BUNDLED SOLAR PV BASED POWER GENERATION BY JKLCL

Document Prepared By PA Research & Consultants Pvt. Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed project activity is a bundled solar PV based power generation by JK Lakshmi Cement Limited (JKLCL) at its units located in Haryana, Gujarat, Rajasthan and Chhattisgarh states of India. JK Lakshmi Cement is part of prestigious organisation JK Group a group known worldwide for its business legacy of more than a century. In line with organizsational goal to maximise use of renewable energy, JKLCL has decided to install rooftop solar PV based power generation at its manufacturing units.

The proposed project activity comprises of 0.5MWp, 0.5MWp, 0.034MWp, 2.36MWp and 2.0MWp solar PV based rooftop systems at its unit in Jhajjar, Kalol, Sirohi, Surat and Durg in Haryana, Gujarat, Rajasthan and Chhattisgarh state of India, with aggregated installed capacity of 5.7MW. In all proposed locations polycrystalline PV module technologies will be used. The project activity involves the installation and operation of a green field solar photovoltaic (PV) power plant at its manufacturing facilities at respective location. The earliest sub bundle under proposed project activity has been commissioned on 8 Jan 2017.

The purpose of the project activity is to utilize the sunlight as energy source for carbon-neutral electricity generation. The net generated electricity from the project activity will be used in its manufacturing facility for captive consumption at respective units. The generated electricity will be supplied to plant through Indian grid. The project activity will be displacing the estimated annual net electricity generation i.e. 9597 MWh from the Indian grid, which otherwise would have been imported from the Indian grid. The project activity doesn't involve any GHG emission sources. The estimated annual average and the total CO_2e emission reduction by the project activity over the first renewable crediting period of 10 years are expected to be 92630 tCO2e.

The spatial extent of project boundary is the Indian grid. The project activity will supply electricity to respective manufacturing facility through Indian grid through transmission lines connected through sub-stations. Since the project activity will generate electricity through solar energy, a clean renewable energy source it will not cause any negative impact on the environment and thereby contributes to climate change mitigation efforts.

Capacity	Village/Taluka	District	State	Owner
500kW	Bajitpur/Matanhail	Jhajjar	Haryana	JK Lakshmi Cement Ltd
2360kW	Dastan/Palsana	Surat	Gujarat	JK Lakshmi Cement Ltd
500kW	Moti Bhoyan/Kalol	Gandhinagar	Gujarat	JK Lakshmi Cement Ltd
34kW	Jaykay Puram	Sirohi	Rajasthan	JK Lakshmi Cement Ltd
2000kW	Malpuri Khurd	Durg	Chhattisgarh	JK Lakshmi Cement Ltd
5.7MWdc				

The 2MW at Durg is not yet implemented and is likely to be commissioned in December 2018. The technical details e.g. PV module manufacturre, number, inverter capacity and number etc will be provided in first periodic verification.

In the absence of the project activity an equivalent amount of electricity would have been generated from the connected/ new power plants in the integrated Indian grid, which are

predominantly based on fossil fuels[1]. On the contrary the operation of solar modules is emission free throughout the lifetime of the project activity. As per the applicable methodology the baseline scenario for the project activity is the grid based electricity system, which is also the pre-project scenario.

1.2 Sectoral Scope and Project Type

According to Appendix B of the Simplified Modalities and Procedures (M&P) for small-scale CDM project activities, the project activity falls under:

Sectoral scope: 01- Energy Industries

Type: I- Renewable Energy Project

Category: AMS I. D. - Grid Connected renewable electricity generation"

The proposed project activity is not a grouped project.

1.3 Project Proponent

Organization name	JK Lakshmi Cement Limited
Contact person	Mr Naveen Kumar Sharma
Title	President-Projects
Address	Nehru House 4, Bahadur Shah Zafar Marg, New Delhi-110002
Telephone	+91 11 33001142
Email	naveensharma@lc.jkmail.com

1.4 Other Entities Involved in the Project

Organization name	PA Research & Consultants Pvt. Ltd.
Role in the project	Consultants
Contact person	Mr Phool Chand
Title	Director
Address	317, Vardhman Star Mall, Sector-19, Faridabad-121002, Delhi NCR, India
Telephone	+91 129 4013677
Email	pchand@pars-consultants.com

1.5 Project Start Date

The start date of the project activity is 08/01/2017, which is date of commissioning and start date of actual operation of the first sub bundle under proposed project activity.

[1] http://www.cea.nic.in/reports/monthly/executive_rep/nov11/8.pdf

[2] http://www.cea.nic.in/executive_summary.html

1.6 Project Crediting Period

The PP has chosen renewable crediting period of 10 years, crediting period start from 8th Jan 2017 (The date of commissioning) to 7th Jan 2027 (including both days). The crediting period can be renewed as 2x10 years.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	--

Year	Estimated GHG emission reductions or removals (tCO_2e)
2017-18	9263
2018-19	9263
2019-20	9263
2020-21	9263
2021-22	9263
2022-23	9263
2023-24	9263
2024-25	9263
2025-26	9263
2026-27	9263
Total estimated Ers	**92630**
Total number of crediting years	10
Average annual Ers	**9263**

1.8 Description of the Project Activity

The instant project activity involves installation of 5.7MW_{DC} solar power project based on polycrystalline technology. The major components of the solar project are the solar modules, module mounting structures, transformer etc. The solar modules are mounted on the module mounting structures. The solar module is a packaged, connected assembly of solar cells which uses the incident photons from the sun light and converts it into electricity. The solar module generates DC power, which is converted to AC power with the help of inverters.

The instant project encompasses the following at respective sites:

Jhajjar:

Particulars	Details
Nominal Power	500 kW

Particulars	Details
AC Power	0.45MW
No. of modules	1569
Module make	Renesola
Module Type	JC320M-24/Ab
Rated Voltage	36.8V
Rated Current	8.69 Amp
Mounting	Rooftop
Inverter	9 Inverter includes 50kWac (0.45MWac)
Make	Delta

Kalol:

Particulars	Details
Nominal Power	500 kW
AC Power	0.45MW
No. of modules	1561
Module make	Renesola
Module Type	JC320M-24/Ab
Rated Voltage	36.8V
Rated Current	8.69 Amp
Mounting	Rooftop
Inverter	9 Inverter includes 50kWac (0.45MWac)
Make	Delta

Surat:

Particulars	Details
Nominal Power	2360 kW
AC Power	2.02MW

Particulars	Details
No. of modules	7644
Module make	Trina Solar
Module Type	315wp
Rated Voltage	36.8V
Rated Current	8.69 Amp
Mounting	Rooftop
Inverter	47Inverter includes 43kWac (2.02MWac)
Make	Huawei

Jaykay Puram:

Particulars	Details
Nominal Power	30.4 kW
AC Power	0.03MW
No. of modules	95
Module make	Vikram Solar
Module Type	320wp
Rated Voltage	37.65V
Rated Current	8.5 Amp
Mounting	Rooftop
Inverter	1Inverter includes 30kWac (0.03MWac)
Make	Delta

Durg:

Particulars	Details
Nominal Power	2000 kW

Particulars	Details
AC Power	1.9MW
Inverter	Total capacity 1.9MW

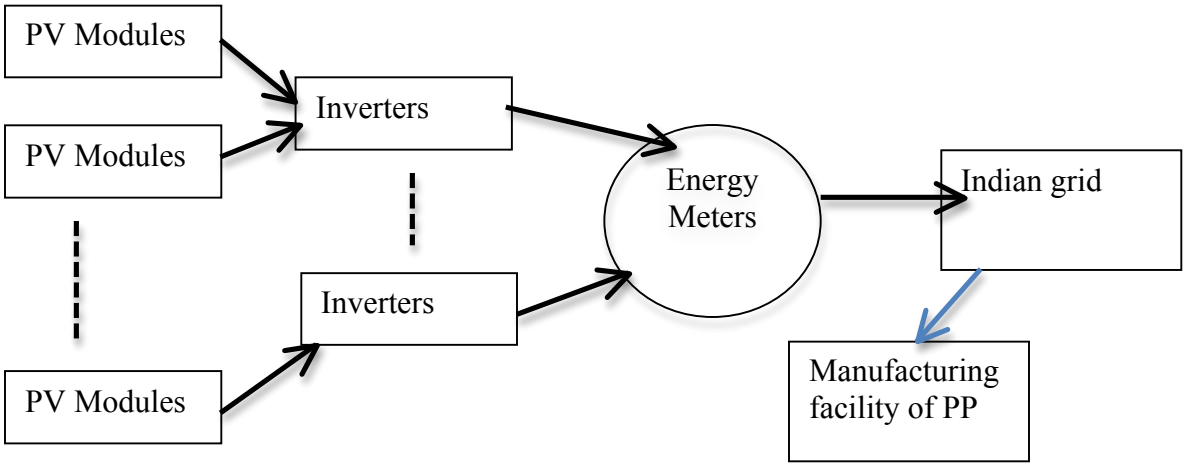

Fig 1: Schematic arrangements of systems and monitoring equipment

The average lifetime of the modules under project activity is around 25 years as per the equipment supplier specifications. The electricity generation estimates by third party is considered for emission reduction calculation.

In the absence of the project activity the equivalent amount of electricity would have been imported from the Indian grid, which is predominantly based on fossil fuels[2], hence baseline scenario of the project activity is the grid based electricity system, which is also the pre-project scenario.

The solar project converts the incident sunlight into electricity and is a GHG emission free form of energy generation. The technology and the project do not pose any adverse threat to the environment and contribute positively in reducing GHG emissions by displacing energy generation from fossil fuel powered projects. The proposed project activity is environmentally safe to implement and operate. The Solar PV modules are manufactured by Candadian Solar, the rest of the equipment required by the project activity are available in the country.

2 http://www.cea.nic.in/executive_summary.html

1.9 Project Location

All project sites are well connected by district roads to the nearest town.The physical address and geographic co-ordinate of the sub project activities under the project is provided below.

Latitude	Longitude	Vill	Taluk	District	State
28° 29' 38"N	76° 21' 30"E	Bajitpur	Matanhail	Jhajjar	Haryana
24° 41' 28"N	73° 00' 11"E	Jaykaypuram	Sirohi	Sirohi	Rajasthan
21° 08' 24"N	73° 01' 11.99"E	Dastan	Palsana	Surat	Gujarat
28° 30' 00"N	76° 21' 35.99"E	Moti Bhoyan	Kalol	Gandhinagar	Gujarat
21° 22' 19"N	81° 26' 56"E	Malpuri Khurd	Dhamdha	Durg	Chhattisgarh

1.10 Conditions Prior to Project Initiation

This is a Greenfield project (new facility). Prior to proposed project activity, there were no power generation facilities based on solar PV at respective sites. In pre-project scenario the respective PP was importing the required electricity from the Indian grid to meet its captive requirement of electrical energy.

The project activity is a Greenfield project activity with no power generation facilities existing at the project sites in the pre-project scenario. In the pre-project scenario equivalent amount of

electricity that would be generated by the project activity to be utilised in manufacturing facility of PP, would have been continued to import from Indian grid, which is dominated by fossil fuel based thermal power plan.

As established the baseline scenario for the project activity is same as continuation of the pre-project scenario wherein equivalent amount of electricity shall be imported from carbon intensive Indian grid. The project activity will thus reduce the anthropogenic emissions of Green House Gases (GHGs) in to the atmosphere associated with the equivalent amount of electricity generation from the fossil fuel based grid connected power plant.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

There is no legal requirement on the choice of a particular technology for generating power in India. The project activity conforms to all the applicable laws and regulations in India.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

The following evidences can verify the ownership of the Project and its right to use:

1. Commissioning certificates

2. Purchase orders of Solar PV project component

1.12.2 Emissions Trading Programs and Other Binding Limits

This project activity is voluntary initiative and it is not to meet any local laws or regulatory compliances. Project has not participated in emission trading program and other binding limits. An undertaking has been submitted that PP shall not claim for GHG emission reduction credits for the given crediting period under any other emission-trading program or GHG binding limits.

1.12.3 Other Forms of Environmental Credit

PP declares that emission reductions generated from the project activity will not be double counted (i.e. issuance of other form of environmental credit like under CDM) for the particular crediting period, which is being claimed under VCS mechanism. PP has submitted an undertaking to the VVB that they shall not claim for GHG emission reduction credits for the given period under any other emission-trading program. Also the project will not claim any other form of environmental credit.

1.12.4 Participation under Other GHG Programs

The project activity has not been registered, or currently seeking registration under any other GHG programs. The project has not participated under any other GHG programme.

1.12.5 Projects Rejected by Other GHG Programs

PP hereby declares that any other GHG program has not rejected the project activity; an undertaking for the same has been submitted by the PP.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The project activity is not a grouped project.

Leakage Management

The project activity is renewable source based power generation i.e. from Solar PV, which has no leakage as per applied methodology.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Sustainable Development

Ministry of Environment & Forests, Government of India has stipulated following indicators for sustainable development in the interim approval guidelines[3] for GHG projects.

1. Social well-being
2. Economic well-being
3. Environmental well-being
4. Technological well-being

Environmental wellbeing:

- The project activity involves use of renewable energy source for electricity generation instead of fossil fuel based electricity generation, which would have emitted gaseous, liquid and/or solid effluents/wastes.
- Being a renewable resource, using Solar energy to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.

Social benefits:

- Use of a renewable source of energy reduces the dependence on imported fossil fuels and associated price variation thereby leading towards increased energy security.
- The project activity will result in employment generation.

Economical Benefits:

- The project activity requires temporary and permanent, skilled and semi-skilled manpower at the solar project location; this will create additional employment opportunities in the region
- The generated electricity will be utilised for captive consumption, thereby reduing the demand from the grid.

[3] Ministry of Environment and Forest web site: http://envfor.nic.in:80/divisions/ccd/cdm_iac.html

Technical Benefits:

- Increased interest in Solar energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future.

In view of the above, the PP **has** considered that the project activity profoundly contributes to the sustainable development.

Further Information

Not such implication as explained above.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

Following approved baseline & monitoring methodology is applied;
Title: Type-I, Renewable Energy Projects
Methodology: AMS I.D. Grid connected renewable electricity generation"

Version: 18.0, valid from 28/11/2014. Sectoral Scope: 01, EB 81

Reference: The approved baseline methodology has been referred from the "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories." http://cdm.unfccc.int/methodologies/DB/9KJWQ1G0WEG6LKHX21MLPS8BQR7242

The tools referenced in this methodology include:

- Tool to calculate the emission factor for an electricity system Version 06.0.0, Annex 7 of EB 97
- "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" Version 02, Annex 11, EB41.
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", Version 01, Annex 7, EB 39.
- "Project and leakage emissions from road transportation of freight" Version 01.1.0, Annex 23 of EB70
- Investment Analysis Version-07, Annex-5 of EB92

- **Guidelines:**
  - General guidelines for SSC CDM methodologies, Version 22.1, EB 86, Annex 13. (https://cdm.unfccc.int/filestorage/e/x/t/extfile-20160415160825656-Meth_guid25.pdf/Meth_guid25.pdf?t=R2Z8b2hrMTBwfDCJ3FsAgy3mXJjAohJ_m8CX)

2.2 Applicability of Methodology

As per the Para 12 of Simplified M & P for small-scale CDM project activities (FCCC/CP/2002/7/Add.3, Page 21) – "to use simplified modalities and procedures for small-scale CDM project activities, a proposed project activity shall meet eligibility criteria for a small scale CDM project activity[4]" . AMS I.D Version-18.0 has been used and justifications for the eligibility conditions are provided below.

Applicability Conditions	Position of the project activity vis-à-vis applicability conditions

[4] http://cdm.unfccc.int/Reference/Documents/AnnexII/English/annexII.pdf

Applicability Conditions	Position of the project activity vis-à-vis applicability conditions
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass a) Supplying electricity to a national or a regional grid b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity is solar PV based power generation project with aggregated installed capacity 5.7MW that will supply the generated renewable electricity to its respective manufacturing facilities through grid.
Illustration of respective situations under which each of the methodology (i.e. "AMS-I.D.: Grid connected renewable electricity generation", "AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and "AMS-I.A.: Electricity generation by the user) applies is included in the appendix.	As per Table No 2 of AMS – I. D. / Version 18, the AMS I.D is applicable to the project activity.
3. This methodology is applicable to project activities that (a) Install a Greenfield plant; (b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	The project activity is installation of a Greenfield project activity. PPs doesn't have existing Solar PV at the project site prior to the implementation of the project activity.
4. Hydro power plants with reservoirs[5] that satisfy at least one of the following conditions are eligible to apply this methodology: a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; b) The project activity is implemented in an existing reservoir[6], where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2; c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.	The project activity is a solar PV based power plant. Hence, not applicable

[5] A reservoir is a water body created in valleys to store water generally made by the construction of a dam.

[6] A reservoir is to be considered as an .existing reservoir. if it has been in operation for at least three years before the implementation of the project activity.

Applicability Conditions	Position of the project activity vis-à-vis applicability conditions
5. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co fires fossil fuel[7], the capacity of the entire unit shall not exceed the limit of 15MW.	The project activity is only 5.7MW solar PV based renewable electricity generation project. It does not include any non-renewable unit and co-firing system.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The project activity does not involve combined heat and power generation system as it is only a wind power project.
7. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct[8] from the existing units.	It is a Greenfield project and not the extension of an existing renewable energy facility.
8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	The project activity is not the retrofitting or replacement of an existing facility for renewable energy generation. Hence this criteria in not applicable.
9.In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	The proposed project activity is a solar PV based power project, hence criterion not applicable.
10.In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The proposed project activity is a Solar PV based power project, hence criterion not applicable.

Table 2: Applicability of AMS-I.D, AMS-I.F and AMS-I.A based on project types

[7] Co-fired system uses both fossil and renewable fuels.

[8] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

	Project type	AMS-I.A	AMS-I.D	AMS-I.F
1	Project supplies electricity to a national/regional grid		√	
2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			√
3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)		√	
4	Project supplies electricity to a mini grid[9] system where in the baseline all generators use exclusively fuel oil and/or diesel fuel			√
5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√		

The project activity is installation of 5.7 MW of Solar PV power and there would not be any change in the capacity of the project during its crediting period. Since the project generates and supplies renewable electricity to its manufacturing facility and the capacity of the project activity is well below the qualifying limit of 15 MW. Hence the choice of project Type I and category is justified.

2.3 Project Boundary

As per Para 18 of applied baseline and monitoring methodology AMS I.D, Version-18 / EB 81 the spatial extent of the project boundary includes manufacturing facilities, the project power plant and all power plants connected physically to the electricity system that the VCS project power plant is connected to.

The proposed project activity supplies power to its manufacturing facilities using transmission lines of Indian grid. Therefore, all the power plants contributing electricity to the Integrated Indian grids have been considered in the project boundary for the purpose of baseline estimation. The project activity targets reduction of CO_2e as main GHG greenhouse gas in baseline, there are no GHG emission associated with project activity.

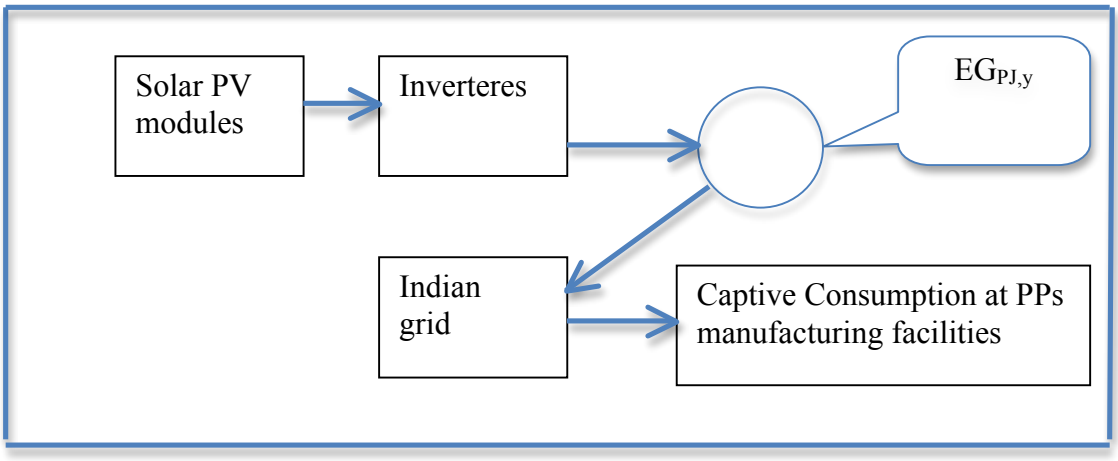

Fig: Project boundary

[9] The sum of installed capacities of all generators connected to the mini-grid is equal to or less than 15 MW.

2.4 Baseline Scenario

As per para 19 of AMS-I.D. (Version 18) "The baseline scenario is that the electricity delivered to the respective manufacturing facilities by the project activities would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid. Project activity supplies electricity through Indian grid. In the absence of the project activity same amount electricity would have been generated from Indian grid, in which the electricity is generated by the fossil fuel intensive power plant (Coal based). Thus baseline is in line with para 19 of AMS-I.D. (Version 18).

Para 22 of AMS-I.D. (Version 18) calculates baseline emissions as:

$BE_y = EG_{PJ,y} \times EF_{grid,.y}$. .....(A)

Where,

BE_y = Baseline Emissions in year y; t CO2

$EG_{PJ,y}$ = 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)

$EF_{grid,.y}$ = 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" (t CO_2/MWh)

Accordingly, the emission factor of the grid will be used to estimate emission reductions. As per para 23 of AMS-I.D. (Version 18), PP has chosen option (a) and used the combined margin (CM) approach to calculate emission factor, as official data is available for operating margin (OM) and build margin (BM) values, whereas no such data exists in the public domain to support choice of option (b). Hence,

$EF_{grid,.y} = EF_{grid,CM,y}$ .....(B)

DATA USED

Parameters	Description	Source
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor for the project electricity system in year *y*	Calculated as per "*Tool to calculate the emission factor for an electricity system (Version 06.0.0)*" using data from Central Electricity Authority of India's (CEA) "*Baseline Carbon Dioxide Emission Database Version 12.0*" [10]
$EF_{grid,BM,y}$	Build margin CO_2 emission factor for the project electricity system in year *y*	
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for the project electricity system in year *y*	
Variables	**Description**	**Source**
$EG_{BL,y}$	Quantity of net electricity displaced as a result of the implementation of the CDM project activity in year y *(4430MWh)*	Estimated generation based on rated capacity of the project activity and the applicable PLF by third party
$PLF_{Jhajjar}$	19.22%	Based on third party
PLF_{Sirohi}	19.22%	Based on third party
$PLF_{Kalol\ and\ Surat}$	19.22%	Based on third party
PLF_{Durg}	19.22%	Based on third party

This data is published by Central Electricity Authority (CEA) (a statutory body constituted under Electricity Act and having its office attached to Ministry of Power, Government of India) on their website (www.cea.nic.in). "Baseline Carbon Dioxide Emission Database Version 12.0" is the latest available data at the time of publication of the VCS PD for global stakeholder consultation and is, therefore, being used in calculation of the baseline emissions.

2.5 Additionality

In accordance with "Demonstration of additionality of small scale project activity" Version-11.0, PP shall provide an explanation to show that the project activity would not have occurred due to at least one of the following barrier

- Investment barrier:
- Technological barrier:
- Barrier due to prevailing practice:
- Other barriers

[10] http://cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

The project activity reduces anthropogenic emissions of greenhouse gases that would have occurred in absence of the project activity. As per the 6 (c) decision 17/CP.7[11] Para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

Further, referring to EB 94 Annex 11 "Demonstration of additionality of small-scale Project activities" (Version 11)[12]Para 11, a positive list of grid-connected renewable electricity generation technologies that are automatically defined as additional, without further documentation of barriers, (e.g. installed capacity up to 15 MW) consists of the following renewable electricity generation technologies:

(a) The following grid-connected and off-grid renewable electricity generation technologies:

(i) Solar technologies (photovoltaic and solar thermal electricity generation);
(ii) Off-shore wind technologies;
(iii) Marine technologies (wave, tidal);
(iv) Building-integrated wind turbines or household rooftop wind turbines of a size up to 100 kW;
(v) Biomass internal gasification combined cycle (BIGCC);

(b) The following off-grid electricity generation technologies where the individual units do not exceed the thresholds indicated in parentheses with the aggregate project installed capacity not exceeding the 15 MW threshold:

(i) Micro/pico-hydro (with power plant size up to 100 kW);
(ii) Micro/pico-wind turbine (up to 100 kW);
(iii) PV-wind hybrid (up to 100 kW);
(iv) Geothermal (up to 200 kW);
(v) Biomass gasification/biogas (up to 100 kW);

As the subject project is the installation of a new small scale Solar photovoltaic power plant with aggregated installed capacity 5.7MW, which is below 15 MW and would contribute in reducing GHG emissions below that would have occurred in the absence of the instant project activity, therefore the same may be considered to be additional.

2.6 Methodology Deviations

None

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

Emission reduction:

As per para 22 of AMS-I.D. (Version 18), baseline emission are calculated as follows:

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

Where,

BE_y = Baseline Emissions in year y; t CO2

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a

[11] http://unfccc.int/resource/docs/cop7/13a02.pdf#page=36
[12] http://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf

result of the implementation of the CDM project activity in year y (MWh)

$EF_{grid,.y}$ = 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" (t CO_2/MWh)

Calculation of $EG_{PJ,y}$

As proposed project activity is a greenfield project, in accordance with para 26 of applied methodology

$EG_{PJ,y} = EG_{PJ, facility,y}$

Where,

$EG_{PJ, facility,y}$ Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)

Calculation of BEy

Calculation of baseline emissions i.e. BEy, requires calculation of grid emission factor ($EF_{grid,y}$), which is being presented below.

As stipulated in para 23 of applied approved small scale methodology AMS I.D, the emission factor is calculated in a transparent and conservative manner as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the Tool to calculate the Emission Factor for an electricity systemî; OR

(b) The weighted average emissions (in t CO_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The PP has chosen option a i.e. combined margin (CM) consisting of combination OM and BM. Tool to calculate the emission factor for an electricity system (Version 06.0.0), has been used to determine the CO_2 emission factor for displacement of electricity generated by power plants in an electricity system, by calculating the combined margin emission factor (CM) of that electricity system.

Option (a) has been considered to calculate the grid emission factor as per the 'Tool to calculate the emission factor for an electricity system' since data is available from an official source. CO_2 Baseline Database for the Indian Power Sector, Version 12, May 2017, published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per the "Tool to calculate the emission factor for an electricity system" Version 06.0, EB 97, Annex 7, the following steps have been followed.

STEP 1: Identify the relevant electricity systems;
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3: Select a method to determine the operating margin (OM);
STEP 4: Calculate the operating margin emission factor according to the selected method;
STEP 5: Calculate the build margin (BM) emission factor;
STEP 6: Calculate the combined margin (CM) emission factor.

STEP 1: Identify the relevant electricity power systems
The tool defines that "for determining the electricity emission factors, identify the relevant electricity system. Similarly, identify any connected electricity systems". It also states that, "If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used". Keeping this into consideration, the Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into five regional grids viz. Northern, Eastern, Western, North-eastern and Southern.

However since Since August 2006, however, all regional grids except the Southern Grid had been integrated and were operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids were treated as a single grid named as NEWNE grid from FY 2007-08 onwards for the purpose of this CO2 Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Since the project supplies electricity to the Indian grid, emissions generated due to the electricity generated by the Indian grid as per CM calculations will serve as the baseline for this project.

Indian Grid				
Northern	**Eastern**	**Western**	**North-Eastern**	**Southern**
Chandigarh Delhi Haryana Himachal Pradesh Jammu & Kashmir Punjab Rajasthan Uttar Pradesh Uttarakhand	Bihar Jharkhand Orissa West Bengal Sikkim Andaman-Nicobar	Chhattisgarh Gujarat Daman & Diu Dadar & Nagar Haveli Madhya Pradesh Maharashtra Goa	Arunachal Pradesh Assam Manipur Meghalaya Mizoram Nagaland Tripura	Andhra Pradesh Karnataka Kerala Tamil Nadu Pondicherry Lakshadweep

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants have the option of choosing between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

The Project Participant has chosen only grid power plants in the calculation i.e. option I.

STEP 3: Select a method to determine the operating margin (OM) method
The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

PP has chosen Option (a) i.e. simple OM, to determine the operating margin. Other available options in the tool were ruled out considering the fact that data required to calculate simple

adjusted OM or dispatch data analysis is not available publically. As per the tool, low cost/must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. Data for the same, as published by Central Electricity Authority, has been presented below which illustrates that low cost/must run resources constitute less than 50% of total Indian grid generation, hence, the average OM method could not have been used.

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

	2011-12	2012-13	2013-14	2014-15	2015-16
India	19.6%	16.9%	18.6%	16.8%	15.1%

Data Source: Central Electricity Authority (CEA) database Version-12

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of three most recent years) for the INDIAN grid is less than 50 % of the total generation. Thus the average emission rate method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The "Simple operating margin" has been calculated as per the weighted average emissions (in tCO_2/MWh) of all generating sources serving the system, excluding hydro, geo-thermal, wind, low-cost biomass, nuclear and solar generation;

As per tool to calculate emission factor for an electricity system (Version 06.0.0), The simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Since the low cost/must run resources constitute less than 50% of total grid generation as seen from the average of five most recent years, the Simple OM method can be used to calculate the Operating Margin Emission factor.

PP has chosen ex ante option, thus, no monitoring and recalculation of the emissions factor during the crediting period is required. PP has considered a data vintage of 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.

STEP 4: Calculate the operating margin emission factor according to the selected method
The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO2 emission factor of each power unit; or Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The CO_2 Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system, Version 06.0.0". We have, therefore, used the Combined Margin data published in the CEA database, for calculating the Baseline Emission Factor.

As per „Tool to calculate the emission factor for an electricity system", Option A ("Based on the net electricity generation and a CO_2 emission factor of each power unit") is used to calculate simple

OM emission factor. Where Option A is used, the simple OM emission factor is calculated based on the electricity generation of each power unit and an emission factor for each power unit, as follows:

$EF_{grid,OMsimple,y} = \Sigma (EG_{m,y} \times EF_{EL,m,y}) / \Sigma EG_{m,y}$

Where:

$EF_{grid,OMsimple,y}$ Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)

$EG_{m,y}$ Net quantity of electricity generated and delivered to the grid by power unit m in year y

(MWh)

$EF_{EL,m,y}$ CO_2 emission factor of power unit m in year y (tCO_2/MWh)

m All power units serving the grid in year y except low-cost / must-run power units y the relevant year as per the data vintage chosen in STEP 3

The CO_2 emission factor ($EF_{EL,m,y}$) data for simple OM, available under the CEA database (Version 12.0) for the last three years is as follows.

Net generation in operating margin GWh including import			
	2013-14	2014-15	2015-16
Indian Grid	725037	810011	871740

Simple operating margin(tCO_2/MWh) (Incl Import)			
	2013-14	2014-15	2015-16
Indian Grid	1.0	0.99	0.97

Weighted Avg. Operating Margin Indian Grid is

= (725037*1.0+810011*0.99+871740*.97)/ (7225037+810011+871740)
= 0.98433 tCO_2/MWh

Step 5: Calculate the build margin (BM) emission factor, $EF'_{grid',BM,y}$

The project participants have chosen Option I, i.e. fixing build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM PDD submission to the DOE for validation.

The build margin emissions factor is the generation-weighted average emission factor of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$EFgrid_{BM,y} = \Sigma(EG_{m,y} \times EF_{EL,m,y}) / \Sigma EG_{m,y}$

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (t CO_2 e/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (t CO_2 e/MWh)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) is determined as per the procedures given in step 4 (a) for the simple OM, using options A1B1 using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin.

The build margin emission factor ($EF_{grid,BM,y}$) for the year 2015-16 (most recent year) for Indian grid is 0.9083 tCO_2/MWh.

CEA's "CO2 Baseline Database for the Indian Power Sector" Version 12.0,.

Build Margin (tCO2/MWh) (not adjusted for imports)	
	2015-2016
Indian Grid	0.9083

Step 6: Calculate the combined margin (CM) emissions factor
The combined margin is the weighted average of the simple operating Margin and the build margin. As per the 'Tool to calculate the emission factor for an electricity system (Version 05.0.0)', allows to weigh the operating margin and Build margin at 75% and 25%, respectively

$$EF_{grid,CM,y} = (EF_{,OM,y} \times w_{OM}) + (EF_{BM,y} \times w_{BM})$$

$$= (EF_{grid,OM,y} \times 75\%) + (EF_{grid,BM,y} \times 25\%)$$

Electronic spreadsheet showing calculation of all these parameters is being submitted separately and the final values are presented below:

Parameter	Value	Units
Operating Margin : $EF_{OM,y}$	0.98433	tCO2e/MWh
Build Margin : $EF_{BM,y}$	0.90830	
Combined Margin : $EF_{grid,CM,y}$	=0.98433*75%+0.9083*25%	
Combined Margin : $EF_{grid,CM,y}$	0.9653	

3.2 Project Emissions

As per applied approved methodology no project emission applicable as this is a solar power generation project.
PE y = 0

3.3 Leakage

No leakage emission applicable as this is a solar power generation project.
LE y = 0

3.4 Net GHG Emission Reductions and Removals

This is a renewable power generation project, the entire power generated from the project activity will be used in manufacturing facilities of PP. This form of energy generation has no associated GHG emissions. So, the emission reductions will just depend on the quantity of electricity being supplied to the manufacturing facility of PP, which would have been otherwise imported from grid.

Baseline emissions:

Baseline emission is calculated as per equation (1) in section B.6.1

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

$EG_{PJ, y}$ =
(2.36MW*19.22%+0.5MW*19.22%+0.5MW*19.22%+0.034MW*19.22%+2.0MW*19.22%)*
365days * 24 hours = 9597 MWh

PLF has been taken from the third party Report.

Here,

$EF_{grid, CM, y} = EF_{CO2}$

So,

$EF_{CO2, y}$ = 0.9653 t CO_2e/MWh

BE y = 9597x 0.9633 = 9263 tCO2/year (rounded down)

$ER_y = BE_y - PE_y - LE_y$

Project emission: 0 tCO2/year

Leakage emission: 0 tCO2/year

Hence, average annual emission reduction
$ER_y = BE_y - PE_y - LE_y$ = 9263 – 0– 0
ER_y= 9263tCO_2e/year

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2017-18	9263	0	0	9263
2018-19	9263	0	0	9263
2019-20	9263	0	0	9263
2020-21	9263	0	0	9263
2021-22	9263	0	0	9263
2022-23	9263	0	0	9263
2023-24	9263	0	0	9263
2024-25	9263	0	0	9263
2025-26	9263	0	0	9263

2026-27	9263	0	0	9263
Total	**92630**	**0**	**0**	**92630**

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	**$EF_{grid, CM, y}$**
Data unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor for the Indian Grid in year y
Source of data	CEA's "*Baseline Carbon Dioxide Emission Database Version 12.0* "
Value applied	0.98433
Justification of choice of data or description of measurement methods and procedures applied	Calculated in line with "*Tool to calculate the emission factor for an electricity system (Version 06.0.0)*" using data from Central Electricity Authority of India's (CEA) "*Baseline Carbon Dioxide Emission Database Version 12.0*". The value used is calculated ex-ante as generation based weighted average of last three years of the operating margin provided in the CEA database. Weighted average = $\sum_{i=1 \text{ to } n}$ (Net generation in operating margin in year i * Simple operating margin in year i)/$\sum_{i= 1 \text{ to } n}$ (Net generation in operating margin of year i)
Purpose of Data	Calculation of project emissions
Comments	The value is fixed ex-ante

Data / Parameter	**$EF_{grid, BM, y}$**
Data unit	tCO_2/MWh
Description	Build Margin CO_2 emission factor for the India Grid in year y
Source of data	CEA's "*Baseline Carbon Dioxide Emission Database Version 12.0*
Value applied	0.90830
Justification of choice of data or description of measurement methods and procedures applied	Calculated in line with "*Tool to calculate the emission factor for an electricity system (Version 06.0.0)*" using data from Central Electricity Authority of India's (CEA) "*Baseline Carbon Dioxide Emission Database Version 12.0*". The value is calculated ex-ante as most recent build margin provided by the CEA.
Purpose of Data	Calculation of combined margin emissions

Comments	The value is fixed ex-ante

Data / Parameter	**$EF_{grid, CM, y}$**
Data unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor for the India Grid in year y
Source of data	Central Electricity Authority(CEA) of India Database*Version 12.0*
Value applied	0.9653
Justification of choice of data or description of measurement methods and procedures applied	This has been calculated based on Operating Margin (OM) and Build Margin (BM) published by Central Electricity Authority (CEA) of India.
Purpose of Data	Calculation of project emissions
Comments	The value is fixed ex-ante

4.2 Data and Parameters Monitored

Data / Parameter	EG_{PJ, y_Jhajjr}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Energy meter record
Description of measurement methods and procedures to be applied	The net electricity supplied to facility will be ascertained on the basis of energy meter reading. The electricity generated by PV modules is fed to invereters and thereafter supplied to grid.
Frequency of monitoring/recording	Continuous monitoring, monthly recording
Value applied	842
Monitoring equipment	Trivector energy meters with accuracy class 0.2s
QA/QC procedures to be applied	The energy meters will be of 0.2S accuracy class and Calibration of the meter will be done at least once in 3 years.
Purpose of data	Calculation of baseline emissions
Calculation method	NA
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	EG_{PJ, y_Surat}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Energy meter record
Description of measurement methods and procedures to be applied	The net electricity supplied to facility will be ascertained on the basis of energy meter reading. The electricity generated by PV modules is fed to invereters and thereafter supplied to grid.
Frequency of monitoring/recording	Continuous monitoring, monthly recording
Value applied	3973
Monitoring equipment	Trivector energy meters with accuracy class 0.2s
QA/QC procedures to be applied	The energy meters will be of 0.2S accuracy class and Calibration of the meter will be done at least once in 3 years.
Purpose of data	Calculation of baseline emissions
Calculation method	NA
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	EG_{PJ, y_Kalol}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Energy meter record
Description of measurement methods and procedures to be applied	The net electricity supplied to facility will be ascertained on the basis of energy meter reading. The electricity generated by PV modules is fed to invereters and thereafter supplied to grid.
Frequency of monitoring/recording	Continuous monitoring, monthly recording
Value applied	842
Monitoring equipment	Trivector energy meters with accuracy class 0.5s
QA/QC procedures to be applied	The energy meters will be of 0.2S accuracy class and Calibration of the meter will be done at least once in 3 years.
Purpose of data	Calculation of baseline emissions

Calculation method	NA
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	EG_{PJ, y_Sirohi}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Energy meter record
Description of measurement methods and procedures to be applied	The net electricity supplied to facility will be ascertained on the basis of energy meter reading. The electricity generated by PV modules is fed to invereters and thereafter supplied to grid.
Frequency of monitoring/recording	Continuous monitoring, monthly recording
Value applied	58
Monitoring equipment	Trivector energy meters with accuracy class 0.2s
QA/QC procedures to be applied	The energy meters will be of 0.2S accuracy class and Calibration of the meter will be done at least once in 3 years.
Purpose of data	Calculation of baseline emissions
Calculation method	NA
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

Data / Parameter	EG_{BL, y_Durg}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Energy meter record
Description of measurement methods and procedures to be applied	The net electricity supplied to facility will be ascertained on the basis of energy meter reading. The electricity generated by PV modules is fed to invereters and thereafter supplied to grid.
Frequency of monitoring/recording	Continuous monitoring, monthly recording
Value applied	3367
Monitoring equipment	Trivector energy meters with accuracy class 0.2s

QA/QC procedures to be applied	The energy meters will be of 0.2S accuracy class and Calibration of the meter will be done at least once in 3 years.
Purpose of data	Calculation of baseline emissions
Calculation method	NA
Comments	All the data will be archived till a period of two years from the end of the crediting period or last issuance whichever is later.

4.3 Monitoring Plan

The project activity will be operated and managed by the project proponent with the help of site in charge (personal from the project proponent) and site O & M contractor (personal from the EPC). For the accurate execution of the Project activity a project team has been constructed. The project will abide by all regulatory and statutory requirements as prescribed under the state and central laws and regulations. The project team is delegated with the responsibility of monitor and document the electricity generated and also safe keeping of the recorded data. The project team is also responsible for calculation of actual creditable emission reduction in the most transparent and relevant manner.

QA/QC Procedures

The energy meters of 0.2s accuracy class shall be used. The individual invereters are also equiped with digital energy meters. If some defect occurs to energy meters, the readings taken at inverters shall be used for calculation of net electricity supplied. All energy meters will be calibrated at least once in a three-year.

Data Management and Data Archiving

Monitoring data will be retained and archived for the entire crediting period plus two years by the project proponent.

Emergency preparedness plan

Operation and Maintenance team is trained for emergency situations.

Training:

Operation and maintenance team will train the staff on operation and maintenance aspects of the plant. The training will ensure preventive maintenance and better operational control of the plant.

Data adjustments/uncertainities

If there is any problem in energy meters, digital meters at inverters will be used for monitoring.

If a situation appears that any meter is faulty then the energy meter will be sent for maintenance and maintaining a conservative approach, VCUs will be calculated from reading taken at inverters deducting technical losses at inverters. Technical losses shall be calculated based on historical generation (previous one month) of reading at inverters less meter readings or as per manufacturer specification.

The VCS monitoring team will composed the following staff:

Position	Report to:
Operators	Site Engineer
Site Engineer	Site Incharge
Site Incharge	Project Owner
VCS monitoring project manager	Project Owner

5 SAFEGUARDS

5.1 No Net Harm

The facility does not produce any pollution in process of power generation as it utlises renewable energy source that is solar energy Hence there is positive impact on the environment due to this small-scale project activity of reducing the pollution caused by fossil fuels used in mix power plants in grid. Further this project will have no air pollution, no water pollution and no noise pollution.

The project activity has obtained the No Objection Certificate for Consent to Establish from the concern agencies.

5.2 Environmental Impact

As per the prevailing regulations of the Host Party i.e. India represented by the Ministry of Environment and Forests (MoEF), Govt. of India, Environment Impact Assessment Notification no. 3067 dated 01/12/2009[13], the project activity does not require Environment Impact Assessment to be conducted.

5.3 Local Stakeholder Consultation

The local stakeholder consultation meeting for the proposed project activity has been conducted at respective project sites as per details in below table. The PP has identified the relevant stakeholders and sends personal invitation letters well in advance. The stakeholder meeting process is followed in the following sequence

0.5MW	11/04/2017	Bajitpur	Jhajjar	Rajasthan
2.36MW	12/01/2017	Dastan	Surat	Gujarat
0.5MW	28/01/2017	Moti Bhoyam	Ghandhinagar	Gujarat
0.034MW	27/01/2015	JK Puram	Sirohi	Rajasthan
2MW	12/07/2017	Malpuri Khurd	Durg	Chhattisgarh

- Welcome Speech by the organizers.
- Introduction to 'GHG' programme
- Interactive Sessions with the stakeholders.
- Vote of Thanks

5.4 Public Comments

Issues Raised by Villagers and response:

A. Does this project help the villagers in employment generation?

[13] http://www.moef.nic.in/downloads/rules-and-regulations/3067.pdf

Answer: Yes the proposed project has employed local people during construction and will also employ local people in future when required on preferred basis.

B. What is lifetime of solar project?

Answer: The proposed project has a lifetime of 25 years.

C. How does this project control global warming?

Answer: The project activity is utilizing solar energy to generate electricity, which is emission free and it will replace grid electricity, which is produced using grid mix power plant dominated by fossil fuel. The project will generate approx. 9500 MWh electricity yearly and will help in reducing GHG emission upto 9400 tCO_2 yearly. Thus, the project activity will reduce CO_2 emissions and save the equivalent amount of conventional fuel, which is a non-renewable resource.

D. What is Carbon Credit?

Answer: Carbon credits are a key component of national and international emissions trading schemes that have been implemented to mitigate global warming. They provide a way to reduce greenhouse effect emissions on an industrial scale by capping total annual emissions and letting the market assign a monetary value to any shortfall through trading. Credits can be exchanged between businesses or bought and sold in international markets at the prevailing market price. Credits can be used to finance carbon reduction schemes between trading partners and around the world.

E. Any negative impact of project activity on nearby villages?

Answer: The proposed project utilises solar energy to generate power, hence has no negative impact.
There were no negative comments raised by stakeholders in the local stakeholder consultation meetings and due to the associated benefits stakeholders have appreciated the proposed project activity.