Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT		
Title of the project activity	30 MW Solar PV Project by Nirosha Solar Power Private Limited	
UNFCCC reference number of the project activity	GS I.D 5699	
Version number of the PDD applicable to this monitoring report	GS passport version 03 dated 17/02/2018 CDM PDD version 03 dated 17/02/2018	
Version number of this monitoring report	02	
Completion date of this monitoring report	10/05/2018	
Monitoring period number	GS Monitoring Period: 01	
Duration of this monitoring period	GS Monitoring Period Duration: 20/09/2016 to 31/03/2018	
Monitoring report number for this monitoring report	Not Applicable	
Project participants	Nirosha Solar Power Private Limited	
Host Party	India	
Sectoral scopes	Sectoral Scope- 1 Energy Industries (renewable/non-renewable sources).	
Applied methodologies and standardized baselines	ACM0002- Grid-connected electricity generation from renewable sources - Version 17.0	
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 tCO_2e	78,149 tCO_2e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	46,815 tCO_2e (Annual average estimation) 71,569 tCO_2e (Estimation for current monitoring period)	

SECTION A. Description of project activity

A.1. General description of project activity

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy source. Nirosha Solar Power Private Limited is the promoter of the proposed project activity. The project activity involves installation of 30 MW (AC) solar power project at Village: Bendo, District: Mahoba, Uttar Pradesh. The project replaces anthropogenic emissions of greenhouse gases (GHG's), thereon displacing certain 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 project activity is connected to 132 KV substation.

The details of the project and the state of installation are mentioned in the table:-

Project Promoters' Name	Capacity in MW	Connection with Grid	State	Usage of Electricity
Nirosha Solar Power Private Limited	30 MW (AC)	Indian Grid	Uttar Pradesh	Sale to Grid

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".

Baseline Scenario:

As per the applicable methodology, a Greenfield power plant is defined as "a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity".

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per paragraph 24 of Section 5.2.1 of applied methodology is the following:

If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity 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".

Hence, pre-project scenario and baseline scenario are the same.

Reduction of GHGs emissions due to the project activity:

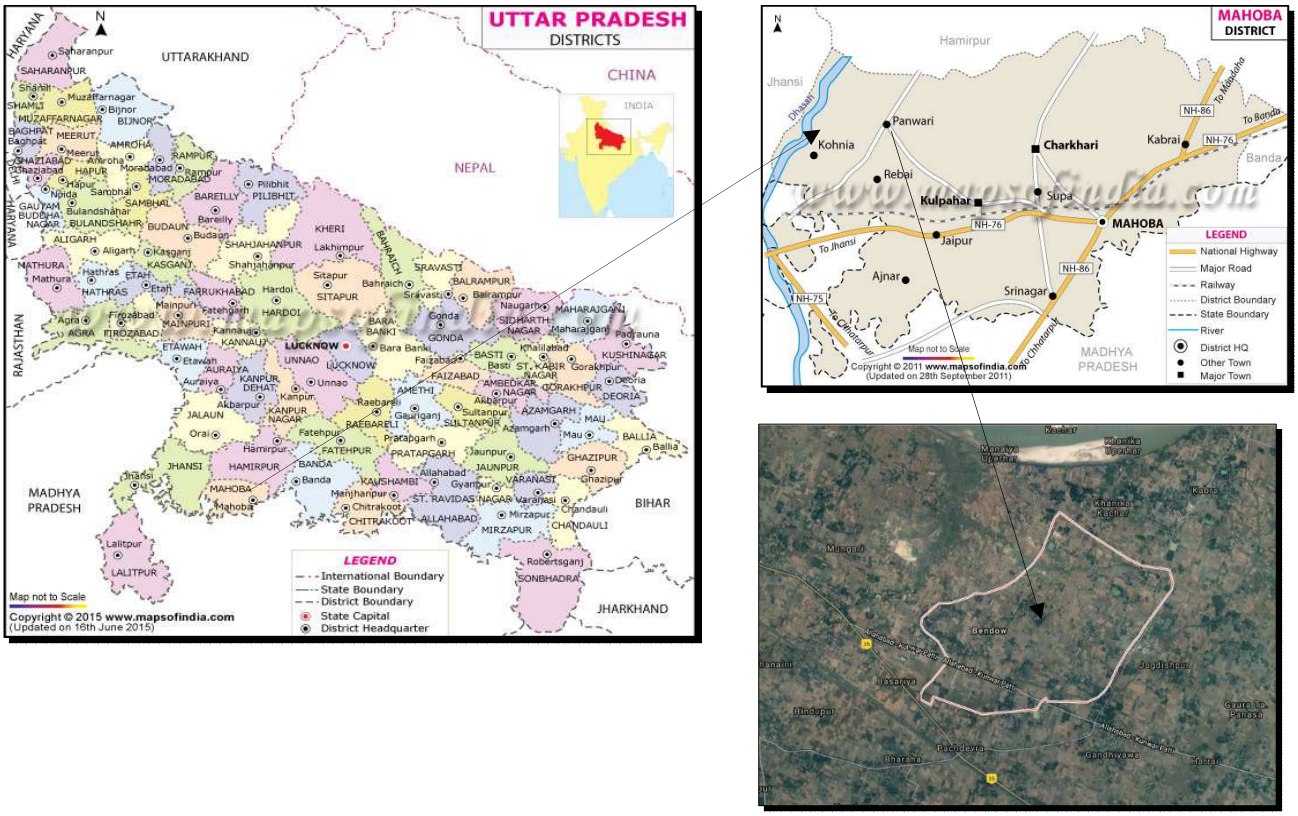
The GHG emission reductions achieved from current monitoring period is 78,149 t CO_2.

A.2. Location of project activity

Host Party: India
State: Uttar Pradesh
District: Mahoba
Village: Bendo

Project Promoters' Name	Latitude	Longitude	Date of Commissioning
Nirosha Solar Power Private Limited	25.42 N	79.44 E	20/09/2016

Geographical location can be viewed in the following 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)	Nirosha Solar Power Private Limited (Private Entity)	No

A.4. Reference to applied methodologies and standardized baselines

Methodology Title: Grid-connected electricity generation from renewable sources

Reference: ACM0002:/Version 17, Sectoral Scope: 01,
https://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN

Methodological Tool: "Tool to calculate the emission factor for an electricity system" – Version, 05.0

Reference: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

A.5. Crediting period type and duration

Renewable Crediting Period: 15 years total (renewable after 5 years as per GS4GG)
Start date of crediting period: 20/09/2016

Present Monitoring Period: 20/09/2016 to 31/03/2018 (both dates inclusive)

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy source. Nirosha Solar Power Private Limited is the promoter of the proposed project activity. The project activity involves installation of 30 MW (AC) solar power project at Village: Bendo, District: Mahoba, Uttar Pradesh. The project replaces anthropogenic emissions of greenhouse gases (GHG's) thereon displacing certain 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.

Table 1: Technical details of the project activity

Technical detail of the equipment	Remark
Technology	Polycrystalline modules on Seasonal Tilt at 25 degree and 5 degree.
Solar photovoltaic module	(255 Wp,260 Wp Module make: BYD) (260 Wp,265 Wp Module make: Suntech)
No. of modules	132384
Total Number of Invertors	38 Units
Transformer	Power transformer: 31500 KVA(1 Nos), Aux. Trafo: 100 KVA(1 Nos), Inv. Trafo.: 4080 KVA (1 Nos),2800 KVA (8 Nos), Aux Trafo. ICR: 5 KVA (5 Nos)
Central inverters of nominal AC power output	680 KW , Schneider-total 38 invertors
Technical & Operational Lifetime	25 years

The project activity commissioned on 20/09/2016 and is running satisfactorily for current monitoring period.

B.2. Post-registration changes

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

Not Applicable for current GS monitoring period.

B.2.2. Corrections

Not Applicable for current GS monitoring period.

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

Not Applicable for current GS monitoring period.

B.2.4. Inclusion of monitoring plan

Not Applicable for current GS monitoring period.

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 for current GS monitoring period.

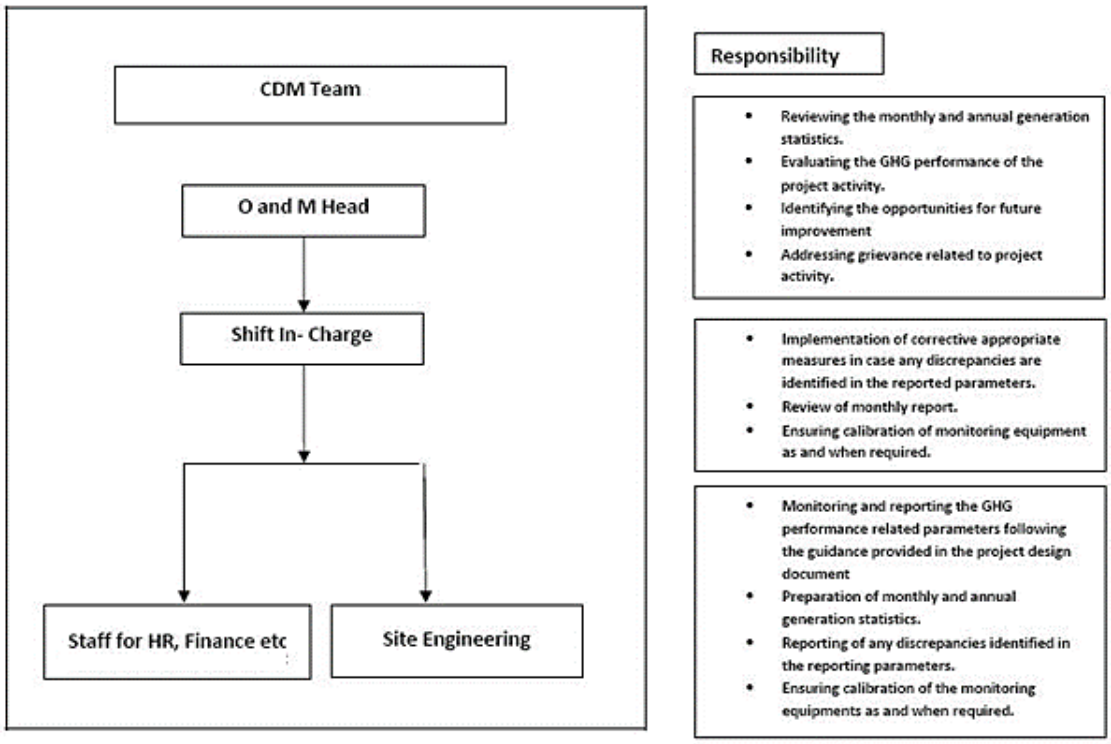
B.2.6. Changes to project design

Not Applicable for current GS monitoring period.

SECTION C. Description of monitoring system

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

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



Data Measurement

The export and import energy is measured continuously using above mentioned Main and Check meters located at the substation. Authorized officer of SEB in the presence of PP takes Readings of meters on monthly basis. Invoices are raised based on the Meter Reading Statement issued to Nirosha Solar Power Private Limited. These invoices can be used for cross checking the meter readings taken for the respective project activity.

Data collection and archiving:

Readings from meters is collected in the presence of the plant in-charge. Export and Import data are 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 CERs 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 (CDM team) are trained. The plant helpers are trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/parameter:	**$EF_{grid,OM,y}$**
Unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016
Value(s) applied)	0.9941
Choice of data or measurement methods and procedures	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 2012-13, 2013-14, & 2014-15. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 11, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comments	This parameter is fixed ex-ante for the entire crediting period

Data/parameter:	**$EF_{grid,BM,y}$**
Unit	tCO_2/MWh
Description	Build Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016[1]
Value(s) applied)	0.9285
Choice of data or measurement methods and procedures	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 2012-13, 2013-14, & 2014-15. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 11, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comments	This parameter is fixed ex-ante for the entire crediting period

Data/parameter:	**$EF_{grid,CM,y}$**
Unit	tCO_2/MWh

[1] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

Description	Combined Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016.
Value(s) applied)	0.9777 tCO_2/MWh
Choice of data or measurement methods and procedures	The combined margin emissions factor is calculated as follows: $\mathbf{EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}}$ Where: $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year y (tCO_2/MWh) $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year y (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of data	For the calculation of the Baseline Emission
Additional comments	This parameter is fixed ex-ante for the entire crediting period

D.2. Data and parameters monitored

Data/parameter:	**$EG_{facility,y}$**
Unit	MWh (Mega-watt hour)
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y in MWh
Measured/calculated/default	Measured
Source of data	Monthly joint meter reading reports (30 MW)
Value(s) of monitored parameter	79,932.35 MWh
Monitoring equipment	**Data Type:** Measured **Monitoring equipment:** Energy Meters are used for monitoring **Recording Frequency:** Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually **Archiving Policy:** Paper & Electronic **Calibration frequency:** One in five years Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per below equation: $EG_{facility,y} = EG_{Export} - EG_{Import}$ The joint reading at metering point is carried out once in a month in presence of O&M officials and state electricity board personnel. The calculations/measurement of net electricity supplied to grid is under purview of state electricity board and the PP/Project activity Instance owner has no role on it. PP/Project activity Instance owner will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan. **Cross Checking:** Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the PP to the State Electricity Board or equivalent.
Measuring/reading/recording frequency:	Continuous monitoring and monthly recording
Calculation method (if applicable):	Not Applicable

QA/QC procedures:	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. 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 accuracy class of meters, calibration frequency of meters is totally under purview of state electricity board and PP do not have any control on it. Thus deviation against the accuracy class, calibration frequency, metering arrangement etc is acceptable for future period.
Purpose of data:	Calculation of baseline emissions
Additional comments:	Data will be archived in paper & electronic form for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later.

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 emissions due to generation of electricity:

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 tCO_2/year
BE_Y = Baseline emission in tCO_2/year
PE_Y = Project emissions in tCO_2/year

Baseline Emission (BE_Y)

The baseline emissions are the product of electrical energy baseline $EG_{PJ,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor.

$BE_y = EG_{facility,y} * EF_{grid,CM,y}$

Where,

$EG_{facility,y}$ = Total quantity of net electricity delivered to the INDIAN grid
$EF_{grid,CM,y}$ = Baseline emission factor
= 0.9777 tCO_2/MWh

BEy = 79,932.35* 0.9777
= 78,149 tCO_2/year

Since $PE_y = 0$
$ER_y = BE_y$

Therefore, ER_y = 78,149 tCO_2/year

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

Since the project activity is a renewable energy project, which generates electricity using solar power, therefore there are no resulting project emissions.

E.3. Calculation of leakage emissions

No leakage is considered from the project activity as per methodology.

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

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	78,149	0	0	0	78,149	78,149

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_2e)	Amount estimated ex ante (t CO_2e)
78,149 tCO_2e	71,569 tCO_2e

E.6. Remarks on increase in achieved emission reductions

From section E.5 above, it is evident that the actual emission reduction for the current monitoring period is higher than the estimated emission reduction by 9.19%, which is due to the higher performance of the solar panels during the current monitoring period. This is due high PLF, which is not under control of PP. Though there is no change in project design, the high PLF does not have any adverse impact on project additionality.

Annex-1: Sustainable Monitoring Plan

The GS registration is done on 16/01/2018 and current GS monitoring period starts retroactively from commissioning date. Thus, current GS monitoring period is from 20/09/2016 to 31/03/2018.The sustainable monitoring plan for the project activity is as below. As a part grievance mechanism, there are no any major problems/comments received for the project activity.

As per registered GS monitoring plan, the below sustainable indicators parameters are monitored.

No		**1**
Indicator		Quality of employment
Mitigation measure		N/A as indicator scored positive.
Repeat for each parameter		
Chosen parameter		Training of Staff
Current situation of parameter		Without the Project, local people have no such opportunities to be trained on the technology and the monitoring of the plant operation, and the emergency and safety procedures
Estimation of baseline situation of parameter		Without the Project, local people have no such opportunities to be trained on the technology and the monitoring of the plant operation, and the emergency and safety procedures.
Future target for parameter		Together with the technology supplier, the Project organise training for the staff on the technology and the monitoring of the plant operation, and the emergency and safety procedures.
Way of monitoring	How	The training records for all the employees
	When	Annually
	By who	Project proponent

Monitoring result –

The quality of employment parameter is monitored through training records for employees of project activity. This parameter is monitored by PP and training records are prepared once training is complete. The training records are provided for same. The below are training details for the project activity

1. Fire fighting and safety training conducted on 30/01/2018. Total 14 persons attended the training program.

2. Fire safety, Types of Fire Extinguisher & uses training conducted on 24/01/2018. Total 40 persons attended the training program.

3. Preventive Maintenance schedule roles and responsibility training conducted on 06/01/2018. Total 7 persons attended the training program.

4. Types of Fire Extinguisher & uses training conducted on 14/12/2017. Total 7 persons attended the training program.

5. Basics of PV module and Faults & uses training conducted on 11/11/2017. Total 7 persons attended the training program.

6. Waste management training conducted on 08/11/2017. Total 8 persons attended the training program.

7. Use of PPE training conducted on 19/10/2017. Total 7 persons attended the training program.

8. Fire Safety training conducted on 08/10/2017. Total 7 persons attended the training program.

9. Access Control training conducted on 01/07/2017. Total 33 (11+21) persons attended the training program.

10. Fire and life safety training conducted on 01/06/2017. Total 30 persons attended the training program.

11. Electrical safety, Electrical Hazards and fire Extinguisher training conducted on 10/03/2017. Total 31 persons attended the training program

12. Safety training conducted on 09/03/2017. Total 22 persons attended the training program

The evidence of training records are submitted to the DOE assessment team for verification purpose.

No		**2**
Indicator		Quantitative employment and income generation
Mitigation measure		N/A as indicator scored positive.
Repeat for each parameter		
Chosen parameter		No. of Staff Employed
Current situation of parameter		No. of staff employed in the project activity.
Estimation of baseline situation of parameter		None
Future target for parameter		As per the requirements for plant operations. More than 10 people are employed during crediting period
Way of monitoring	How	Employee rolls, pay-slips, attendance registers, etc.
	When	Annually
	By who	Project proponent

Monitoring result –

The parameter quantitative employment and income generation is monitoring through employee records. This parameter is monitored by PP through attendance register. The sample month attendance register are submitted which indicates that around 13 employees are working for operation and maintenance of project activity site. Also wages details are provided which indicates that peoples are getting higher salary than local level due to implementation of project activity.

Outcome of Monitoring Sustainable Indicators -

Documentary evidence has been submitted to DOE to access Outcome of Monitoring Sustainable Plan & Indicators. PP has monitored all sustainable indicators appropriately and evidence for each sustainable indicator is submitted. The project activity helps to improve the quality of employment, to create employment and income generation and to improve vegetation status at site. The supporting evidences/records for same is submitted to DOE. The project activity helps to generate clean renewable energy, which replaces baseline fossil fuel dominated electricity.

Annex-2: Meter Calibration Details

Meter Serial Number	15625430
Make	Larson and Toubro Limited
Accuarcy Class	0.2s
Calibration On	01-12-2017
Due date of calibration	01-12-2022

At the time of commissioning, the meters are calibrated and installed by state electricity board. However, PP do not have these calibration certificates available with them. Thus, conservatively delay in calibration is considered till Nov 2017 and applied error factor conservatively. Please refer emission reduction excel sheet for the same.

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Document information

Version	*Date*	*Description*
06.0	7 June 2017	Revision to: • 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: • 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: • 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 *F-CDM-MR* to *CDM-MR-FORM*; • 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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