



Verified Carbon Standard

140 MW SOLAR PHOTOVOLTAIC PROJECT IN RAJASTHAN



Document Prepared by EKI Energy Services Limited.

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¹ <https://registry.verra.org/app/projectDetail/VCS/1709>

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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 energy source. Rising Bhadla 1 Private Ltd. and Rising Bhadla 2 Private Ltd. are the promoter of the project activity. Over the 10 years crediting period, for the duration 18-July-2017 to 17-July-2027 (Inclusive of both dates), the project would replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 241,456² tCO₂e per year, thereon displacing 250,258 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.

A Power Purchase Agreement has been signed with NTPC Ltd (NTPC has been identified by the Government of India as implementation agency for setting up of Grid- connected Solar PV Power Projects) for the sale of electricity by the respective PPs. Two Separate PPAs have been signed, one for the 70 MW (AC) capacity between Rising Bhadla 1 Pvt. Ltd. and NTPC and, the remaining 70 MW (AC) capacity between Rising Bhadla 2 Pvt. Ltd. and NTPC. Also, It is clearly stated in both the PPA's that the electricity will be purchased by NTPC Vidyut Nigam Limited on behalf of NTPC, which will be further sold to Discom after bundling it with the Thermal Power allocated by Ministry of Power, Government of India. Thus, a total of 140 MW of clean electricity is generated by several multi crystalline solar photo voltaic modules which is spread over an area of 2,800,200 square meters (1,400,000 square meters for Rising Bhadla 1 Private Limited and 1,400,200 square meters for Rising Bhadla 2 Private Limited) along with the power conditioning units and power transformers for which the detailed description is mentioned in section 3.1 of this monitoring report. The output generated by the modules in DC ranges from 0.315 KW to 0.330 KW

Since the project activity is a solar power project so, no major construction is involved in the project activity. Also, the project activity is in continued operation since the day of commissioning. The details of the project and the state of installation are mentioned in the table:-

Project Proponents Name	Capacity in MW (AC)	COD	Connection with Grid	State	Usage
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² As per the registered VCS PD, the ER estimation is done based on 20.50% PLF and 8760 hours of annual operation. Also, the value is the estimated value for the 5th Year of the crediting period considering the deviation.

Rising Bhadla 1 Private Ltd.	40 MW	18-July-2017	INDIAN Grid	Rajasthan	Sale to Grid
	30 MW	29-September-2017			
Rising Bhadla 2 Private Ltd.	40 MW	29-August-2017			
	30 MW	01-November-2017			

Scenario existing prior to the implementation of project activity:

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per paragraph 24 of Section 5.2.1 of applied methodology ACM0002 version 17.0³ is the following:

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”⁴ -Version 05.0 (EB 87, Annex 09)

During the current monitoring period the project resulted in 340,149 tCO₂e which included the operation of the project activity for the duration of 10,169 hours and 50 minutes⁵ for the period from 01-October-2021 to 30-November-2022 (inclusive of both dates).

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 17.0⁶

³ <https://cdm.unfccc.int/methodologies/DB/HF3LP6O41YY0JIP1DK6ZRJO9RSCX3S>

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf>

⁵ The Project was operational for 426 days which gives total operational hours as 10,224. Also, Since the project activity was under breakdown for the duration 54 hours and 10 minutes as described in Appendix 2 of this report, the total operational hours for the project activity for the monitoring 01-October-2021 to 30-November-2022 is 10,169 hours and 50 minutes

⁶ <https://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN>

The project is not a grouped project activity.

1.3 Project Proponent

Organization name	Rising Bhadla 1 Private Ltd
Contact person	Mr. Ayush Bhargava
Title	Assistant Manager- Project Management
Address	S-18 Second Floor Green Park Extension Delhi-110016 India
Telephone	+91 9818363357
Email	ayush.bhargava@risingsunenergy.in

Organization name	Rising Bhadla 2 Private Ltd
Contact person	Mr. Ayush Bhargava
Title	Assistant Manager- Project Management
Address	S-18 Second Floor Green Park Extension Delhi-110016 India
Telephone	+91 9818363357
Email	ayush.bhargava@risingsunenergy.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Mr. Abhishek Anjan
Title	Sr. Executive- (Operations)
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India
Telephone	+91-7004475951
Email	abhishek.anjan@enkingint.org

1.5 Project Start Date

For this project activity, the project start date is the earliest date of commissioning i.e. 18-July-2017.

1.6 Project Crediting Period

Crediting Period Start date : 18-July-2017

Crediting Period End date : 17-July-2027⁷

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

This is the 5th periodic verification of the 1st crediting period.

The project is registered under VCS standard v4.0, where Appendix 1 states that “registered projects and projects that complete validation on or before 19 March 2020 remain eligible to apply the crediting period requirements under VCS version 3.” The Project completed validation before 19 March 2020 and chose to use the crediting period requirements under VCS version 3.

1.7 Project Location

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

Location of the Plant	Village - Bhadla, Tehsil - Phalodi, District- Jodhpur, State-Rajasthan	
Location details	For Rising Bhadla 1 Private Ltd. –	
	Latitude (North)	Longitude (East)
	27°29'53.75"	71°54'59.50"
	27°29'38.16"	71°54'59.93"
	27°30'22.73"	71°55'02.19"
	27°30'02.37"	71°55'02.75"
	27°30'02.47"	71°55'07.61"
	27°29'53.93"	71°55'07.85"
	27°30'23.09"	71°55'19.10"
	27°30'14.47"	71°55'25.29"
	27°30'17.81"	71°55'28.04"
	27°30'10.09"	71°55'32.22"
	27°30'13.76"	71°55'34.88"
	27°30'09.80"	71°55'41.91"
	27°29'39.09"	71°55'42.60"
	27°30'09.66"	71°55'44.77"
	27°29'41.14"	71°55'45.55"
	For Rising Bhadla 2 Private Ltd.	
	Latitude (North)	Longitude (East)
	27°30'03.31"	71°54'37.83"
27°29'06.79"	71°54'39.38"	
27°30'03.49"	71°54'45.87"	

⁷ The Start Date and the end date of the crediting period are inclusive of both dates.

	27°29'53.46"	71°54'46.15"	
	27°29'06.99"	71°54'48.62"	
	27°29'09.85"	71°54'55.74"	
	27°29'53.75"	71°54'59.39"	
	27°29'38.06"	71°54'59.82"	
	27°29'12.12"	71°55'02.33"	
	27°29'14.43"	71°55'08.92"	
	27°29'16.22"	71°55'11.47"	
	27°29'27.56"	71°55'25.93"	
	27°29'38.99"	71°55'42.45"	
	Since the project activity is spread across the area of 2,800,200 square meters (1,400,000 square meters for Rising Bhadla 1 Private Limited and 1,400,200 square meters for Rising Bhadla 2 Private Limited) the details co-ordinates are mentioned in the table above. Elevation :180 m above MSL		
Distance from District Headquarter	159 km from Jodhpur		
Access by Road	Connected by Road- NH65		
Access by Rail	Nearest Railway station- Phalodi: 83 km		
Access by Air	Nearest Airport – Jodhpur		
Telecommunication	Fairly available		
Land	Approximately 140ha land available for 70 MW Solar PV plant.		
Climate	Annual Rainfall – 3 mm Max Temp: 50°C Min Temp: -3°C Max Relative Humidity: 100 % Min Relative Humidity: 5%		

The project locations have been shown in the map below:



Figure 1. State and district Map of Rajasthan and Jodhpur



Figure 2 Entire project Location on Google maps

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 : Grid-connected electricity generation from renewable sources ACM0002-Version 17.0⁸

⁸ <https://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN>

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 system⁹ - Version 05.0 (EB 87, Annex 09)

1.9 Participation under other GHG Programs

Not Applicable, as the project activity is not registered with any other program.

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 publicly available link of REC generators.

Web-link: https://www.recregistryindia.nic.in/index.php/publics/accredited_regens

The project activity is also not availing and IREC benefits and the same can be seen from the link below –

Web-link: <https://evident.services/device-register>

PP has also submitted undertaking for not availing other forms of environmental credit for the same crediting period under consideration. A letter of undertaking from the project participant is being submitted regarding no double counting from the project.

1.11 Sustainable Development Contributions

Contribution to sustainable development:

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment and Forests (MoEF), has mentioned four indicators for the sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India. Thus, the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

- **Social well-being**
- **Economic well-being**
- **Technological well-being**

⁹ <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

- **Environmental well-being**

According to the Appendix 2- the document history mentioned in the VCS Standard Version 4.3¹⁰, it is clearly mentioned that Project Proponent is required to demonstrate contributions to a minimum of three SDGs, effective immediately for all projects registered on or after 20-January-2023. Also, it is clearly mentioned in the point 4 of the Quarter 1 VCS Program Update released in 20-January-2022¹¹ that a project activity is required to demonstrate contributions to a minimum of three SDGs by 20-January-2025 for the projects registered with VERRA before 20-January-2023. Since this is the 5th Periodic Verification of this project for the Monitoring Period 01-October-2021 to 30-November-2022 (Inclusive of both Dates) and it is registered before 20-January-2023, the PP will demonstrate contribution to at least three SDGs by 20-January-2025. For the present monitoring period the PP is voluntarily demonstrating contributions to 2 SDGs as mentioned in the below table and SD contributions by minimum 3 SDGs for the project activity will be demonstrated by 20-January-2025.

¹⁰ https://verra.org/wp-content/uploads/VCS-Standard_v4.3.pdf

¹¹ <https://verra.org/wp-content/uploads/2022/01/VCS-Summary-of-Effective-Dates-2022-Q1.pdf>

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime ¹²
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About 352,376.94 MWh renewable electricity has supplied to Indian grid during the reported period that helps to increase the renewable energy share in the energy mix.	About 352,376.94 ¹³ MWh renewable electricity has supplied to Indian grid throughout the project lifetime that helps to increase the renewable energy share in the energy mix
2)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By supplying 352,367.94 MWh clean electricity (generated through Solar PV) to Indian grid, the project avoided release of 340,149 tCO ₂ e in to the atmosphere during the reporting period.	Overall Prevented the release of 340,149 ¹⁴ tCO ₂ e into the atmosphere since project commissioning.

¹² Since this is the 5th Verification of this project and it is registered before 20-January-2023, the PP will demonstrate contribution to at least three SDGs by 20-January-2025. Also, as per point 4 of the Quarter 1 VCS Program Update released in 20-January-2022, a project activity is required to demonstrate contributions to a minimum of three SDGs by 20-January-2025 for the projects registered with VERRA before 20-January-2023. For the present monitoring period the PP is voluntarily demonstrating contributions to 2 SDGs and SD contributions by minimum 3 SDGs for the project activity will be demonstrated by 20-January-2025.

¹³ Contribution to the current monitoring period from 01-October-2021 to 30-November-2022 (Inclusive of Both Start and End Dates)

¹⁴ Contribution to the current monitoring period from 01-October-2021 to 30-November-2022 (Inclusive of Both Start and End Dates)

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, 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 same¹⁵.

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.

Also, as per the grievance register submitted for the current monitoring period there are no any negative environmental and socio-economic impacts due to the project activity.

2.2 Local Stakeholder Consultation

The Local Stakeholder Meetings were organized for local stakeholder consultation and informed local stakeholder regarding the meeting. The followings were the local stakeholders for the project activity:

- Local community
- Local village administration
- Technology suppliers
- Local vendors

All the stakeholders were invited through public notice to attend the stakeholders meeting. The details of the Stakeholder Meetings are as follows:

Date of invitation – 15/09/2016

Date of Meeting – 24/09/2016

Location of Meeting - Project site, Rajasthan

As a part of continual improvement process, feedback from the associated stakeholders is vital, therefore a dedicated Visitor register cum grievance register has been placed at the project site which is accessible to stakeholders to provide their feedback on the project. It is appropriate publicly accessible location at which local stakeholders can provide their feedback on the project. This location is also conducive to continuous and regular checks for stakeholder comments. Thus, continuous and ongoing stakeholder inclusivity is in place for the project activity in order to consider feedback or concerns from the local stakeholders

¹⁵ <https://smartnet.niua.org/sites/default/files/resources/report-on-developmental-impacts-of-RE.pdf>

involved in the project activity. For the global stakeholders, the suggestion and the grievance can be submitted to Info@Risingsunenergy.in

Stakeholder meetings were organized at the time of registration of project activity in order to identify the major challenges around the area, stakeholders were invited well in advance through printed invitation, calls, meeting and a notice was placed around the local common areas. The stakeholder are also request to share their experiences and grievances on continuous basis. Registers is used to records the grievances and feedback.

During the current monitoring period, No any grievances received, therefore, no any mitigation measures are required. In case of grievances, the nature of probable resolution is discussed with the plant head office and implemented by the site in-charge. The grievance copies have been submitted to VVB.

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 is a renewable power project 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.

Starting date of the operation of the project activity is 18-July-2017 which is the date of commissioning/commercial operation of the 1st solar project and since then it is in continuous operation.

The Project is in continued operation for 5th periodic verification for which the monitoring period is from 01-October-2021 to 30-November-2022 (Inclusive of both dates). There has been no major downtime of equipment's, overhaul times or exchange of equipment's in the project activity during the current monitoring period. The project underwent continued generation and no major breakdown occurred during the monitoring period. However, some minor breakdowns have been occurred which have led to a shutdown of 54 hours and 10 minutes in this monitoring period. The details have been clearly described in the Appendix 2 of the monitoring report. So, there has been no any such event that may impact the GHG emission reductions during the current monitoring period.

Solar PV Project Technology Details-

The project activity aims to harness solar energy through installation of PV with total installed capacity of 140 MW (AC).

The technical specification of 40 MW plant commissioned on 18-July-2017 at Rising Bhadla 1 Private Ltd. are as follows:

Sl. No.	Technical details of the equipment ¹⁶	Comments
1	Technology Used	Multi Crystalline
2	Rating of each module (Wp)	315 Wp to 330 Wp
3	Angle from horizontal at which array is installed	5 Deg Angle
4	Number of modules installed of each type	315 Wp- 3120 Nos. 320 Wp 36192 Nos. 325 Wp- 53040 Nos 330 Wp- 61152 Nos. The DC capacity of the Solar panels is 49.8 MW and the AC capacity is 40 MW. Hence the DC to AC conversion ratio if 1.25.
5	Sources(s) of the modules installed of each type	Canadian Solar 315 Wp, 320 Wp 325 Wp, 330 Wp
6	Number of the Power Conditioning Units (PCUs) installed	1000 KW- 40 Nos
7	Sources of PCUs (Name of Supplied)	ABB India Limited
8	Invertor Transformers	11 Nos. (4 MVA - 10 Nos & 2 MVA- 1No.)
9	Power Transformer	2 Nos. (30/36 MVA) Schneider

The Technical Specifications of 30 MW of Rising Bhadla 1 Private limited commissioned on 29-September-2017 are as follows:

Sl. No.	Technical details of the equipment ⁵	Comments
1	Technology Used	Multi Crystalline
2	Rating of each module (Wp)	315 Wp to 330 Wp
3	Angle from horizontal at which array is installed	5 Deg Angle
4	Number of modules installed of each type	315 Wp- 4,800 Nos. 320 Wp 10,848 Nos. 325 Wp- 85,920 Nos 330 Wp- 14,848 Nos. The DC capacity of the Solar panels is 37.80 MW and the AC capacity is 30 MW. Hence the DC to AC conversion ratio if 1.26.

¹⁶ It is to be noted that in future there is possibility of change in module configuration, however project capacity in total will remain same as 140 MW (AC).

5	Sources(s) of the modules installed of each type	Canadian Solar 315 Wp, 320 Wp 325 Wp, 330 Wp
6	Number of the Power Conditioning Units (PCUs) installed	1000 KW- 30 Nos
7	Sources of PCUs (Name of Supplied)	ABB India Limited
8	Invertor Transformers	7 Nos. (4 MVA- 7 Nos)

The technical specifications of 40 MW of Rising Bhadla 2 Private limited commissioned on 29-August- 2017 are as follows:

Sl. No.	Technical details of the equipment ¹⁷	Comments
1	Technology Used	Multi Crystalline
2	Rating of each module (Wp)	320 Wp to 330 Wp
3	Angle from horizontal at which array is installed	5 Deg Angle
4	Number of modules installed of each type	320 Wp 78,400 Nos. 325 Wp- 46,320 Nos 330 Wp- 30,400 Nos. The DC capacity of the Solar panels is 50.17 MW and the AC capacity is 40 MW. Hence the DC to AC conversion ratio if 1.25.
5	Sources(s) of the modules installed of each type	Canadian Solar 320 Wp, to 330 Wp JA Solar 320 Wp, 325 Wp
6	Number of the Power Conditioning Units (PCUs) installed	1000 KW- 40 Nos
7	Sources of PCUs (Name of Supplied)	ABB India Limited
8	Invertor Transformers	10 Nos. (4 MVA – 10 Nos)
9	Power Transformer	2 Nos. (30/36 MVA) Crompton Greaves

The technical specifications of 30 MW of Rising Bhadla 2 Private Limited commissioned on 01-November-2017 are as follows:

Sl. No.	Technical details of the equipment ¹⁸	Comments
1	Technology Used	Multi Crystalline
2	Rating of each module (Wp)	320 Wp to 330 Wp
3	Angle from horizontal at which array is installed	5 Deg Angle
4	Number of modules installed of each type	320 Wp 15,680 Nos. 325 Wp- 84,920 Nos 330 Wp- 15,200 Nos. The DC capacity of the Solar panels is 37.6 MW and the

¹⁷ It is to be noted that in future there is possibility of change in module configuration, however project capacity in total will remain same as 140 MW (AC).

¹⁸ It is to be noted that in future there is possibility of change in module configuration, however project capacity in total will remain same as 140 MW (AC).

		AC capacity is 30 MW. Hence the DC to AC conversion ratio if 1.25.
5	Sources(s) of the modules installed of each type	Canadian Solar 320 Wp, to 330 Wp JA Solar 320 Wp, 325 Wp
6	Number of the Power Conditioning Units (PCUs) installed	1000 KW- 30 Nos
7	Sources of PCUs (Name of Supplied)	ABB India Limited
8	Invertor Transformers	8 Nos. (4 MVA – 7 Nos & 2 MVA – 1 Nos)

The Power Conditioning Units for all the 4 project instances as mentioned above are stored in separate Power Conditioning Rooms, One for each instance.

Cleaning mechanism and Insulation

Tractors are used for the cleaning of the solar panels to increase the efficiency of the solar panels. This is a periodic onsite practice that is performed thrice every month.

High Tension circuit breakers are used for the insulation of the circuits and thus the formation of electric arc is avoided. These circuit breakers are situated at various places in the electric circuit making the connection secure and thus avoiding accidents.

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.2.2 Project Description Deviations

Deviation 1: During the physical Audit for the 5th periodic verification for the monitoring period 01-October-2021 to 30-November-2022 (Inclusive of both dates) it was observed that the exact pinpoint location of the project activity as mentioned in the registered VCS PD does not contains any solar modules. So, the exact pin-point location of the Project Activity has been changed. As per the observation the exact physical location for the project activity is as mentioned below –

For Rising Bhadla 1Private Ltd. –	
Latitude (North)	Longitude (East)
27°29'53.75"	71°54'59.50"
27°29'38.16"	71°54'59.93"
27°30'22.73"	71°55'02.19"
27°30'02.37"	71°55'02.75"
27°30'02.47"	71°55'07.61"
27°29'53.93"	71°55'07.85"
27°30'23.09"	71°55'19.10"

27°30'14.47"	71°55'25.29"
27°30'17.81"	71°55'28.04"
27°30'10.09"	71°55'32.22"
27°30'13.76"	71°55'34.88"
27°30'09.80"	71°55'41.91"
27°29'39.09"	71°55'42.60"
27°30'09.66"	71°55'44.77"
27°29'41.14"	71°55'45.55"

For Rising Bhadla 2 Priate Ltd.

Latitude (North)	Longitude (East)
27°30'03.31"	71°54'37.83"
27°29'06.79"	71°54'39.38"
27°30'03.49"	71°54'45.87"
27°29'53.46"	71°54'46.15"
27°29'06.99"	71°54'48.62"
27°29'09.85"	71°54'55.74"
27°29'53.75"	71°54'59.39"
27°29'38.06"	71°54'59.82"
27°29'12.12"	71°55'02.33"
27°29'14.43"	71°55'08.92"
27°29'16.22"	71°55'11.47"
27°29'27.56"	71°55'25.93"
27°29'38.99"	71°55'42.45"

Since the project activity is spread across the area of 2,800,200 square meters (1,400,000 square meters for Rising Bhadla 1 Private Limited and 1,400,200 square meters for Rising Bhadla 2 Private Limited) the details co-ordinates are mentioned in the table above.

The same correction has been implemented in the section 1.7 of the MR.

The deviation does not have any impact on the additionality and the applicability condition of the project activity.

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 ¹⁹
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	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	Calculated from CEA database, Version 12, May 2017 ²⁰
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 CO ₂ emission factor for the project electricity system in year y

¹⁹ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver12.pdf

²⁰ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver12.pdf

Source of data	Calculated from CEA database, Version 12, May 2017 ²¹
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:</p> $EF_{\text{grid,CM,y}} = EF_{\text{grid,OM,y}} * W_{\text{OM}} + EF_{\text{grid, BM,y}} * W_{\text{BM}}$ <p>Where:</p> <p>$EF_{\text{grid,BM,y}}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh)</p> <p>$EF_{\text{grid,OM,y}}$ = Operating margin CO₂ emission factor in year y (tCO₂/MWh)</p> <p>W_{OM} = Weighting of operating margin emissions factor (%) = 75%</p> <p>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	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	<p>Common metering at the substation: All the plants (including the project activity solar plant and other investors solar plant) are connected to a Pooling substation 132/220 KV GSS II and further electricity is transferred to 220/400 KV RRVPNL substation. The common metering point at RRVPNL²² substation consists of both main & check meters (ABT Meters) having accuracy class of 0.2s. The export/import losses between these two substations are apportioned based on pooling substation readings.</p> <p>For detailed schedule of Calibration of energy meters involved in project activity please refer Appendix 1</p>

²¹ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver12.pdf

²² Rajasthan Rajya Vidyut Prasaran Nigam Limited which is an apex body for the integrate operation of the power system in the state.

Frequency of monitoring/recording	Continuous measurement & monthly recording
Value monitored	352,376.94 MWh
Monitoring equipment	The electricity is exported / supplied by the plant to pooling substation and further to RRVPNL substation. This main meter & Check meter located at 132/220 KV GSS END are bidirectional which measures export and import of electricity by the plant from the grid.
QA/QC procedures to be applied	<p>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 as per the registered VCS PD and the Notification by the Central Electricity Authority of India²³. But as per the onsite-practice the energy meters are being calibrated once in a year from the last 2 to 3 years which is a more conservative approach. 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 would be 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 do 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.</p> <p>The detailed explanation on the serial numbers, Accuracy class, calibration dates, validity etc. have been clearly mentioned in the Appendix 1.</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 would be archived in paper & electronic form for two years after the end of crediting period or of the last issuance of VCUs for this project activity, whichever occurs later.

4.3 Monitoring Plan

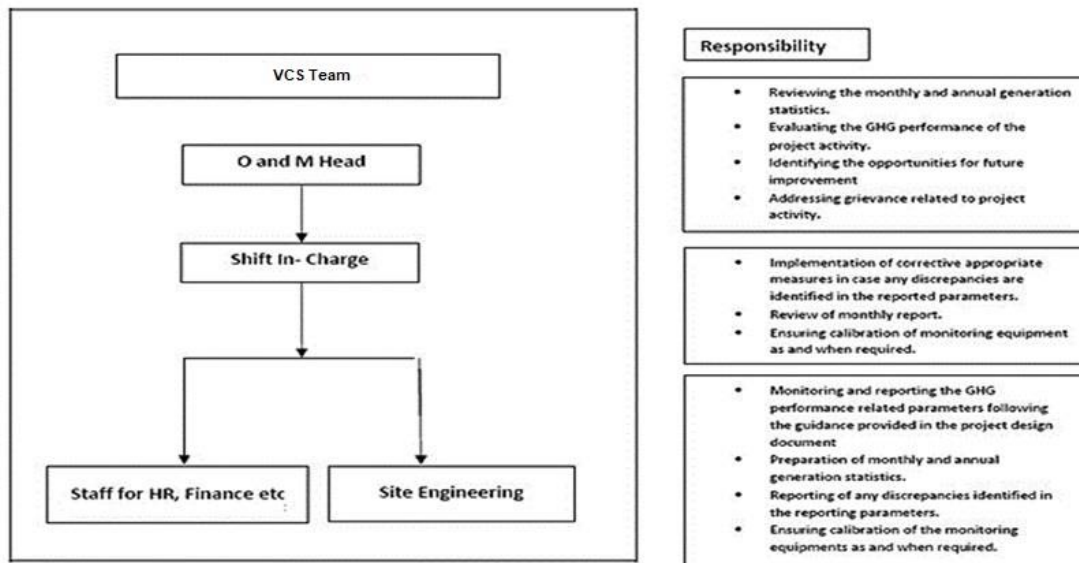
The monitoring plan is developed in accordance with the modalities and procedures for VCS project activities and is used for grid-connected solar energy project. The monitoring plan, implemented by the project participant describes about the monitoring organization,

²³ https://cea.nic.in/wp-content/uploads/2020/02/meter_reg.pdf

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 Sterling and Wilson Solar Limited which is the O&M Contractor for the project Activity. PP implemented the following structure for data monitoring, collection, data archiving and calibration of equipment for this project activity. The conversion factor for conversion of DC to AC capacity is 1.25. to 1.26. Also, SCADA²⁴ system is used for the continuous monitoring of all the parameters.

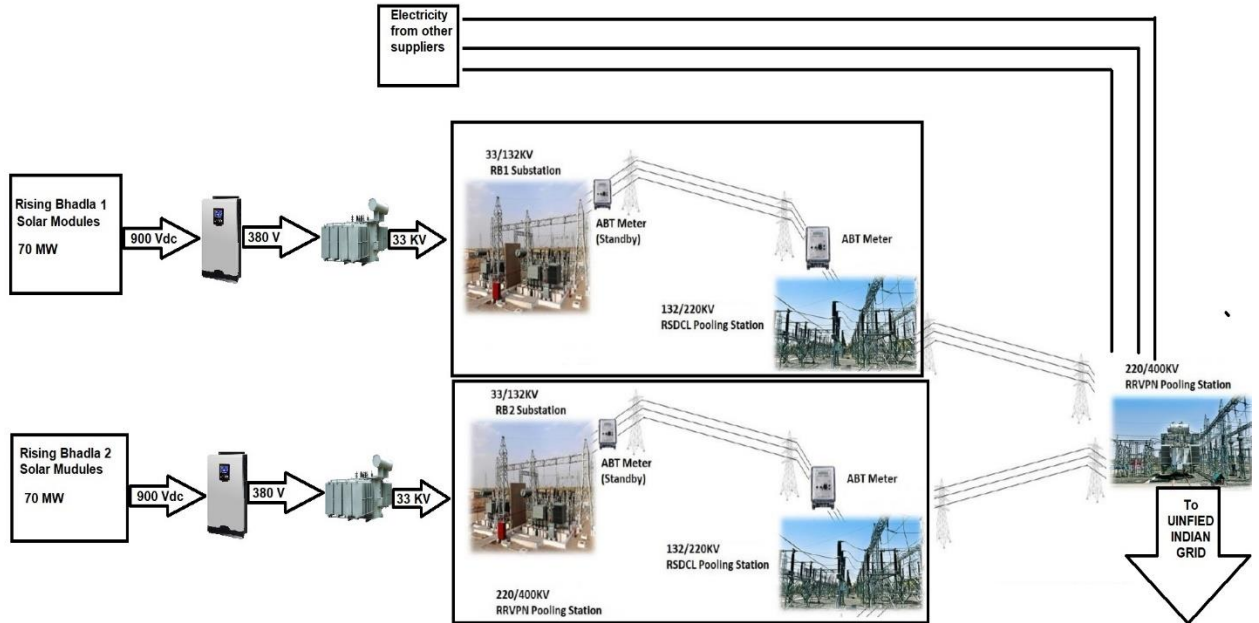
The calibration of the meters is done by Yadav Measurements Private Limited for year 2018, Darsh Calibrations Private Limited for years 2020 and 2021, and Yash Metrology Laboratory Private Limited for year 2022. Yadav Measurements Private Limited, Darsh Calibrations Private Limited and Yash Metrology Laboratory Private Limited are NABL²⁵ Accredited agencies that comes under the purview the State Electricity Board. The detailed sheet for the exact date of calibration is mentioned in appendix 1. The team comprises of the following members:



Schematic line diagram for the project activity are as follows:

²⁴ Supervisory control and data acquisition

²⁵ National Accreditation Board for Testing and Calibration Laboratories



The 900 volts DC electricity from the Rising Bhadla 1 and Rising Bhadla 2 solar modules is supplied to the Inverters which converts it to 380 volts AC. The Same is further Supplied to Inverter Transformer which further converts the same to the 33 kilovolts, which is further Stepped Up to the 132 kilovolts at the plant end substation managed by PP and is further Stepped Up to 220 kilovolts at the RSDCL²⁶ Pooling Substation. The electricity from both Rising Bhadla 1 and Rising Bhadla 2 along with the electricity from other sources is supplied to the RRVPNL²⁷ Pooling substation where the same is again Stepped Up to 400 kilovolts. After the 400KV Pooling Substation by RRVPNL the electricity is Supplied to NTPC which is the consumer of the electricity as per the Power Purchase Agreement. NTPC further supplies the electricity to the Unified Indian Grid.

Data Measurement

The export and import energy are 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 are raised. These invoices can be used for cross checking the meter readings taken for the respective project activity.

²⁶ Rajasthan Solarpark Development Corporation Limited.

²⁷ Rajasthan Raja Vidyut Prasaran Nigam Limited

Procedure for data apportioning

There is a possibility that the start date of monitoring period (whichever is later) for the project activity may not coincide with the start date of the JMR Statement.

For intervening period, the apportioning of electricity exported supplied to the grid from the solar panels would be done as per following procedures:

A = Electricity Exported for the entire billing cycle as per the daily generation data (MWh)

B = Electricity Exported for the intervening period as per the daily generation data (MWh)

C = Generation Ratio = (B/A)

D = Electricity Exported for the entire billing cycle as per the Joint Meter Reading Value - (MWh)

E = Apportioned value of Electricity Exported for the intervening period = $(C*D)$

The Import Value is considered for the entire monitoring period and thus follows the most conservative approach for the apportioning of net electricity

Data collection and archiving

Readings from meters are collected in the presence of the plant in-charge. Export and Import data are 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 is 2 years after the end of crediting period or till the last issuance of VCUs for the project activity whichever occurs later.

Emergency preparedness

The project activity does 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.

In the event that the main meter, which is used to record the net electricity exported by the project, is found to be faulty it will be repaired or replaced and the data from the check meter will be used in its place. In the unlikely event that the check meter fails it will also be repaired or replaced. There are three meters located at the metering point namely Main Meter, Check Meter, and Standby Meter. Onsite Calibration of meters is being followed for the energy meters available at the site and the meters are always in continuous operation. During calibration of the meters, if any one of the three meters is found to exceed the permissible limits, the other two meters are used for measurement and hence there is no interruption in the recording of the energy generation values. The faulty meter is then replaced with a new meter.

Personnel training

In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff are trained. The plant helpers are already trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan. For the current monitoring period for the duration 01-October-2021 to 30-November-2022 (Inclusive of both dates), Some trainings like Road safety training are organized for creating awareness among employees and also some technical trainings like Inverter Operation and Maintenance Training, Switchyard Maintenance Training and Office Safety Training is organized.

QA/QC procedures

The energy meters at the feeders are maintained and owned by state electricity board. Neither the project proponent nor the site personnel have any control over it. Also, as per the Power Purchase Agreement the calibration of the meters must be done once in 5 years. But as a conservative approach, Since the last 2 to 3 years the calibration of the meters is being done annually and a more conservative approach is being followed. However as per the registered monitoring plan, the meters are to be calibrated by state electricity board at-least once in five years. But the project owner has applied a more conservative and good approach for the calibration of the meters which is anyways in compliance with the applicable calibration frequency which is once in 5 years as mentioned in the applicable Power Purchase Agreement.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the approved consolidated Methodology ACM0002 (Version 17.0):

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 all project electricity generation above baseline levels would have been generated by existing grid- connected power plants and the addition of new grid- connected power plants. 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 (t CO₂/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/year)

$EF_{grid,CM,y}$ = 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)

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

For Rising Bhadla 1 Private Limited –

Net Electricity = 176,294.46 MWh

Baseline Emission = Net Electricity * Emission Factor
 = 176,294.46 MWh* 0.9653 tCO₂/MWh
 = 170,177 tCO₂e.

For Rising Bhadla 2 Private Limited –

Net Electricity = 176,082.48 MWh

Baseline Emission = Net Electricity * Emission Factor
 = 176,082.48 MWh* 0.9653 tCO₂/MWh
 = 169,972 tCO₂e

Therefore,

$EG_{PJ,y} = 176,294.46 \text{ MWh} + 176,082.48 \text{ MWh}$
 $= 352,376.94 \text{ MWh}$

Since,

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

So,

$BE_y = 352,376.94 \text{ MWh} \times 0.9653 \text{ tCO}_2/\text{MWh}$
 $= 340,149 \text{ tCO}_2\text{e (Round down Value)}$

Also,

$BE_y = 176,294.46 \text{ MWh} \times 0.9653 \text{ tCO}_2\text{e/MWh} + 176,082.48 \text{ MWh} \times 0.9653 \text{ tCO}_2\text{e/MWh}$
 $= 170,177 \text{ tCO}_2\text{e} + 169,972 \text{ tCO}_2\text{e (Rounddown values)}$
 $= 340,149 \text{ tCO}_2\text{e (Round down Value)}$

In the above calculation, it is clearly mentioned that the Baseline Emissions calculation for both the combined approach as well as individual site wise calculation is the same and is equal to 340,149 tCO₂e.

5.2 Project Emissions

Not Applicable, since emissions from the project activity is zero as per applied methodology ACM0002 (version 17.0).

As per para 38 under section 5.4.1., “For all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected.”

As per the standard operating procedure of the O&M contractor, the solar panels are cleaned via tractors which are used to clean the panels through water. Since negligible amount of emission reductions are accounted for such consumption so the project emission is here taken to be zero.

Hence, project emissions $PE_y = 0 \text{ tCO}_2\text{e}$

5.3 Leakage

Not Applicable, since leakage emissions are not to be considered as per the applied methodology ACM0002 (Version 17.0).

Hence leakage $LE_y = 0 \text{ tCO}_2\text{e}$

5.4 Net GHG Emission Reductions and Removals

The net emission reductions achieved during the current monitoring period are being calculated as per below equation:

$$\begin{aligned} \text{Net Emission Reductions} &= BE_y - PE_y - LE_y \\ &= 340,149 - 0 - 0 = 340,149 \text{ tCO}_2\text{e} \text{ (Round down)} \end{aligned}$$

The vintage breakup has been tabulated below.

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-October-2021 to 31-December-2021	68,261	0	0	68,261
01-January-2022 to 30-November-2022	271,888	0	0	271,888
Total	340,149	0	0	340,149

The achieved GHG emission reduction is 20.70% higher than the estimated value which is 281,808 tCO₂e. This is due to the higher number of sunshine hours. The generation of electricity depends upon many other climatic conditions, and not within the control of the project participant. The increase in the observed PLF which is 24.62% during the current monitoring period is within the sensitivity analysis values for the PLF in the registered PDD value of (25.55%). The percentage increase is found within the crossing benchmark limit.

APPENDIX 1: CALIBRATION RECORDS

Calibration Details

Although, 5 years calibration frequency has been taken as mentioned in the Power Purchase Agreement and as per the registered PD, the validity of the calibration as mentioned in the calibration certificates are mentioned below. The error won't be applied as the meters are calibrated well before the end date of previous calibration as per the registered PD which is 5 years.

Particular	Meter Serial No.	Accuracy Class	Make	Calibration Date	Validity
Rising Bhadla 1 Pvt Ltd (70 MW)					
Main Meter	13194081	0.2 s	L&T	13-August-2018 ²⁸ , 07-September-2021, 14-October-2022	12-August-2023, 06-September-2026, 13-October-2027
Check Meter	13194941	0.2 s	L&T	13-August-2018, 07-September-2021, 14-October-2022	12-August-2023, 06-September-2026, 13-October-2027
Stand- by Meter	13195711	0.2 s	L&T	13-August-2018, 07-September-2021, 14-October-2022	12-August-2023, 06-September-2026, 13-October-2027
Rising Bhadla 2 Pvt Ltd (70 MW)					
Main Meter	13194961	0.2 s	L&T	13-August-2018 ²⁹ , 07-September-2021, 14-October-2022	12-August-2023, 06-September-2026, 13-October-2027

²⁸ Since the end date of monitoring period is within the calibration validity as per the date of calibration, So no error has been applied for the months in this monitoring period.

²⁹ Since the end date of monitoring period is within the calibration validity as per the date of calibration, So no error has been applied for the months in this monitoring period.

Check Meter	13195690	0.2 s	L&T	13-August-2018, 07-September-2021, 14-October-2022	12-August-2023, 06-September-2026, 13-October-2027
Stand-by Meter	13195705	0.2s	L&T	13-August-2018, 07-September-2021, 14-October-2022	12-August-2023, 06-September-2026, 13-October-2027

APPENDIX 2: BREAKDOWN DETAILS

Date	Breakdown Hours	Breakdown Remarks	Type of Breakdown (Scheduled/Unscheduled)
11-November-2021	09:00	Solar Panel Cleaning	Scheduled
14-April-2022	07:30	Maintenance Shutdown.	Scheduled
26-July-2022	17:05	HT Cable fault	Unscheduled
20-December-2021	12:35	Control room HT panel insulation failure due to moisture.	Unscheduled
09-March-2022	08:00	Y-Phase fuse get failure	Unscheduled
Total	54:10 (54 hours and 10 minutes)		