SOLAR AND WIND POWER PROJECT BY NTPC LIMITED

Document Prepared by Infinite Solutions

Project Title	Solar and Wind Power Project by NTPC Limited
Version	05
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Project ID	1772
Monitoring Period	01-October-2020 to 31-December-2021 (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 replaced 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. For this monitoring period i.e., from 01/10/2020 to 31/12/2021 project activity is reducing 1,225,812 tCO_2e and displacing 1,269,881 MWh amount of electricity from the generation-mix of power plants connected to the Indian grid.

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	21/02/2017		Rajasthan	
	250 MW	31/05/2017		Madhya Pradesh	
	50 MW	10/11/2017		Gujarat	

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 *01/10/2020* to *31/12/2021* (First and last date included) the project activity has supplied 1,269,881 MWh of electricity, and thus contributing to the GHG reductions *1,225,812 tCO_2e*.

Audit Type	Period	Program	VVB Name	Number of years
Validation	29/06/2018	VCS	LGAI Technological Center S.A.	-
Verification	10/08/2016 to 30/06/2018	VCS	LGAI Technological Center S.A.	01 Year, 10 Months, 21 days
Verification	01/07/2018 to 30/09/2020	VCS	Earthood Services Private Limited	02 Years,3 Months
Verification	01/10/2020 to 31/12/2021	VCS	LGAI Technological Center S.A.	01 Year, 3 Months
Total				**05 Years,4 Months,21 days**

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

Project Category: Grid-connected electricity generation from renewable sources ACM0002-Version 18.1.

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	NTPC Bhawan, SCOPE Complex, Institutional Area, Lodhi Road, New Delhi – 110003, India
Telephone	+91-120-2410333
Email	nspsingh@ntpc.co.in

1.4 Other Entities Involved in the Project

Organization name	Infinite Environmental Solutions LLP
Role in the Project	Project Consultant
Contact person	Mr. Jimmy Sah
Title	Chief Operating Officer (COO)
Address	214-215 Milinda Manor, Opp. Next Treasure Island, 2 RNT Marg, Indore – 452001, India
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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-August-2016. This is the date of commissioning of 50 MW solar PV project activity by NTPC Limited.

Capacity in MW	COD	State
50 MW	10/08/2016	Andhra Pradesh
260 MW	08/02/2017	Rajasthan
250 MW	31/05/2017	Madhya Pradesh
50 MW	10/11/2017	Gujarat

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 project involves setting up of 560 MW of Solar power project and a 50 MW Wind power project. Total Capacity of this project activity is 610 MW.

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): -

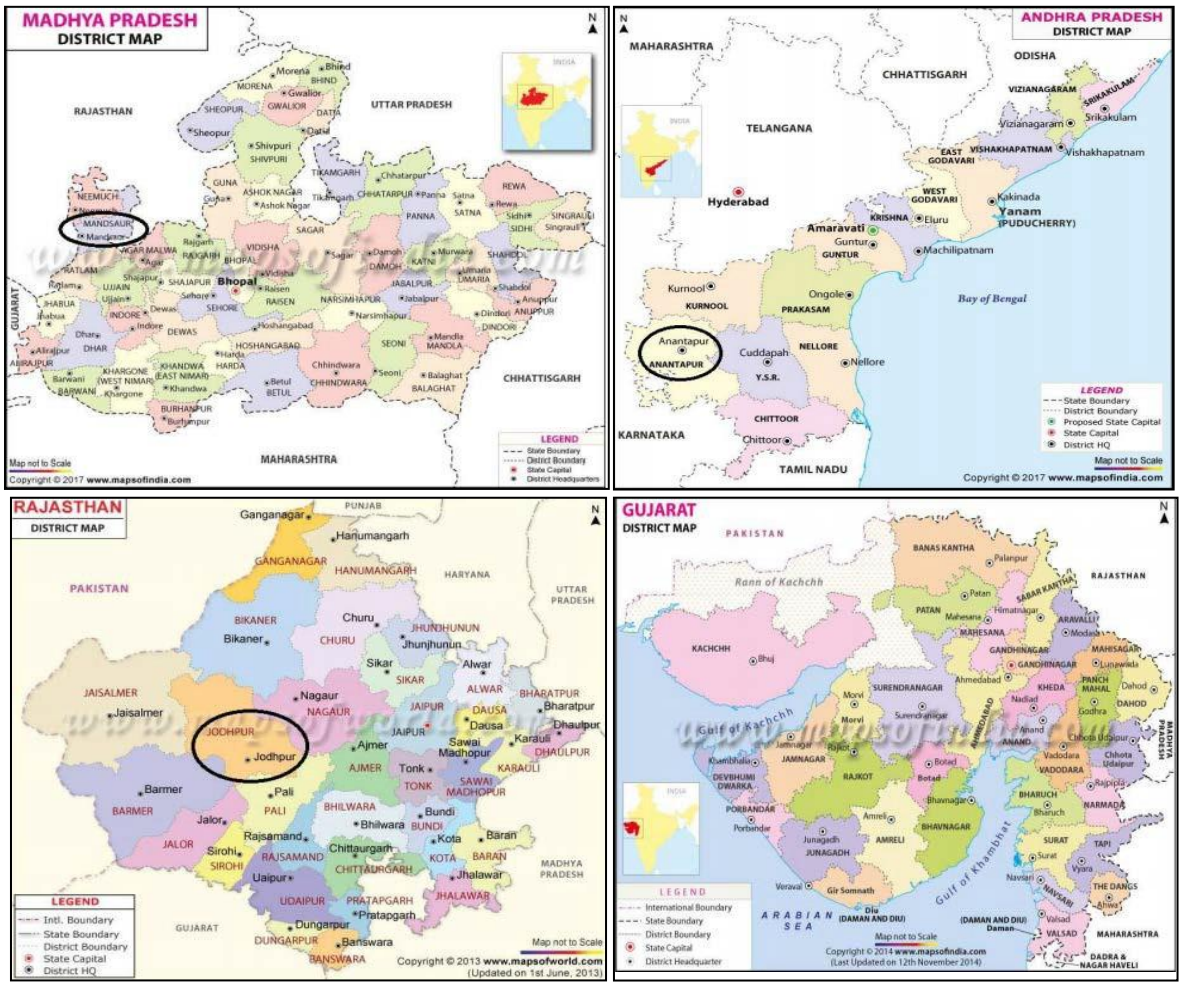
Name of Investor	NTPC Limited
Capacity (MW)	50 MW
Village/Tehsil / Mandal / District(s) / State	Amrapur, Kalasar, Ambaradi, Vanala, Kotda, Itariya, Rampara, Taiwadar, Kidi, Anlaka, Isswariya, Chanvad, Sukavada & Shivrajpur Village, Vinchiya, Jasdan, Gadhada, Babra & Lathi Tehsil, Rajkot, Amreli & Botad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

S.NO	WTGs ID[1]	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"

[1] Source: Commissioning Certificates of WTGs

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

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- Version 06.0 (EB 97, Annex 07)
- Methodological Tool- Tool for the demonstration and assessment of additionally - 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 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/general/publics/registered_regens*. PP has also submitted an undertaking for not availing other forms of environmental credit for the current monitoring period under consideration.

1.11 Sustainable Development Contributions

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 SO_x, NO_x, and SPM associated with the conventional thermal power generation facilities.

Technological well-being: The successful operation of project activity led 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.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
Sequential row number	SDG Target number	Number and text of SDG indicator or, if no official SDG indicator is applicable, user-defined indicator	Indicate the project's contribution to the SDG Indicator (implemented activities to increase or decrease)	Brief description of the quantifiable impact of the project's activities related to the SDG indicator, during the monitoring period.	Brief description of the cumulative quantifiable impact of the project's activities related to the SDG indicator, over the project lifetime.
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About 1,269,881 MWh renewable electricity has supplied to Indian grid during this monitoring period that helps to increase the renewable energy share in the energy mix	Project Activity has contributed 4,558,650 MWh till this monitoring period. First monitoring period (10/08/2016-30/06/2018): 1,124,009 MWh Second monitoring period (01/07/2018 - 30/09/2020): 2,164,760 MWh Third monitoring period (01/10/2020 - 31/12/2021): 1,269,881 MWh

2)	8.5	Numbers of job opportunities provided by implementation of the project	Implemented activities to increase	338 people (Contractual + Permanent) have been employed by the project activity for this monitoring period.	338 people (Contractual + Permanent) have been employed by the project activity for this monitoring period. Since commissioning, the project activity has employed 701 people till the current monitoring period.
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By installation of 560 MW Solar and 50 MW Wind Energy Power Plant, project has prevented the release of 1,225,812 tons of carbon into the atmosphere during the monitoring period	Project has prevented the release of 4,400,455 tCO_2e to the environment, till this monitoring period. First monitoring period (10/08/2016-30/06/2018): 1,085,005 tCO_2e Second monitoring period (01/07/2018 - 30/09/2020): 2,089,638 tCO_2e Third monitoring period (01/10/2020 - 31/12/2021): 1,225,812 tCO_2e

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.

In solar and wind, during operation there is no significant waste generation happens. Also, in current monitoring period no hazardous waste (faulty PV module and WTG) has been identified. In case of faulty module or WTG, vendor will collect it and will dispose/recycle as per national guideline.

The report on "Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects[2]" 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.

The report on "Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects[3]" prepared by MNRE dated September 2013. This report also suggests that wind farms operations do not result in direct air pollution, noise pollution.

Thus, there are no 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 and there is no change in Project design since its commissioning. Project is working properly as defined in registered PD. The Local stakeholder consultation process was conducted during the validation stage as mentioned below and no negative comments were received during LSC at the time of validation:

	Anantapur	Bhadla	Mandsaur	Rojmal
Date of invitation	01/04/2015	15/02/2016	16/02/2016	14/11/2016
Date of Meeting	09/04/2015	22/02/2016	23/02/2016	21/11/2016
Location of Meeting	Project site, Andhra Pradesh	Project site, Rajasthan	Project site, Madhya Pradesh	Project site, Gujarat

PP is maintaining the grievance register at each site in the accessible location for everyone as the part of grievance mechanism. Anyone can register their complain/suggestion on it. There

[2] https://odishainnovationcell.nic.in/Content/SIC/Articles/RE_Development_Impacts_in_India.pdf

[3] https://odishainnovationcell.nic.in/Content/SIC/Articles/RE_Development_Impacts_in_India.pdf

were no negative comments received during this monitoring period. If any genuine comment comes to the project proponent, it will be addressed immediately.

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 themselves of the VCS benefits for the project.

The project during the Current Monitoring Period from *01/10/2020* to *31/12/2021* (First and last date included) has supplied 1,269,881 MWh of electricity, and thus contributing to the GHG reductions *1,225,812 tCO_2e*.

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[4] of 50 MW solar plant interconnection with grid on 10-Aug-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

[4] Source: As per Technical Specification Document.

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[5] of 260 MW solar plant interconnection with grid on 21-Feb-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, 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[6] of 250 MW solar plant interconnection with grid on 31-May-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,

[5] As per technical Specification Document

[6] Source: Technical Specification Document

		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[7] 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 during the monitoring system. There are no events or situations 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.

At the time of registration and first verification (PDMR), the other entity 'EKI Energy Services Limited' involved as a Registry holder for this project. Later on, NTPC (PP) has requested VERRA to shift a project from Enking's Registry to NTPC Registry.

[7] Source: Technical Specification Document

3.2 Deviations

3.2.1 Methodology Deviations

There is no request for methodology deviation applied neither during this monitoring period nor during previous monitoring periods.

3.2.2 Project Description Deviations

Following deviation was requested and approved during the previous monitoring period (01-July-2018 to 30-September-2020)

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.

Following deviations are requested during the current monitoring period (01-October-2020 to 31-December-2021)

Deviation 1:

The commissioning date for 260 MW solar plant at Bhadla, Bap, Jodhpur District, Rajasthan and 250 MW solar plant at Mandsaur District, Madhya Pradesh by NTPC Limited were mentioned earlier in the registered PDD is 08/03/2017 and 06/06/2017 respectively. But as per the commissioning certificates from Jodhpur Vidyut Vitran Nigam Limited (JDVVNL) & Rajasthan Rajya Vidyut Prasaran Nigam Limited (RVPNL) for Rajasthan site and Madhya Pradesh Power Transmission Company Limited (MPPTCL) for Madhya Pradesh site the commissioning dates for the respective site are 21/02/2017 & 31/05/2017 respectively. This deviation doesn't have any impact on installed capacity, methodology applicability, monitoring methodology and calculation of emission reductions because the project start date of the project activity i.e.,10/08/2016 is considered from the earliest commissioning among the project activities for each particular sites.

The Deviation 1 in Project Description is applied during the current monitoring period (01/10/2020 to 31/12/2021) (i.e., Third verification) and the nature of deviation is permanent.

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.

Deviation 2:

At the time of registration and first verification (PDMR), the other entity was 'EKI Energy Services Limited' as a 'Project Consultant' and a Registry holder for this project. Later on, NTPC (PP) has requested VERRA to shift a project from Enking's Registry to NTPC Registry.

For this monitoring period the 'Project Consultant' is 'Infinite Environmental Solutions LLP', hence MR has been updated accordingly in section 1.4.

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 12, May 2017
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 05" 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, Government of India.
Purpose of Data	Calculation of 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 CO2 emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 12, May 2017

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 05" as per the latest data available for 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 CO2 emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 12, May 2017
Value applied	0.9653
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 05" as per the latest data available for 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 emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ, y}$
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

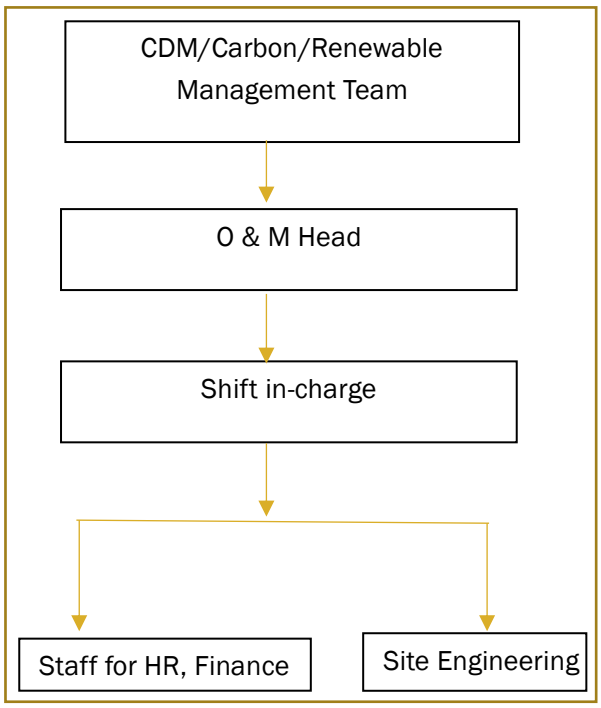
Value monitored	1,269,881 MWh
Monitoring equipment	The electricity exported / supplied by the plant to pooling substation and further to substation. This meter also measures electricity imported by the plant from the grid. There are numerous meters used in this project activity and the details including Meter serial number, Make, accuracy class and the calibration dates are mentioned APPENDIX 1: Calibration Records.
QA/QC procedures to be applied	The meters 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 years The monthly electricity supplied/exported by the project activity is monitoring through JMR report and will be cross-checked with the monthly invoices of sale. In case of discrepancy between JMR and invoices, conservation approach (lower value will be accounted for calculation) will be followed. In the absence or delay in the meter calibration, 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, which will be 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 for this project activity.

The team comprises of the following members:



Responsibility
• Reviewing the monthly and annual generation statistics • Evaluating the GHG performance of the project activity • Identifying the opportunity for future Improvement • Addressing grievance related to project activity.
• Implementation of corrective appropriate measures in case any discrepancies are identified in the reported parameters. • Review of monthly report • Ensuring calibration of monitoring equipment as and when required.
• Monitoring and reporting the GHG performance related parameters following the guidance provided in the project design document. • Preparation of monthly and annual generation statistics • Reporting of any discrepancies identified in the reporting parameters.

Data Measurement

The export and import energy will be measured continuously using above mentioned Main and Check meters located at the substations. Readings of meters shall be 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 will be 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 will be collected in the presence of the plant in-charge. Export and Import data would be 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 till the last issuance of VERs for the project activity whichever occurs later.

Emergency preparedness

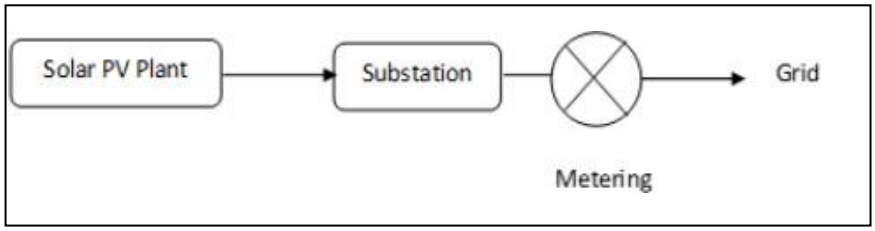
Exported electricity is measured through Main meter, there is chance it may stop working due to various reasons so PP has installed the Check or backup meter as a emergency preparedness to monitor the exported electricity. In case of faulty Main meter, billing (invoicing) will be generated on check meter' reading.

Personnel training

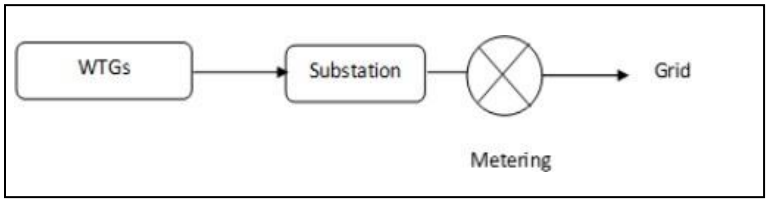
In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff will be trained. The plant helpers will be trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with 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.

Procedures used for handling any internal auditing performed and any non-conformities identified:

Senior Management or site in charge is responsible for internal audit, and they are performing it by meetings and inspections. And if non-conformities occur below are the procedure at the site by asking these questions:

- What is the problem and what is its history?
- Where did it occur?
- When did it happen and when was it reported?
- How big is the problem, how frequent is it and how is it being measured?

In this monitoring period no non-conformity has been identified.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emission calculation for the project activity is attributable to the CO_2 Emission that could have been produced by the fossil fuel-based power plants in absence of the project activity. Therefore, the amount electricity supplied to the Indian grid is multiplied by the grid emission factor of Indian grid to calculate the baseline emissions reduced by the project activity.

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

Where,

BE_y = Baseline Emissions in year y; tCO_2

$EG_{facility, y}$ = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{grid, CM, y}$ = CO_2 emission factor of the grid in year y; tCO_2/MWh

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	tCO_2e
1	Mandsaur	469,136	4,52,856
2	Rojmal	111,612	1,07,738
3	Bhadla	521,077	5,02,994
4	Anantapur	168,056	1,62,224
Total		**1,269,881**	**1,225,812 (Round down values)**

Thus,

BE_y = 1,269,881*0.9653

= 1,225,812 tCO_2e (Round down values).

5.2 Project Emissions

Not Applicable, since project emissions from the renewable energy power generation project activity is zero, as per ACM0002 (Version 18.1) methodology. Hence, PE_y = 0.

5.3 Leakage

Not Applicable, since project emissions from the renewable energy power generation project activity is zero, as per ACM0002 (Version 18.1) methodology. Hence, LE_y = 0.

5.4 Net GHG Emission Reductions and Removals

Quantify 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 = 1,225,812 tCO_2e

PE_y = 0 tCO_2e

The achieved GHG emission is 4.05% 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.

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-October - 2020 to 31 – December 2020	236,070	0	0	236,070
01-January 2021 to 31 – December 2021	989,742	0	0	989,742
Total	**1,225,812**	**0**	**0**	**1,225,812**

Ex-ante emissions reductions/removals	Achieved emissions reductions / removals	Percent difference	Justification for the difference
1,178,047	1,225,812	+ 4.05%	The achieved GHG emission is 4.05% 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. However, increased ER is not affecting the additionality.

APPENDIX 1: METER DETAILS

It is to be noted that all meters installed at the time of commissioning are calibrated meters as per state/national electricity guidelines. Thus, considering the calibration frequency of five years[8], all meters are valid for current monitoring period.

The details of calibration are as below:

A) **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	10/03/2021	10/03/2021	10/03/2021
Due Date	09/03/2026	09/03/2026	09/03/2026

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	10/03/2021	10/03/2021	10/03/2021
Due Date	09/03/2026	09/03/2026	09/03/2026

B) **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	27/10/2021	27/10/2021
Due Date (As per PD MR)	26/10/2026	26/10/2026

[8] https://cea.nic.in/wp-content/uploads/2020/02/meter_reg.pdf

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	21/10/2021	21/10/2021
Due Date (As per PD MR)	20/10/2026	20/10/2026

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	21/10/2021	21/10/2021
Due Date (As per PD MR)	20/10/2026	20/10/2026

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 (As per PD MR)	10/01/2022	10/01/2022

C) **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	24/06/2021	24/06/2021
Due Date	23/06/2026	23/06/2026

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	12/11/2021	12/11/2021	12/11/2021
Due Date	11/11/2026	11/11/2026	11/11/2026

132KV/220KV Substation						
Block- P4, BHEL						
	Feeder-1		**Feeder-2**		**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	05/01/2021	06/01/2021	05/01/2021	06/01/2021	06/01/2021	06/01/2021
Due Date	04/01/2026	05/01/2021	04/01/2026	05/01/2021	05/01/2021	05/01/2021

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	31/03/2021	31/03/2021	31/03/2021	31/03/2021
Due Date	30/03/2026	30/03/2026	30/03/2026	30/03/2026

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

NTPC Rojmal	220 KV SUKHPUR (INOX) SUBSTATION	
Meter Details	Main Meter (line 1)	(Main Meter line 2)
Meter Serial No	GJ- 3057-A	GJ- 3058-A
Meter Make	EDMI	EDMI
Accuracy Class	0.2s	0.2s

Date of Calibration	21/11/2021	22/11/2021
Due Date	20/11/2026	21/11/2026