 Monitoring report form for CDM project activity (Version 09.0)			
MONITORING REPORT			
Title of the project activity	250 MW Solar Power Plant in Pavagada Solar Park in Karnataka		
UNFCCC reference number of the project activity	10573		
Version number of the PDD applicable to this monitoring report	02		
Version number of this monitoring report	01		
Completion date of this monitoring report	16/11/2021		
Monitoring period number	1 st Monitoring Period		
Duration of this monitoring period	11/09/2020 to 31/12/2020 (Inclusive of both days)		
Monitoring report number for this monitoring period	01		
Project participants	Fortum Solar India Pvt Ltd		
Host Party	India		
Applied methodologies and standardized baselines	Applied Methodology: ACM0002- Grid-connected electricity generation from renewable sources (Version 20.0) Standardized baselines: Not Applicable		
Sectoral scopes	Sectoral Scope 1: Energy Industries (renewable/non-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 until 31 December 2020	Amount achieved from 1 January 2021
	0	157,936 tCO ₂ e	0
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	143,396 tCO ₂ e		

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. Fortum Solar India Pvt Ltd is the promoter of the project activity. The project activity involves installation of 250 MWp solar power project at village Thirumani, Rayacherlu, Vallur, Balasamundra and Kyataganacherlu of Nafalmadike Hobli, Pavagada Taluk, Tumkur District of Karnataka.

The project estimates the replacement of anthropogenic emissions of greenhouse gases (GHG's) to be approximately 467,318 tCO₂e per year, thereon displacing average of 496,144 MWh/year 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.

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".

The total GHG emission avoided in the current monitoring period is 157,936 tCO₂e.

A.2. Location of project activity

The project activity is located at

Village : Thiumani, Rayacherlu, Vallur, Balasamundra and Kyataganacherlu

Tehsil: Pavagada

District : Tumkur

State: Karnataka

The latitude and longitude are as follows:

Latitude 14° 16'28.0" N

Longitude 77° 24' 50.03" E

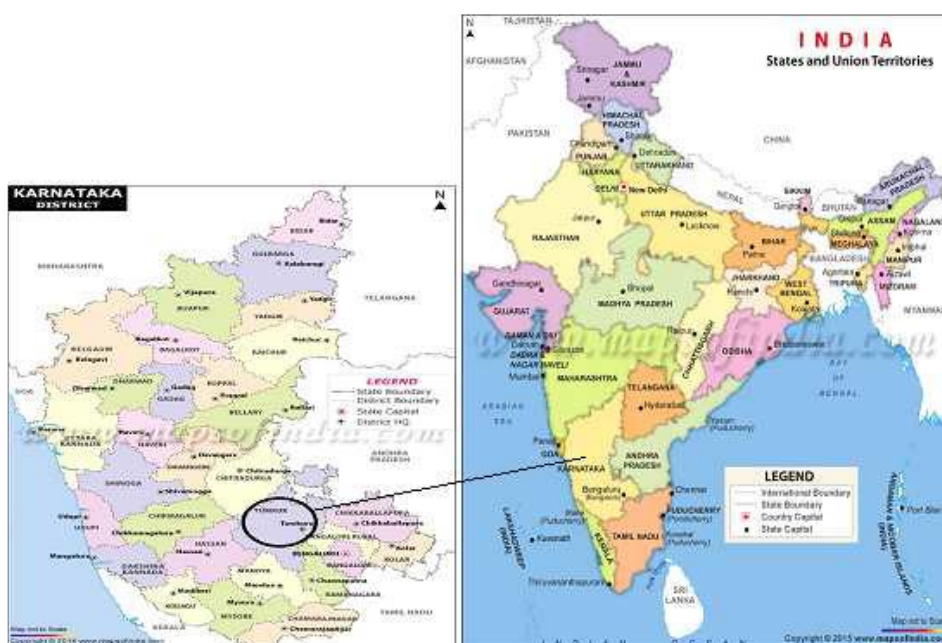




Figure 1. Project Site Satellite view

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)	Fortum Solar India Pvt Ltd	No

A.4. References to applied methodologies and standardized baselines

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Title: Grid-connected electricity generation from renewable sources

Reference: ACM0002 (Version 20.0)¹

Methodological Tool:

Tool for the demonstration and assessment of additionality⁴ (Version 07.0.0, EB 70, Annex 8)

Tool to calculate the emission factor for an electricity system” – Version 07.0 EB 100, Annex04

A.5. Crediting period type and duration

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Type of crediting period	Renewable
Crediting period from	11/09/2020 - 10/09/2027
Length of the Crediting Period	07 Years
Monitoring period from	11/09/2020 to 31/12/2020
Length of the Monitoring Period	112 Days

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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The project activity harness solar energy through installation of PV with total installed capacity of 250 MWp.

Technical detail of the equipment Remark	Technical detail of the equipment Remark
Technology	Thin Film-CdTe modules on Fixed Tilt at 20

¹ <https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO>

	degrees
Solar photovoltaic module	95 Wp Modules
No. of modules	1,536,850
Total Number of Invertors	100 Units
Transformer	100
Central inverters of nominal AC power output	680 kVA-CONEXT CORE XC 680, Schneider Make), three phase, 50 Hz.
Technical & Operational Lifetime	25 years

The project is already commissioned and supplying generated electricity to INDIAN grid. The project activity is running smoothly with any major breakdown and the design changes.

Project Promoters' Name	Site Zone	Capacity (MW)	Commissioning date
Fortum Solar India Pvt Ltd	B5	50	03-08-2019
	B9	50	18-07-2019
	B14	50	15-07-2019
	B20	50	15-07-2019
	B40	50	05-08-2019

B.2. Post-registration changes

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

Not applicable for the present monitoring period.

B.2.2. Corrections

Not applicable for the present monitoring period.

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

Not Applicable

B.2.4. Inclusion of monitoring plan

Not applicable for the present 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 methodological regulatory documents

Not applicable for the present monitoring period.

B.2.6. Changes to project design

Not applicable for the present monitoring period.

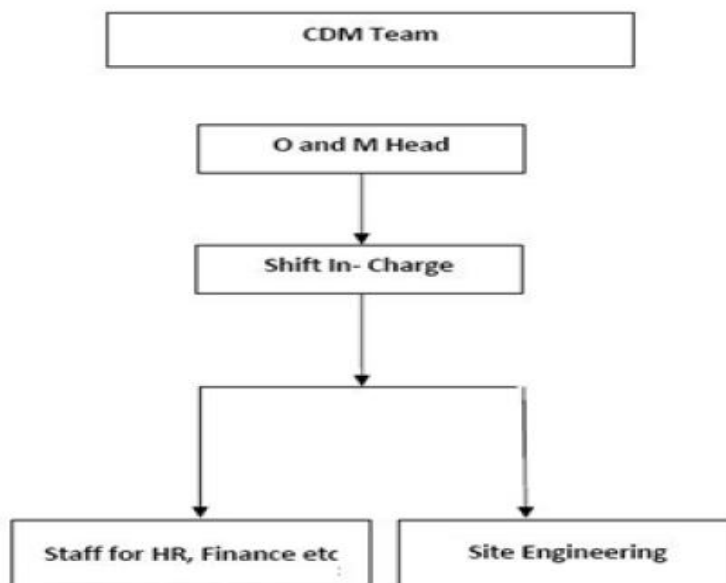
B.2.7. Changes specific to afforestation or reforestation project activity

Not applicable for the project activity.

SECTION C. Description of monitoring system

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected solar power project being implemented in Karnataka, India. The monitoring plan, which is implemented by the project participant describes about the monitoring organization, 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's for this project activity. The team comprises of the following members:



Data Measurement

The export and import energy is being measured continuously using above mentioned Main and Check meters located at the substation. Readings of meters shall be taken on monthly basis by authorized officer of SEB in the presence of PP or representative of PP. Based on the Meter Reading Statement to Fortum Solar India Pvt Ltd., invoices are raised. These invoices can be used for cross checking the meter readings taken for the respective project activity.

Data collection and archiving

Readings from meters are 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

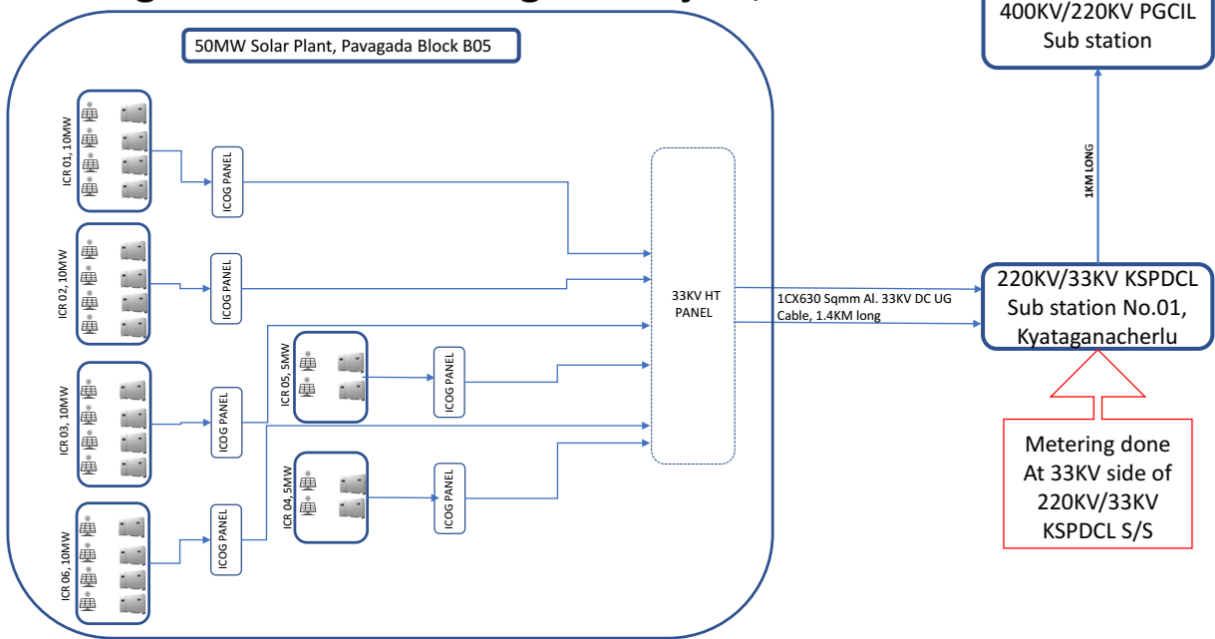
The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

Personnel training

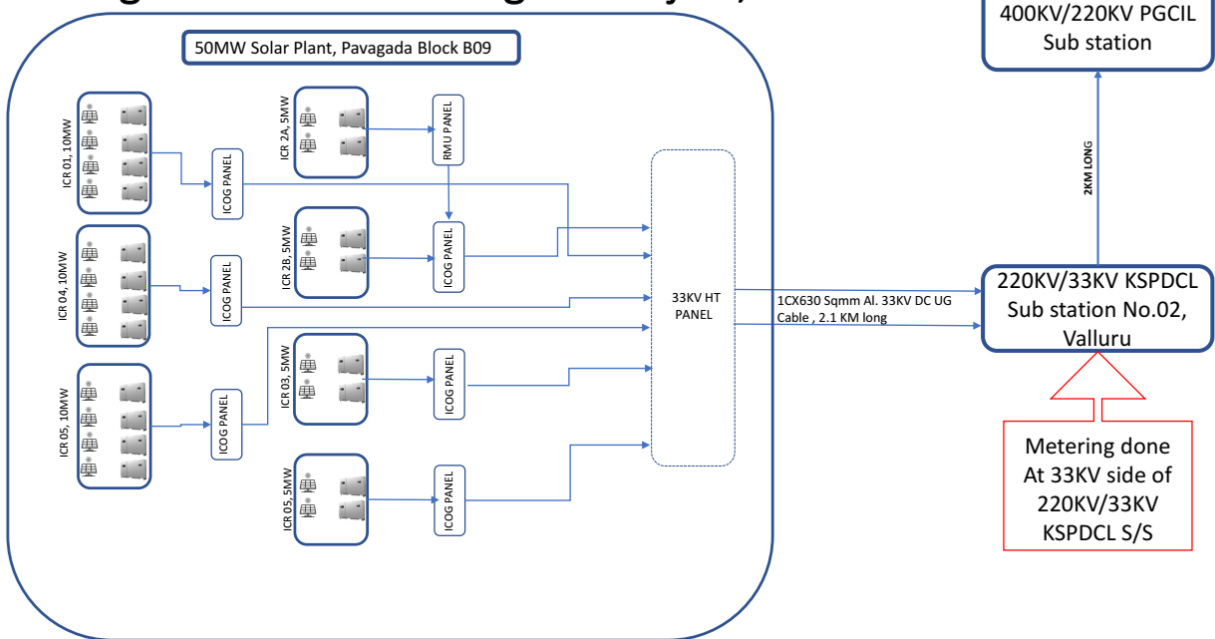
In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff (CDM team) are trained. The plant helpers are trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

Block wise line Diagram of Project activity:

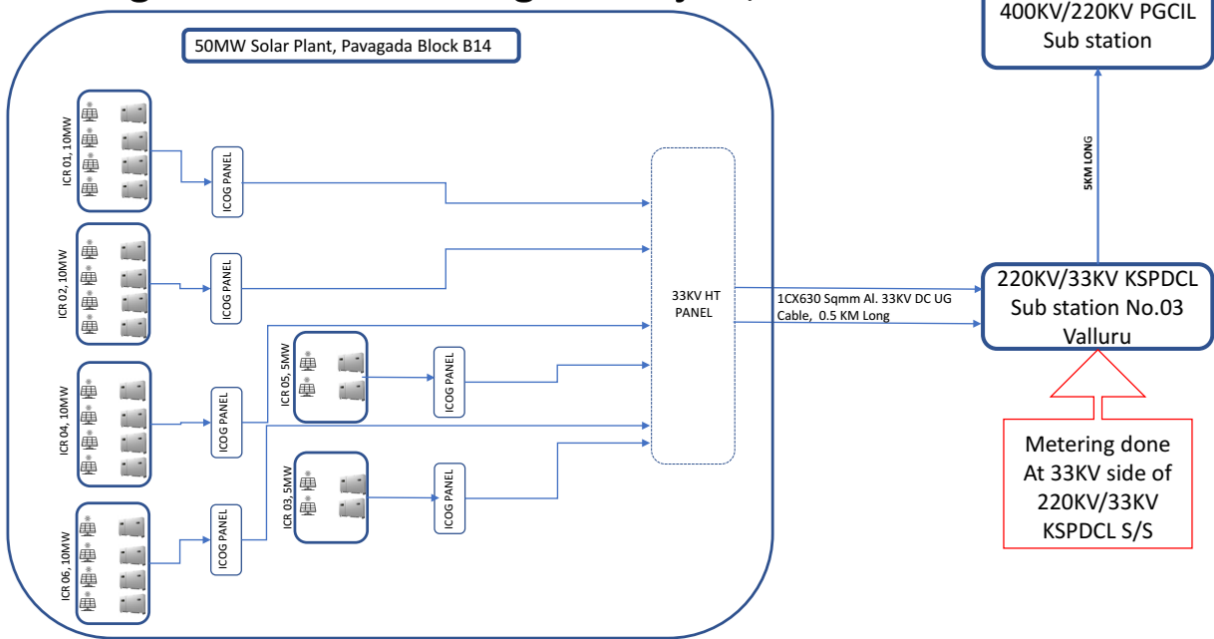
Line diagram of 50MW Pavagada Project, Block B05



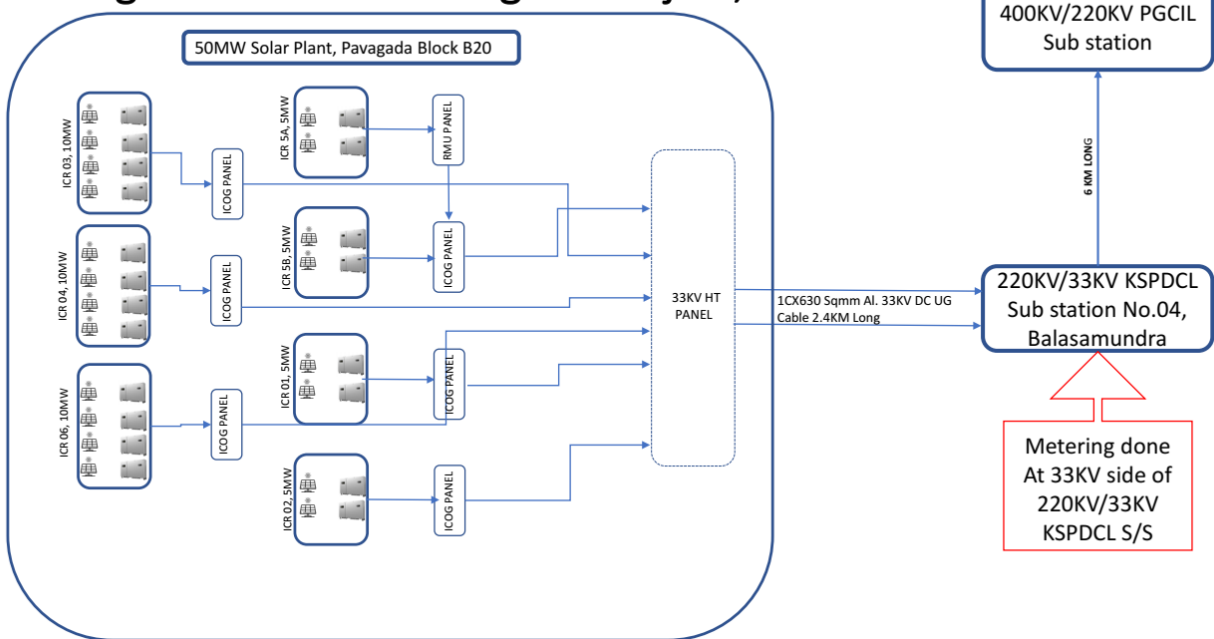
Line diagram of 50MW Pavagada Project, Block B09



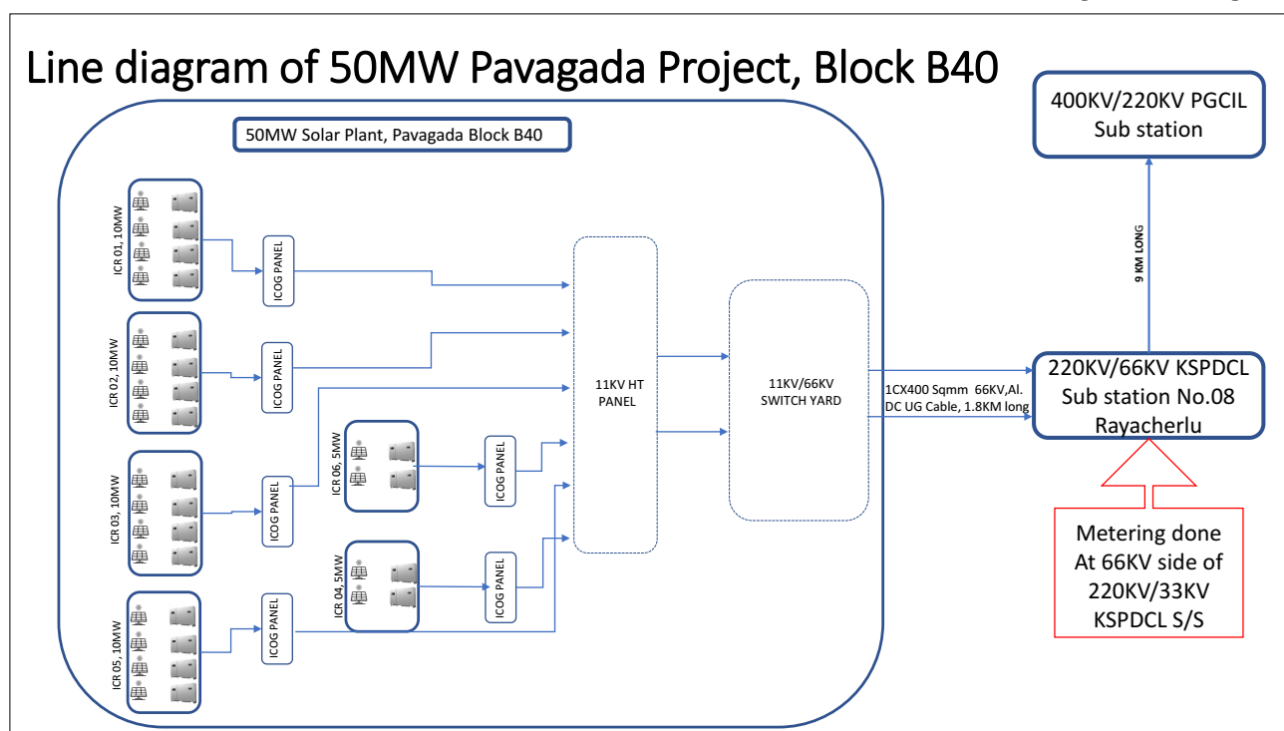
Line diagram of 50MW Pavagada Project, Block B14



Line diagram of 50MW Pavagada Project, Block B20



Line diagram of 50MW Pavagada Project, Block B40



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 15, December 2019
Value(s) applied	0.9622
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as 3-year generation weighted average using data for the years 2016-17, 2017-18 & 2018-19. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 15, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data/parameter	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 15, Dec 2019
Value(s) applied	0.8811
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as 3-year generation weighted average using data for the years 2016-17, 2017-18 & 2018-19. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 15, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data/parameter	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
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 15, Dec 2019 ²³
Value(s) applied	0.9419
Choice of data or measurement methods and procedures	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ 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/parameter	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	$EG_{PJ,y}$
Unit	MWh
Description	Quantity of net electricity generation supplied by the project (Solar) plant/unit to the grid in year y
Measured/calculated/default	Measured
Source of data	Form B reports monthly generation report from state electricity board
Value(s) of monitored parameter	167,678.531
Monitoring equipment	Main meter and Check meter with 0.2 accuracy class having facilities to measure export & import of energy is installed. The meters are sealed, maintained, and calibrated by the DISCOM.
Measuring/reading/recording frequency	Continuous monitoring, hourly measurement and at least monthly recording
Calculation method (if applicable)	The Net electricity is calculated based on Export-115%import Transmission loss. The Net electricity exported to the grid is being crosschecked against the invoice raised by the PP towards the DISCO Monthly meter readings are taken from the main and check meter installed at metering point and certified by the representatives of SEB Officials and the representatives of the project participant. The export and import values of the Credit note or Joint Meter Reports is cross checked with the export and import values mentioned at the electricity sales invoice. Monitoring: Bidirectional Tri vector meter are used Data type: Measured Type of meter: Static type meter (Main & Check). Both are Bidirectional meters. Class of meter: 0.2s. Calibration frequency: One in five years
QA/QC procedures	The calibration of all the meters will be undertaken at required intervals (once in five years as per CEA notification) and faulty meters will be duly replaced immediately. The meters are of accuracy class 0.2s. The meter accuracy class and calibration interval is under purview of state electricity board and PP do not have any control on it. It is also noted that apportioning procedure is under control of state electricity board and PP do not have any control on it. The available parameter to PP is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter.
Purpose of data/parameter	Calculation of Baseline emissions
Additional comments	The data would be archived electronically and maintained for the entire crediting period plus two years.

D.3. Implementation of sampling plan

No sampling is required

SECTION E. Calculation of emission reductions or net anthropogenic removals**E.1. Calculation of baseline emissions or baseline net removals**

As per the approved consolidated Methodology ACM0002 version 20.0 that Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid- connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where:

BE_y = Baseline emissions in year y (tCO₂/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" (tCO₂/MWh)

Therefore,

$$BE_y = 167,678.531 \times 0.9419$$

$$BE_y = 157,936 \text{ tCO}_2/\text{year (rundown values)}$$

Since $ER_y = BE_y$

Therefore, $ER_y = 157,936 \text{ tCO}_2\text{e/year}$

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

As per registered PDD, there is no project activity emissions associated with the project activity.

E.3. Calculation of leakage emissions

As per registered PDD, there is no leakage associated with the project activity.

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 until 31/12/ 2020	From 01/01/ 2021	Total amount
Total	157,936	0	0	0	157,936	0	157,936

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 for this monitoring period in the PDD (t CO ₂ e)
157,936	143,396

E.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the PDD”

As per CDM registered PDD, 467,318 tCO₂e is the amount of CERs generated annually. Therefore, following unitary method, the amount of estimated ex ante for this monitoring period is identified. The total number of days in this monitoring period is 112.

$$= (467,318/365) * 112$$

$$= 143,396 \text{ tCO}_2\text{e}$$

E.6. Remarks on increase in achieved emission reductions

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From E.5 above, we can observe that actual emission reduction for the monitoring is increased by 9.21%. The increase in actual emission reductions is due to a greater number of sunny days in the monitoring period, which is not in control of the project owner. The increased values has been checked with the IRR breaching values, the increased in PLF found to be within additionality breaching values.

E.7. Remarks on scale of small-scale project activity

Not Applicable as the project is in large-scale project category.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
09.0	8 October 2021	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 03.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN).
08.0	6 April 2021	Revision to: <ul style="list-style-type: none"> • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
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.

<i>Version</i>	<i>Date</i>	<i>Description</i>
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.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		