Project design document form for small-scale CDM project activities

(Version 07.0)

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Solar Power Project by EnKing International (EKIESL-CDM-May-16-03)
Version number of the PDD	01
Completion date of the PDD	26/05/2016
Project participant(s)	ReXchange Global Solutions (P118)
Host Party	India
Applied methodology(ies) and, where applicable, applied standardized baseline(s)	Methodology: - AMS-I.D “Grid connected renewable electricity generation” (EB 81, Version 18)
Sectoral scope(s) linked to the applied methodology(es)	Sectoral Scope 1: Energy Industries (renewable - /non-renewable sources)
Estimated amount of annual average GHG emission reductions	6,638 tCO2e / annum

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy source. Triveni Sangam Holdings & Trading Co. Private Ltd, Atul Sharma, Ranjanaben P. Chovtia and Dartyens Power Pvt Ltd. are the investors of the proposed project activity. The project activity involves installation of 3.83 MWp Solar PV power project.

The details of Project capacity and location details for all the bundle partners are as follows:

Project Investors' Name	Village	Tehsil	District	State
Triveni Sangam Holdings & Trading Co Pvt Ltd.	Mandrup	South Solapur	Solapur	Maharastra
Atul Sharma	Dhabla Sondhiya	Barod	Shahjapur	Madhya Pradesh
Ranjanben P. Chovtia	Dhabla Sondhiya	Barod	Shahjapur	Madhya Pradesh
Dartyens Power Pvt ltd	Marupaka	Nidamanoor	Nalgonda	Andhra Pradesh

The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 6,638 tCO_2e per year, thereon displacing 6,792 MWh/year amount of electricity from the generation-mix of power plants connected to the INDIAN Electricity grid, which is mainly dominated by thermal/ fossil fuel based power plant.

The electricity generated from the project of Dartyens Power Pvt Ltd will be exported to the state grid of Andhra Pradesh which is part of the INDIAN grid of India and sold to Southern Power Distribution Company of Telangana Limited (SPDCTL) under a power purchase agreement which will be fixed for entire lifetime of the project activity. The electricity generated from the Project activity of Triveni Sangam Holdings and Trading Co. Pvt. Ltd will be sold to State Electricity Grid which is part of the INDIAN grid, whereas power generated from the Projects of Atul Sharma and Ranjanaben P. Chovtia will be sold to Third Party under a formal Power Purchase Agreement which will be applicable for entire lifetime of the project activity. The electricity sold to third party is transmitted through INDIAN electricity grid.

The purpose of the project activity is to utilize renewable solar energy for generation of electricity. The power sector in India largely comprises of thermal power stations. In the absence of the project activity equivalent amount of electricity would have been generated from the existing grid connected power plants and planned capacity additions which are also largely fossil fuel based. The baseline scenario of the project activity is identified in line with the approved small scale methodology AMS I.D (Version 18). As per that, the baseline scenario is that the 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. Thus, the project activity contributes towards reduction in the demand-supply gap in the region and increase in the share of renewable energy in the grid mix.

The technical life of all the solar PV Power plants is 25 years[1].

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

[1] Letter from Technology Supplier

Project Promoters' Name	Capacity in MW	Connection with Grid	State	Use of Electricity
Triveni Sangam Holdings & Trading Co Pvt Ltd.	1.2 MWp	INDIAN	Maharastra	Sale to Grid
Atul Sharma	1 MWp	INDIAN	Madhya Pradesh	Sale to Third Party
Ranjanben P. Chovtia	0.63 MWp	INDIAN	Madhya Pradesh	Sale to Third Party
Dartyens Power Pvt ltd	1 MWp	INDIAN	Andhra Pradesh	Sale to Grid

Sectoral Scope: 01 : "Grid connected renewable electricity generation", AMS I.D. (Version 18)
Project Type: (i) : Renewable energy projects

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity, is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Baseline Scenario:

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

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

The baseline scenario is that the 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.

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

Sustainable development indicators

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment and Forests (MoEF), has mentioned four indicators for the sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India[2].Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Social well being

The project activity provided / provides job opportunity to local people during erection, commissioning and maintenance of the solar project. Frequency of visiting villages and nearby areas by skilled,

[2] http://www.cdmindia.gov.in/approval_process.php

technical and industrialist increase due to installation /site visit/operation and maintenance work related to solar plant. This directly and indirectly positively effects the economy of villages and nearby area.

Environmental well being

Solar power is one of the cleanest renewable energy powers and does not involve any fossil fuel. There are no GHG emissions. The impact on land, water, air and soil is negligible. Thus the project activity contributes to environmental well-being without causing any negative impact on the surrounding environment.

Economic well being

The CDM project activity generates permanent and temporary employment opportunity within the vicinity of the project. The electricity supply in the nearby area improves which directly and indirectly improves the economy and life style of the area.

Technological well being

The project activity is step forward in harnessing the untapped solar potential and further diffusion of the solar technology in the region. The project activity leads to the promotion and demonstrates the success of solar projects in the region which further motivate more investors to invest in solar power projects. Hence, the project activity leads to technological well-being.

The Host County Approval issued by Indian DNA declaring acceptability of the Sustainable Indicators by the project activity will be submitted to DOE.

A.2. Location of project activity

A.2.1. Host Party

India

A.2.2. Region/State/Province etc.

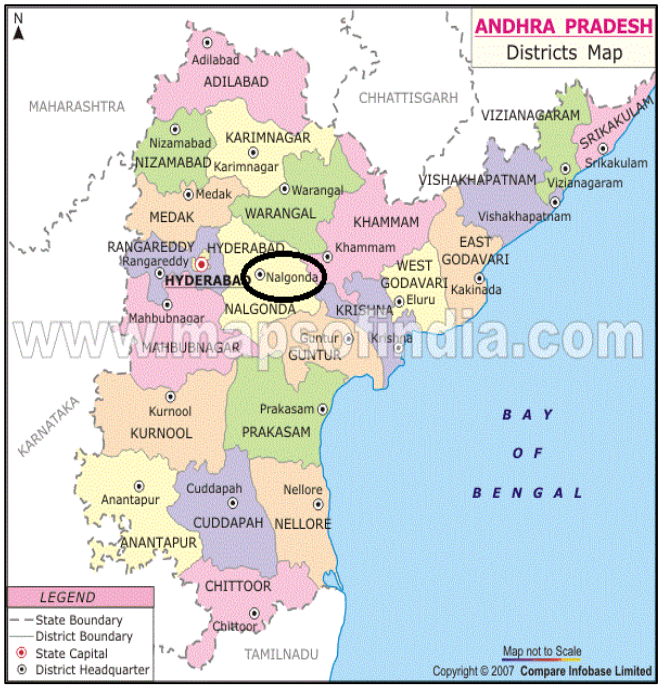
Madhya Pradesh, Maharastra and Andhra Pradesh

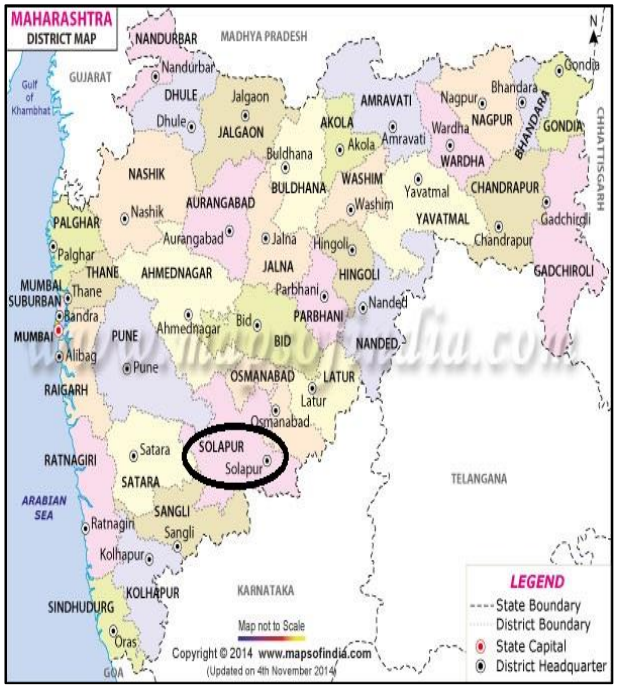
A.2.3. City/Town/Community etc.

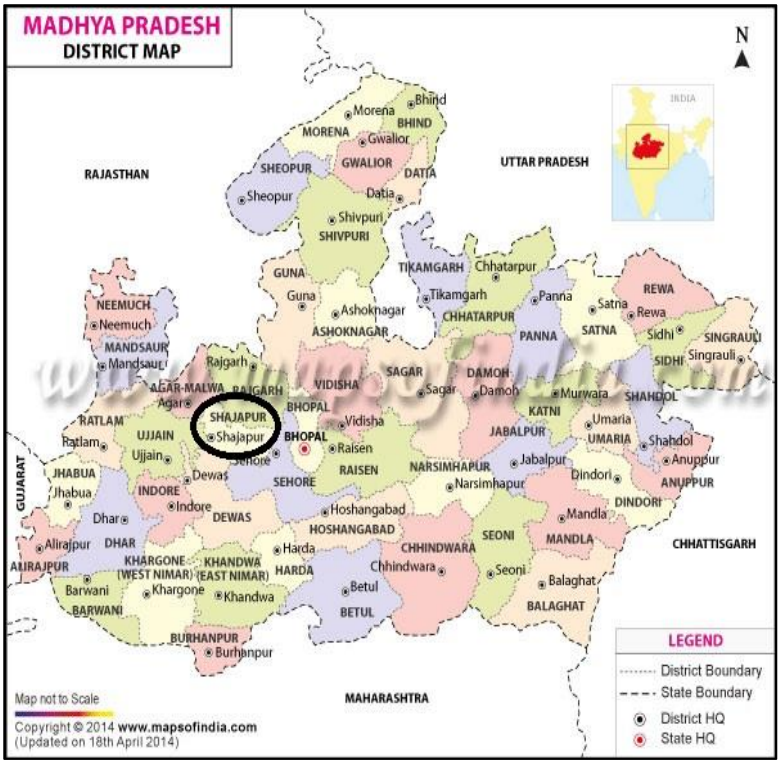
Village : Dhabla Sondhiya, Mandrup and Marupaka
Tehsil : Barod, South Solapur, and Nidamnoor
District : Shahjapur, Solapur, and Nalgonda

A.2.4. Physical/Geographical location

Project Investors' Name	Latitude	Longitude	Date of Commissioning
Triveni Sangam Holdings & Trading Co Pvt Ltd.	N 17^0 30' 10.23"	E 75^0 46' 18.42"	22/03/2014
Atul Sharma	N 23° 50' 56"	E 75° 54' 77"	30/03/2013
Ranjanben P. Chovtia	N 23° 50' 06"	E 75° 54' 1.7"	30/09/2013
Dartyens Power Pvt ltd	N 16° 54' 22.7232"	E 79° 18' 54.3780"	30/06/2016 (Expected)







A.3. Technologies and/or measures

Sectoral Scope : 01 - Energy industries (renewable / non renewable sources)
Project Type : I - Renewable Energy Projects
Project Category : I.D. - Grid connected renewable electricity generation (Version 18, EB 81)

The project activity aims to harness solar energy through installation of PV with total installed capacity of 3.83 MWp. Solar energy is a pollution-free, infinitely sustainable form of energy. It does not use fossil fuel. It does not produce greenhouse gases, and it does not produce toxic or radioactive waste. Therefore the technology used for the project activity is environmentally safe and sound.

The proposed CDM project activity will generate power using solar energy, which is a renewable source of energy. The solar PV system mainly consists of PV modules, module mounting structures, junction boxes, Inverters, regulators, monitoring devices etc. The solar PV cells convert solar radiation into DC current. The solar panels are installed in arrays. The modules in the each array are connected in parallel and/or series in order to get the preferred current & voltage which match with the rated input parameters of the inverter. The Inverter connected in each array converts the DC current to AC current. The electricity collected from all the inverters is stepped up to 11 kV through a 415V/11kV transformer. The 11 kV electricity is further stepped up to 66 kV and then supplied to Southern grid. The life time of the project activity is 25 years.

The technical features of the Solar PV systems are summarized below:

Technical Specifications for 1 MW Solar PV Project of Atul Sharma and 0.63 MW Solar PV Project of Ranjanaben P. Chovatia

Module Supplier	Ujjas
Solar PV Panel	245 Wp
Mounting Stuctures	As per design specifications
Inverters	600 V DC Supply from Solar PV Panels
ACB/LT Panel	1250 A with inbuilt protection system
Transformer	1250 KVA (300- 300 V/ 33 KV)
CT PT Installation-Conductor Specifications	As per equipment specifications
ABT Metering	By MPEB
Lightning Arrestor	33 KV, 10 KA
Isolator with Interlocking	33 KV/ 400 A
Invertors (MAKE)	AEG
DC Input Voltage Range	1000 V
Efficiency Factor	98.7%
Voltage Range	+10% to -15%

Technical Specifications of 1.2 MW Solar PV Project of Triveni Sangam Holdings and Trading Co. Pvt Ltd	
Crystalline Solar PV Modules	AREPL Make- Dhoop
Nominal Power- Pmax (watts)	230 V
Voltage at Maximum Power- Vmp (Volts)	28.62
Current at Maximum Power- Imp (Amps)	8.06
Open Circuit Voltage- Voc (Volts)	36.77
Short Circuit Current- Isc (Amps)	8.68
Maximum System Voltage	1000 V DC
Temperature Coefficient- Voc	-0.74 V/^{0}C
Temperature Coefficient- Isc	+2.8 mA/^{0}C
Solar Cells Per Modules- Unit	60
Parent Solar Cell Size mm	156 mm Mono/Multi Crystalline
Mechanical Details	
Dimensions (mm)	1662 x 992 x 42
Weight (Kgs)	20
Mounting Holes Pitch (Y) mm	962
Mounting Holes Pitch (Y) mm	950
Hole Diameter- mm	8
Area- sq. metres	1.65

Technical Specifications of 1 MW Solar PV Project of Dartyens Power Pvt Ltd	
Crystalline Solar PV Modules	Canadian Solar Make
Capacity	1.10 MW DC
Nominal Power- Pmax (watts)	240 V
Number of Modules	4400

Central Inverters	ABB PVS 800
Number of Inverters	2
Maximum Power-(KWh)	500
Transformer	Essener/ PETE
Capacity	1.25 MVA
SCADA System	ABB/ Schneider

There is no technology transfer involved in the project activity from any Annex- I countries.

For Plant Load Factor, please refer Section B.6.3.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	ReXchange Global Solutions (P118) (Private Entity)	No

A.5. Public funding of project activity

There is no public funding from Annex 1 countries and no diversion of Official Development Assistance (ODA) involved in the project activity.

A.6. Debundling for project activity

As per the provisions prescribed in “Clean development mechanism project standard” and further referring to “Guidelines on assessment of de-bundling for SSC project activities” according to which EB 54, Annex 13, Para 2, “A small project activity shall be deemed to be a de-bundled component of large scale project activity, if there is a registered small scale CDM project activity or an application to register another small scale CDM project activity.

- With the same project participants
- In the same project category and technology
- Registered within the previous two years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small scale activity”

The project participant hereby confirms that they have not registered any small scale CDM activity or applied to register another small scale CDM project activity within 1 km of the project boundary, in the same project category and technology/measure in previous 2 years.

This means that the project activity does not fall under the de-bundled category and qualifies for small scale CDM Project.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

Title: Grid connected renewable electricity generation[3]

[3] http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

Reference: The project activity meets the eligibility criteria to use the simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

Details of methodology for baseline calculations for CDM projects of capacity less than 15 MW are available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities".

Methodology : AMS-I.D Grid Connected Renewable Electricity Generation (Version 18)[4]
Type I : Renewable Energy Project (Small Scale)
Category : I. "D", Grid Connected Renewable Electricity Generation

Reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

Tools referred with above methodology are:

Tool to calculate the emission factor for an electricity system[5] - Version 05.0 (EB 87, Annex 9)

B.2. Project activity eligibility

The project activity involves generation of grid connected electricity from renewable solar energy. The project activity has an installed capacity of 3.83 MWp which will remain less than the maximum qualifying capacity of 15 MW for a small scale CDM project activity under Type-I of the small scale methodologies. The installed capacity will not increase throughout and even after the crediting period therefore the project activity will remain within the limit of small scale in each year of the crediting period. The project status is corresponding to the methodology AMS-I.D and applicability of methodology AMS-I.D are discussed below:

Applicability Criterion as per methodology	Project Case
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 a Renewable Energy Project i.e. Solar Photo Voltaic Power Project which falls under applicability criteria option 1(a) i.e., "Supplying electricity to a national or a regional grid" and option 1 (b) i.e Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling. Hence the project activity meets the given applicability criterion.
2. 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 theuser) applies is included in the appendix[6].	The 1st option and 3rd option of Table 2 of AMS I.D. Version 18, EB 61 is applicable (please refer footnote) as project supplies electricity to national grid and also electricity is being supplied

[4] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

[6]

	Project type	AMS-I.A	AMS-I.D	AMS-I.F
1	Project supplies electricity to a national/regional grid		√	

	to a Third Party under a formal contractual agreement (PPA).
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 is installation of new solar based electricity generation plants (not addition to existing system). Option a is applicable.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, 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/m^2; • 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/m^2.	The project is solar power project and thus the criterion is not applicable to this project activity.
5. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity is a 3.83 MWp solar electricity generation. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The Project activity is a renewable solar energy project and is not a combined heat and power system. Hence the criteria is not applicable to the project activity
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	The project activity is Greenfield and there is no existing power generation facility at the site. Hence the criteria is not applicable to the project activity

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[6] 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	√		

should be lower than 15 MW and should be physically distinct[7] from the existing units.	
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.	Not applicable, the solar project is a Green field project activity and this project is not the enhancement or up gradation project.
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 Project activity is a renewable solar Photovoltaic power project and is not a landfill gas, waste gas, waste water treatment and agro-industries projects or recovered methane emissions project. Hence the criteria is not applicable to the project activity
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The Project activity is a renewable solar Photovoltaic power project and is not a biomass project. Hence the criteria is not applicable to the project activity.

The project activity qualifies as Type I during every year of the crediting period in accordance with applicable provisions for project activity eligibility as discussed above. Also the total installed capacity of project activity is 3.83 MWp which is less than 15 MW threshold limit for small scale project activities as per **AMS-I.D.: Grid connected renewable electricity generation, version 18**.

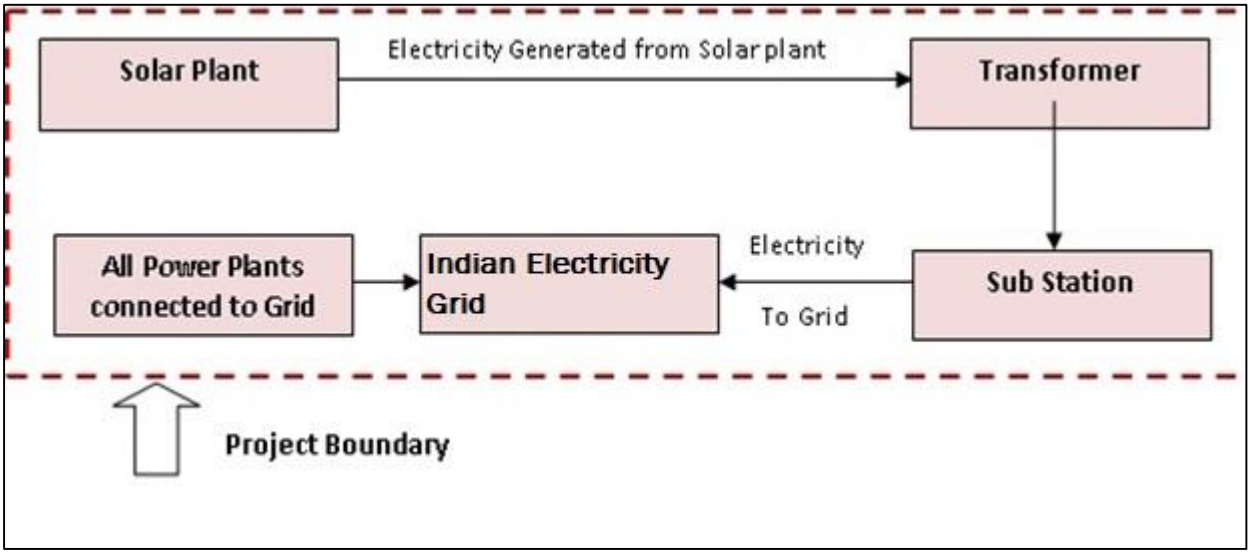
The project capacity will be always remain the same and hence the project activity will always be under the threshold limit of small scale project activities throughout the crediting period and thereafter.

B.3. Project boundary

As per AMS-I.D Version 18, EB 81 - "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to".

The project boundary includes the solar project, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the INDIAN Electricity grid. Therefore the entire INDIAN grid and all connected power plants, as well as the recipient third party receiving the

[7] 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".



generated electricity have been considered in the project boundary for the proposed CDM project activity.

B.4. Establishment and description of baseline scenario

As the project activity is the installation of a Greenfield power plant, the baseline scenario is the following as per applied methodology:

The baseline scenario is that the 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 project activity involved setting up of a solar plant to harness the power of sunlight to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the INDIAN electricity grid, which is fed mainly by fossil fuel fired plants.

Hence, the baseline for the project activity is the equivalent amount of power from the INDIAN electricity grid.

The combined margin ($EF_{grid,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) (having weightage 25%) and build margin (BM) (having weightage 75%). Calculations for this combined margin must be based on data from an official source[8] and made publically available.

The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source

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

$EF_{grid,y}$	0.9777 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO_2 Emission Database, Version 11.0 Dated April 2016 published by Central Electricity Authority (CEA), Government of India.
$EF_{grid,OM,simple,y}$	0.9941 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2012-13, 2013-14, 2014-15) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 11.0, Dated April 2016 published by Central Electricity Authority (CEA), Government of India.
$EF_{grid,BM,y}$	0.9285 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 11.0, Dated April 2016 published by Central Electricity Authority (CEA), Government of India.

B.5. Demonstration of additionality

Annexure 3 of the EB 22 states that national and/or sectoral policies and circumstances have to be accounted for when considering the baseline scenario.

Para 7(a) of the same states that, only those national and/or sectoral policies or regulations under paragraph 6(a) i.e. type E+ policy that increase GHG emissions, that have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11 December 1997), shall be taken into account when developing a baseline scenario. The Electricity Act of 2003 promoted cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity (Refer Section 86(1) of Electricity Act 2003). Therefore, it could be seen that the provincial and sectoral policies are E- i.e., policies that decrease GHG emissions and are after November 2001. Hence the baseline scenario is the electricity generation by grid connected fossil fuel dominated power plants confirming to Annex 3 of EB 22.

Further, the baseline alternative mentioned above is in compliance with all the applicable regulatory policies and laws. Additionally, the project participant is under no compulsion to opt for any particular technology or even a renewable mode of power generation. There is no governmental body or EB policy which requires a particular kind of fuel to be chosen and there is no legal requirement to which the above alternative does not conform.

Prior Consideration of CDM

CDM Project Standard Version 09.0, Section 6.5 states that “For a proposed CDM project activity with a start date on or after 2 August 2008, project participants shall inform the host Party’s designated national authority (DNA) and the secretariat of their intention to seek CDM status in accordance with the Project cycle procedure”.

In line with the above guidance, the Prior Intimation Submitted to the UNFCCC and host party DNA i.e. National CDM Authority (NCDMA) of its intention to seek CDM for the proposed project activity in a defined F-CDM form on below mentioned dates, which is within six months of the project activity start date (as mentioned in section C.1.1).

Project Investor	Start Date of Project Activity	Date of Prior Intimation Submitted to UNFCCC and Host Party DNA
Triveni Sangam Holdings & Trading Co Pvt Ltd.	28-10-2013	04-02-2014
Atul Sharma	28-02-2013	05-03-2013
Ranjanben P. Chovtia	15-07-2013	28-11-2013
Dartyens Power Pvt ltd	28-02-2015	09-12-2014

Hence from the above table, it can be clearly concluded that CDM was seriously considered in the decision to proceed with the proposed project activity.

Additionality Assessment

As per Guidelines on the Methodological Tool for the demonstration of additionality of small- scale project activities[9] - Version 10.0.0 (EB 83, Annex 14), a positive list of grid-connected renewable electricity generation technologies are listed that are automatically defined as additional, without further documentation of barriers.

The positive list comprises of the following grid-connected renewable electricity generation technologies of installed capacity up to 15 MW:

1) Solar technologies (photovoltaic and solar thermal electricity generation);
2) Off-shore wind technologies;
3) Marine technologies (wave, tidal).
4) Building-integrated wind turbines or household rooftop wind turbines of a size up to 100 kW;

Since the project activity is a solar photovoltaic electricity generation project of capacity 3.83 MWp, it can be concluded from the above list that the project activity is automatically additional and does not require demonstration of barriers.

Thus, it is well established that the proposed project activity is auto additional.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

Applied Methodology: AMS - I.D, version 18, EB 81

Baseline emissions:

The baseline emission calculation for the project activity is attributable to the CO_2 Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the INDIAN grid will be multiplied by the grid emission factor of respective grid to calculate the baseline emissions reduced by the proposed project activity.

[9] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v1.pdf

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

Where,

BE_y	=	Baseline emissions in year y (t CO_2)
$EG_{PJ,y}$	=	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)

The methodology provides following approaches for emission factor calculations:

(a) *Combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology "Tool to calculate the emission factor for an electricity system".*

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.*

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 11.0, April 2016[10], 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[11]" Version 05.0, EB 87, Annex 9, 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

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

[11] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

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.

Table: Geographical Scope of Indian Electricity Grid

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

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.

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.

The data required to calculate simple adjusted OM or Dispatch data analysis is not possible due to lack of availability of this activity data to the project developers. The choice of other two options for calculating the operating margin emission factor depends on the generation of electricity from low cost/must run sources. In the context of the methodology low cost/must run resources typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation.

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

	2010-11	2011-12	2012-13	2013-14	2014-15
India	18.4%	19.6%	16.9%	18.6%	16.8%

Data Source: Central Electricity Authority (CEA) database Version 11, April'2016

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;

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- **Ex ante option:** If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required.

Or

- **Ex post option:** If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

PP has chosen ex ante option for the calculation of OM with 3 years generation weighted average of the most recent years available at the time of submission of CDM-PDD to the DOE for validation.

OM determined at validation stage will be the same throughout the crediting period. There will be no requirement to monitor & recalculate the emission factor during the first crediting period.

STEP 4: Calculate the operating margin emission factor according to the selected method

The operating margin emission factor has been calculated using a 3 year data vintage:

	Net Generation in Operating Margin (GWh) (excl. Imports)		
	2012-13	2013-14	2014-15
INDIAN Grid	6,97,187	7,21,632	8,08,417

	Simple Operating Margin (tCO_2/MWh) (incl. Imports)		
	2012-13	2013-14	2014-15
INDIAN Grid	0.99	1.00	0.99

Weighted Generation Operating Margin	
INDIAN Grid	**0.9941**

STEP 5: Calculate the build margin emission factor ($EF_{BM,y}$)

Option 1 as described above is chosen to calculate the build margin emission factor for the project activity. BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period.

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2014-15
INDIAN Grid	**0.9285**

(With sample group constituting most recent capacity additions to the grid comprising 20% of the system generation)

STEP 6: Calculate the combined margin (CM) emissions factor

Combined Margin – The combined margin is the weighted average of the simple operating Margin and the build margin. In particular, for intermittent and non- dispatchable generation types such as wind and solar photovoltaic, the Tool to calculate the emission factor for an electricity system[12], Version 05.0.0, EB 87, Annex 9, allows to weigh the operating margin and Build margin at 75% and 25%, respectively**.**

The baseline emission factor is calculated using the combined margin approach as described in the following steps:

Calculation of Baseline Emission Factor EF_y

The baseline emission factor **EF_y** is calculated as the weighted average of the Operating Margin emission factor **($EF_{OM,y}$)** and the Build Margin emission factor **($EF_{BM,y}$)**:

$EF_y = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y}$

Where,

w_{OM}	75% weight for solar energy projects
w_{BM}	25% weight for solar energy projects
$EF_{OM,y}$	calculated as described in Steps 3 & 4 above (tCO_2/MWh)
$EF_{BM,y}$	calculated as described in Steps 5 above (tCO_2/MWh)

Baseline Emission factor (INDIAN Electricity Grid) = 0.75*0.9941 + 0.25*0.9285
= 0.9777 tCO_2/MWh

Project Emissions: For most renewable power generation projects activities PE_y =0. As per applied methodology only emission associated with the fossil fuel combustion, emission from operation of geo-thermal power plants due to release of non-condensable gases, emission from water reservoir of Hydro should be accounted for the project emission. Since the project activity is a solar power project,

Hence PE_y= 0

Leakage Emissions: No Leakage emissions are considered. The main emission potentially giving rise to leakage in the context of electrical sector projects is emission arising due to activities arising such as power plant construction and upstream emission from fossil fuel use (e.g. extraction, processing, and transport). These emission sources are neglected.

[12] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

Hence, LE_y= 0

Emission reduction (ER_y): The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plant by renewable electricity. The emission reduction ER_y by the project activity during a given year y is the difference between Baseline emission and Project emission & Leakage emission.

$ER_y = BE_y - PE_y - LE_y$

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

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,OM,y}$
Unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016[13]
Value(s) applied	0.9941
Choice of dataorMeasurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO2/MWh
Description	Build Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016[14]
Value(s) applied	0.9285
Choice of data or Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,y}$
Unit	tCO2/MWh
Description	Combined Margin CO_2 emission factor in year y

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

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

Source of data	Calculated from CEA database, Version 11, April 2016[15]
Value(s) applied	0.9777
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	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

B.6.3. Ex ante calculation of emission reductions

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 (BE_Y)

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

$BE_Y = EG_{PJ,y} * EF_{grid,y}$

Where,

$EG_{PJ,y}$ = Total quantity of net electricity delivered to the INDIAN grid

Project Investors' Name	PLF (%)	Grid	Generated Power(MWh) p.a	Baseline Emission Factor (tCO_2/MWh)	Baseline emissions (tCO_2/ year)
Triveni Sangam Holdings & Trading Co Pvt Ltd.	19.00%	INDIAN	1,997	0.9777	1,952
Atul Sharma	21.00%	INDIAN	1,840	0.9777	1,798
Ranjanben P. Chovtia	21.00%	INDIAN	1,159	0.9777	1,133
Dartyens Power Pvt ltd	20.50%	INDIAN	1,796	0.9777	1,755

As per EB 48, Annex- 11, PLF for all the Solar PV Project has been considered and demonstrated.

$EF_{grid,y}$ = Baseline emission factor (INDIAN Grid)

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

= 0.9777 tCO_2/MWh

BE_y = 6,792 * 0.9777
= 6,638

As per Section B.6.1:
$PE_y = LE_y = 0$

Thus,
$ER_y = BE_y - PE_y - LE_y$
$ER_y = BE_y - 0 - 0$
$ER_y = BE_y$

Therefore,
$ER_y = BE_y$ = **6,638**

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	6,638	0	0	6,638
Year 2	6,638	0	0	6,638
Year 3	6,638	0	0	6,638
Year 4	6,638	0	0	6,638
Year 5	6,638	0	0	6,638
Year 6	6,638	0	0	6,638
Year 7	6,638	0	0	6,638
Total	46,466	0	0	46,466
Total number of crediting years	7			
Annual average over the crediting period	6,638	0	0	6,638

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

For 1 MW Solar PV Project at Andhra Pradesh

Data/Parameter	$EG_{PJ,y}$
Unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
Source of data	Credit Report as per Monthly Generation Report
Value(s) applied	1,796 (Estimated Value)
Measurement methods and procedures	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: At least once in 5 years[16]

[16] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf, page 12

	The electricity is exported to the grid by the project activity by a feeder line to the sub-station. The net electricity is measured by a dedicated two-way electronic meters of accuracy class 0.2s or 0.5s. There is a main meter and check meter on the feeder line. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from Joint Energy Meter Reading Report provided by APSPDCL as per below equation: $EG_{PJ,y} = EG_{Export} - EG_{Import}$ The export and import energy will be measured continuously using above mentioned Main & Check meters at the switchyard. Export & Import readings of Main meter shall be taken on monthly basis at appointed day and hour (time) by authorized officer of APSPDCL in the presence of PP or representative of PP. The meter reading will be taken jointly and signed by the representatives of the APSPDCL and PP. Based on the readings, monthly invoices for net electricity exported will be raised by PP. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the project proponent.
Monitoring frequency	Monthly
QA/QC procedures	Calibration of all the meters will be undertaken at least once in 5 years and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2s or 0.5s. If during the calibration tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limit, then billing will be as per main meter as usual and vice versa. The main/ check meter will be replaced immediately. Billing for the period thereafter till the next monthly meter reading shall be as per the replaced main meter. It is to be noted that the calculation of net electricity supplied to grid is under purview of state electricity board and PP does not have any control on it. Also calibration interval and accuracy class of meters are not under control of PP.
Purpose of data	The Data/Parameter is required to calculate the baseline emission
Additional comment	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

For Solar PV Project at Madhya Pradesh

Data/Parameter	$EG_{PJ,y}$
Unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
Source of data	Monthly Joint Energy Meter Reading Report
Value(s) applied	2,999 (Estimated Value)
Measurement methods and procedures	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: Once in 5 years[17]

[17] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf, page 12

	Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from Joint Energy Meter Reading Report provided by MPPKVVCL as per below equation: $EG_{PJ,y} = EG_{Export} - EG_{Import}$ Cross Checking: The export and import energy will be measured continuously using Main & Check meters at the switchyard. Export & Import readings of Main meter shall be taken on monthly basis at appointed day and hour (time) by authorized officer of Discom in the presence of PP or representative of PP. The meter reading will be taken jointly and signed by the representatives of the Discom and Project Investor. Based on the readings, invoices for net electricity exported will be raised to third party. Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the Project Participant.
Monitoring frequency	Monthly
QA/QC procedures	The energy meters used are trivector meters which are of accuracy class 0.2s or 0.5s. The meters are monitored continuously & cumulative readings are taken at the end of the month by joint meter reading procedure. These are sealed by MPPKVVCL to avoid malfunctioning with meter readings. The officials frequently check the meters for tampering and malfunctioning with the meters. Meter is calibrated once in 5 years[18] by the authority in the presence of O&M Contractor / investors representatives and MPPKVVCL officials to ensure the working of meter within permissible limits. In case of any failure in the main meter, the check meter readings will be used. Also, the main meter will be replaced immediately with the calibrated back up meter. It is to be noted that the calculation of net electricity supplied to grid is under purview of state electricity board and PP does not have any control on it. Also calibration interval and accuracy class of meters are not under control of PP.
Purpose of data	The Data/Parameter is required to calculate the baseline emission
Additional comment	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

For Solar PV Project at Maharastra

Data/Parameter	$EG_{PJ,y}$
Unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
Source of data	Monthly Joint Energy Meter Reading Report
Value(s) applied	1,997 (Estimated Value)
Measurement methods and procedures	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: Once in 5 years[19]

[18] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf, page 12

[19] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf, page 12

	Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from Monthly Credit Notes provided by MSEDCL as per below equation: $EG_{PJ,y} = EG_{Export} - EG_{Import}$ Cross Checking: The export and import energy will be measured continuously using Main & Check meters at the switchyard. Export & Import readings of Main meter shall be taken on monthly basis at appointed day and hour (time) by authorized officer of Discom in the presence of PP or representative of PP. The meter reading will be taken jointly and signed by the representatives of the Discom and Project Investor. Based on the readings, invoices for net electricity exported will be raised by Project Investor to Discom. Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the Project Participant.
Monitoring frequency	Monthly
QA/QC procedures	The energy meters used are trivector meters which are of accuracy class 0.2s or 0.5s. The meters are monitored continuously & cumulative readings are taken at the end of the month by joint meter reading procedure. These are sealed by MSEDCL to avoid malfunctioning with meter readings. The officials frequently check the meters for tampering and malfunctioning with the meters. Meter is calibrated once in 5 years[20] by the authority in the presence of O&M Contractor / investors representatives and MSEDCL officials to ensure the working of meter within permissible limits. In case of any failure in the main meter, the check meter readings will be used. Also, the main meter will be replaced immediately with the calibrated back up meter. It is to be noted that the calculation of net electricity supplied to grid is under purview of state electricity board and PP does not have any control on it. Also calibration interval and accuracy class of meters are not under control of PP.
Purpose of data	The Data/Parameter is required to calculate the baseline emission
Additional comment	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

B.7.2. Sampling plan

Sampling is not required for the given project activity.

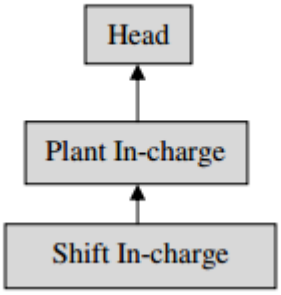
B.7.3. Other elements of monitoring plan

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 Madhya Pradesh, Maharastra and Andhra Pradesh, India. The monitoring plan, which will be implemented by the project proponent describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the project proponent. PP proposed the following structure for data monitoring, collection, data archiving for this project activity. The team comprises of the following members:

[20] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf, page 12

Organisational Structure for Monitoring



Responsibilities of Head: Overall functioning and maintenance of the project activity and overall responsibility of compliance with the CDM Monitoring Plan.

Responsibilities of Plant In-charge: Responsibility for Maintains the data records, ensures completeness of data, and reliability of data. Regularly verifying the monthly energy generation date with energy sales receipt or installed meters reading for identification of any discrepancies in data collection and taking suitable action to rectify them.

Responsibilities of Shift In-charge: Responsibility for day to day data collection and maintains day to day log book for monitored data. Responsibility for monthly and annual report generation. Quality assurance of the data/reports and preliminary check of data for any discrepancies.

Data Measurement

The export and import energy will be measured continuously using above mentioned Main & Check meters. Export & Import readings of Main & Check meters shall be taken on monthly basis by authorized officer of Discom in the presence of PP or representative of PP. The meter reading will be taken jointly and signed by the representatives of the Discom and project investors. Based on the readings, invoices will be raised by project investors. These invoices can be used for cross checking the meter readings taken for the project activity. It is to be noted though PP or PP representative is available during meter reading, the calculations of net electricity supplied to grid is completely under purview of Discom and PP do not have any control on it. Also accuracy class of meters and calibration frequency is under purview of Respective State Electricity Board and PP do not have any control on it. PP got the monthly credit report from where net electricity supplied to grid is obtained and used for emission reduction calculations.

Monitoring procedure for projects in State of Maharashtra:

As the project in Maharashtra includes SPV Plant which is monitored at the common sub-station.

The electricity generated by the project plant along with non-project plant is metered at a common metering point at the substation. This metering point consists of both main & check meters (ABT Meters). These meters are capable of measuring the electricity parameters on a real time basis.
The Joint Meter Reading (JMR) is taken on a monthly basis. The monthly JMR report records both total export[21] & total import[22] by the all the connected solar plants including the project plant in kWh. The total export reading for a given billing month is obtained by subtracting initial reading (taken in previous month) from the final reading (taken in billing month).

[21] MSEDCL termed this as 'Import' in all relevant documents like PPA, JMR etc.

[22] MSEDCL termed this as 'Export' in all relevant documents like PPA, JMR etc.

The difference is multiplied by the applicable meter constant/factor. Similar procedure is followed to arrive the total import reading.

The PP wise export kWh, import kWh is obtained by apportioning procedure. The sample apportioning procedure is given below:

Sample apportioning procedure:

In a given billing month, the individual plant end reading is recorded for each connected plant including the project plant. The % distribution of energy for the project plant is arrived by dividing the project plant end generation with the total generation of all the connected plants including the project plant.

The project plant's export kWh & import kWh is obtained by multiplying the arrived % distribution of energy of the project plant with the total export kWh & total import kWh respectively.

The net electricity supplied to the grid by the project plant in a given month is calculated by subtracting value of import kWh from export kWh.

Thus,

Net electricity supplied to the grid by an individual PP in a given month = Export kWh – Import kWh

Monitoring procedure for projects in State of Madhya Pradesh and Andhra Pradesh:

All the individual Project proponents are allocated a dedicated meter for the individual projects which records both the export and import values on monthly basis. The same shall be considered and the values shall be cross checked with the monthly invoices.

Data collection and archiving

Export & Import readings from main & check meter will be collected under the supervision of the plant in-charge. The net electricity supplied to grid would be calculated based on export & import readings. Export and Import data would be 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.

In the event that the main meter, which is used to record the net electricity exported by the project, is found to be faulty it will be repaired or replaced and the data from the check meter will be used in its place. In the unlikely event that the check meter fails it will also be repaired or replaced. During this time when both the main meter and check meter are repaired or replaced simultaneously, the net electricity shall be taken from the SCADA. In this regard, it should also be noted that the imported electricity and exported electricity are monitored continuously through SCADA and, hence, the net electricity is taken from the SCADA. Also, the SCADA net electricity value shall be compared with the lower value over the previous twelve months, using the values recorded in the Metered Net Electricity Generation monthly reports, described above and the lower of the two values shall be

used. In the event of meter failure, the details will be recorded by the Assistant Engineer / Junior Engineer and summarized in a discrete section of the Emission Reductions quarterly report.

Personnel training

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

In case of mismatch of date between the start date of the billing cycle and the start date of monitoring period the data will be apportioned in line to the daily generation values for the said mismatch period.

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

26/05/2016 is the date of completion of study on application of the selected methodology (AMS I.D - version 18.0). Further, the standardized baseline is not applicable for this project activity.

EKI Energy Services Limited is the entity responsible for the application of the selected methodology for this project activity. The details of the Project Participant are mentioned in Appendix 1 below.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

Start date of the project activity is the earliest date of Purchase Order released on 28/02/2013. This is Work Order for project activity between Atul Sharma and M/s M and B switchgears Ltd.

C.1.2. Expected operational lifetime of project activity

25 Years 00 Months

C.2. Crediting period of project activity

C.2.1. Type of crediting period

Renewable crediting period of 7 years 00 Months have been opted for the project activity. This is the first crediting period of the project activity.

C.2.2. Start date of crediting period

01/08/2016 or Date of submission of complete request for registration by the DOE whichever is later.

C.2.3. Length of crediting period

07 Years 00 Months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

The project activity has no significant impact on the environment. Solar PV projects are not included in the Schedule I of the EIA notification S.O.1533 (E) dated 14th September 2006[23] and thus an EIA is not required. Ministry of Environment & forests vide their OM J-11013/41/2006 - IA II (I) dated 13th May 2011[24] has re-affirmed this and exempted Solar PV power plants from EIA and EC requirement.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

The Local Stakeholder Meetings were organized for local stakeholder consultation and informed local stakeholder regarding the meeting at Project Site of each Project Investor in the state of Madhya Pradesh, Maharastra and Andhra Pradesh. The following are the stakeholders for the project activity:

- Local community
- Local village administration
- Technology suppliers
- Local vendors

All the stakeholders have been invited through Notice and announcement at public places.

Sr No.	Project Investor	Village	District	State	Invitation Date	Meeting Date
1	Triveni Sangam Holdings & Trading Co Pvt Ltd.	Mandrup	Solapur	Maharastra	25/09/2013	05/10/2013
2	Atul Sharma	Dhabla Sondhiya	Shahjapur	Madhya Pradesh	08/02/2013	18/02/2013
3	Ranjanben P. Chovtia	Dhabla Sondhiya	Shahjapur	Madhya Pradesh	21/06/2013	01/07/2013
4	Dartyens Power Pvt ltd	Marupaka	Nalgonda	Andhra Pradesh	28/01/2015	08/02/2015

The names of LSHM Participants for Andhra Pradesh site are as follows:

1. K.L.Ravichandra- Villager
2. V.M.Harisha- Villager
3. K.Baba Fakrudin- Villager
4. N.Davaroja- Villager
5. Shaikh Honnaz- Villager
6. Radhakrishna- Villager

The names of LSHM Participants for Madhya Pradesh site are as follows:

1. Kumar Vasudev- Villager
2. Virendra- Villager
3. Karnesh Lohia- Villager
4. Nilesh Singh- Villager
5. Shailendra Pandey- Villager
6. Radhika- Villager
7. Rohan Solanki- Villager
8. Ratnesh Bahadur- Site Incharge

[23] http://envfor.nic.in/legis/eia/so1533.pdf
[24] http://moef.nic.in/downloads/public-information/OM-SolarPV.pdf

The names of LSHM Participants for Maharastra site are as follows:

1. Mohan- Villager
2. Viju Shastri- Villager
3. Kaunesh- Villager
4. Nilangshu Mohrail- Villager
5. Shivanshu Mahato- Villager
6. Ranjan Patil- Villager
7. Swapnil- School Teacher
8. Ravindra Patel- Site Incharge

The meeting was presided over by Mr Ravi Thakur (Asst. Manager- Projects) who welcomed the gathering and introduced the company and its initiative to those present. He gave a brief description about the initiative by company in the Solar Power generation sector. He explained to the stakeholders about how the project will be beneficial to the people in the surrounding areas. He invited and described the technical aspects of the project activity. He informed the stakeholders present at the meeting about the capacity of the Solar PV Project and the technology proposed to be employed for the power generation. He further pointed out the benefits of renewable power generation as compared to conventional sources of power based on fossil fuels such as Coal and Oil. CDM Consultant present at meeting briefed the stakeholders on the possible threats of climate change caused due to increased concentration of Green House gases in the atmosphere. He further briefed the gathering about Kyoto protocol, Clean Development Mechanism and its associated benefits. He described the project activity in relation to CDM and discussed the benefits of implementation of the project activity. He described that the project if implemented, would result in reduction of greenhouse gases in the atmosphere by feeding power to the fossil fuel based grid system. Thus he concluded that the project activity will be beneficial to the society and environment as a whole.

Mr Thakur then invited the stakeholders to share their queries, suggestions and concerns with respect to the proposed CDM Project activity and replied to the questions raised.

The Minutes of meeting with commenting sheet from LSH, invitation letter receipt copy shall be submitted to the DOE.

E.2. Summary of comments received

Meeting started with opening speech by representative of project participant. He introduced all guests on dais. The representative of project participant explained Technical aspects of project to stakeholders. He also explained about social, environmental & economical benefits of the project. He also elaborated about CDM & its requirement for the current project. After the presentation, the session was open for questions/ feedback from stakeholders.

The stakeholders gathered at the venue, as per the scheduled time. The meeting was opened by opening remarks from Consultant of EKI Energy Services Limited with welcome remark; it was attended by the attendees depicted above.
Explanation about the main purpose of the project activity i.e. 'to generate electrical energy through green energy generation resource & to utilize the generated output for selling it to the state electricity utility' was narrated. Furthermore it was elaborated that the said project also conceives the following:-

- Indian economy is highly dominated by generation of electricity using fossil fuel, & coal is majorly used in thermal power plants to generate energy & for production processes, yet the basic necessity of large section is not being met. Use of renewable form of energy

generation will change consumption pattern & will mitigating the immense stress on the environment.

- Spread of the commercialization of the solar projects in the region.
- Contribute to sustainable development of the region, socially, environmentally & economically.

After the detailed presentation some of the stakeholders raised questions on the proposed solar energy based power project to clear their doubts. Following questions were asked which were adequately explained and answered:

Q: Will the operation of the plant result in increased temperature in the surroundings?
A: Since the electricity generation is dependent upon the sun rays falling on the PV Modules, there will be no generation during the night and the generation will be less during cloudy days.

Q: How much electricity will be generated from the Solar PV Plant?
A: The operation of the power plant will result in approx. 9,128 MWh of electricity. In simple terms it could light up 10400 electric bulbs of 100 W capacity for the whole year round.

Q: Does the project provides employment opportunities or improve economic development of the area?
A: Yes, the project will provide economic development of the area and will provide employment opportunities to the local people.

Q: Does the project provides lighting for streets?
A: Yes, the project will provide lighting on streets in nearby areas.

Q: Will the project help in improving the electricity supply to the villagers or neighbourhood areas?
A: Yes, the project will help in improving the electricity in the adjoining areas.

Q: How the project activity benefit the villages around the project site and their residents?
A: The project activity will benefit the nearby villagers by providing employment opportunities to local or nearby people and also provides immense opportunity for economic development of the area like increase in business opportunities, improvement in transportation social activities helps to uplift the standard of living.

The participants expressed their positive feedback on the initiative taken up by project promoter. They also expressed their goodwill for the environment friendly initiative.

Finally Mr Thakur thanked all the participants for attending the meeting. He also expressed that investor is committed to its social and environmental obligations and invites various participants to keep on giving their feedback on continuous basis so that if any improvements are called for these could be implemented in various operation of the project.

All the above queries have been suitably and satisfactorily replied / clarified by project participant's representatives. Local stakeholders welcomed and expressed their support to the project. The meeting was concluded by vote of thanks to all the participants.

E.3. Report on consideration of comments received

There were no comments raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region.

SECTION F. Approval and authorization

The letter of approval from Indian DNA is pending for this project activity and will be submitted to DoE on receipt of the same.

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	ReXchange Global Solutions (P118)
Street/P.O. Box	Office No 201, Plot No 48, Scheme 78, Part II, Vijay Nagar
Building	Enking Embassy
City	Indore
State/Region	Madhya Pradesh
Postcode	452010
Country	INDIA
Telephone	
Fax	
E-mail	
Website	
Contact person	Manish Dabkara
Title	Director
Salutation	Mr.
Last name	Dabkara
Middle name	
First name	Manish
Department	
Mobile	+91-9907534900
Direct fax	
Direct tel.	
Personal e-mail	manish@enkingint.org

Project participant and/or responsible person/ entity	☐ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	EKI Energy Services Limited
Street/P.O. Box	Office No 201, Plot No 48, Scheme 78, Part II, Vijay Nagar
Building	Enking Embassy
City	Indore
State/Region	Madhya Pradesh
Postcode	452010
Country	INDIA
Telephone	0731-4289086
Fax	0731-4289086
E-mail	business@enkingint.org
Website	www.enkingint.org
Contact person	Manish Dabkara

Title	CEO
Salutation	Mr.
Last name	Dabkara
Middle name	-
First name	Manish
Department	CDM Services Dept.
Mobile	+91-9907534900
Direct fax	+91-0731-4289086
Direct tel.	+91-0731-4289086
Personal e-mail	manish@enkingint.org

Appendix 2. Affirmation regarding public funding

No public funding for this project activity was received from annex 1 parties.

Appendix 3. Applicability of methodology and standardized baseline

Please refer section B of the PDD for the same.

Appendix 4. Further background information on ex ante calculation of emission reductions

Please refer section B.6.2 of PDD

Appendix 5. Further background information on monitoring plan

Please refer section B.7.1 and B.7.2 for information on monitoring.

Appendix 6. Summary of post registration changes

Not applicable

- - - - -

Document information

Version	*Date*	*Description*
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).

Version	*Date*	*Description*
06.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for small-scale CDM project activities (these instructions supersede the "Guidelines for completing the project design document form for small-scale CDM project activities" (Version 01.1)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-SSC-PDD* to *CDM-SSC-PDD-FORM*; • Editorial improvement.
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	13 March 2012	EB 66, Annex 9 Revision required to ensure consistency with the “Guidelines for completing the project design document form for small-scale CDM project activities”
03.0	15 December 2006	EB 28, Annex 34 • The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02.0	08 July 2005	EB 20, Annex 14 • The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01.0	21 January 2003	EB 07, Annex 05 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project design document, SSC project activities