

MONITORING REPORT

Document Prepared By First Climate (India) Private Limited

Project Title	Solar PV power project by Roha Dyechem Pvt. Ltd. (EKIESL.CDM.Aug-11-02)
Version	02
Report ID	FCIPL/RDPL/01
Date of Issue	20-May-2013
Project ID	NA
Monitoring Period	04-March-2012 to 29-December-2012 (both dates included)
Prepared By	First Climate (India) Private Limited
Contact	3C, Camac Street, Camac Tower, 9th floor, Kolkata – 700 016, India. Tel. +91 (33) 4022 3456 Fax +91 (33) 4005 6615 www.firstclimate.com

Table of Contents

CONTENTS

1	Project Details.....	3
1.1	Summary Description of Project	3
1.2	Sectoral Scope and Project Type.....	3
1.3	Project Proponent.....	3
1.4	Other Entities Involved in the Project.....	4
1.5	Project Start Date.....	4
1.6	Project Crediting Period	5
1.7	Project Location	5
1.8	Title and Reference of Methodology	6
2	Implementation Status.....	6
2.1	Implementation Status of the Project Activity	6
2.2	Project Description Deviations.....	7
2.3	Grouped Project.....	7
3	Data and Parameters	7
3.1	Data and Parameters Available at Validation	7
3.2	Data and Parameters Monitored	8
3.3	Description of the Monitoring Plan	9
4	Quantification of GHG Emission Reductions and Removals	11
4.1	Baseline Emissions	11
4.2	Project Emissions	12
4.3	Leakage	12
4.4	Summary of GHG Emission Reductions and Removals.....	12
5	Additional Information.....	12

1 PROJECT DETAILS

1.1 Summary Description of 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 project activity was commissioned on 04/03/2012.

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

Party involved (host) indicates a host Party	Private and/or public entity(ies) project proponent (as applicable)	Indicate if the Party involved wishes to be considered as project proponent (Yes/No)
India (host)	Roha Dyechem Pvt. Ltd. (Private entity)	No
India (host)	First Climate (India) Private Limited (Private entity)	No

The contact details is provided below:

Organization:	Roha Dyechem Private Limited
Street/P.O.Box:	Road No.2 Andheri East
Building:	A-44 and 45, MIDC
City:	Mumbai
State/Region:	Maharashtra
Postcode:	400093
Country:	India
Telephone:	+91 (22) 4077 3333
FAX:	+91 (22) 2830 2531
E-Mail:	Shrikisan.bhutada@rohagroup.com
Website:	http://www.rohadyechem.com/
Contact Person:	Mr. Shrikisan Bhutada
Title:	Renewable Energy Head

¹ Nominal power output of 145 W

Salutation:	Mr.
Last Name:	Bhutada
Middle Name:	
First Name:	Shrikisan
Department:	
Mobile:	+91 9823240000
Direct FAX:	+91 (22) 2830 2531
Direct tel:	+91 (22) 4077 3333
Personal E-Mail:	Shrikisan.bhutada@rohagroup.com

Organization:	First Climate (India) Private Limited
Street/P.O.Box:	3C, Camac Street
Building:	Camac Towers, 9 th Floor
City:	Kolkata
State/Region:	West Bengal
Postcode:	700016
Country:	India
Telephone:	+91 (33) 4022 3456
FAX:	+91 (33) 4005 6615
E-Mail:	subhendu.biswas@firstclimate.com
Website:	http://www.firstclimate.com/
Contact Person:	Mr. Subhendu Biswas
Title:	Director
Salutation:	Mr.
Last Name:	Biswas
Middle Name:	
First Name:	Subhendu
Department:	Carbon Asset Development
Mobile:	+91 9748756709
Direct FAX:	+91 (33) 4005 6615
Direct tel:	+91 (33) 4022 3468
Personal E-Mail:	subhendu.biswas@firstclimate.com

The project proponent shall maintain all the monitoring equipment. The proponents shall record the data and shall make the data available to the DOE during validation and verification

1.4 Other Entities Involved in the Project

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

The crediting period details are provided below:

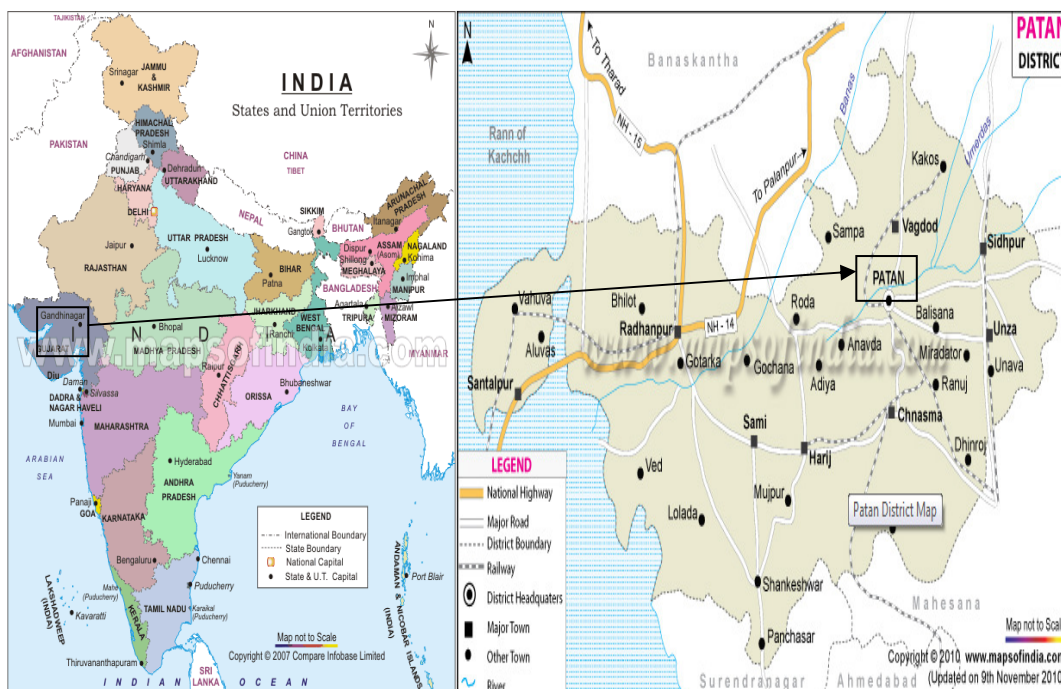
Crediting Period Number	Crediting Period Start Date	Crediting Period End Date	Duration of Crediting Period
1	04-March-2012	03-March-2022	10 years 00 months
2	04-March-2022	03-March-2032	10 years 00 months
3	04-March-2032	29-December-2033	1 year 10 months(End date of CDM crediting period)

However, for the concerned monitoring period (04-March-2012 to 29-December-2012), a separate declaration has been provided to address the issue of double counting

1.7 Project Location

The project location details are provided below:

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: - Consolidated baseline methodology for grid-connected electricity generation from renewable sources

Methodology: - Approved Consolidated Baseline and Monitoring Methodology ACM0002

Version: 13.0.0

Date: Valid from 11-May-2012 onwards

Reference: ACM0002 version 13.0.0²

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 ($\pm 5\%$) 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

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

- **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.

2.2 Project Description Deviations

There has been no deviation.

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 Unit / 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)
Purpose of the data:	Calculation of baseline emissions
Any comment:	The simple operating margin is fixed <i>ex-ante</i>

Data Unit / 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
Value applied:	0.859 (based on data for the most recent year i.e. 2010~2011)
Purpose of the data:	Calculation of baseline emissions
Any Comment:	The build margin is fixed <i>ex-ante</i> .

Data Unit / Parameter:	$EF_{grid,CM,y}$
------------------------	------------------

Data unit:	tCO ₂ /MWh
Description:	Combined margin CO2 emission factor for the project electricity system in year y
Source of data:	Central Electricity Authority: Baseline CO2 Emission Database Version 07 http://www.cea.nic.in/reports/planning/cdm_co2/database_7.zip
Value applied:	0.953
Purpose of the data:	Calculation of baseline emissions
Any comment:	The combined margin is fixed <i>ex-ante</i> .

3.2 Data and Parameters Monitored

Data Unit / 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 Reporting Frequency: Monthly		
Value monitored:	Period	Quantity of net Electricity generation(MWh)	
	04-March-2012 to 29-December-2012 (both dates included)	33744.312	
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		

	Meter Type	ABT Meter								
	Manufacturer	SEMS								
	Serial Number	GJ1211A								
	Accuracy Class	0.2s								
	Meter Details for Check Meter									
	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 meter: <table><tr><td>Test Date</td><td>Next Calibration Due Date</td></tr><tr><td>28-12-2011</td><td>27-December-2014</td></tr></table> Check meter: <table><tr><td>Test Date</td><td>Next Calibration Due Date</td></tr><tr><td>31-12-2011</td><td>30-December-2014</td></tr></table>		Test Date	Next Calibration Due Date	28-12-2011	27-December-2014	Test Date	Next Calibration Due Date	31-12-2011	30-December-2014
Test Date	Next Calibration Due Date									
28-12-2011	27-December-2014									
Test Date	Next Calibration Due Date									
31-12-2011	30-December-2014									
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) = Net Export(in MWh)- Net Import(in MWh)									
Any comment:	This data has been used to calculate the baseline emissions. Additionally The data will be archived for crediting period+2 years									

3.3 Description of the 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:

Position	Report to:
Technical Engineer	Technical Manager

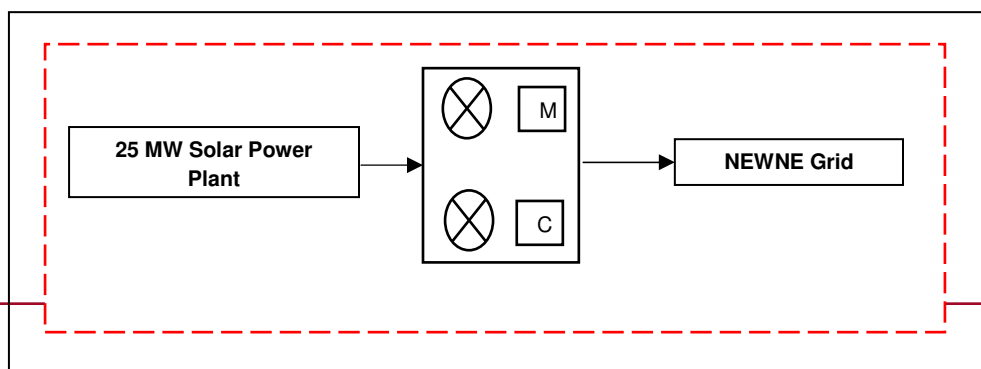
Technical Manager	Project Manager
-------------------	-----------------

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	✓	✓	
	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 (04-March-2012 to 29-December-2012).

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



Switchyard

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 (04-March-2012 to 29-December-2012)

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
(04-March-2012 to 29-December-2012)	33744.312	0.953	32,158

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, 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 Summary of GHG Emission Reductions and Removals

	2012
Total Emission Reductions for this monitoring period (tCO ₂) (04-March-2012 to 29-December-2012)	32,158

5 ADDITIONAL INFORMATION

Generation Data (From 04-March-2012 to 29-December-2012)

Month	Export(in MWh)	Import(MWh)	Total(MWh)
March-12(From 04-March-2012)	3001.183	24.939	2976.244
Apr-12	3899.678	32.071	3867.607
May-12	4324.347	30.062	4294.285
Jun-12	3671.959	27.754	3644.205
Jul-12	2748.649	29.282	2719.367
Aug-12	2511.860	31.063	2480.797
Sep-12	3057.430	31.097	3026.333
Oct-12	3894.615	32.441	3862.174
Nov-12	3541.399	33.608	3507.791
Dec-12(till 29-December-2012)	3396.313	30.804	3365.509
Net Electricity Generation			33744.312

Emission Reductions (from 04-March-2012 to 29-December-2012)

Period	Baseline Emission(tCO₂)	Project Emission (tCO₂)	Leakage Emission(tCO₂)	Emission Reductions(tCO₂)
	BE_y	PE_y	LE_y	ER_y= BE_y-PE_y-LE_y
04-March-2012 to 29-December-2012	32,158	0	0	32,158

Plant Shutdown/Maintenance details

During the monitoring period (04-March-2012 to 29-December-2012) 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.