

140 MW Solar Photovoltaic Project in Rajasthan



Document Prepared By EKI Energy Services 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 energy source. Rising Bhadla 1 Private Ltd. and Rising Bhadla 2 Private Ltd. are the promoter of the proposed project activity. The project activity involves installation of 2 x 70 MW solar power project at Bhadla, Jodhpur, Rajasthan. Over the 10 years crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 241,573 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.

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
Rising Bhadla 1 Private Ltd.	40 MW	18/07/2017	Indian Grid	Rajasthan	Sale to Grid
	30 MW	29/09/2017			
Rising Bhadla 2 Private Ltd.	40 MW	29/08/2017			
	30 MW	01/11/2017			

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".

The commissioning details of the project has been mentioned in the Section 2.1 and the geographical locations of the project have been mentioned in Section 1.7 of the Monitoring Report.

During the current monitoring period the project resulted in 368,248 tCO₂e which included the period from 18th July 2017 to 31st Dec 2018 (inclusive of both dates).

1.2 Sectoral Scope and Project Type

Sectoral Scope 01: Energy Industries (renewable/non-renewable).

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 17.0¹

¹ <https://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN>

Tools referred with above methodology are:

Tool to calculate the emission factor for an electricity system² - Version 05.0 (EB 87, Annex 09)

This 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	--
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	--
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. Bhaskar Dutta
Title	Manager
Address	Enking Embassy, Office no. 201, Plot 48, Scheme 78 part 2, Vijay Nagar, Indore-452010 (M.P, India)
Telephone	+91 9109916710
Email	bhaskar@enkingint.org

1.5 Project Start Date

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

² <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

1.6 Project Crediting Period

This is the first monitoring under VCS and covers the activity from 18/07/2017 to 31/12/2018 (inclusive of both dates).

The duration of the crediting period is 10 years. The Crediting Period of the project activity is from 18th July 2017 to 17th July 2027 which will be renewed twice.

1.7 Project Location

Both the solar plant of respective project investor are located at a single region and the details are as follows³:

Location of the Plant	Village - Bhadla, Tehsil - Phalodi, District- Jodhpur, State-Rajasthan
Location details	Latitude :27°29' N Longitude :71°54'E 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% Wind Speed: 1.4 M/s (Min) to 5.7 M/s (Max)

³ Sourced from DPR of the project activity.



Figure 1. State and district Map of Rajasthan and Jodhpur



Figure 2 Pin point drop on Google maps

1.8 Title and Reference of Methodology

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 17.0⁴

Tools referred with above methodology are:

Tool to calculate the emission factor for an electricity system⁵ - Version 05.0 (EB 87, Annex 09)

1.9 Other Programs

The project has not been registered with any mechanism other than VCS. Also it can be crosschecked that PP is not claiming REC benefits, the same can be verified with the REC accreditation body of India⁶.

1.10 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 India⁷. Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Social well-being

- Contribution to the development of an otherwise underdeveloped area.
- Generation of employment opportunities for local people during various phases of the project activity.

Economic well-being

- Since, the project uses renewable solar power resources for power generation it does not lead to any emissions in the environment.
- Avoiding further depletion of the already over-exploited, limited non-renewable sources like coal, oil, etc.

Technological well-being

- The technology selected for the power project would use well established Horizontal Pelton type turbines and the project activity would promote the use of such technology.

Environmental well-being

⁴ <https://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN>

⁵ <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

⁶ https://recregistryindia.nic.in/index.php/publics/registered_regens

⁷ http://www.cdmindia.in/approval_process.php

- Solar being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the Project activity also helps in avoiding significant amount of GHG emissions.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

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

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 scheduled breakdown and maintenance during the monitoring period, the details of which is mentioned in Appendix 2 of the report.

2.2 Deviations

2.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

2.2.2 Project Description Deviations

Not Applicable.

2.3 Grouped Project

Not applicable as the project is not a group project.

2.4 Safeguards

2.4.1 No Net Harm

The project activity does not cause any harm to the local ecology. It primarily requires the installation of the Solar PV project, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

However, there are no negative impacts on air, water, soil quality and ambience are envisaged due to the project activity.

2.4.2 Local Stakeholder Consultation

The project proponents organized stakeholders meeting in order to take into account the concerns of the nearby villagers regarding the project implementation. As a part of continuous feedback from stakeholders, there were no other major comments or protest raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the

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

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 12, May 2017 ⁸
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 the 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 in year y
Source of data	Calculated from CEA database, Version 12, May 2017 ⁹
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 the data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid,CM,y}
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⁸ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

⁹ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

Data unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 12, May 2017 ¹⁰
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: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid, BM,y} * W_{BM}$ 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 the data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

3.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ, y}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y in 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 RRVPNL 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. For detailed schedule of Calibration of energy meters involved in project activity please refer Appendix 1</p>
Frequency of monitoring/recording	Continuous measurement & monthly recording
Value monitored	381,488
Monitoring equipment	The electricity exported / supplied by the plant to pooling substation and further to RRVPNL substation. This meter also measures

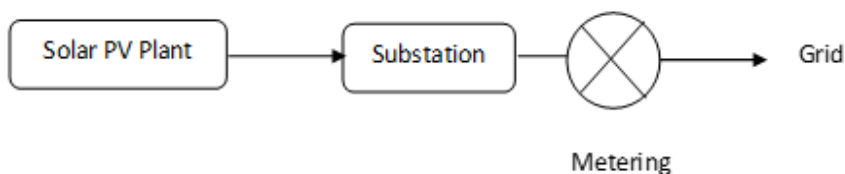
¹⁰ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

	electricity imported by the plant from the grid.
QA/QC procedures to be applied	The meters is approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The frequency of calibration is once in 5 years. ⁴¹ 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 will be 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 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.
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 will be 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.

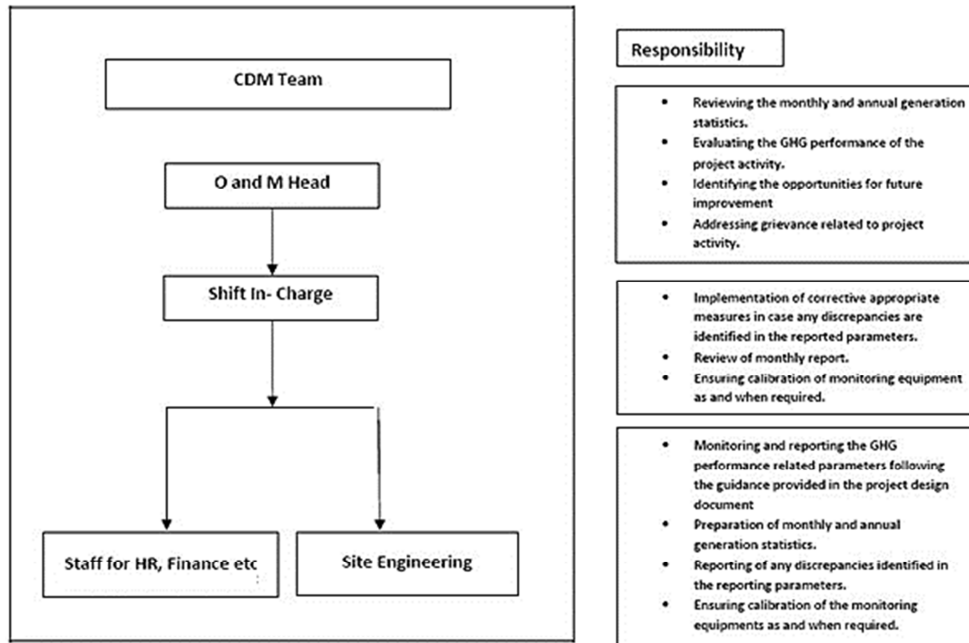
3.3 Monitoring Plan

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected solar power project being implemented in Rajasthan, India. The monitoring plan, which will be implemented by the project participant describes about the monitoring organization, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

Schematic line diagram for the project activity are as follows:



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 equipments for this project activity. The team comprises of the following members:



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 Rising Bhadla 1 Private Ltd and Rising Bhadla 2 Private Ltd, 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

The project activity will 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

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.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emission factor (EF_y):

The baseline emission factor is calculated using the combined margin approach as described below:

$$EF_{\text{grid,CM,y}} = EF_{\text{grid,OM,y}} * W_{\text{OM}} + EF_{\text{grid,BM,y}} * W_{\text{BM}}$$

Where:

$EF_{\text{grid,BM,y}}$	= Build margin CO ₂ emission factor in year y (t CO ₂ /MWh)
$EF_{\text{grid,OM,y}}$	= Operating margin CO ₂ emission factor in year y (t CO ₂ /MWh)
W_{OM}	= Weighting of operating margin emissions factor (per cent)
W_{BM}	= Weighting of build margin emissions factor (per cent)

The following default values should be used for W_{OM} and W_{BM} :

Wind and solar power generation project activities: $W_{\text{OM}} = 0.75$ and $W_{\text{BM}} = 0.25$ (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods. Since project activity is of solar power generation, the above weightage has been considered for OM and BM.

$$\begin{aligned} \text{Therefore, } EF_{\text{grid,CM,y}} &= 0.9843 * 0.75 + 0.9083 * 0.25 \\ &= 0.9653 \text{ t CO}_2/\text{MWh} \end{aligned}$$

$$\text{Therefore, } EF_y = EF_{\text{grid,CM,y}} = 0.9653 \text{ t CO}_2/\text{MWh}.$$

$$BE_y = 381,488 \times 0.9653 = 368,248 \text{ tCO}_2\text{e}$$

4.2 Project Emissions

As the project activity is the installation of a new grid-connected Solar PV Power plant and does not involve any project emissions from fossil fuel, operation of dry, flash steam or binary geothermal power plants, and from water reservoirs of hydro power plants. Therefore $PE_{\text{FF,y}}$, $PE_{\text{GP,y}}$, $PE_{\text{HP,y}}$ are equal to zero and thus, $PE_y = 0$.

4.3 Leakage

The project activity is not a hydro power project. There are no leakage emissions involved as a whole as a result of the project activity.

$$\text{Thus, } LE_y = 0$$

4.4 Net GHG Emission Reductions and Removals

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

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)
2017	75,294	0	0	75,294
2018	292,954	0	0	292,954
Total	368,248	0	0	368,248

It is to be noted here that as per the registered PD, the emission reductions during the current monitoring period was estimated to be 352,100 tCO₂e, whereas actual emission reductions achieved are 368,248 tCO₂e, which is approximately 4% higher than the estimated emission reductions. The generation of electricity depends upon the solar radiation availability, which is influenced by natural phenomena of and not within the control of the project participant.

APPENDIX 1: METER CALIBRATION DETAILS

Particular	Meter Serial No.	Accuracy Class	Calibration Date	Validity
Rising Bhadla 1 Pvt Ltd (70 MW)				
Main Meter	13194081	0.2 s	05/07/2017	04/07/2022
Check Meter	13194941	0.2 s	05/07/2017	04/07/2022
Rising Bhadla 2 Pvt Ltd (70 MW)				
Main Meter	13194961	0.2 s	22/08/2017	21/08/2022
Check Meter	13195690	0.2 s	22/08/2017	21/08/2022

APPENDIX 2: BREAKDOWN DETAILS FOR THE CURRENT MONITORING PERIOD

Date	Plant Break Down Detail	Breakdown Hrs
11/24/2017	Inverter Tripped due to Power swing	3:00 hours
11/25/2017	Inverter Tripped due to Power swing	3:00 hours
11/26/2017	Inverter Tripped due to Power swing	3:00 hours
11/28/2017	Inverter Tripped due to Power swing	3:00 hours
12/3/2017	Common yard VCB tripped on OC	2:00 hours
12/4/2017	Common yard VCB tripped on OC	2:00 hours
12/5/2017	Common yard VCB tripped on OC	2:00 hours
12/6/2017	Common yard VCB tripped on OC	2:00 hours
12/7/2017	Common yard VCB tripped on OC	2:00 hours
12/8/2017	Common yard VCB tripped on OC	2:00 hours

12/9/2017	Common yard VCB tripped on OC	2:00 hours
3/9/2018	Inverter Tripped due to Power swing	3:00 hours
3/10/2018	Inverter Tripped due to Power swing	3:00 hours
3/28/2018	Inverter Tripped due to Power swing	3:00 hours
3/29/2018	Common Yard VCB Tripped due to power swing and Manual operation Bottons gets stucked	2:00 hours
3/30/2018	Common Yard VCB Tripped due to power swing and Manual operation Bottons gets stucked	2:00 hours
3/31/2018	Common Yard VCB Tripped due to power swing and Manual operation Bottons gets stucked	2:00 hours
4/16/2018	Common yard VCB tripped on OC	2:00 hours
4/17/2018	Common Yard VCB Tripped due to power swing and Manual operation Bottons gets stucked	2:00 hours
4/18/2018	Common Yard VCB Tripped due to power swing and Manual operation Bottons gets stucked	2:00 hours
4/19/2018	Inverter Tripped due to Power swing	3:00 hours
4/20/2018	Inverter Tripped due to Power swing	3:00 hours
4/21/2018	Common yard VCB tripped on OC	2:00 hours
4/28/2018	Common yard VCB tripped on OC	2:00 hours
4/29/2018	B/D due to Ground fault	1:00 hours
4/30/2018	TR tripped due to Over load	1:00 hours