



**Verified Carbon
Standard**

**SOLAR PV POWER PROJECT BY ROHA
DYECHM PVT. LTD.
(EKIESL.CDM.AUG-11-02)**



**INFINITE
SOLUTIONS**

Document Prepared by

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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 PV system will mainly consist of PV modules, module mounting structures, inverters, regulators, monitoring devices etc. The project activity uses 172,728 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 38,257 tons of CO₂e.

PP	Capacity (MW)	Technology	Purpose	State
Roha Dyechem Pvt. Ltd. (RDPL)	25 MW	Solar	Sale to EB	Gujarat

The purpose of the project activity is to generate energy electricity by the utilization of solar power and further selling the generated energy to the respective Grid. In this process there is no consumption of any fossil fuel and hence it does not lead to any greenhouse gas emissions. Thus, electricity would be generated through sustainable means without causing any negative impact on the environment. The Commissioning Date of the Project is 04-March-2012.

The monitoring period is from 29th Dec 2020 to 31st Dec 2021. The total GHG emission reductions or removals generated in this monitoring period are 38,257 tCO₂.

1.2 Sectoral Scope and Project Type

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

Project Type : I - Renewable Energy Projects

Methodology : ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources - Version 13.0.0

PP hereby confirms that the project is not a grouped project.

1.3 Project Proponent

Organization name	Roha Dyechem Pvt. Ltd.
Contact person	Sachin Chavan
Title	Authorized Signatory

Address	Road No.2 Andheri East, A-44 and 45, MIDC, Mumbai, Maharashtra – 400093
Telephone	+91 (22) 4933 1386
Email	sachin.chavan@rohagroup.com

1.4 Other Entities Involved in the Project

Organization name	Infinite Solutions
Role in the Project	Carbon Consultant
Contact person	Richa Thakur Sah
Title	Project Manager
Address	Address: 214-215 Milinda Manor Opp. Next Treasure Island, 2 RNT Marg, Indore-452001
Telephone	Landline No.: 0731-4050174
Email	richa@infisolutions.org

1.5 Project Start Date

04-March-2012

1.6 Project Crediting Period

Crediting Period Start date: 04-March-2012 to 03-March-2022

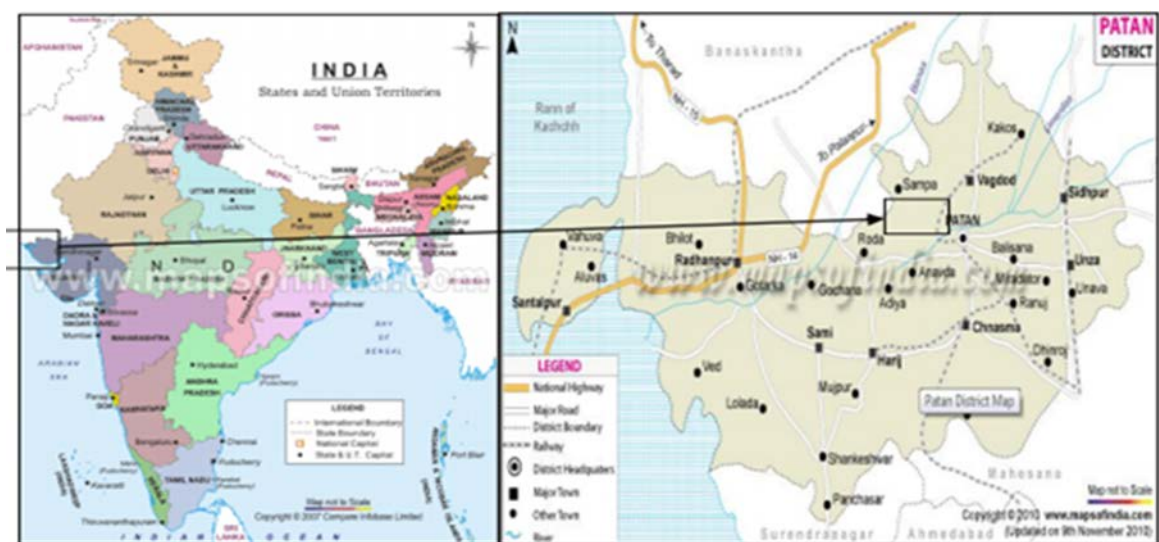
The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

1.7 Project Location

The project activity is located in Patan district of Gujarat, India. The exact location of the project activity has been detailed below:

DISTRICT	TALUKA	VILLAGE	STATE	GEOGRAPHICAL COORDINATES	
				LATITUDE (N)	LONGITUDE (E)
Patan	Santalpur	Charanka	Gujarat	23° 53' 59" N	71° 12' 01" E

The map of the project location is shown below:



1.8 Title and Reference of Methodology

Title: ACM0002: Consolidated baseline methodology for grid connected electricity generation from renewable sources, Version 13.0.0.

Type I: Renewable Energy Project

Tools referred with above methodology are:

Tool to calculate the emission factor for an electricity system - Version 02.2.1¹

Tool for the demonstration and assessment of additionality - Version 06.1.0².

1.9 Participation under other GHG Programs

- **Emission Trading Programs and Other Binding Limits:** Net GHG emission reductions or removals generated by the Project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits.
- **Other Forms of Environmental Credit:** The project proponent hereby confirms that the project has been taken up as CDM project and has not been applied for any other form of environmental credit. The projects are not registered under the REC mechanism of India and the same can be cross-checked at <https://recregistryindia.nic.in>.
- **Participation under Other GHG Programs:** The project has been registered as CDM. The details are presented below.

Registration date: 26-December-2012.

¹ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf>

² <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf>

UNFCCC reference number: 7442³

Crediting Period: 29-Dec-2013 to 28-Dec-2020.

1.10 Other Forms of Credit

The Project is registered with as CDM project, no. 7442. The Project Proponent has submitted undertaking for not availing other forms of environmental credit for the same monitoring period under consideration.

1.11 Sustainable Development Contributions

The main purpose of this project activity is to generate clean form of electricity through renewable Wind energy source for sale of electricity to the grid. The project activity involves 25 MW wind power project in the state of Gujarat in India.



For SDG 7: Project proponent is committed towards generating clean energy. Hence, about 40,144.11 MWh renewable electricity has supplied to Indian grid during the reported monitoring period that helps to increase the renewable energy share in the energy mix.



For SDG-13: Project proponent has shown leadership in workplaces and in their communities by advocating climate action consistent with the science. Hence, by supplying 40,144.11 MWh clean electricity to Indian grid, the project avoided release of 38,257.00 tCO₂ in to the atmosphere during the reporting period.

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

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About 40,144.11 MWh, renewable electricity has supplied to Indian grid during the reported period that helps to increase the renewable energy share in the energy mix.	Since Commissioning, about 306,992.807 MWh renewable electricity has supplied to Indian grid 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 40,144.11 MWh clean electricity to Indian grid, the project avoided release of 38,257.00 tCO ₂ in to the atmosphere during the reporting period.	Prevented the release of 292,522 Tonnes of carbon in the atmosphere

2 SAFEGUARDS

2.1 No Net Harm

Project does not have any negative environmental and socio-economic impacts. Thus, this is not applicable for this project activity.

2.2 Local Stakeholder Consultation

Local stakeholder consultation already done during registration of project activity. The project proponent had organized stakeholders meeting in order to take into account the concerns of the nearby villagers regarding the project implementation however there were no 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. Also as a part of continuous feedback from stakeholders, the PP also placed a feedback/complaint register onsite in where the stakeholder can put down his/her complain and the same if found genuine will be addressed immediately.

2.3 AFOLU-Specific Safeguards

This section is not required.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project activity has been commissioned on 04-March-2012. The project activity involves the installation and operation of 25 MW solar power project implemented by Roha Dyechem Pvt. Ltd. in Patan district of Gujarat, India. The project consists of installation of solar panels.

PP	Capacity (MW)	Technology	Purpose	State
Roha Dyechem Pvt. Ltd.	25	Solar	Sale to EB	Gujarat

It consists of following equipment:

Solar PV modules: 172728 solar modules of nominal power capacity of 145 W ($\pm 5\%$) 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.

There has not been any change in project technology or equipment during the aforesaid monitoring period. 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. The project has undergone continuous operation and there is no major incident observed for the monitoring period.

3.2 Deviations

3.2.1 Methodology Deviations

There are no methodology deviations.

3.2.2 Project Description Deviations

There are no Project Description deviations.

3.3 Grouped Projects

No new instances added to the group project activity.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Simple Operating margin
Source of data	CO ₂ baseline database Version 07.
Value applied	0.984
Justification of choice of data or description of measurement methods and procedures applied	The generation weighted average of simple operating margins of the years (based on most recent 3 years' data i.e. 2008~2009, 2009-10, 2010-11) have been used to calculate <i>ex-ante</i> OM.
Purpose of Data	Calculation of baseline emissions

Comments	The simple operating margin is fixed ex-ante
Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build margin
Source of data	CO ₂ baseline database Version 07
Value applied	0.859
Justification of choice of data or description of measurement methods and procedures applied	The ex-ante value for the year 2010~2011 has been used to calculate ex-ante BM
Purpose of Data	Calculation of baseline emissions
Comments	The built margin is fixed ex-ante

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	CO ₂ baseline database Version 07.
Value applied	0.953
Justification of choice of data or description of measurement methods and procedures applied	Combined Margin Emission Factor ($EF_{grid,CM,y}$) is calculated <i>ex-ante</i> as the weighted average of Operating Margin Emission Factor ($EF_{grid,OM,y}$) and Build Margin Emission Factor ($EF_{grid,BM,y}$) following the formula: $EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM}$ The data has been sourced from CEA (CO₂ Baseline Database) is an authentic source of data.
Purpose of Data	Calculation of baseline emissions
Comments	The combined margin is fixed ex-ante

4.2 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																
Frequency of monitoring/recording	Recording Frequency: Half hourly, Continuous/Real time measurement Reporting Frequency: Monthly																
Value monitored	40,144.11																
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 border="1"> <tr> <td>Meter Type Accuracy</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>Class</td><td>0.2s</td></tr> </table> Meter Details for Check Meter: <table border="1"> <tr> <td>Meter Type Accuracy</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>Class</td><td>0.2s</td></tr> </table> Frequency of main meter calibration is once in 3 years.	Meter Type Accuracy	ABT Meter	Manufacturer	SEMS	Serial Number	GJ1211A	Class	0.2s	Meter Type Accuracy	ABT Meter	Manufacturer	SEMS	Serial Number	GJ1210A	Class	0.2s
Meter Type Accuracy	ABT Meter																
Manufacturer	SEMS																
Serial Number	GJ1211A																
Class	0.2s																
Meter Type Accuracy	ABT Meter																
Manufacturer	SEMS																
Serial Number	GJ1210A																
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 provided in Appendix 1.																
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)																

	Calculated based on the formula provided below: $EG_{\text{facility},y} = EG_{\text{export},y} - EG_{\text{import},y}$
Comments	This data has been used to calculate the baseline emissions. Additionally, The data will be archived for crediting period+2 years

4.3 Monitoring Plan

The monitoring plan for the proposed project activity has been designed in-line with the applied monitoring methodology ACM0002, v13.0.0

General aspects of 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
1	Recording of monitored data	✓		
2	Verification of data monitored (consistency and completeness)	✓	✓	
3	Ensuring adequate training of staff		✓	✓
4	Ensuring adequate maintenance	✓	✓	
5	Ensuring calibration of monitoring instruments	✓	✓	✓
6	Data archiving: ensuring adequate storage of data monitored		✓	

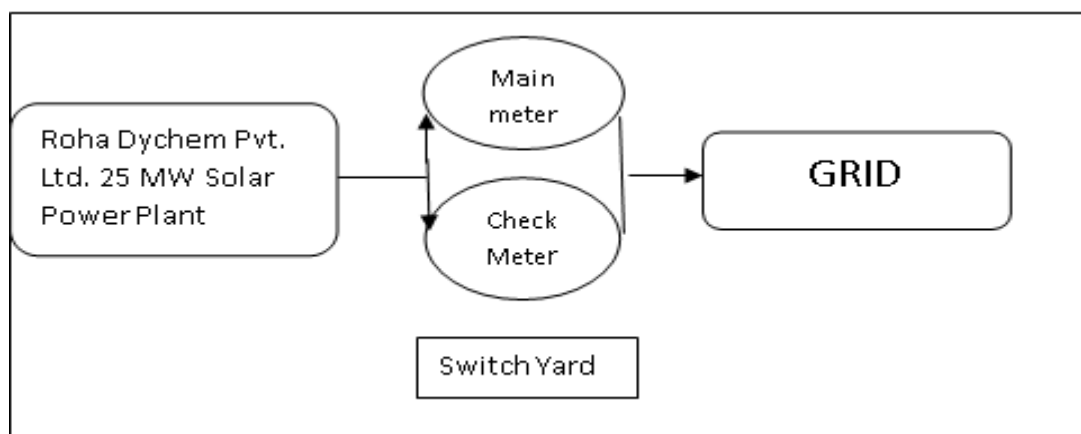
7	Identification of non-conformance and corrective/preventive actions and monitoring		✓	✓
8	Emergency procedures	✓	✓	
9	Processing of data and calculation of emission reductions			✓
10	Monitoring report: management review of monitoring report (internal audit)		✓	✓

Meters & Calibration: -

There are two power evacuation lines to export electricity to the grid and for each of the lines, one Main meter and one Check meter have been installed at the plant to continuously monitor the grid electricity export and import. These measurements are being undertaken on an hourly basis and readings from Main meter is recorded by representatives of the state utility and representatives of project proponents at least once in a month. The monthly generation data is uploaded on the SLDC website (www.sldcguj.com). The net electricity exported/supplied to the grid has been calculated as the difference between the measured quantities of the grid electricity export and the import.

Calibration of all the meters have been scheduled to be undertaken once in three years and faulty meters are to be replaced immediately.

The line diagram of the electricity generation of the Project Activity:



Data Recording & Archiving: - Roha Dychem Pvt. Ltd. will keep complete and accurate records of operating log at the Power Plant. The data will be archived electronically as well as in log books at the power plant and will be kept for two years after the end of the crediting period or the last issuance of for this project activity, whichever occurs later.

Emergency Preparedness & Uncertainty procedure: - In Case Main meters or Check meters are found to be outside the acceptable limits of accuracy or faulty or not functioning properly, they

will be repaired, recalibrated or replaced by Roha Dyechem Pvt. Ltd. and/or GUVNL/GETCO as soon as possible. In the event that the Main meters are not in service as a result of maintenance, repairs or calibration, the check meters will be used for readings. Further in case of mismatch in the dates of verification period and start and end dates of monthly electricity generation reports at SLDC website, the CERs will be calculated from daily readings of the check meter during that period. The faulty equipment/instrument would be replaced with immediate effect. In the event of unavailability of the instrument, the emission reductions for the concerned would not be considered.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

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

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/yr)

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (t CO₂/MWh)

Calculation of $EG_{PJ,y}$

If the project activity is the installation of a Greenfield power plant, 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,

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

Here,

$$EG_{\text{PJ,facility},y} = 40,144.11$$

$$EF_{\text{grid,CM},y} = 0.953$$

$$BE_y = 40,144.11 \times 0.953 = 38,257 \text{ tCO}_2\text{e}$$

5.2 Project Emissions

As per Applied Methodology: ACM0002, v13.0.0

As the project activity is the installation of a new grid-connected Solar 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, $PE_y = 0$.

5.3 Leakage

No other leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.

5.4 Net GHG Emission Reductions and Removals

Emission reductions:

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂e/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

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)
2020	313	0	0	313

2021	37,945	0	0	37,945
Total	38,257	0	0	38,257

The estimated emission reduction for this monitoring period i.e. 368 days works out to be 36,666 tco₂ and emission reductions achieved during this monitoring period are 38,257 tco₂ which is 4.34% higher than the estimated reduction as per registered vcs-pd.

APPENDIX 1: CALIBRATION DETAILS

Meter Sr.No.	Accuracy Class of the meter	Previous Calibration date	Calibration due date	Calibration Date	Validity of the Calibration
GJ1211A (Main)	0.2s	19-July-2018	18-July-2021	03-December-2021	02-December-2024
GJ1210A (Check)	0.2s	19-July-2018	18-July-2021	03-December-2021	02-December-2024

As due date of calibration was in July 2021 but calibration was done in December 2021 so error factor of 0.2 is applied in the delay months for emission reduction calculation. For this the export values (from July 2021 to December 2021) are multiplied by $(1 - 0.2\%)$ and import values are multiplied by $(1 + 0.2\%)$.