverters of 1.25 MW capacity each (Hitachi Make).
4	Number of Transformers and its capacity	4 Nos of 63 MVA, 132/33 kV 5 Nos of 2 MVA Inverter Transformers. 52 Nos of 2.5 MVA Inverter Transformers 14 Nos of 4 MVA Inverter Transformers 13 Nos of 5 MVA Inverter Transformers

The technical specification of 250 MW solar plant interconnection with grid on 06/06/2017 by

NTPC Limited at Mandsaur, Madhya Pradesh are as follows:

Sl. No.	Technical details of the equipment	Description
1	Technology Used	Solar PV technology
2	Module capacity and number of the modules of each capacity	Total no. of modules- 821340 Module Ratings- 285,288,290,291,294,295,297,297.5,300, 302.5,303,305,306,307.5,309,310,312.5,3 15,317.5,318,320,322.5
3	Number of Inverters and its capacity	184 Inverters of 1.25 MW capacity each (Hitachi Make), 465 Inverters of 43 KW capacity each (Huawei Make)
4	Number of Transformers and its capacity	80 Nos of 2.5 MVA Inverter Transformers (Pete Hammond). 10 Nos of 2 MVA Inverter Transformers (Pete Hammond). 12 Nos of 2.5 MVA Inverter Transformers. (Kirloskar)

The technical specification for 50 MW Wind project at Rojmal, Gujarat is given below.

WTG Make and Model No.	INOX WIND DF/2000/100
Generator Type & Rating	Doubly-Fed Induction generator, 2000kW
WTG configuration	25 X 2000kW
Rotor Diameter	100m
Hub Height	92
Tower Type	Conical Tubular Steel
Cut-in-wind speed	3.0 m/s
Rated wind speed	11.0 m/s
Cut-out wind speed	20.0 m/s
Survival wind speed	52.5 m/s
Operational Mode	Variable Speed
Power Regulation	Electrical Blade Pitch control, variable speed inverters, power back up with ultra-capacitor

The project activity has been in operation continuously since its commissioning. There have been no emergencies happened to the monitoring system. There are no events or situation that occurred during the monitoring period which may impact the applicability of the methodology.

There is no major shutdown observed during the current monitoring period in the project activity & supporting documents for the same has been provided to the Auditor.

3.2 Deviations

3.2.1. Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.2.2. Project Description Deviations

During current monitoring period a deviation has been taken on account of delay in meter calibration. There is delay in calibration of energy meters in the year 2020. In year 2020, the scheduled date of calibration was 24/04/2020 but these energy meters are not calibrated yet. Therefore, PP has applied maximum error factor (-0.4 %) in all net export values taken from the whole month of April 2020 to September 2020 being conservative. It is to be noted that the GETCO is the sole entity responsible for calibration of meters and the PP don't have any control over the same.

Hence, it can be confirmed from the above explanation that the deviation does not have an impact on the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid, OM, y}$
Data unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 13, June 2018[7]
Value applied	0.9843

7 http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as 3-year generation weighted average using data for the years 2014-15, 2015-16 & 2016-17. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 13, published by the Central Electricity Authority, Ministry of Power, and Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid, BM, y}$
Data unit	tCO_2/MWh
Description	Build margin CO_2 emission factor for the project electricity system in year y
Source of data	Central Electricity Authority (CEA) of India Database Version 13
Value applied	0.9083
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as per the latest data available for the most recent year 2016-17. The data is obtained from "CO_2 Baseline Database for Indian Power Sector" version 13, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	Calculation of baseline emissions
Comments	The above value is fixed and it is same for the entire crediting period

Data / Parameter	$EF_{grid, CM, y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 13, June 2018[8]
Value applied	0.9653
Justification of choice of data or description	The combined margin emissions factor is calculated as follows:

8 http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

of measurement methods and procedures applied	$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year y (tCO_2/MWh) $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year y (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of Data	Calculation of baseline emissions
Comments	The above value is fixed and it is same for the entire crediting period

4.2 Data and Parameters Monitored

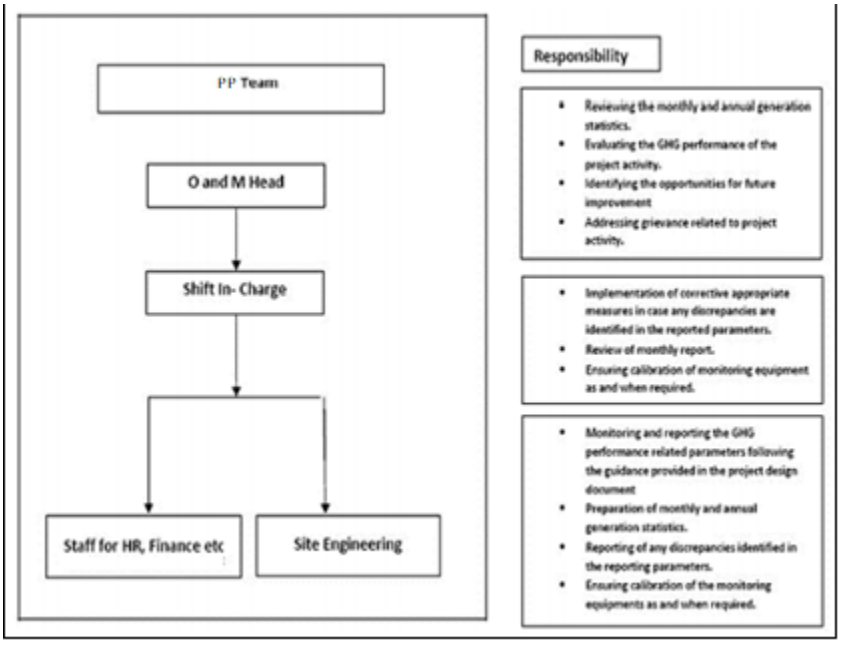
Data / Parameter	$E_{GPJ,y}$
Data unit	MWh/y
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)
Source of data	Monthly joint meter reading reports
Description of measurement methods and procedures to be applied	The difference of final value of export and import is used for monthly values of net electricity supplied to the grid by the project activity and same value is considered for ER calculations.
Frequency of monitoring/recording	Continuous measurement & monthly recording
Value monitored	2,164,760 MWh
Monitoring equipment	The electricity exported / supplied by the plant to pooling substation and further to substation. This meter also measures electricity imported by the plant from the grid. There are numerous meters used in this project activity and the details including Meter serial number, Make, accuracy class and the calibration dates are mentioned APPENDIX 1: Calibration Records.
QA/QC procedures to be applied	The meters is approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The frequency of calibration is once in 5 years[9] The monthly electricity supplied/exported by the project activity in the JMR report is cross-checked with the monthly invoices of sale. In the absence or delay in the meter calibration,

9 http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

	appropriate Guidelines has been applied appropriately to confirm the conservativeness of metering. The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and PP does not have any control on it. PP is getting value of net electricity supplied to grid and the same is considered the monitoring parameter. The billing is raised based on substation meters.
Purpose of the data	Calculation of baseline emissions
Calculation method	Thus, Net electricity supplied to the grid by the project plant in a given month = Export, kWh– Import, kWh
Comments	Data is archived in paper & electronic form for two years after the end of crediting period or of the last issuance of VERs for this project activity, whichever occurs later.

4.3 Monitoring Plan

The monitoring plan is developed in accordance with the modalities and procedures for Carbon project activities. The monitoring plan, which implemented by the project participant describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving. The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the project participant. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipment's for this project activity. The team comprises of the following members:



Data Measurement

The export and import energy is measured continuously using above mentioned Main and Check meters located at the substations. Readings of meters is taken on monthly basis by authorized officer of SEB in the presence of PP or representative of PP. Based on the Meter Reading Statement to PP, invoices is raised. These invoices can be used for cross checking the meter readings taken for the respective project activity.

Data collection and archiving

Readings from meters collected in the presence of the plant in-charge. Export and Import Data directly recorded and stored in logs as well as in electronic form on a daily basis. The records are checked periodically by the Plant Manager and discussed thoroughly with the plant supervisor. The period of storage of the monitored data will be 2 years after the end of crediting period or until the last issuance of VERs for the project activity whichever occurs later.

Emergency preparedness

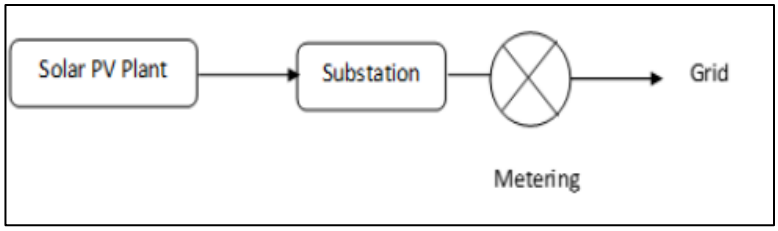
The project activity is not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

Personnel training

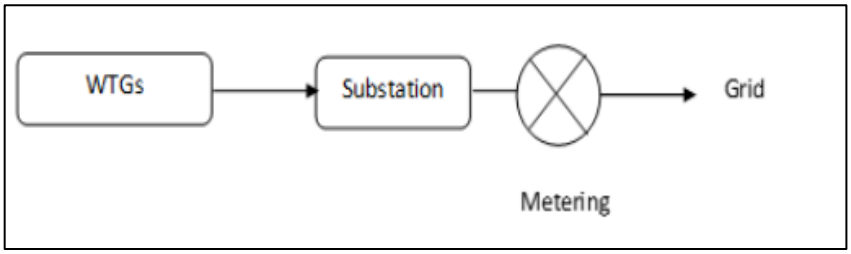
All the staff members trained for the proper functioning of the project activity and a properly monitoring of emission reductions. The plant helpers are trained for equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

Metering Arrangement

Line diagram with metering arrangement for the solar project activity is shown below.



The metering arrangement for all the three solar sites are the same. Each solar plant have their own dedicated metering arrangement at the substation end. The metering arrangement is under control of state electricity board and may change in future. Line diagram with metering arrangement for the wind project activity is shown below:



The metering arrangement is under control of state electricity board and may change in future.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the approved consolidated Methodology ACM0002 (Version 18.1) para 42:

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that existing grid- connected power plants and the addition of new grid- connected power plants and generated all project electricity generation above baseline levels. The baseline emissions are to be calculated as follows:

$$BEy = EG_{PJ,\,y} \times EF_{grid,\,CM,\,y}$$

Where:

BE_y = Baseline emissions in year y (tCO_2/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,\,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

Grid Emission Factor

The GEF is fixed ex-ante in the PD as given below:

Parameter	Value
OM	0.9843
BM	0.9083
CM	0.9653

Net Generation (MWh)			Emission Reduction(tCO_2e)
Sr.no	**Site**	**MWh**	**tCO2e**
1	Mandsaur	824,771	796,151
2	Rojmal	197,234	190,389
3	Bhadla	968,989	935,363
4	Anantapur	173,766	167,735
Total		**2,164,760**	**2,089,638 (Round down values)**

Therefore,

BE_y = 2,164,760 X 0.9653

= 2,089,638 tCO2e (Round down values)

5.2 Project Emissions

Not Applicable, since emissions from the project activity is zero as per ACM0002 methodology.

Hence, $PE_y = 0$.

5.3 Leakage

Not Applicable, since leakage emissions from the project activity is zero as per ACM0002 methodology. Hence, $LE_y = 0$.

5.4 Net GHG Emission Reductions and Removals

The Formula used to calculate the net emission reduction for the project activity is

$$ER_Y = BE_y - PE_y$$

Where,

ER_y = Emission Reduction in tCO_2/year

BE_y = Baseline emission in tCO_2/year

PE_y = Project emissions in tCO_2/year

LE_y = Leakage Emissions in tCO_2/year

BE_y =2,089,638 tCO_2e

PE_y = 0 tCO_2e

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
(01/07/2018 to 31/12/2018) 2018	447,182	0	0	447,182
(01/01/2019 to 31/12/2019) 2019	931,554	0	0	931,554
(01/01/2020 to 30/09/2020) 2020	710,902	0	0	710,902
Total	2,089,638	0	0	2,089,638

The achieved GHG emission is 2% lesser as compared to the estimated values in the registered VCS PD. The generation of electricity depends upon many other climatic conditions, and the availability of sunlight/Wind Speed is not within the control of the project participant.

APPENDIX1: CALIBRATION RECORDS

It is to be noted that all meters installed at the time of commissioning are calibrated meters as per state electricity guidelines. Thus, considering the calibration frequency of five years, all meters are valid for current monitoring period.

The details of calibration are as below:

Meter and Calibration details of 50 MW Solar power project by NTPC limited at Anantapur:

220/33 KV POOLING SUBSTATION-I NP KUNTA			
Feeder- 1A			
Meter Details	**Main Meter**	**Check Meter**	**Standby Meter**
Meter Serial No	APX00736	APX00737	APX00738
Meter Make	Secure	Secure	Secure
Accuracy Class	0.2s	0.2s	0.2s
Date of Calibration	13/03/2016	13/03/2016	13/03/2016
Due Date	12/03/2021	12/03/2021	12/03/2021

220/33 KV POOLING SUBSTATION-I NP KUNTA			
Feeder- 1B			
Meter Details	**Main Meter**	**Check Meter**	**Standby Meter**
Meter Serial No	APX00739	APX00740	APX00741
Meter Make	Secure	Secure	Secure
Accuracy Class	0.2s	0.2s	0.2s
Date of Calibration	13/03/2016	13/03/2016	13/03/2016
Due Date	12/03/2021	12/03/2021	12/03/2021

Meter and Calibration details of 260 MW Solar power project by NTPC Limited at Bhadla, Rajasthan

132 KV GOVERNMENT SUBSTATION		
Block- P4, Jakson		
Meter Details	**Main Meter**	**Check Meter**
Meter Serial No	15624946	15199974
Meter Make	L & T	L & T
Accuracy Class	0.2s	0.2s
Date of Calibration	24/10/2016	24/10/2016
Due Date	23/10/2021	23/10/2021

132 KV GOVERNMENT SUBSTATION

Block- P5, Vikram		
Meter Details	Main Meter	Check Meter
Meter Serial No	16195132	16195133
Meter Make	L & T	L & T
Accuracy Class	0.2s	0.2s
Date of Calibration	11/01/2017	11/01/2017
Due Date	10/01/2022	10/01/2022

132 KV GOVERNMENT SUBSTATION		
Block- P6, Vikram		
Meter Details	Main Meter	Check Meter
Meter Serial No	16195109	16195110
Meter Make	L & T	L & T
Accuracy Class	0.2s	0.2s
Date of Calibration	23/12/2016	23/12/2016
Due Date	22/12/2021	22/12/2021

132 KV GOVERNMENT SUBSTATION		
Block- P7, Tata		
Meter Details	Main Meter	Check Meter
Meter Serial No	16082424	16082425
Meter Make	L & T	L & T
Accuracy Class	0.2s	0.2s
Date of Calibration	11/01/2017	11/01/2017
Due Date	10/01/2022	10/01/2022

Meter and Calibration details of 250 MW Solar power project by NTPC Limited at Mandsaur, Madhya Pradesh

132KV/220KV Substation		
Block- P1, Lanco		
Meter Details	Feeder-1 Meter	Feeder-2 Meter
Meter Serial No	Y0319695	Y0319685
Meter Make	Secure	Secure
Accuracy Class	0.2s	0.2s
Date of Calibration	12/03/2018	12/03/2018
Due Date	11/03/2023	11/03/2023

132KV/220KV Substation

Block- P2, Lanco	Feeder-1		Feeder - 2	
Meter Details	Main Meter	Spare Meter	Main Meter	Spare Meter
Meter Serial No	Y0319681	Y0319693	Y0319692	Y0319694
Meter Make	Secure	Secure	Secure	Secure
Accuracy Class	0.2s	0.2s	0.2s	0.2s
Date of Calibration	12/03/2018	13/03/2018	12/03/2018	13/03/2018
Due Date	11/03/2023	12/03/2023	11/03/2023	12/03/2023

132KV/220KV Substation			
Block- P3, Vikram Solar			
Meter Details	Main Meter	Check Meter	Spare Meter
Meter Serial No	Y0310625	Y0310626	Y0582663
Meter Make	Secure	Secure	Secure
Accuracy Class	0.2s	0.2s	0.2s
Date of Calibration	05/05/2017	05/05/2017	23/05/2018
Due Date	04/05/2022	04/05/2022	22/05/2023

132KV/220KV Substation						
Block- P4, BHEL	Feeder-1		Feeder-2			
Meter Details	Main Meter	Check Meter	Main Meter	Check Meter	Spare Meter	Spare Meter
Meter Serial No	Y0319907	Y0319906	Y0319908	Y0319910	Y0319909	Y03199011
Meter Make	Secure	Secure	Secure	Secure	Secure	Secure
Accuracy Class	0.2s	0.2s	0.2s	0.2s	0.2s	0.2s
Date of Calibration	24/03/2017	24/03/2017	24/03/2017	24/03/2017	24/03/2017	24/03/2017
Due Date	23/03/2022	23/03/2022	23/03/2022	23/03/2022	23/03/2022	23/03/2022

132KV/220KV Substation				
Block- P5, Tata	Feeder-1		Feeder-2	
Meter Details	Main Meter	Check Meter	Main Meter	Check Meter
Meter Serial No	XE505968	XE505967	XE505965	XE505966
Meter Make	Secure	Secure	Secure	Secure
Accuracy Class	0.2s	0.2s	0.2s	0.2s
Date of Calibration	04/05/2017	04/05/2017	04/05/2017	04/05/2017
Due Date	03/05/2022	03/05/2022	03/05/2022	03/05/2022

Meter and Calibration details of 50 MW Wind power project by NTPC Limited at Rojmal, Gujarat

Meter Details	220 KV SUKHPUR (INOX) SUBSTATION	
Meter Serial No	GJ- 3057-A	GJ- 3058-A
Meter Make	EDMI	EDMI
Accuracy Class	0.2s	0.2s
Date of Calibration	24/04/2015	24/04/2015
Due Date	23/04/2020	23/04/2020

Delay in meter Calibration has been identified in 50 MW Wind power project by NTPC Limited at Rajma during the current monitoring period. PP would like to clarify that the calibration is not under the direct control or purview of the Project Participant (PP) and is performed by the state govt. authority / DISCOM, which is the authorized body for energy meter testing. However, PP has followed conservative approach and hence, an error factor equating the maximum permissible limit (-0.4%) of error for the meters has been applied for the delayed period to the monthly Net electricity generation to the grid during the monitoring period from April-20 to Sept-20.