



**Monitoring report form for CDM project activity
(Version 06.0)**

MONITORING REPORT		
Title of the project activity	Solar Thermal Power Plant by Godawari Green Energy Limited	
UNFCCC reference number of the project activity	7379 ¹	
Version number of the PDD applicable to this monitoring report	Version: 04 Date: 14/11/2012	
Version number of this monitoring report	01	
Completion date of this monitoring report	18/01/2018	
Monitoring period number	02	
Duration of this monitoring period	01/07/2015 to 31/12/2017 (first and last day included)	
Monitoring report number for this monitoring report	01	
Project participants	Godawari Green Energy Limited Numerco Limited EKI Energy Services Limited	
Host Party	India	
Sectoral scopes	Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)	
Applied methodologies and standardized baselines	ACM0002 ver. 12 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0 t CO ₂ e	206,934 t CO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	283,675 t CO ₂ e	

¹ https://cdm.unfccc.int/Projects/DB/KBS_Cert1348206450.84/view

SECTION A. Description of project activity

A.1. General description of project activity

Godawari Green Energy Limited has implemented a new 50 MW large-scale grid connected solar thermal power project ("Project activity") in Jaisalmer district, Rajasthan, India. Project activity comprises of state-of-the-art, environment friendly, solar thermal power generation using parabolic trough technology. Project activity comes under the purview of large-scale, solar thermal power technology based project implemented in India.

Electricity generated from the project activity is sent to Combined Regional grid i.e. Northern, Eastern, Western, and North-Eastern grids(NEWNE) of India. As per registered PDD, the gross electricity generation from the project activity is estimated as 130,263 MWh/year and the auxiliary electricity consumption in the project activity is 11,397 MWh/year. Accordingly this project activity estimates supply of 118,866 MWh net electricity to the grid per year and abates 1,131,600 tonnes of Carbon Dioxide emissions, in the project boundary, during the crediting period.

During the present monitoring period from 01/07/2015 to 31/12/2017, the total emission reduction achieved are 206,934 t CO₂e.

Start date of the project activity was 20/08/2011, i.e. date of the equipment purchase and EPC Contract date was on 20/08/2011.

A.2. Location of project activity

Host Party: India

State: Rajasthan

District: Jaisalmer

Nokah Village, Pokaran Tehsil

GPS Coordinates: Longitude- 72° 14' 9.2" E

Latitude- 27° 36' 13" N



Figure 1: Map of India (Source- Google Maps)



Figure 2: Rajasthan and Project Site (Source: Google Maps)

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host Party)	Godawari Green Energy Limited (Private entity)	No
United Kingdom of Great Britain and Northern Ireland	Numerco Limited (Private entity)	No
Switzerland	EKI Energy Services Limited (Private entity)	No

A.4. Reference to applied methodologies and standardized baselines

Methodology: ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 12.3.0, EB 66)

The following tools have been used for the project activity under consideration –

- Tool to calculate emission factor for an electricity system Reference: Version 02.2.1/EB – 63, Annex 19
- Demonstration and assessment of additionality Reference: Version 06, EB 65, Annex 21

A.5. Crediting period type and duration

Fixed Crediting Period: 10 years

Start date of crediting period: 19/06/2013

Present Monitoring Period (MP02): 01/07/2015 to 31/12/2017 (both dates inclusive)

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

Project activity is a grid-connected large-scale 50 MW solar thermal power generation facility by using environmentally safe and sound technology.

In the pre project scenario, the thermal power plants connected with the NEWNE grid would have generated the equivalent amount of electricity. These plants majorly use fossil fuels to generate electricity.

Electricity generation is through solar thermal power generation technology. Technology for implementation of project activity is sourced from reputed international suppliers leading to the transfer of technology. The list of major equipment and manufacturer/technology provider is given

in Table 1. The execution of the whole plant is under EPC contract by M/s Lauren Engineers & Constructors India Pvt Ltd. and is operated by Godawari Green Energy Limited.

Table 1: Major Equipment list of Manufacturer/Technology Provider

Equipment	Manufacturer's / Technology provider
Steam turbo generator (STG)	Siemens, Sweden
Heat exchanger	Alborg CSP, Denmark
Solar collector loops	Design by SBP, Germany
Cooling tower	Paharpur cooling tower, India
Boiler feed pump	Sulzer India
Heat Transfer Fluid (HTF) vessel	Ravi Industries, India
HTF pump	Sulzer India
Deaerator	Ravi Industries, India
Reflectors	Flagbag, Germany
Receiver Tube	Schott Glass, Germany

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

Not Applicable

B.2.2. Corrections

Not Applicable

B.2.3. Changes to the start date of the crediting period

Not Applicable for current monitoring period. However, the start date of crediting period was changed from 09/05/2013 to 19/06/2013 and it is approved by UNFCCC. Please refer project UN project web page for the same.

https://cdm.unfccc.int/Projects/DB/KBS_Cert1348206450.84/view

B.2.4. Inclusion of monitoring plan

Not Applicable

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

Not Applicable

B.2.6. Changes to project design

Not Applicable

SECTION C. Description of monitoring system

The project is in accordance with ACM0002 ver. 12.3 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources. The project activity is generating electricity from Solar energy for which GHG emission is nil. The generated electricity is supplied to grid. Thus the power generated in the project activity is actually displacing the electricity generated from the fossil fuels in the NEWNE grid. In case the project activity would not have been there, the same amount of electricity would have been generated from the power plants connected to the grid of which majority of the power plants are based on fossil fuels.

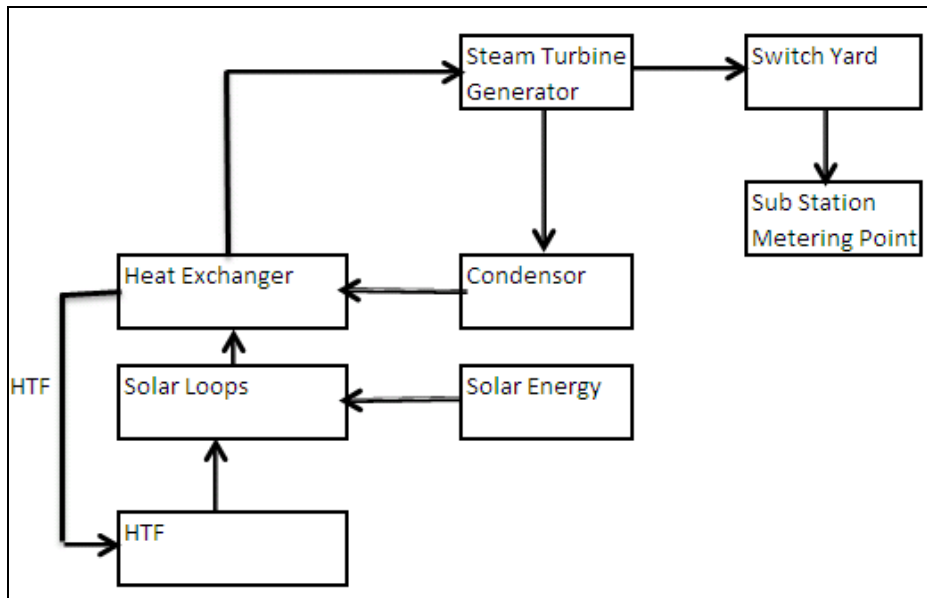


Figure 3: Schematic Diagram of the Project

Roles and Responsibility

The project proponent has operational & management structure in order to monitor the emission reduction and processes in place. Monitoring plan includes roles and responsibilities for individuals, selection, metering and calibration of monitoring equipment, metering of $EG_{facility,Y}$, and other relevant aspects. This includes systems and protocols implemented by project participant in order to ensure reliability, transparency and consistency while carrying-out various critical activities such as metering, data management and computation of emission reductions achieved by the project activity.

Organizational Structure

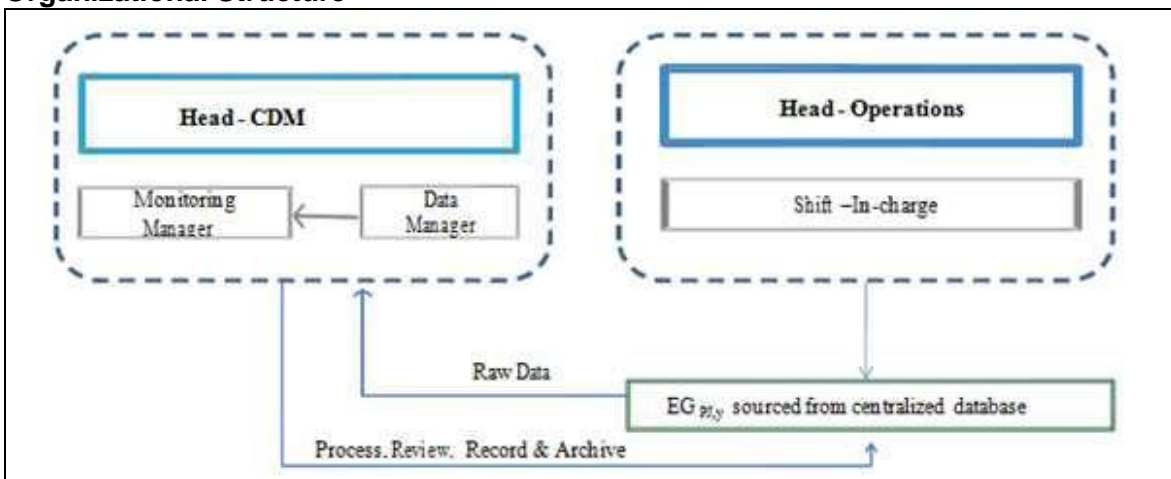


Figure 4: Organizational Structure

Designation	Responsibility
Head - CDM	<p>a. Complete responsibility of CDM implementation of project activity including preparation of PDD, validation, verification and associated action thereto as indicated in PDD.</p> <p>b. Formulate monitoring compliance protocols & human resources training guidelines for O&M, & CDM teams to comply with Monitoring Plan requirements.</p> <p>c. Ensure adequate training is offered for O&M and CDM teams to comply with the requirements of project activity.</p> <p>d. Establish systems for data management and approve data submitted by CDM operational team.</p>
Monitoring Manager- CDM	<p>a. Implementation of compliance guidelines for O&M & CDM teams to comply with PDD including Monitoring Plan.</p> <p>b. Coordinating with O&M teams for collection of data.</p> <p>c. Ensure that O&M team and comply with monitoring of data, including calibration and archiving of data are carried-out as per the frequency indicated in data management section.</p> <p>d. Carryout QA/QC checks on data collected by data managers, and conduct the consistency checks.</p> <p>e. Computation of Emission Reductions based on the data</p> <p>f. Conduct training programs for internal stakeholders.</p>
Data Managers- CDM	<p>a. Collection of data from O&M group.</p> <p>b. Carrying-out consistency checks on parameters and formats.</p> <p>c. Prepare the data for calculations</p> <p>d. Storage of data including calibration and maintain data and retrieval of data.</p>
Head- Operation	<p>a. Monitor, measure, calibrate and store electricity generation data and other related data</p>

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,OM,y}$
Unit	tCO ₂ /MWh
Description	This is the operating margin for the NEWNE grid of India
Source of data	<p>"CO₂ Baseline Database for Indian Power Sector" version 7 published by the CEA, MoP, Gol.</p> <p>Weblink: www.cea.nic.in</p>
Value(s) applied	0.984
Choice of data or measurement methods and procedures	Calculated as per ACM0002 with 3 years vintages (2008-09,2009-10,2010-11) data obtained from "CO ₂ Baseline Database for Indian Power Sector" version 7 published by the CEA, MoP, Gol, which is based on " tool to calculate emission factor for an electricity system, version 2.2.1"

Purpose of data/parameter	Baseline emission calculations
Additional comments	This is fixed ex-ante and it will remain same throughout during the crediting period.

Data/Parameter	EF _{grid, BM, y}
Unit	tCO ₂ /MWh
Description	This is the build margin for the NEWNE grid of India
Source of data	CO ₂ Baseline Database for Indian Power Sector” version 7 published by the CEA, MoP, Gol.
Value(s) applied	0.858
Choice of data or measurement methods and procedures	Calculated as per ACM0002 with year 2010-11 data obtained from “CO ₂ Baseline Database for Indian Power Sector” version 7 published by the CEA, MoP, Gol. Which is based on “ tool to calculate emission factor for an electricity system, version 2.2.1”
Purpose of data/parameter	Baseline emission calculations
Additional comments	This is fixed ex-ante and it will remain same throughout during the crediting period.

D.2. Data and parameters monitored

Data/Parameter	EG _{facility, y}
Unit	MWh
Description	Quantity of Net Electricity generated and fed into Grid
Measured/calculated/default	Calculated from the measured values of exported and imported electricity
Source of data	Monthly Joint Meter Reading records
Value(s) of monitored parameter	217,368 MWh
Monitoring equipment	Monitoring equipment: Tri-Vector type Availability Based Tariff Energy meter Accuracy class : 0.2s Make: Secure Meters Limited, Serial Number: RJB80105 Calibration Dates: 06/03/2013, 27/03/2014 and 20/03/2015. As per the registered PDD, calibration is to be done once in five years whereas PP is doing calibration annually.
Measuring/reading/recording frequency	The electricity is continuously measured and monthly recorded.
Calculation method (if applicable)	Net electricity exported to grid is calculated as the difference of measured exported and measured imported Electricity
QA/QC procedures	Quantity of net electricity supplied is cross-verified with the invoice raised. As per the registered PDD, calibration is to be done once in five years whereas PP is doing calibration annually.
Purpose of data/parameter	Baseline emission calculation
Additional comments	The period of storage of the monitored data is 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later. Data is archived in paper and electronic form.

D.3. Implementation of sampling plan

Not Applicable

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

Baseline for the project activity is power generated from renewable energy source multiplied by the grid emission factor of NEWNE grid calculated in transparent and conservative manner.

$$BE_y = EG_{BL,y} \times EF_{Grid, CM, y}$$

The calculation of baseline emissions for the monitoring period:

$$\begin{aligned} EG_{facility,y} &= 217,368 \text{ MWh} \\ EF_{Grid, CM,y} &= 0.952 \text{ t CO}_2\text{e/MWh} \\ BE_y &= 217,368 \text{ MWh} * 0.952 \text{ t CO}_2\text{e} \\ &= 206,934 \text{ t CO}_2\text{e} \end{aligned}$$

Where

BE_y is Baseline Emissions (t CO₂e)

EF_{Grid, CM, y} is the is Combined margin CO₂ emission factor for grid (t CO₂/MWh) fixed ex-ante for the crediting period

E.2. Calculation of project emissions or actual net removals

Project Emissions: 0 t CO₂e, since project emissions for solar power project activities is zero.

E.3. Calculation of leakage emissions

Leakage: 0 t CO₂e.

The main emissions potentially giving rise to leakage in the context of electrical 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, as per ACM 0002 methodology: Grid-connected electricity generation from renewable sources” and the same is mentioned in the registered PDD.

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	206,934	0	0	0	206,934	206,934

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante (t CO ₂ e)
206,934	283,675

E.6. Remarks on increase in achieved emission reductions

The emission reduction is 27% lower than the projected ex-ante calculated values, due to less number of sunny days during the monitoring period.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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