



Verified Carbon Standard

SOLAR AND WIND POWER PROJECT BY NTPC LIMITED



Document Prepared by: Kosher Climate India Private Limited

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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 will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 940,891 tCO_{2e} 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: -

Capacity in MW (Technology)	COD	Connection with Grid	Location	Usage
50 MW (Solar PV)	10-August-2016	Indian Grid	Anantapur district of Andhra Pradesh, India	Sale to State DISCOM
260 MW (Solar PV)	25-March-2017 (Block 4-65MW)		Bhadla, Rajasthan, India	
	21-February-2017 (Block 5-65MW)			
	25-March-2017 (Block 6-65MW)			
	22-March-2017 (Block P7-65MW)			
250 MW (Solar PV)	25-August-2017		Mandsaur District of Madhya, India	
50 MW (Wind)	10-November-2017	Rajkot, Amreli & Botad District, Gujarat, India		

The project is promoted by NTPC Limited.

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

Project Type: I - Renewable Energy Projects

Methodology: 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 system¹ - Version 06.0 (EB 97, Annex 07)

Total emission reductions achieved in this monitoring period:

During the Current Monitoring Period from 01-January-2022 to 31-December-2022 (First and last date included) the project activity has supplied 987,916 MWh of electricity, and thus contributing to the GHG reductions 953,635 tCO_{2e}.

The Audit history is provided in the below table

Audit Type	Period	Program	VVB Name	Number of years
Joint Validation/ Verification	10-August-2016 to 30-June-2018	VCS	LGAI TECHNOLOGICAL CENTER, S.A	1 year 10 months
Verification	01-July-2018 to 30-September- 2020	VCS	Earthood Services Private Limited	2 year 3 months
Verification	01-October-2020 to 31-December- 2021	VCS	LGAI TECHNOLOGICAL CENTER, S.A	1 year 3 months
Verification	01-January-2022 to 31-December- 2022 (On going)	VCS	LGAI TECHNOLOGICAL CENTER, S.A	1 year
Total	10-August-2016 to 31-December- 2022	VCS		6 years 6 months

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)

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

Project Type: I - Renewable Energy Projects

Project Category: Grid-connected electricity generation from renewable sources ACM0002-
Version 18.1²

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	Kosher Climate India Private Limited
Role in the Project	Consultant /Bundling Agency
Contact person	Vamsi Krishna
Title	Global Business Head
Address	Zee Plaza, No.1678, Ground Floor, 27th Main Road, Sector 2, HSR Layout, Bengaluru, Karnataka 560102
Telephone	+91 80 49931177
Email	vamsi@kosherclimate.com , narendra@kosherclimate.com

² <http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V80D9SFYVAMFFWNP>

1.5 Project Start Date

Start date of the project activity is the earliest date of interconnection with the grid i.e., 10-August-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.

1.6 Project Crediting Period

Crediting Period Start date: 10-August-2016

Crediting Period End date: 09-August-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:

Name of Investor: NTPC Limited

S.No.	Project	Capacity (MW)	Village/Tehsil/Mandal/District(s)/State	Latitude(N)	Longitude(E)
1	Anantapur (50 MW)	50	P Kothapalli and NP Kunta, Anantpur District, Andhra Pradesh	14° 1'7.45"	78° 25'7.59"
2	Bhadla (260 MW)	260	Bhadla, Bap, Jodhpur District, Rajasthan	27° 29'41.44 56"	71° 54'54.77 04"
3	Mandsaur (250 MW)	250	Runija and Gujakhedi Village, Suvasara, Mandsaur District, Madhya Pradesh	24° 05'13.22 88"	75° 47'41.17 92"
4	Rojmal (50 MW)	50	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	(See Appendix 2)	(See Appendix 2)

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 18.1³

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 system⁴ - Version 06.0 (EB 97, Annex 07)
- Methodological Tool- Tool for the demonstration and assessment of additionally⁵ - 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.

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

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

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

The project also does not affect emissions associated with a goods or service that is included in the Supply Chain (Scope 3) Emissions.

1.11 Sustainable Development Contributions

The proposed project activity involves the installation of Solar Power Projects in Madhya Pradesh, Andhra Pradesh and Rajasthan and wind power project in Gujarat of India. The purpose of the project activity is to generate clean electricity with utilization of wind & solar energy. The total

³ <http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V80D9SFYVAMFFWNP>

⁴ <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v6.pdf>

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

installed capacity of the project is 610 MW; which involves operation of three solar projects of 50 MW at Andhra Pradesh, India, 260 MW at Rajasthan and 250MW at Madhya Pradesh capacity and 1 wind power plant with total capacity of 50 MW located at Gujarat, India.

The project supplies clean electricity from the solar and wind power plant to the Indian National Grid hence displacing the electricity generated from grid connected fossil fuel power plants and thereby avoiding the equivalent Carbon dioxide which is a greenhouse gas. In the absence of the project activity, there won't be any avoidance of carbon dioxide. The project activity is contributing to the SDGs 7,8 and 13.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	About 987,916 MWh renewable electricity has supplied to Indian National grid during the current monitoring period that helps to increase the renewable energy share in the energy mix.	Since commissioning, about 5,544,893 MWh renewable electricity has been supplied to Indian grid till this monitoring that helps to increase the renewable energy share in the energy mix.
2)	8.5	Number of employment opportunities created	Implemented activities to increase	About 393 employment opportunities has been created during the current monitoring period.	The project has created about 1,447 employment opportunities since commissioning.
3)	13.2	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By supplying 987,916 MWh of clean electricity to Indian grid, the project avoided release of 953,635 tCO ₂ into the atmosphere during the reporting period and contributed to the sustainable development goal 13.	Prevented the release of 5,352,485 tCO ₂ into the atmosphere since its commissioning.

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 same⁶.

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

The project activity is the construction and generation of electricity from greenfield solar and wind plants. This does not fall under AFOLU projects. Hence, this section is not applicable to this project activity.

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

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 is 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 tCO_{2e} per year, thereon displacing 974,716 MWh/year amount of electricity from the grid over the 10 years crediting period.

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-August-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 themodules of each capacity	Total no. of modules- 932,596 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-March-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- 842,220 Module Ratings- 281,288,291,294,295,297,297.5,300,302.5,303,305,306,307.5,309,310,312,312.5,315,317.5,320,322.5
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-June-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- 821,340 Module Ratings- 285,288,290,291,294,295,297,297.5,300,302.5,303,305,306,307.5,309,310,312.5,315,317.5,318,320,322.5
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 2022 for Anantapur 50 MW Solar project and 250 MW solar project in Mandsaur and two months delay for 50 MW wind project in Gujarat. In year 2022, the meters are not calibrated as per the scheduled date. Therefore, PP has applied maximum error factor (0.2 %) in all export and import values taken for the months for which calibration is delayed (March to December) being conservative and for the months November and December 2022 for 50 MW Gujarat wind project respectively. It is to be noted that the DISCOM 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. There are no other project description deviations applied during this monitoring period or in previous monitoring reports.

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 12, May 2017 ⁷
Value applied	0.9843
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 06” as 3-year generation weighted average using data for the years 2013-14, 2014-15 & 2015-16. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 12, 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 12
Value applied	0.9083
Justification of choice of data or description of	Calculated as per “Tool to calculate the emission factor for an electricity system, version 06” as per the latest data available for

⁷ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

measurement methods and procedures applied	the most recent year 2015-16. The data is obtained from “CO ₂ Baseline Database for Indian Power Sector” version 12, 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 12, June 2018 ⁸
Value applied	0.9653
Justification of choice of data or description of measurement methods and procedures applied	<p>The combined margin emissions factor is calculated as follows: $EF_{grid, CM, y} = EF_{grid, OM, y} * W_{OM} + EF_{grid, BM, y} * W_{BM}$</p> <p>Where: $EF_{grid, BM, y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh) $EF_{grid, OM, y}$ = Operating margin CO₂ emission factor in year y (tCO₂/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM} = Weighting of build margin emissions factor (%) = 25%</p>
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	$E_{GP, y}$
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

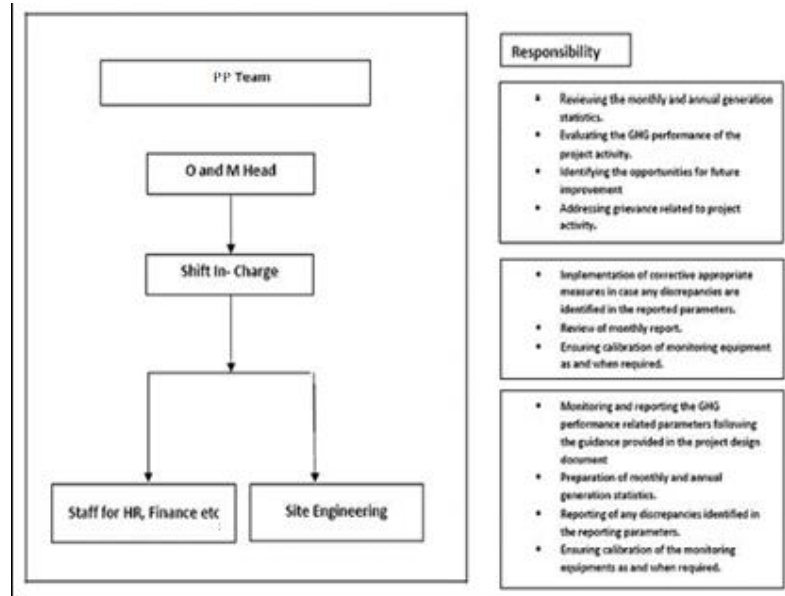
⁸ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

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	987,916 MWh
Monitoring equipment	<p>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.</p> <p>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.</p>
QA/QC procedures to be applied	<p>The meters are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The frequency of calibration is once in 5 years⁹ 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, appropriate Guidelines has been applied appropriately to confirm the conservativeness of metering.</p> <p>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.</p> <p>The billing is raised based on substation meters.</p>
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

⁹ https://cea.nic.in/wp-content/uploads/2020/02/meter_reg.pdf

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 250 MW solar project in Andhra Pradesh is divided into five blocks, each with a capacity of 50MW. Each block is equipped with separate monitoring equipment, including a main meter, check meter, and standby meter. The electricity generated by the current 50MW project is measured using the monitoring equipment dedicated to this specific project. The electricity generation data reported by the SRPC reflects the aggregated capacity of 250MW.

The export and import energy are 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 State Electricity Board in the presence of PP or representative of PP. Based on the Meter Reading Statement to PP, invoices are 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:

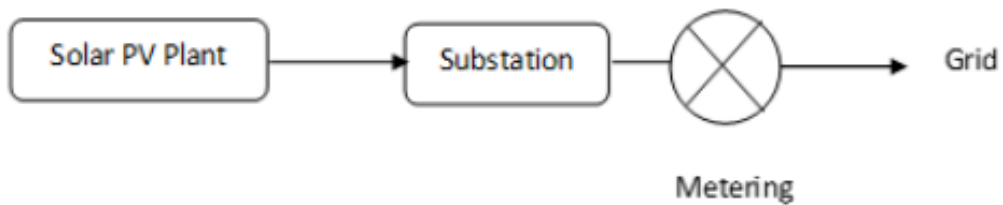
The project activity is not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

Personnel training:

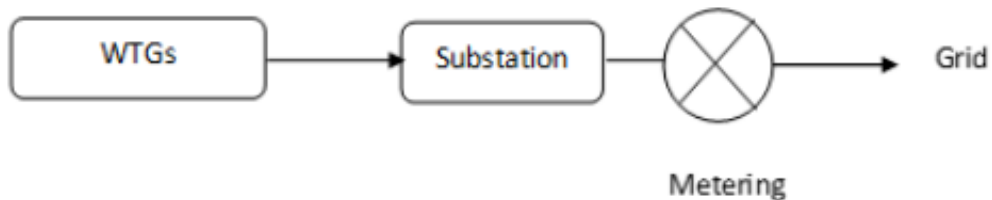
All the staff members trained for the proper functioning of the project activity and a properly monitoring of emission reductions. The plant helpers are trained for equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring 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 has 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 CO₂ 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:

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

Where:

BE_y = Baseline emissions in year y (tCO₂/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 CO₂ 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 CO₂/MWh)

Net Electricity- Project wise:

Months	50MW Andhra Pradesh (MWh)	260MW Rajasthan (MWh)	250MW Madhya Pradesh (MWh)	50MW Gujarat (MWh)	Total (MWh)
Jan-22	6,726	32,925	32,000	7,848	79,499
Feb-22	7,183	36,514	35,456	5,995	85,148
Mar-22	7,148	40,560	37,891	9,012	94,611
Apr-22	7,098	38,198	36,183	10,104	91,582
May-22	6,296	37,804	38,067	16,454	98,621
Jun-22	6,541	36,921	32,079	9,890	85,430
Jul-22	5,500	31,247	22,881	12,321	71,949

Aug-22	6,028	32,508	24,270	8,493	71,300
Sep-22	5,953	36,777	27,831	5,305	75,866
Oct-22	5,885	38,961	33,053	3,936	81,834
Nov-22	4,967	33,595	31,711	3,880	74,154
Dec-22	5,498	35,135	30,386	6,903	77,922
Total	74,822	431,145	381,808	100,141	987,916

Project wise baseline emission reduction for the monitoring period.

Net Generation (MWh)			Emission Reduction(tCO ₂ e)
Sr.no	Site	MWh	tCO ₂ e
1	Anantapur	74,822	72,226
2	Bhadla	431,145	416,184
3	Mandsaur	381,808	368,559
4	Rojmal	100,141	96,666
Total		987,916	953,635 (Round down values)

Therefore,

$$BE_y = 987,916 \times 0.9653 = 953,635 \text{ tCO}_2\text{e (Round down values)}$$

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 tCO₂/year

BE_y = Baseline emission in tCO₂/year

PE_y = Project emissions in tCO₂/year

LE_y = Leakage Emissions in tCO₂/year

BE_y = 953,635 tCO₂e

PE_y = 0 tCO₂e

	Anantapur	Bhadla	Mandsaur	Rojmal	Total
Start date of monitoring period	01-January-2022	01-January-2022	01-January-2022	01-January-2022	01-January-2022
End date of Monitoring period	31-December-2022	31-December-2022	31-December-2022	31-December-2022	31-December-2022
Actual Emission Reductions (tCO ₂ e)	72,226	416,184	368,559	96,666	953,635

Vintage wise emission reduction:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
(01-January-2022 to 31-December-2022) 2022	953,635	0	0	953,635
Total	953,635	0	0	953,635 (round down value)

Comparison of estimated emission reductions with actual:

<u>Ex-ante emissions reductions/removals</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
940,891	953,635	1.34%	The achieved GHG emission reductions in the current monitoring period are 1.34% higher 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.

APPENDIX 1: CALIBRATION RECORDS

It is to be noted that all meters installed at the time of commissioning are calibrated meters as per state electricity guidelines.

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-March-2016	13- March - 2016	13- March - 2016
Due Date	12- March - 2021	12- March - 2021	12- March - 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- March - 2016	13- March - 2016	13- March - 2016
Due Date	12- March - 2021	12- March - 2021	12- March - 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	Previous:27-October-2021 Recent:01-December-2022	Previous:27-October-2021 Recent:01-December-

		2022
Due Date	Previous:26-October-2022 Recent:30-November-2023	Previous:26-October-2022 Recent:30-November-2023

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	Previous:21-October-2021 Recent:01-December-2022	Previous:21-October-2021 Recent:01-December-2022
Due Date	Previous:20-October-2021 Recent:30-November-2023	Previous:20-October-2021 Recent:30-November-2023

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	Previous:21-October-2021 Recent:01-December-2022	Previous:21-October-2021 Recent:01-December-2022
Due Date	Previous:20-October-2021 Recent:30-November-2023	Previous:20-October-2021 Recent:30-November-2023

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	Previous:01-March-2021 Recent:02- March -2022	Previous:01- March -2021 Recent:02- March -2022
Due Date	Previous: 28-February-2022 Recent:01- March -2023	Previous: 28-February-2022 Recent:01- March -2023

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-March -2018	12-March -2018
Due Date	11-March -2023	11-March -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- March -2018	13- March -2018	12- March -2018	13- March -2018
Due Date	11- March -2023	12- March -2023	11- March -2023	12- March -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-May-2017	05-May-2017	23-May-2018
Due Date	04-May-	04-May-2022	22-May-2023

	2022		
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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- March - 2017	24- March - 2017	24- March - 2017	24- March - 2017	24- March - 2017	24- March - 2017
Due Date	23- March - 2022	23- March - 2022	23- March - 2022	23- March - 2022	23- March - 2022	23- March - 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-May-2017	04- May- 2017	04- May- 2017	04- May-2017
Due Date	03- May- 2022	03- May- 2022	03- May- 2022	03- May-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	22-November- 2021	22- November- 2021
Due Date	21- November- 2022	21- November- 2022

Delay in meter Calibration has been identified in the 50MW solar at Anantapur and 250 MW Solar at Mandsaur and 50 MW Gujarat wind project by NTPC Limited 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 (0.2%) of error for the meters has been applied for the monitoring period to the monthly electricity export and import to the grid during the monitoring period for 50MW solar project at Anantapur and 250 MW Solar project at Mandsaur and 50 MW Gujarat wind project by NTPC Limited.

APPENDIX 2: PROJECT LOCATION

The geographical coordinates of the 50MW Wind project located in Gujarat are given below:

WTGs ID	Latitude (N)	Longitude (E)	Latitude (N)	Longitude (E)
RJ6T-36	21.9242	71.3878	21°55' 27.12" N	71°23' 16.08" E
RJAT-42	21.9396	71.3776	21°56' 22.56" N	71°22' 39.36" E
RJAT-44	21.9354	71.3809	21°56' 7.44" N	71°22' 51.24" E
RJAT-45	21.9282	71.3777	21°55' 41.52" N	71°22' 39.72" E
RJPT-142	21.9106	71.4352	21°54' 38.16" N	71°26' 6.72" E
RJAT-11	22.0142	71.2994	22°0' 51.12" N	71°17' 57.84" E
RJAT-15	22.0362	71.3068	22°2' 10.32" N	71°18' 24.48" E
RJAT-16	22.0242	71.3071	22°1' 27.12" N	71°18' 25.56" E
RJ8T-135	21.8851	71.4073	21°53' 6.36" N	71°24' 26.28" E
RJ9T-110	22.1788	71.3404	22°10' 43.68" N	71°20' 25.44" E
RJPT-12	21.9923	71.3403	21°59' 32.28" N	71°20' 25.08" E
RJPT-28	22.0295	71.4092	22°1' 46.2" N	71°24' 33.12" E
RJPT-29	22.0244	71.3929	22°1' 27.84" N	71°23' 34.44" E
RJPT-188	21.9284	71.248	21°55' 42.24" N	71°14' 52.8" E
RJPT-196	21.9473	71.252	21°56' 50.28" N	71°15' 7.2" E
RJPT-197	21.9414	71.2565	21°56' 29.04" N	71°15' 23.4" E
RJPT-198	21.952	71.2539	21°57' 7.2" N	71°15' 14.04" E
RJPT-199	21.956	71.2591	21°57' 21.6" N	71°15' 32.76" E
RJPT-200	21.9587	71.2596	21°57' 31.32" N	71°15' 34.56" E
RJPT-140	21.8374	71.3926	21°50' 14.64" N	71°23' 33.36" E
RJPT-141	21.8369	71.4088	21°50' 12.84" N	71°24' 31.68" E
RJAT-43	21.9389	71.381	21°56' 20.04" N	71°22' 51.6" E
RJPT-125	21.9644	71.3146	21°57' 51.84" N	71°18' 52.56" E
RJPT-119	21.9304	71.2728	21°55' 49.44" N	71°16' 22.08" E
RJ8T-022	22.0045	71.307	22°0' 16.2" N	71°18' 25.2" E

Project 1: Anantapur (50 MW):



Project 2: Bhadla (260 MW)



Project 3: Mandsaur (250 MW):



Project 4: Rojmal (50 MW)

