

Solar PV power project by Roha Dyechem Pvt. Ltd. (EKIESL.CDM.Aug-11-02)



Document Prepared By First Climate (India) Private Limited

Project Title	Solar PV power project by Roha Dyechem Pvt. Ltd. (EKIESL.CDM.Aug-11-02)
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Roha Dyechem Pvt. Ltd. (RDPL) has installed a Greenfield 25 MW solar photovoltaic (PV) power plant in the solar park at Patan district in Gujarat. The purpose of the project activity is to generate electrical energy utilizing solar energy and export the generated electricity to the regional grid. The PV system will mainly consists of PV modules, module mounting structures, inverters, regulators, monitoring devices etc. The project activity uses 172728 nos. of 145 W¹ Nexpower (NT/ AX series) solar thin film modules which are installed in array configuration. The total emission reductions accrued for the project activity during the monitoring period has been 41,272 tonnes of CO₂e.

Activity	Date
Commissioning Date of the Project	04-March-2012

1.2 Sectoral Scope and Project Type

Sectoral Scope	Energy industries (renewable - / non-renewable sources)
Project Type	I-Renewable Energy Projects

1.3 Project Proponent

Organization name	Roha Dyechem Pvt. Ltd.
Contact person	Mr. Shrikisan Bhutada
Title	Renewable Energy Head
Address	Road No.2 Andheri East, A-44 and 45, MIDC, Mumbai, Maharashtra – 400093
Telephone	+91 (22) 4077 3333
Email	Shrikisan.bhutada@rohagroup.com

Organization name	First Climate (India) Private Limited
Contact person	Mr. Subhendu Biswas
Title	Director
Address	3C, Camac Street, Camac Towers, 4 th Floor, Kolkata, West Bengal- 700016
Telephone	+91 (33) 4022 3456

¹ Nominal power output of 145 W

Email	subhendu.biswas@firstclimate.co.in
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1.4 Other Entities Involved in the Project

Organization name	Not Applicable
Role in the project	Not Applicable
Contact person	Not Applicable
Title	Not Applicable
Address	Not Applicable
Telephone	Not Applicable
Email	Not Applicable

1.5 Project Start Date

The start date of the project is 04-March-2012 which coincides with the commissioning date of the project activity.

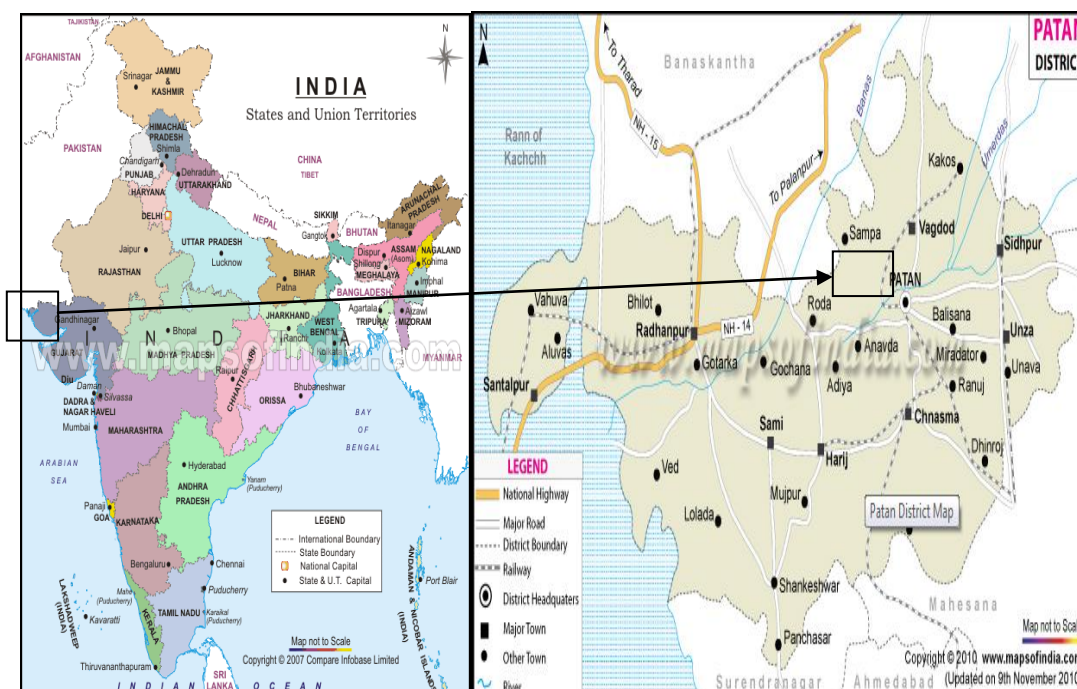
1.6 Project Crediting Period

Crediting Period Start Date	Crediting Period End Date	Duration of Crediting Period
04-March-2012	03-March-2022	10 years 00 months

However, for the concerned monitoring period (30-December-2012 to 28-December-2013), a separate declaration has been provided to address the issue of double counting

1.7 Project Location

Village	Taluka	District	State	Latitude	Longitude
Charanka	Santalpur	Patan	Gujarat	23° 53' 59" N	71° 12' 01" E



1.8 Title and Reference of Methodology

Title of the Methodology	Methodology	Version	Date	Reference
Consolidated baseline methodology for grid-connected electricity generation from renewable sources	Approved Consolidated Baseline and Monitoring Methodology ACM0002	13.0.0	11-May-2012 onwards	ACM0002 version 13.0.0 ²

1.9 Other Programs

- Emission Trading Programs and Other Binding Limits:** The project has not participated in any Emissions Trading Programs and Other Binding Limits prior to the CDM registration date. The related emission reductions have not and will not be claimed under any other GHG programs.
- Other Forms of Environmental Credit:** The project has been purely taken up as CDM project and has not been applied for any other form of environmental credit. However, for a specific monitoring period during the crediting period, the

² <http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT>

issue of double counting shall be addressed in the form of an undertaking by the project proponent.

- **Participation under Other GHG Programs:** The project has been registered as CDM. The details are presented below.
Registration date: 26-December-2012
UNFCCC reference number: 7442.³
Crediting Period:-29-Dec-2013 to 28-Dec-2020⁴

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The project activity has been commissioned on 04-March-2012. It consists of following equipments:

- **Solar PV modules:** 172728 solar modules of nominal power capacity of 145 W (±5%) has been installed in array configuration. Nine solar modules have been connected in series to form one string. 19158 such strings are in parallel, connected to 450 Array Junction Boxes (AJBs). Therefore the total power generation capacity of the modules installed at site translates to 25.04 MW (i.e. 25 MW).
- **Module mounting structure:** There are 6400 mounting structures designed for each having a maximum of 27 modules. Some of the mounting structures are having less than 27 modules.
- **Inverters :** 50 Nos. of 500 kW Satcon make inverters have been utilized in the project activity
- **Data logging systems :** There are total of 4789.5 arrays, which are being monitored by the WEM (Wipro Energy Manager) sub systems in cluster rooms and main master in the MRSS (Main Receiving Substation)
- **Transformers and Distribution Control Panels:**
Transformers: 25 Nos. of 1.25MVA Transformer, 1 No of 160KVA Auxiliary Transformer & 1 No of 27.5MVA Main transformer are being utilized in the project.

The project has already accrued 32,158 tonnes of CO₂e for the last monitoring period (04-March-2012 to 29-December-2012 (both dates included)

There has not been any change in project technology or equipment during the aforesaid monitoring period (**30-December-2012 to 28-December-2013**).

There has been routine maintenance resulting from instances like inverter failure, circuit breaker failure, grid failure etc. But there hasn't been any continuous breakdown for the entire plant in the aforesaid monitoring period.

³ http://cdm.unfccc.int/Projects/DB/KBS_Cert1348557135.31/view

⁴ Changed from: 30 Dec 2012 - 29 Dec 2019

2.2 Deviations

2.2.1 Methodology Deviations

There has not been any methodology deviation during the aforesaid monitoring period (30-December-2012 to 28-December-2013)

2.2.2 Project Description Deviations

There has not been any project description deviation applied during the current monitoring period (30-December-2012 to 28-December-2013). Additionally there was not any project description deviation applied during previous monitoring reports

2.3 Grouped Project

The project activity is not a bundled or grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Simple Operating Margin for NEWNE Grid
Source of data	Central Electricity Authority: Baseline CO ₂ Emission Database Version 07. http://www.cea.nic.in/reports/planning/cdm_co2/database_7.zip
Value applied:	0.984 (based on most recent 3 years data i.e. 2008~2009, 2009-10, 2010-11)
Justification of choice of data or description of measurement methods and procedures applied	The data has been sourced from CEA (CO ₂ Baseline Database) is an authentic source of data.
Purpose of the data	Calculation of baseline emissions
Comments	The simple operating margin is fixed <i>ex-ante</i>

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build margin for NEWNE electricity grid
Source of data	Central Electricity Authority: Baseline CO ₂ Emission Database Version 07 http://www.cea.nic.in/reports/planning/cdm_co2/database_7.zip

	7.zip
Value applied:	0.859 (based on data for the most recent year i.e. 2010~2011)
Justification of choice of data or description of measurement methods and procedures applied	The data has been sourced from CEA (CO ₂ Baseline Database) is an authentic source of data.
Purpose of the data	Calculation of baseline emissions
Comments	The built margin is fixed <i>ex-ante</i>

Data / Parameter	EF_{grid,CM,y}
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for the project electricity system in year y
Source of data	Central Electricity Authority: Baseline CO ₂ Emission Database Version 07 http://www.cea.nic.in/reports/planning/cdm_co2/database_7.zip
Value applied:	0.953
Justification of choice of data or description of measurement methods and procedures applied	The data has been sourced from CEA (CO ₂ Baseline Database) is an authentic source of data.
Purpose of the data	Calculation of baseline emissions
Comments	The combined margin is fixed <i>ex-ante</i>

3.2 Data and Parameters Monitored

Data / Parameter	EG_{facility,y}
Data unit	MWh/year
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Statement of net export of power to the grid at the plant site
Description of measurement methods and procedures to be applied	The net energy exported to the grid is measured every month using calibrated energy meter by the State Electricity Board authorities in the presence of the project implementer.

	Measuring procedure: The net electricity generation has been measured by an export-import energy meter. The net electricity exported by the project plant would be calculated by deducting the amount of imported electricity from the total amount of exported electricity. Accuracy class of energy meter: 0.2s Entity responsible: Roha Dyechem Private Limited																	
Frequency of monitoring/recording	Recording Frequency: Half hourly, Continuous/Real time measurement Reporting Frequency: Monthly																	
Value monitored:	<table><tr><th>Period</th><th>Quantity of net Electricity generation (MWh)</th></tr><tr><td>30-December-2012 to 28-December-2013</td><td>43,308.375</td></tr></table>	Period	Quantity of net Electricity generation (MWh)	30-December-2012 to 28-December-2013	43,308.375													
Period	Quantity of net Electricity generation (MWh)																	
30-December-2012 to 28-December-2013	43,308.375																	
Monitoring equipment	The net electricity supplied by the project activity to the grid has been measured by export-import energy meter. The metering system has a main meter and a check meter. The main meter and check meter details have been provided below: Meter Details for Main Meter <table><tr><td>Meter Type</td><td>ABT Meter</td></tr><tr><td>Manufacturer</td><td>SEMS</td></tr><tr><td>Serial Number</td><td>GJ1211A</td></tr><tr><td>Accuracy Class</td><td>0.2s</td></tr></table> Meter Details for Check Meter <table><tr><td>Meter Type</td><td>ABT meter</td></tr><tr><td>Manufacturer</td><td>SEMS</td></tr><tr><td>Serial Number</td><td>GJ1210A</td></tr><tr><td>Accuracy Class</td><td>0.2s</td></tr></table>		Meter Type	ABT Meter	Manufacturer	SEMS	Serial Number	GJ1211A	Accuracy Class	0.2s	Meter Type	ABT meter	Manufacturer	SEMS	Serial Number	GJ1210A	Accuracy Class	0.2s
Meter Type	ABT Meter																	
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Serial Number	GJ1211A																	
Accuracy Class	0.2s																	
Meter Type	ABT meter																	
Manufacturer	SEMS																	
Serial Number	GJ1210A																	
Accuracy Class	0.2s																	
QA/QC procedures to be applied	The meters have been tested by an external agency. Since the meter is under the purview of GUVNL, hence the testing/calibration of the meter is also done by GUVNL. The meter test																	

	records have been maintained in the plant. The calibration details are as follows: Main meter⁵: <table> <tr> <th>Test Date</th><th>Next Calibration Due Date</th></tr> <tr> <td>28- December -2011</td><td>27-December-2014</td></tr> </table> Check meter⁶: <table> <tr> <th>Test Date</th><th>Next Calibration Due Date</th></tr> <tr> <td>31- December -2011</td><td>30-December-2014</td></tr> </table>	Test Date	Next Calibration Due Date	28- December -2011	27-December-2014	Test Date	Next Calibration Due Date	31- December -2011	30-December-2014
Test Date	Next Calibration Due Date								
28- December -2011	27-December-2014								
Test Date	Next Calibration Due Date								
31- December -2011	30-December-2014								
Purpose of the data	This data has been used to calculate baseline emissions								
Calculation method	The net electricity exported by the project plant would be calculated by deducting the amount of imported electricity from the total amount of exported electricity. Net Electricity(MWh) = Export(in MWh)- Import(in MWh)								
Comments	This data has been used to calculate the baseline emissions. Additionally The data will be archived for crediting period+2 years								

3.3 Monitoring Plan

The data monitoring involves the parameters mentioned in the section 3.2. Due care has been taken for the measurement of all these parameters and maintenance of records. Proper training has been imparted to concerned personnel for accurate measurement and collection of data for each parameter.

1. The monitoring team comprises of the following staff:

<u>Position</u>	<u>Report to:</u>
Technical Engineer	Technical Manager
Technical Manager	Project Manager

2. The responsibilities of the various team members have been presented below:

#	Tasks description	Technical Engineer	Technical manager	Project Manager

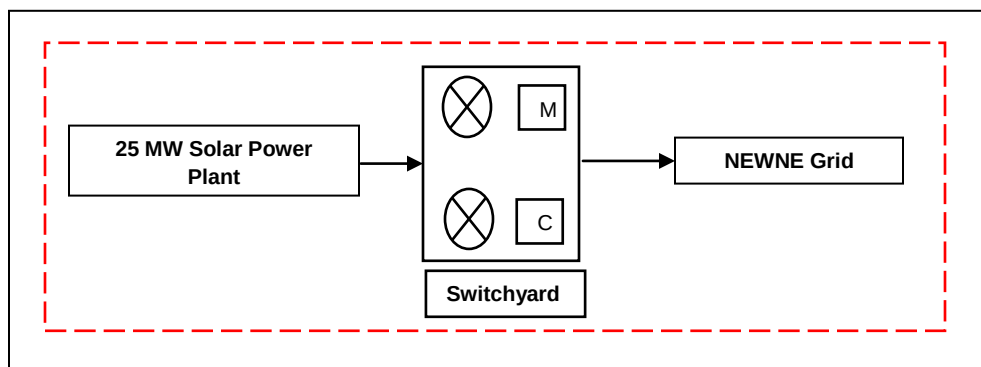
⁵ Frequency of main meter calibration is once in 3 years

⁶ Frequency of check meter calibration is once in 3 years

#	Tasks description	Technical Engineer	Technical manager	Project Manager
1	Recording of monitored data	✓		
2	Verification of data monitored (consistency and completeness)	✓	✓	
3	Ensuring adequate training of staff		✓	✓
4	Ensuring adequate maintenance	✓	✓	
	Ensuring calibration of monitoring instruments	✓	✓	✓
5	Data archiving: ensuring adequate storage of data monitored (integrity and backup)		✓	
6.	Identification of non-conformance and corrective/preventive actions and monitoring plan improvement		✓	✓
7	Emergency procedures	✓	✓	
9	Processing of data and calculation of emission reductions			✓
10	Monitoring report: management review of monitoring report (internal audit)		✓	✓

Data Uncertainty There has not been a single instance of meter failure during the monitoring period considered (30-December-2012 to 28-December-2013)

The diagram shows the position of instrument used for monitoring of the electricity generation.



Notation	Description
M	Main meter
C	Check meter

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

As per the methodology (ACM0002, Version 13), the baseline emissions can be calculated using the following formula:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \text{-----Equation 1}$$

Where:

BE_y	Baseline emissions in year y (tCO ₂ /yr)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO ₂ /MWh)

Calculation of $EG_{PJ,y}$

For Greenfield renewable energy power plants, which is the case for the proposed project activity under consideration, the methodology provides that:

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y} \text{-----Equation 2}$$

Where:

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

Hence from Equation 1 and Equation 2,

$$BE_y = EG_{facility,y} * EF_{grid,CM,y} \text{-----Equation 3}$$

Baseline Emissions from (30-December-2012 to 28-December-2013)

Parameter	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)	Combined margin CO ₂ emission factor for grid connected power generation in year y ((tCO ₂ /MWh)	Baseline emissions in year y (tCO ₂ /yr)
Period	$EG_{facility,y}$	$EF_{grid,CM,y}$	BE_y
30-December-2012 to 28-December-2013	43,308.375	0.953	41,272

4.2 Project Emissions

Since the project activity is a solar power generation project there are no emissions due to the project activity.

4.3 Leakage

The methodology (ACM0002, Version 13) explicitly states that:

“No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, and transport). These emissions sources are neglected”.

There has been no such activity due to this project activity. Hence, for the project activity, no leakage emissions have been considered.

4.4 Net GHG Emission Reductions and Removals

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)
2012 (30-December 2012 & 31-December 2012)	224	0	0	224
2013 (01-Jan-2013 to	41,048	0	0	41,048

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)
28-Dec-2013)				
Total	41,272			41,272

Generation figures for the months (Jan 2013 to June 2013) are on a higher side when compared with the remaining months of the monitoring period. This is due to higher solar radiation for the above mentioned months which has yielded in higher generation and thereby resulting a higher plant load factor (PLF).

APPENDIX 1: GENERATION DETAILS

Month	Export (MWh)	Import (MWh)	Net Export (MWh)	Source of Data
(Generation for 2 days. 30/12/2012 & 31/12/2012)	237.789	2.342	235.447	Daily generation data has been considered for 30/12/2012 and 31/12/2012
Jan-13	3764.338	33.890	3730.448	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
Feb-13	3604.729	29.142	3575.587	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
Mar-13	4245.543	32.312	4213.231	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
Apr-13	4204.877	29.137	4175.740	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
May-13	4555.220	27.945	4527.275	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
Jun-13	3501.686	28.044	3473.642	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
Jul-13	2627.330	29.925	2597.405	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
Aug-13	2932.286	30.555	2901.731	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd

Month	Export (MWh)	Import (MWh)	Net Export (MWh)	Source of Data
Sep-13	3336.637	29.713	3306.924	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
Oct-13	3784.455	32.287	3752.168	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
Nov-13	3500.456	31.799	3468.657	Monthly Energy Injection Data from State Load Dispatch Centre, GETC Ltd
(01-12-2013 to 28-12-2013)			3350.120	Taken from GETCO Report for the month of December 2013
Net Electricity Generation			43308.375	Calculated

APPENDIX 2: PLANT SHUTDOWN & MAINTENANCE

During the monitoring period (30-December-2012 to 28-December-2013) there has been routine maintenance resulting from instances like inverter failure, circuit breaker failure, grid failure etc. But there hasn't been any continuous breakdown for the entire plant in the aforesaid monitoring period.