15 MW Solar Photovoltaic Power Project at Gujarat

Document Prepared By: EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Title: 15 MW Solar Photovoltaic Power Project at Gujarat

CDM Registration Details:

UNFCCC Project ID: - 8671[1]
Registration Date: - 27/12/2012

VCS Monitoring Details:

Monitoring Period: 01 (1st Periodic Verification)
Monitoring Period: 13/03/2012 to 26/12/2012
Total VCU for this monitoring period: 18,207 VCUs

Project Activity:

ACME Solar Technologies (Gujarat) Private Limited (ASTGPL) is envisaging implementation of a 15 MW solar photovoltaic technology based power plant in Village-Wadgam, Tehsil-Khambat in Anand District in the state of Gujarat. The electricity generated from the project activity is exported to the regional electricity grid and sold to Gujarat Urja Vikas Nigam Limited (GUVNL) under a power purchase agreement.

ASTGPL has decided to use thin film CdTe technology for its 15 MW project. The Solar power system is designed with number of sub main plants and solar PV arrays. Solar grid connected inverters of suitable capacity are used.

Since the project activity is a Greenfield project, the approved small scale methodology AMS.I.D already prescribes the baseline scenario as being "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 into the grid". The electricity exported by the proposed project activity would displace an equivalent amount of electricity generated by the power plants already operational and proposed to be added in the NEWNE Grid which relies predominantly on fossil fuels (particularly coal). Thus, it contributes towards reduction in the demand-supply gap during periods of electricity shortage and increase in the share of renewable energy in the grid mix.

Technology specification of the product is further described below.

Type of solar photovoltaic modules	Thin Film

[1] https://cdm.unfccc.int/Projects/DB/BVQI1355214849.13/view

Make of solar photovoltaic modules	First Solar
Model of PV modules	FS-272 FS-275 FS-277 FS-280
Capacity of each photovoltaic modules	72.5 W 75 W 77.5 W 80 W
Number of solar PV modules installed	1.935 lakh
Type of inverters	Central
Make of inverters	ABB
Capacity of each inverter	500 kW
Total capacity of solar power project	15.00 MW

Note -It is to be noted that the technical specifications provided above was available at the time of commissioning of project activity. However as a part of O&M, few modules have some problem of degradation, thus supplier has replaced few modules with another higher watt modules of 110 Watt and less number of modules. It is to be noted that there is no change in capacity of project activity and project remains as 15 MW rated capacity. Due to higher watt modules, less number of modules are installed. This change does not impact any change in capacity of project activity. The change in modules is started from Sept 2015 onwards and these change is not applicable for current VCS monitoring period..

Currently there are 2970 modules of 72.5 watt, 22680 modules of 75 Watt, 54270 modules of 77.5 Watt, 7575 modules of 80 Watt and 75330 modules of 110 Watt and total capacity of project activity remains as 15 MW.

The supporting evidences for the change in modules are submitted to DOE. It is to be noted that in future also, such change in modules will happen without change in capacity of project activity

Power evacuation infrastructure has been set up as per the guidelines of Gujarat Electricity Regulatory Commissions (GERC), Central Electricity Regulatory Commission (CERC) and the respective Distribution Company (DISCOM). The proposed project is connected to the nearby ≥66 kV grid substation. The grid connection unit continuously synchronize the incoming solar power with the available grid for safe and efficient operation. The metering of net electricity generated is undertaken at the grid interconnection point.

The technology for the project is environmentally safe and sound. Further, there is no technology transfer associated with the project activity.

Project activity is implemented and commissioned on 13/03/2012 and operated as per the registered PDD.

During the current monitoring period, the project activity was operated and monitored in accordance with the applicable baseline and monitoring methodology AMS I D, Version 17 and as per registered PDD.

The total emission reductions achieved for the current monitoring period are 18,207 tCO_2e.

1.2 Sectoral Scope and Project Type

Sectoral Scope: Energy Industries (renewable/non-renewable)

Project Type: According to small-scale CDM modalities the project activity falls under:

Type I – Renewable Energy Projects
Category ID – Grid connected renewable electricity generation, (Version 17, EB 61).

The project activity is a not grouped project.

1.3 Project Proponent

Roles and Responsibilities of the Project Proponents:

- Overall responsibility of implementation of the VCS project
- Daily monitoring and record keeping
- Collection of credit reports

Organization name	ACME Solar Technologies (Gujarat) Private Limited
Contact person	Mr. Sandeep Gupta
Title	Director
Address	Plot No. 48, Sector-5, IMT Manesar, Gurgaon, Haryana, 122050
Telephone	+91-124-4817000
Email	sandeep.gupta@acme.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Mr. Manish Dabkara
Title	MD & CEO
Address	Office No. 201, EnKing Embassy Plot No. 48, Scheme No. 78 Part II, Vijay Nagar INDORE – 452001
Telephone	+91-731-4289086
Email	manish@enkingint.org

1.5 Project Start Date

The project start date for this project is 13/03/2012. This is the day on which the project activity was commissioned.

1.6 Project Crediting Period

The project crediting period shall be a maximum of ten years which will be renewed at most twice.
Project commissioned on 13/03/2012 hence start date of PRE-CDM VCS monitoring period is 13/03/2012.
VCS first crediting period is from 13/03/2012 to 12/03/2022.

1.7 Project Location

Host Party	: India
Region	: Western
State	: Gujarat
District	: Anand,
Village	: Wadgam
Taluka	: Khambat

The co-ordinates of project activity are as below
Latitude: 22° 19' 12" North
Longitude: 72° 25' 48" East
The site of the proposed PV power plant is on fairly flat land located in village Wadgam approximately 20 km from the Tehsil Khambat, 60 km from the town of Anand and 86km from Ahmedabad in Gujarat. It lies at an altitude of approximately 6m, above mean sea level. The nearest airport is Ahmedabad. National Highways NH8A and NH8 pass from approximately 43km and 53km respectively from the selected site. State highway connecting Khambat and Bhaunagar lies 14 km from site. Site is well connected by an internal road suitable for transport of heavy equipment.
The below is location map for the project activity

1.8 Title and Reference of Methodology

Title: Grid connected renewable electricity generation

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

Type: I-Renewable Energy Projects

Category: D

Reference: AMS.I.D, Version 17, EB 61
Tool to calculate the emission factor for an electricity system. Version 2.2.1/EB 63
The monitoring of Emission Reductions generated by the project follows the same principles that have been adopted for the monitoring of emission reductions under the Clean Development Mechanism.

In accordance with the AMS I.D methodology, the Monitoring shall consist of the metering of electricity generated by renewable technology. As per monitoring plan in the PDD, the data to be monitored is net electricity exported to the grid.

1.9 Other Programs

Project has been registration with UNFCCC under Clean Development Mechanism program, Registration reference number is 8671[2]. Hence PP will be availing carbon credits accrued from the project for the first crediting period 27/12/2012 to 26/12/2019 under Clean Development Mechanism. There is no overlapping of VCS and CDM monitoring periods since PP is availing VCS credits for the monitoring period (13/03/2012 to 26/12/2012) which is before the start date of CDM crediting period i.e. 27/12/2012.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The project activity is in operation since 13/03/2012 (Date of commissioning of project activity).
No changes / modifications in the plant equipment taken place as on date. There are no changes that have happened in project activity which may impact the applicability of the methodology.

2.2 Deviations

2.2.1 Methodology Deviations

No Deviations in Methodology from the registered project to actual scenario

2.2.2 Project Description Deviations

It is to be noted that the technical specifications provided in section 1.1 above was available at the time of commissioning of project activity. However as a part of O&M, few modules have some problem of degradation, thus supplier has replaced few modules with another higher watt modules of 110 Watt and less number of modules. It is to be noted that there is no change in capacity of project activity and project remains as 15 MW rated capacity. Due to higher watt modules, less number of modules are installed. This change does not impact any change in capacity of project activity. The change in modules is started from the period from Sept 2015 onwards.

At the time of commissioning, the module configuration was as below

S. no	Capacity of modules (W)	Number of modules	Total capacity
1.	72.5	2970	215,325
2.	75	56790	4,259,250

[2] https://cdm.unfccc.int/Projects/DB/BVQI1355214849.13/view

3.	77.5	70290	5,447,475
4.	80	63495	5,079,600
		Project Capacity in watts	15,001,650

Due to replacement of modules, the new configuration of modules is as below

S. no	Capacity of modules (W)	Number of modules	Total capacity
1.	72.5	2970	215,325
2.	75	22680	1,701,000
3.	77.5	54270	4,205,925
4.	80	7575	606,000
5.	110	75330	8,286,300
		Project Capacity in watts	15,014,555

Even after replacement of modules, the project activity capacity remains same as 15 MW and there is no any impact applicability of the methodology, additionality or the appropriateness of the baseline scenario, and the project remains in compliance with the applied methodology.

The above deviation is not applicable for current VCS monitoring period.

2.3 Grouped Project

There are no new instances in this grouped project activities during this monitoring period.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/MWh
Description	Operating Margin Emission factor of the NEWNE grid
Source of data	Referred from CO2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 6.0.
Value applied:	0.9942
Justification of choice of data or description of measurement methods and procedures applied	The data (for the years 2007-08, 2008-09 and 2009-10) has been sourced from CO2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 6.0."
Purpose of the data	Calculations of Baseline emissions
Comments	The value has been fixed ex-ante.

Data / Parameter	**$EF_{grid,BM,y}$**
Data unit	tCO_2/MWh
Description	Built Margin Emission factor of the NEWNE grid
Source of data	Referred from CO2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 6.0.
Value applied:	0.8123
Justification of choice of data or description of measurement methods and procedures applied	The data (for the year 2009-10) has been sourced from CO2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 6.0.
Purpose of the data	Calculations of Baseline emissions
Comments	The value has been fixed ex-ante.

Data / Parameter	$EF_{CO2,grid,y}$
Data unit	tCO_2/MWh
Description	Combined Margin CO2 emission factor for NEWNE grid
Source of data	Calculated as per 'Tool to calculate the emission factor for an electricity system' Version 2.2.1 (EB-63) (i.e. 75% of OM and 25% of BM values).
Value applied:	0.9487(calculated)
Justification of choice of data or description of measurement methods and procedures applied	The data has been sourced from CO2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 6.0. Since the proposed project activity is a solar power project, the combined margin emission factor is calculated as 75% of OM and 25% of BM emission factors.
Purpose of the data	Calculations of Baseline emissions
Comments	The value has been fixed ex-ante.

3.2 Data and Parameters Monitored

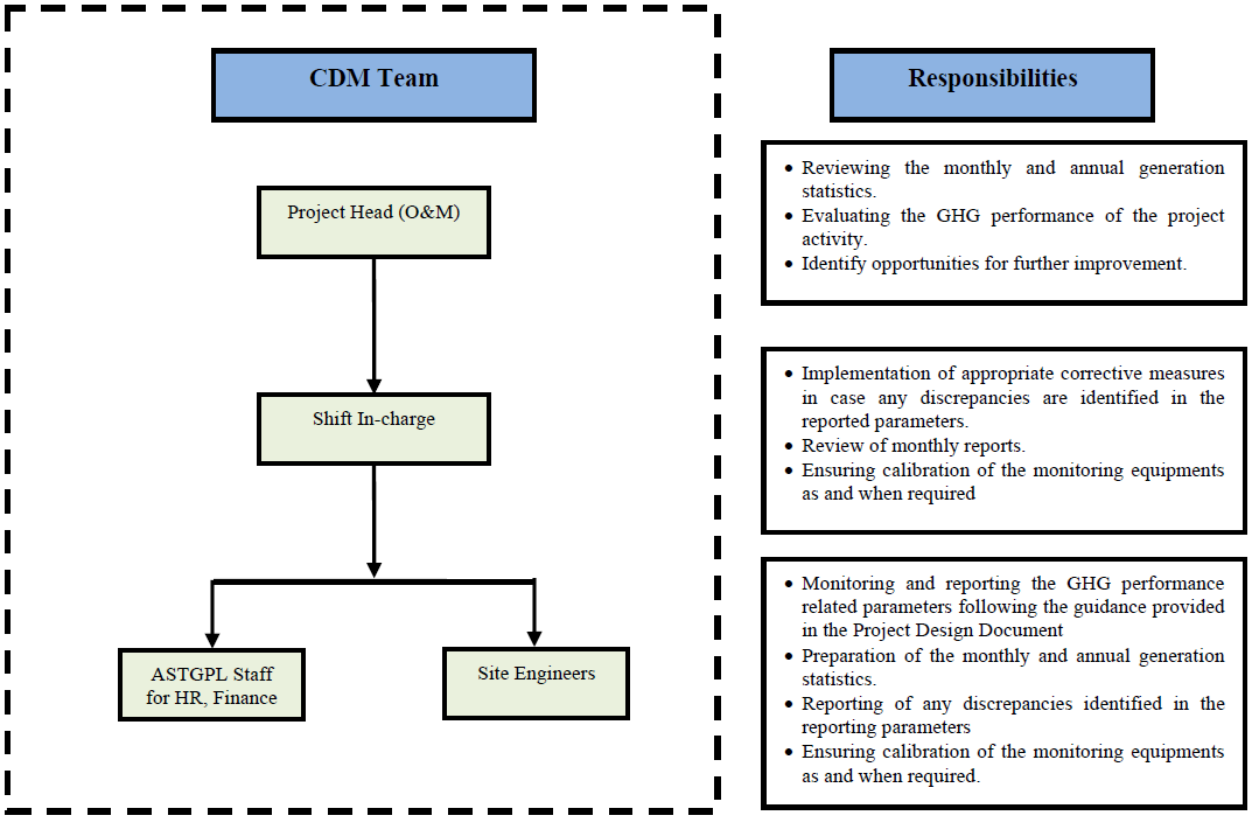
Data / Parameter	**$EG_{BL,y}$**
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid
Source of data	Monthly State Energy Account Report.
Description of measurement methods and procedures to be applied	ABT Main meters, two in number (one for each bay or line), are installed at the plant to continuously measure the grid electricity export and import. These measurements are recorded at least once in a month by representatives of the State utility and ASTGPL. The

	monthly electricity generation data are uploaded on the SLDC website. The net electricity exported/supplied to the grid are calculated as the difference between the measured quantities of the grid electricity export and the import. In the event that the main meters are not in service as a result of maintenance, repairs or testing, then dedicated meters for the plant at the GETCO substation will be used. No such event occurred for current monitoring period.
Frequency of monitoring/recording	Monitoring continuous and Reported monthly. The data is recorded every day and monthly values are reported in the monthly share certificates issued by GETCO
Value monitored:	19,192.139
Monitoring equipment	ABT Main meters, two in number (one for each bay or line), are installed at the plant to continuously measure the grid electricity export and import. These measurements are recorded at least once in a month by representatives of the State utility and ASTGPL. The monthly electricity generation data are uploaded on the SLDC website. The net electricity exported/supplied to the grid are calculated as the difference between the measured quantities of the grid electricity export and the import. In the event that the main meters are not in service as a result of maintenance, repairs or testing, then dedicated meters for the plant at the GETCO substation will be used. No such event occurred for current monitoring period. All the meters have an accuracy class of 0.2s. Please refer section 3.3 of MR for meter details like serial number, make, accuracy class and calibration details.
QA/QC procedures to be applied	Calibration of all the meters are undertaken at least once in three years and no any faulty meters will be duly replaced immediately. Calibration are done by an authorized agency or reputed laboratory. All the meters are sealed by the State utility and are in control of the State utility. The main meter reading is cross checked with records for sold electricity (invoices).
Purpose of the data	For Baseline calculations
Calculation method	Not applicable. The net electricity exported/supplied to the grid are calculated as the difference between the measured quantities of the grid electricity export and the import.
Comments	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 CERs for this project activity, whichever occurs later..

3.3 Monitoring Plan

The organizational structure for the proposed power plant envisages site engineers responsible for O&M of the plant. The site engineers will report to the shift in-charge, who will then report to the Project Head (O&M). The day-to-day operation like planning the routine maintenance, safety and environmental control will be placed under the care of the shift in charges. All administrative functions like personnel, industrial relations, labour welfare and financial functions will be looked after by ACME Solar Technologies (Gujarat) Private Limited. The organizational structure and responsibilities on project operation, monitoring and data recording has been mentioned below:



Operation & Management Structure

Reading and Correction of Meters:

For the purpose of energy accounting, ASTGPL provided ABT compliant meters at the interface points. Interface metering is confirm to the Central Electricity Authority (Installation and Operation Meters) Regulation, 2006. ABT Main meters, two in number (one for each bay or line), are installed at the plant to continuously measure the grid electricity export and import. These measurements are recorded at least once in a month by representatives of the State utility and

ASTGPL. The monthly electricity generation data is uploaded on the SLDC website. The net electricity exported/supplied to the grid is calculated as the difference between the measured quantities of the grid electricity export and the import. In the event that the main meters are not in service as a result of maintenance, repairs or testing, then dedicated meters for the plant at the GETCO substation will be used. No such event is occurred during current monitoring period.

Calibration of Meters:

Calibration of all the meters are undertaken once in three years. No any faulty meters observed during calibration. Calibration are done by an authorized agency or reputed laboratory. All the meters are sealed by the State utility and are in control of the State utility.

Emergency Preparedness and Uncertainty Procedure:

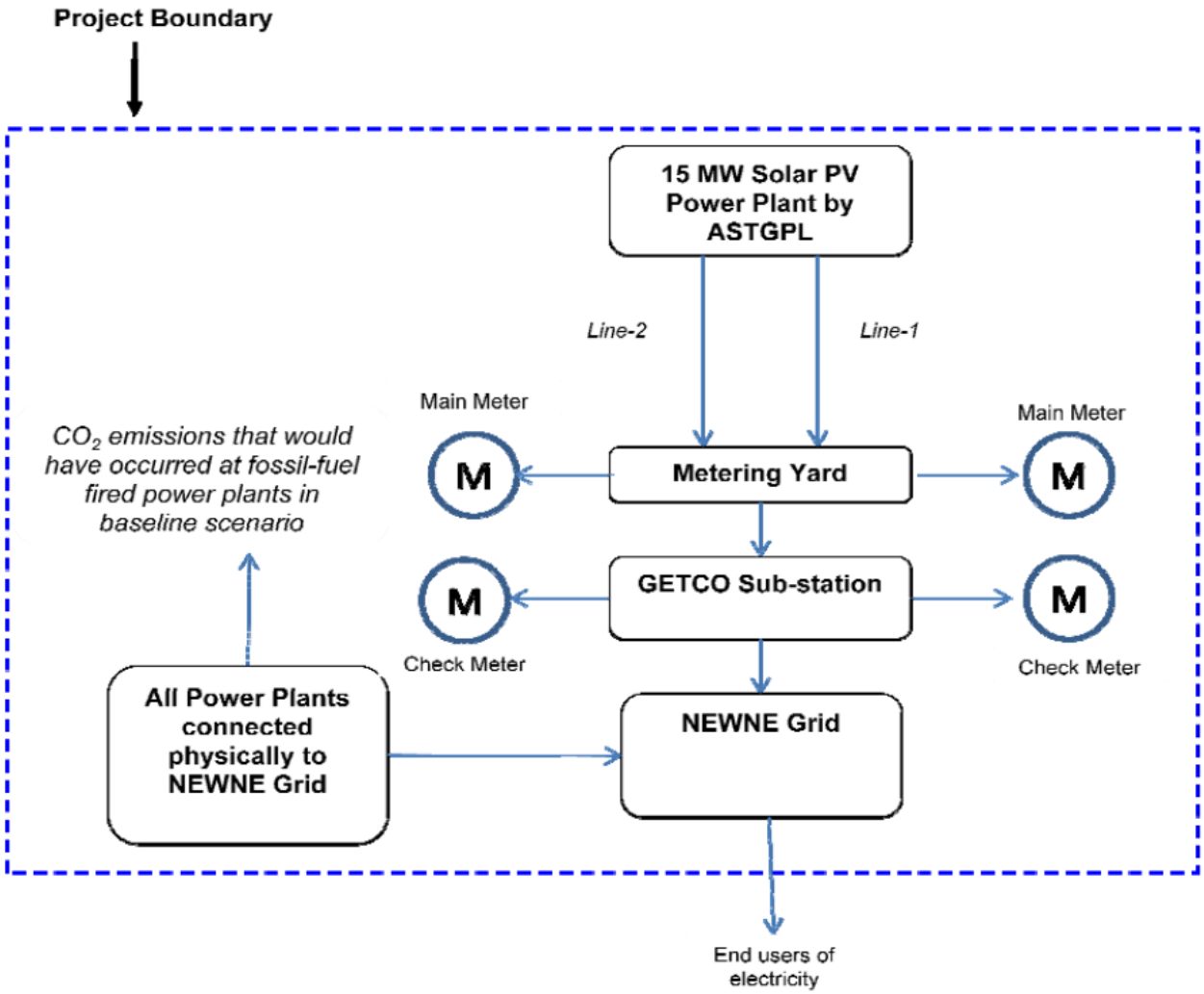
In case Main meters are found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meters are not in service as a result of maintenance, repairs or testing, dedicated meters for the plant at the GETCO substation will be used. The main meter reading will be cross checked with records for sold electricity (invoices).

There is no any such emergency occurred.

Data Recording and Archiving:

ASTGPL keep complete and accurate records of operating log at the Power Plant. The data are 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 CERs for this project activity, whichever occurs later.

The metering arrangement for the project activity is as below



The main meters used for calculation of net electricity supplied to grid are as below

Serial Number	Make	Accuracy Class	Calibration Date	Due date of calibration
GJ1301-A	Secure	0.2s	14/07/2015	14/07/2018
GJ1302-A	Secure	0.2s	14/07/2015	14/07/2018

There is delay in calibration and PP do not have calibration report of meters at the time of commissioning. The calibration report dated 14/07/2015 shows errors within permissible limit, thus error factor till July 2015 need to be applied conservatively. Being VCS monitoring period from 13/03/2012 to 26/12/2012, the error factor is applied for complete monitoring period conservatively.

It is to be noted that the check meters are located at GETCO substation and PP do not have details of check meters available with them. These meters are used only when main meters are not in service and such situation is not occurred for project activity since commissioning. Due to non-availability of check meter details to PP, the check meters detail are not mentioned in MR.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Formula used to calculate the net emission reduction for the project activity is

$ER_Y = BE_Y – PE_Y – LE_Y$

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
LE_Y = Leakage Emissions in tCO_2/year

Baseline Emission (BEY)
BE_y is calculated by multiplying the net quantity of electricity supplied to the grid by this project activity ($EG_{BL,y}$) with the CO_2 emission factor for the grid ($EF_{CO2, grid, y}$) as follows:

$BE_y = EG_{BL, y} * EF_{CO2, grid, y}$

Where:

$EF_{CO2, grid, y}$ = Baseline emission factor in tCO_2/MWh = 0.9487 tCO2/MWh

$EG_{BL, y}$ = Net electricity supplied to the regional grid in year y
BEy = 19,192.139 MWh X 0.9487 tCO_2/MWh

= 18,207 tonnes of CO_2 (Rounded down value)

4.2 Project Emissions

The project activity is a solar energy project. As per methodology and registered PDD, it is zero
Thus, PEy = 0

4.3 Leakage

The project activity is a solar energy project. As per methodology and registered PDD, it is zero.
Thus, LEy = 0

4.4 Net GHG Emission Reductions and Removals

Vintage wise Emission Reductions are as follows:

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
13/03/2012 to 26/12/2012	18,207	0	0	18,207
Total	18,207	0	0	18,207

APPENDIX 1

NA