Project design document form for CDM project activities

(Version 08.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	**20 MW Solar Project in Sanwreej, Jodhpur, Rajasthan**
Version number of the PDD	03
Completion date of the PDD	11/07/2017
Project participant(s)	Janardan Wind Energy Pvt. Ltd.
Host Party	India
Applied methodology(ies) and, where applicable, applied standardized baseline(s)	**ACM0002: Grid-connected electricity generation from renewable sources --- Version 17.0**
Sectoral scope(s) linked to the applied methodology(ies)	**Sectoral Scope 1 : Energy industries (renewable - / non-renewable sources)**
Estimated amount of annual average GHG emission reductions	34,882 tCO_{2e} per 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 for sale of electricity to the grid. Janardan Wind Energy Pvt. Ltd. (JWEPL) is the promoter of the proposed project activity.

The project activity involves installation of 10 MW_{AC} (Project-I) & 10 MW_{AC} (Project-II), totalling to 20 MW_{AC}(corresponding to 22.5 MWp) solar power project under Jawaharlal Nehru National Solar Mission (JNNSM) Phase-II, Batch-II (DCR[1] Category).Both the projects are installed in the same project boundaryat Village: Sanwreej, Teshil: Phalodi, Disrtict: Jodhpur, State: Rajasthan.

The electricity generated from project activity will be sold under the Power PurchaseAgreement (PPA), signed with NTPC Vidyut Vyapar Nigam (NVVN) Ltd.The electricity generated from the project activity will be evacuated through 132 kV sub-station located at Sanwreej for consumption in the Indian Electricity Grid.

The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 34,882 tCO2e per annum, thereon displacing 35,678 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 project activity is the installation of a new grid-connected renewable power plant/unit and this is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

The details of the project are mentioned in the table:

Project Investors' Name	Capacity in MW_{AC}	Capacity in MWp	State
Janardan Wind Energy Pvt. Ltd. (JWEPL)	20	22.5	Rajasthan

a) Scenario existing prior to the implementation of the project activity are as follows:

As the project activity is the installation of a new grid-connected renewable power plant/unit.
The scenario existing prior to the implementation of project activity is Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system", Version 05.0.

b) Baseline Scenario:

Baseline scenario and Scenario existing prior to the implementation of the project activity are the same.

c) Sustainable Development:

- **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, Forest and Climate Change (MoEFCC), 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:

[1] DCR - Domestic Content Requirement

[2] http://ncdmaindia.gov.in/approval_process.aspx

- **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 to villages and nearby areas by skilled, technical and industrialist has increased due to installation /site visit/operation and maintenance work related to solar plant. This directly and indirectly positively effects the economy of nearby populace.

- **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.

In addition to this, the Project Participant will contribute 2% of the CDM revenue realized from the CDM project for sustainable development including society/community development which is in line with DNA of India guideline on commitment of 2% of the CDM revenues towards sustainable development.

The Host County Approval issued by DNA of India declaring acceptability of the Sustainable Indicators by the project activity has been submitted to DOE.

A.2. Location of project activity

A.2.1. Host Party

India

A.2.2. Region/State/Province etc.

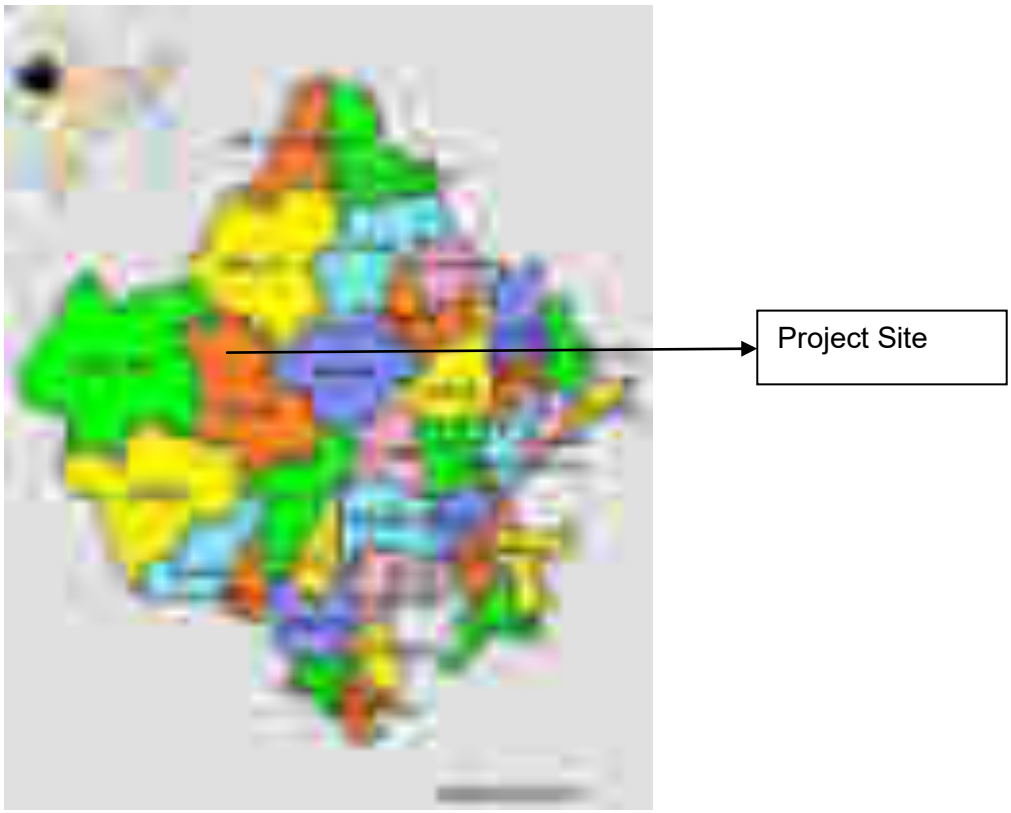
Rajasthan

A.2.3. City/Town/Community etc.

Project Promoters' Name	Village	Taluka	District
Janardan Wind Energy Pvt Ltd (JWEPL)	Sanwreej	Phalodi	Jodhpur

A.2.4. Physical/Geographical location

Project Investors' Name	Latitude	Longitude	Altitude of Site (m)	Project - Part	Commissioning Date
JWEPL	26.98^0 N	72.25^0 E	265 m	10 MW (Project – I)	30-Mar-2017
				10 MW (Project – II)	18-Apr-2017



A.3. Technologies and/or measures

The project activity aims to harness solar energy through installation of PV with total installed capacity of 20 MW_{AC} (corresponding to 22.5 MWp). The solar PV power plant will have solar PV modules, inverters, transformers and other protection system and supporting components as under:

A. Solar PV modules:

Module Supplier	Module Model	Capacity (p)	Number	Total Capacity (MWp)
TATA Power Solar Systems Ltd.	**TP 303** series	303	19520	5.91456
	TP 306series	306	9920	3.03552
	TP 309series	309	19200	5.9328
	TP 312series	312	16960	5.29152
	TP 315series	315	7360	2.3184
TOTAL CAPACITY				22.4928

B. Inverters:

S.No.	Make	10 MW (Project – I)	10 MW (Project – II)
1.	Manufacturer	Sungrow Power	Sungrow Power
2.	Model	SG2500	SG2500
3.	Rated Capacity	2500 kVA	2500kVA
4.	No. of Inverters	4	4
5	Rated Input Voltage(Max.Input Voltage)	1000V	1000V

C. Transformers

S.No.	Make	10 MW (Project – I)	10 MW (Project – II)
1.	Manufacturer	Danish Private Limited	Danish Private Limited
2.	Model	Oil Cooled	Oil Cooled
3.	Capacity	2800KVA	2800KVA
4.	No. of Transformers	4	4
5.	Voltage Ratio	33 KV/360V	33 KV/360 V

D. Metering Equipment Details

S.No.	Make	10 MW (Project – I)	10 MW (Project – II)
1.	Manufacturer	Secure Make	Secure Make
2.	Type	ABT meters	ABT meters
3.	Accuracy Level	0.2s	0.2s
4.	Total no of meter (Site and Substation)	4	4

The solar PV modules have a useful life of 25 years.

For monitoring equipment, their location and technical specifications, refer Section B.7.3. For Plant Load Factor (PLF), please refer Section B.6.3.

Baseline Scenario:

As the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following as per applied methodology:

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

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

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)	Janardan Wind Energy Pvt. Ltd. (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.

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

B.1. Reference of methodology and standardized baseline

Title: Large Scale Consolidated Methodology to describe baseline and monitoring methodology for "Grid-connected electricity generation from renewable sources"

References: Approved Large Scale Consolidated Methodology: ACM0002 "Grid-connected electricity generation from renewable sources" (Version 17.0, EB 89)[3]

ACM0002 draws upon the following tools which have been used in the PDD:

- Methodological Tool: Tool to calculate the emission factor for an electricity system - Version 05.0, EB 87 Annex 9[4].
- Methodological Tool: Tool for the demonstration and assessment of additionality - Version 07.0.0, EB 70 Annex 8[5].
- Methodological Tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation - Version 02.0, EB 87 Annex 8[6].

B.2. Applicability of methodology and standardized baseline

The project activity meets the applicability conditions of the approved consolidated baseline and monitoring methodology ACM0002, Version 17.0, Sectoral Scope 1, EB 89 as described below:

Applicability	Project activity vis-à-vis applicability Conditions
This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (a) Involve a capacity addition to (an) existing plant(s); (b) Involve a retrofit of (an) existing operating plants/units; (c) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (d) Involve a replacement of (an) existing plant(s)/unit(s).	The project activity is installation of a new grid connected solar power plant[7] at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant) and hence this criterion is applicable.
The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	The proposed project activity is an installation of a new grid connected solar power plant and hence criteria under point (a) is met.
(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline	The project does not involve any capacity additions, retrofits or replacements and therefore this criteria under point (b) is not applicable.

[3] http://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN

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

[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v2.0.pdf

[7] The same can be referred to from valid document(s) like Transmission Agreement.

emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	
In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m2 ; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m2 ; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m2 , all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2 ; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	The proposed project activity is an installation of a new grid connected solar power plant and not Hydro power plant, therefore this criteria is not applicable for this project activity.
In the case of integrated hydro power projects, Project Participant shall: • Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or • Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to	The proposed project activity is an installation of a new grid connected solar power plant and not Hydro power plant, therefore this criteria is not applicable for this project activity.

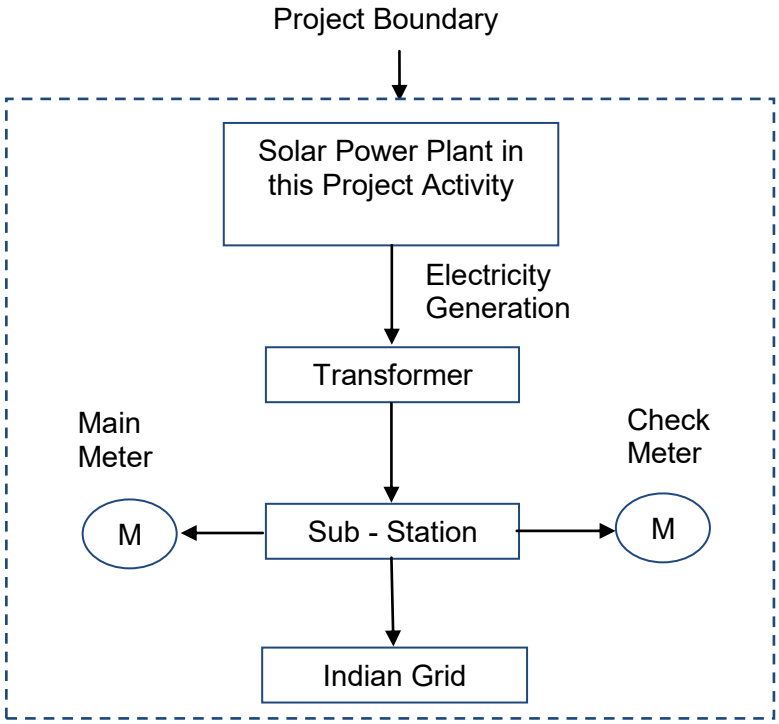
implementation of CDM project activity.	
The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	The project activity is installation of a new grid connected solar power project and does not involve switching from fossil fuel to renewable energy, therefore criterion described in point (a) is not relevant to the project activity. This is a solar power plant and not a biomass fired plant, therefore criterion described in point (b) is not applicable to the project activity.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The project activity is a new grid connected solar power plant and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.
Applicability conditions of "Tool to calculate the emission factor for an electricity system"	
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	This condition is applicable. OM, BM and CM are estimated using the tool under section B.6.1 for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 2: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Since the project activity is grid connected, this condition is applicable and the emission factor has been calculated accordingly.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project activity is located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.
Under this tool, the value applied to the CO2 emission factor of biofuels is zero.	The project activity is a grid connected solar power project and not a hydro power plant. Therefore, this criterion is not applicable for the project activity.

B.3. Project boundary

Project boundary has ascertained using para 22 of ACM0002 (Version 17.0, EB EB 89, Annex 1) – "The spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to."

Hence the project boundary includes the Solar PV Project activity, sub-station, grid and all power plants connected to grid. The proposed project activity will evacuate power to the Indian grid.

Project Boundary:



Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Grid-connected electricity generation.	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	Greenfield Solar PV Power Project Activity.	CO_2	No	No CO_2 emissions are emitted from the project activity.
		CH_4	No	No Project Activity does not emit CH_4.
		N_2O	No	No Project Activity does not emit N_2O.

B.4. Establishment and description of baseline scenario

As per the approved consolidated Methodology ACM0002 (Version 17.0, EB 89, Annex 1) para 24:

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

The project activity involves setting up of solar projects to harness the power of sun 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 grid, which is fed mainly by fossil fuel fired plants.

In the absence of the project activity, the equivalent amount of power would have been drawn from the Indian grid. Hence, the baseline for the project activity is the equivalent amount of power from the Indian grid.

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

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

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	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 (.25) values, sourced from Baseline CO_2 Emission Database, Version 11 published by Central Electricity Authority (CEA), Government of India.
$EF_{grid,OM,y}$	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, 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, published by Central Electricity Authority (CEA), Government of India

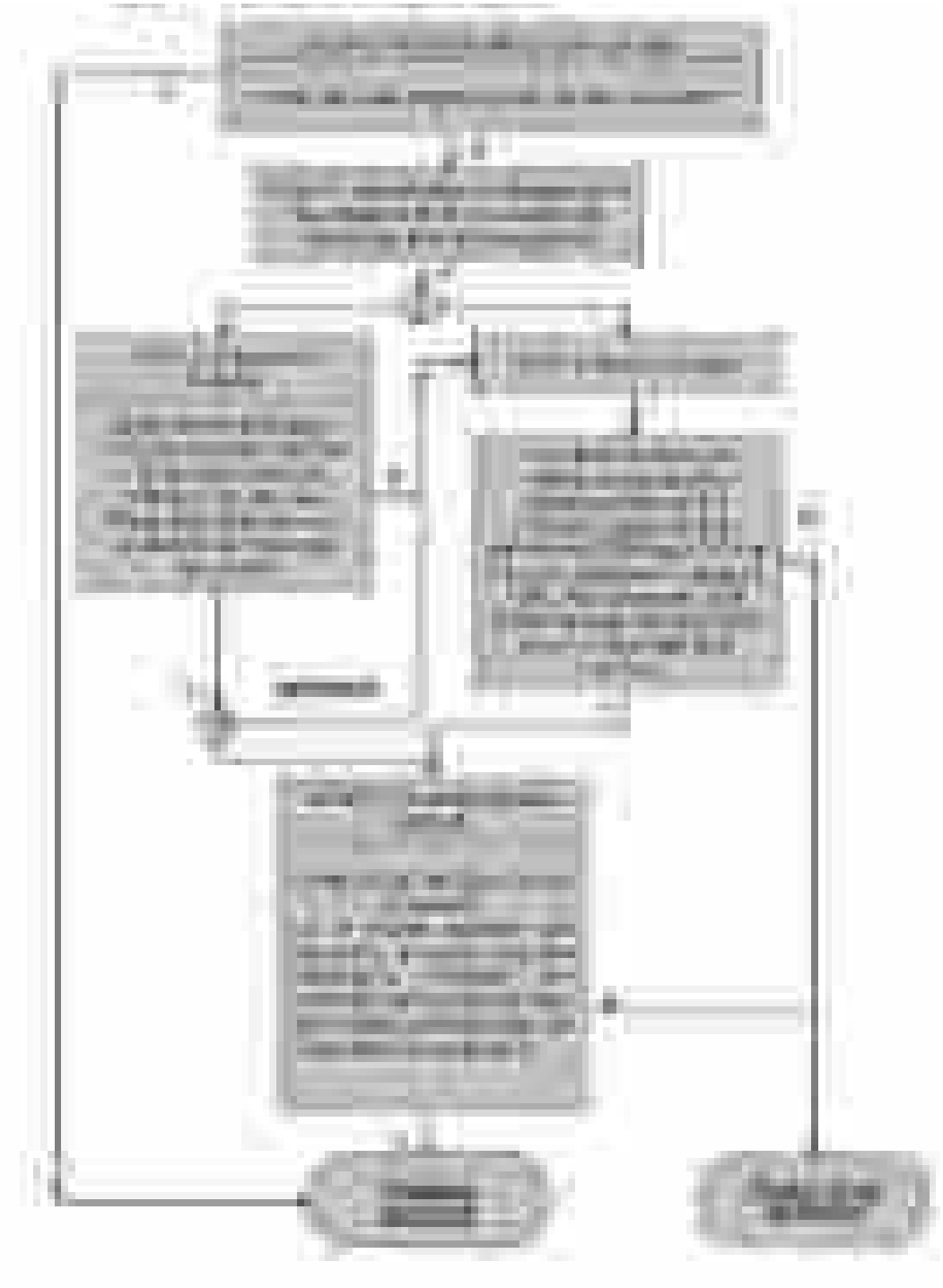
B.5. Demonstration of additionality

The table below is only applicable if the proposed project activity is a type of project activity which is deemed automatically additional, as defined by the applied approved methodologyor standardized baseline.

Specify the methodologyor standardized baseline that establish automatic additionality for the proposed project activity(including the version number and the specific paragraph, if applicable).	NA
Describehow the proposed project activity meets the criteria for automatic additionality in the relevant methodologyor standardized baselines.	NA

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

The proposed CDM project generates power using Solar PV energy which is a renewable, zero emission source of energy. Baseline considerations for the project are based on approved consolidated baseline methodology ACM0002 (Version 17.0). The methodology requires the Project Participant to determine the additionality based on "Tool for the demonstration and assessment of additionality", Version 7.0.0. The step-wise approach to establish additionality of the project activity has been followed, details of which are provided in the following paragraphs:



Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project activity is not the first of its kind. Hence, this step is not applicable.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

As per the applied methodology ACM0002 version 17.0; Para 24, if the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid connected power plant and by the addition of new generation sources.

As the baseline scenario is prescribed by applied methodology, hence no further analysis is carried out to identify alternatives.

Step 2: Investment Analysis

Sub-step 2a: Determine appropriate analysis method

As per "Tool for the demonstration and assessment of additionality" (version 07.0.0), for financial analysis of the project, the following three options are available:

Option I: Simple Cost Analysis
Option II: Investment Comparison Analysis
Option III: Benchmark Analysis

The project will generate revenues from sale of electricity, therefore Option I is not applicable. Option II also does not apply since there is no comparable investment alternative available to the project participant. The most appropriate financial analysis method is therefore option III: the benchmark analysis, where the returns on investment in the project activity are compared to benchmark returns that are available to any investors in the country.

Sub-step 2b: Option III. Apply benchmark analysis

Project Participants have considered Post-Tax Equity IRR for investment analysis at the time of decision-making. As Project Participants is only interested in the returns project is generating on the portion of investment costs, which is financed by them in the form of equity.

As per Para 16 of EB92, Annex 5 states that Required/expected returns on equity are appropriate benchmarks for an equity IRR. Therefore, the Expected return on equity is considered appropriate benchmark.

Accordingly, the post-tax Equity IRR has been considered as the relevant financial indicator for Investment Analysis.

Default Value Benchmark:

As per para 20 of EB92, Annex 5 the cost of equity is determined by selecting the values provided in the Appendix, i.e. Default values for cost of equity (expected return on equity) is presented below:

Appendix A in EB92, Annex 5 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **11.06%**

The Required return on equity (benchmark) was computed in the following manner:

Nominal Benchmark[9] = {(1+Real Benchmark)*(1+Inflation rate)}-1
Where:

- Default value for Real Benchmark = 11.06% (as per Appendix of EB92, Annex 5)

[9]As per Pg. 320 of Corporate Finance, Second Edition of Aswath Damodaran

- Inflation Rate forecast for by Reserve Bank of India (RBI) (i.e. Central Bank of India) for India & in case where RBI Inflation forecast was not available Average Inflation rate forecast for India has been sourced from IMF web site.

Benchmark estimation:

Appendix A in EB92, Annex 5 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **11.06%**

Inflation Forecast for India as per RBI website:

Project Promoters' Name	Inflation Forecast		Benchmark	
	5 Years	10 Years	5 Years	10 Years
JWEPL	5.00%[10]	4.50%	16.61%	16.06%

As a conservative approach, benchmark of **16.06%** has been selected for this project activity.

Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III):

Key assumptions supporting the financial projections

Details of the project		Source
State where the project is situated	Sanwreej, Rajasthan	As per DPR
Total Capacity (MW)	20.00	As per DPR
Expected Date of Commissioning	31-Mar-17	As per DPR
Life of the plant (Yrs.)	25	As per Technical Specification of Tata Power Solar
Generation and sale of electricity		
Net PLF (%)	20.532%	As per Third Party Report in accordance to EB 48 Annex 11
Annual generation (kWh)	3,59,72,064	Calculated Value
Deration every year (%)	0.30%	As per DPR
Tariff rate at the decision making (INR/kWh)	5.06	As per DPR
Operation and maintenance cost and Insurance		
O & M Expenses (INR Mn.)	13.17	As per DPR
Escalation in the operational expenses (%)	5.00%	As per DPR
O & M free for (Yr.)	1.00	As per DPR
Insurance (INR Mn.)	1.18	As per DPR
Other Expenses (INR Mn.)	3.88	As per DPR
Escalation in the Other expenses (%)	5.00%	As per DPR
Financial parameters		
TOTAL COST (INR Mn.)	1,296.84	As per DPR
Loan Amount (INR Mn.)	972.63	As per DPR
Equity Investment (INR Mn.)	324.21	Calculated Value
Term loan		
Margin (%)	25.00%	As per DPR
Loan Amount (INR Mn.)	972.63	Calculated Value
Interest rate (%)	10.00%	As per DPR
Loan Tenure (Qtr.)	72	As per DPR

[10] https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=16980

Moratorium Period (Qtr.)	4	As per DPR
Repayment Period (Qtr.)	68	Calculated Value
Repayment instalments value (INR Mn.)	14.303	Calculated Value
1st instalment from (Qtr. end)	31-Mar-18	Considered from the next Quarter End
Book Depreciation (WDV Method)		
Land Cost (INR Mn.)	30.00	As per DPR
Gross Depreciable Value (INR Mn.)	1,266.84	Calculated Value
Book Depreciation Rate (%)	11.69%	As per DPR
Salvage Value (%)	5.00%	As per DPR
Salvage value (INR Mn.)	63.34	As per DPR
Residual Value (INR Mn.)	93.34	Calculated Value
IT Depreciation (SLM Method)		
IT Depreciation Rate (%)	7.69%	As Per Income Tax , Depreciation rates for power generating units
Income Tax		
Financial Year	FY 2016-17	
Income tax rate (%)	30.00%	Tax rates applicable to a domestic company
MAT (%)	18.50%	
Service Tax (%)	14.50%	As Per Service Tax Rule
Surcharge (%)	12.00%	Tax rates applicable to a domestic company
Education cess (%)	3.00%	
Final Tax rates		
Income tax rate (%)	34.61%	Calculated Value
MAT (%)	21.34%	Calculated Value
Service Tax (%)	14.50%	Calculated Value

Considering the input values, Equity IRRs is given below:

S. No.	Project Promoters' Name	Equity IRR without CDM	Benchmark (Equity IRR)
1	JWEPL	11.21%	16.06%

The CDM project activity cannot be considered as financially attractive as the equity IRR for the project activity is less than the Benchmark.

Sub-step 2d: Sensitivity Analysis

Addressing Guidance 28 & 29 of EB92, Annex 5, following factors has been subjected to sensitivity analysis:

1. PLF
2. O&M Cost
3. Project Cost
4. Tariff

The rationale of sensitivity is, *"The ultimate objective of the sensitivity analysis is to determine the likelihood of the occurrence of a scenario other than the scenario presented, in order to provide a cross-check on the suitability of the assumptions used in the development of the investment analysis."*

The results of sensitivity analysis are as follows:

Variation %	-10%	Normal	10%	Breaching Value
PLF	7.87%	11.21%	14.92%	12.77%
O&M	11.54%	11.21%	10.87%	-148.69%
Project Cost	14.82%	11.21%	8.59%	-12.61%
Tariff Rate	7.87%	11.21%	14.92%	12.77%

The results of sensitivity analysis show that even with a variation of +10% & -10% in project cost, O&M cost, PLF and Tariff Rate Equity IRR is significantly lower than the benchmark. And it is evident from the results given above; the project remains additional even under the most favourable conditions.

Probability to breach the benchmark:
Sensitivity Parameter 1 : PLF
PLF considered in financials is as per **"Guidelines for the reporting and validation of Plant load factors" stated in EB48 Annex11**[11]. Variation in PLF of more than 10% is unlikely to happen as the PLF has been reported as per the Third Party Report based.
Sensitivity Parameter 2 : O&M
The sensitivity analysis reveals that O&M will breach the benchmark at negative values and is hypothetical case. Since the O&M cost is subject to escalation (as evidence by the O&M agreement) and also subject to inflationary pressure, any reduction in the O&M costs is highly unlikely. Hence, the reduction in the O&M cost is highly unlikely.
Sensitivity Parameter 3 : Project Cost
Estimated Project Cost for financial analysis is considered from DPR. However, even if we consider the actual cost of the project even then the benchmark is not breached. Moreover the Sensitivity is carried out for +/-10%.
Sensitivity Parameter 4 : Tariff Rate
As per the PPA with NTPC for 25 years, the tariff is fixed at INR 5.06/kWh for the entire life. However, Sensitivity is carried out for +/-10% variation in the tariff. Even then the benchmark is not breached. Hence, there is no probability of variation for the same.

Outcome of Step 2:
This substantiates that the investment is not financially attractive (Equity IRR for the project activity is less than the Benchmark Equity IRR) for any of the investor. Thus it can be easily concluded that project activity is additional & is not business as usual scenario.

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4: Common practice analysis

Stepwise approach for common practice analysis has been carried out as per Methodological tool "Common Practice", version 03.1 EB84, Annex 7:

[11] http://cdm.unfccc.int/EB/048/eb48_repan11.pdf

Step (1):*calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.*

Range	Capacity	Unit
+50%	30	MW
Capacity of the proposed project activity	20	MW
-50%	10	MW

Step (2): *identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:*

(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Identification of the similar projects (CDM and non-CDM) is carried out as per sub-steps of Step (2) as follows:

a) As the projects are located in Rajasthan state of India, therefore, projects in the geographical area of Rajasthan have been chosen for analysis.
b) The project activity is a green-field solar power project and uses measure *(b) "Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies".*

   Therefore, projects applying same measure (b) are candidates for similar projects.
c) The energy source used by the project activity is solar. Hence, only solar energy projects have been considered for analysis.
d) The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects.
e) The capacity range of the projects is within the applicable capacity range from 10 MW to 30 MW.
f) The start date of the project activity is 20-Jul-2016 i.e. the earliest Purchase Order Date. Therefore projects, which have started commercial operation before 20-Jul-2016, have been considered for analysis.

Numbers of Similar projects identified (as per data published by RRECL[12]), which fulfil above-mentioned conditions are
N_{solar} = 41

Step (3):*within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.*

[12]Rajasthan Renewable Energy Corporation Limited, Details of Commissioned Gird Connected Solar Power Projects in Rajasthan published as on 31-Sep-2015

CDM project activities, which have got registered or are under validation have been excluded in this step. The list of the power plants identified is provided to the DOE. After excluding the registered and under validation projects the total number of projects,

N_{all} = 20

Step (4):*within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.*

As per the tool on Common Practice, the project activities have been separated from the different technologies on the basis two criteria:

1. **Size of Installation**
2. **Investment climate on the date of the investment decision**

Hence, projects where either of the conditions is satisfied those projects are counted for calculating Ndiff projects.

N_{diff} = 18

Step (5):*calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.*

Calculate **$F=1-N_{diff}/N_{all}$**
F = 1-(18/20) = 0.10

Outcome of Step 4:

As,

i. **F = 0.10; is less than 0.2**
ii. **$N_{all}-N_{diff}$ = 2; is less than 3**

The proposed project activity is not a "common practice" within a sector in the applicable geographical area.

The above discussions show that solar power development is not a common practice and the project activity is not financially attractive; hence the project activity is additional.

Project Timelines

Project Timelines	**Date**
Investment Decision	11-Mar-16
Purchase Order	20-Jul-16
Date of Notification to CDM EB & NCDMA	15-Oct-16
Power Purchase Agreement	16-Jun-16
Commissioning Date - Project I	30-Mar-17
Commissioning Date - Project II	18-Apr-17
Loan Sanction Letter	09-Dec-16
LSHM - Invitation	20-Jun-16
LSHM - MOM	11-Jul-16

Host Country Approval	24-May-17

Demonstration of Parallel and continuing actions

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, all the project investors have intimated 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 within 180 days (refer table below). Hence, it can be clearly established that CDM was seriously considered in the decision to proceed with the proposed project activity.

Project Promoters' Name	Start date	F-CDM Date
JWEPL	20-Jul-2016	15-Oct-2016

B.6. Emission reductions

B.6.1. Explanation of methodological choices

Project Emissions:

As per the approved consolidated Methodology ACM0002 (Version 17.0, EB 89, Annex 1) para 36:

"For most renewable energy power generation project activities, PE_Y = 0. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the followingequation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \qquad \textit{Equation(1)}$$

Where:

PE_v	=	*Project emissions in year y (t CO_2e/yr)*
$PE_{FF.v}$	=	*Project emissions from fossil fuel consumption in year y (t CO_2/yr)*
$PE_{GP,y}$	=	*Project emissions from the operation of dry, flash steam or binary geothermal power plants in year y (t CO_2e/yr)*
$PE_{HP,y}$	=	*Project emissions from water reservoirs of hydro power plants in year y (t CO_2e/yr)"*

As the project activity is the installation of a new grid-connected Solar PV Power plant and does not involve any project emissions from fossil fuel, operation of dry, flash steam or binary geothermal power plants, and from water reservoirs of hydro power plants. Therefore $PE_{FF,y}$, $PE_{GP,y}$, $PE_{HP,y}$ are equal to zero and thus, $PE_y = 0$.

Baseline Emissions:

As per the approved consolidated Methodology ACM0002 (Version 17.0, EB 89, Annex 1) para 44:

Baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected

power plants and the addition of new grid- connected power plants. The baseline emissions are to be calculated as follows:

$BE_y = EGfacility,yx\ EF_{grid,CM,y}$

Where:

BE_y	=	Baseline emissions in year y (t CO2/yr)
EGfacility,y	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO2/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, April 2016[13], published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per *Methodological tool: Tool to calculate the emission factor for an electricity system* (Version 05.0, EB 87, Annex 9), following six steps have been followed:

(a) **Step 1:** Identify the relevant electricity systems;

(b) **Step 2:** Choose whether to include off-grid power plants in the project electricity system (optional);

(c) **Step 3:** Select a method to determine the operating margin (OM);

(d) **Step 4:** Calculate the operating margin emission factor according to the selected method;

(e) **Step 5:** Calculate the build margin (BM) emission factor;

(f) **Step 6:** Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electricity systems

As described in tool *"For determining the electricity emission factors, identify the relevant project 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*

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

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, all the 5 zones have been synchronized and called as Indian Grid.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)
Project participants may choose 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)
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 and Dispatch data analysis OM is not possible due to lack of availability of data to project developers.
The choice of other two options for calculating operating margin emission factor depends on 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 five most recent years) for the Indian grid is less than 50 % of the total generation. Thus the Average OM method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (t CO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

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:

(a) **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

(b) **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 calculation of Simple OM emission factor using a 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.
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 crediting period.

Step 4: Calculate the operating margin emission factor ($EF_{grid,OMSimple,y}$) according to the selected method

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

Net Generation in Operating Margin (MWh) (incl. imports)		
2012-13	**2013-14**	**2014-15**
697,187,149	721,631,736	808,417,293

Simple Operating Margin Emission Factors (tCO2/MWh) (incl. Imports)		
2012-13	**2013-14**	**2014-15**
0.99	1.00	0.99

Weighted Generation Operating Margin (t CO2/MWh)	0.9941

Step 5: Calculate the build margin (BM) emission factor ($EF_{grid,BM,y}$)
As per Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version 05.0 , EB 87, Annex 9) para 70 :

In terms of vintage of data, project participants can choose between one of the following two options:
(a) ***Option 1*** *- for the first crediting period, calculate the 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. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.*

(b) ***Option 2*** *- For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.*

Option 1 as described above is chosen by PP 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**

Step 6: Calculate the combined margin (CM) emission factor ($EF_{grid,CM,y}$)
As per Methodological tool : "Tool to calculate the emission factor for an electricity system" (Version 05.0 , EB 87, Annex 9) para 79 :

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:
(a) Weighted average CM; or

(b) Simplified CM.

PP has chosen option (a) i.e weighted average CM to calculate the combined margin emission factor for the project activity.
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 CO2 emission factor in year *y* (t CO2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO2 emission factor in year *y* (t CO2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (per cent)
wBM	=	Weighting of build margin emissions factor (per cent)

The following default values should be used for w_{OM} and w_{BM}:
(a) Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods

Therefore, $EF_{grid,CM,y}$	=	0.9941*0.75 + 0.9285*0.25
	=	0.9777 t CO2/MWh

Baseline emission factor (EF_y) :

The baseline emission factor is calculated using the combined margin approach as described in Step 6 above:
Therefore, $EF_y = EF_{grid,CM,y}$ = 0.9777 t CO2/MWh.

Leakage Emissions:
No other leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.

Emission reductions:

Emission reductions are calculated as follows:
$ER_y = BE_y - PE_y$

Where:

ER_y = Emission reductions in year *y* (t CO_2e/yr)
BE_y = Baseline emissions in year *y* (t CO_2/yr)
PE_y = Project emissions in year *y* (t CO_2e/yr)

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[14]
Value(s) applied	0.9941
Choice of data or Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" as 3-year generation weighted average using data for the years 2012-20132013-2014 &2014-15. 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	tCO_2/MWh
Description	Build Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016[15]
Value(s) applied	0.9258
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". 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	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016[16]
Value(s) applied	0.9777

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

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

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

Choice of data or Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05". The data is 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.

B.6.3. Ex ante calculation of emission reductions

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

$ER_y = BE_y - PE_y$

Where:
ER_y = Emission reductions in year *y* (t CO_2e/yr)
BE_y = Baseline emissions in year *y* (t CO_2/yr)
PE_y = Project emissions in year *y* (t CO_2e/yr)

Baseline Emissions:
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.

$BE_Y = EGfacility,y * EF_{grid,CM,y}$

Where,
EGfacility,y = Total quantity of net electricity delivered to the Indian grid
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y = 0.9777 t CO2/MWh

BE_y = 35,972*0.9777 t CO2/ year.

$PE_y = 0$

Therefore, $ER_y = BE_y$ = 35,972*0.9777 t CO2/ year = 35,169 t CO2 for 1st year.

Year	Annual Generation	De-ration	Net Electricity Generation	Baseline Emission Factor	Baseline Emissions
	MWh	%	MWh	(tCO_2/MWh)	tCO_2
			$EG_{facility,y}$		BE_y
Year 1	35,972	0.00%	35,972	0.9777	35,169
Year 2	35,972	0.30%	35,864	0.9777	35,064
Year 3	36,070	0.30%	35,855	0.9777	35,054
Year 4	35,972	0.30%	35,649	0.9777	34,854
Year 5	35,972	0.30%	35,542	0.9777	34,749
Year 6	35,972	0.30%	35,436	0.9777	34,645
Year 7	36,070	0.30%	35,426	0.9777	34,636
Total			**2,49,744**		**2,44,171**
Average			**35,678**		**34,882**

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	35,169	-	-	35,169
Year 2	35,064	-	-	35,064
Year 3	35,054	-	-	35,054
Year 4	34,854	-	-	34,854
Year 5	34,749	-	-	34,749
Year 6	34,645	-	-	34,645
Year 7	34,636	-	-	34,636
Total	2,44,171			2,44,171
Total number of crediting years	7 Years (Renewable)			
Annual average over the crediting period	34,882	0	0	34,882

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{facility,y}$
Unit	MWh
Description	Quantity of net electricity generation supplied by the projectplant/unit to the grid in year y (MWh)
Source of data	Monthly Meter Reading Reports (separately for each individual 10 MW (Project-I and Project-II)
Value(s) applied	35,678 (Average Estimated Value)

Measurement methods and procedures	Data Type: Measured Monitoring equipment:Energy Meters of accuracy class 0.2s Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually. Archiving Policy: Paper &/or Electronic Calibration frequency: Once in 5 years as per CEA guidelines[17] 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 Meter reading reports provided by SEB as per below equation: $EGfacility,y = EG_{Export} - EG_{Import}$ Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the Invoices/ Monthly Bill raised by the Project Participant to the NTPC.
Monitoring frequency	Monthly
QA/QC procedures	Calibration of all the meters will be undertaken once in 5 years as per CEA guidelinesand faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2.
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.

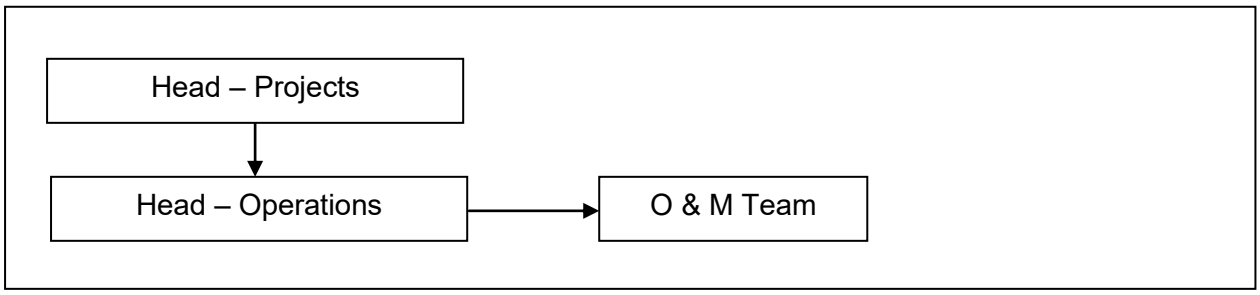
B.7.3. Other elements of monitoring plan

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected solar power projects being implemented in Rajasthan, India. The monitoring plan, 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 participants. The following structure is proposed for data monitoring, collection, data archiving and calibration of equipment for this project activity. The team comprises of the following members:

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

Organisational Structure for Monitoring



Responsibilities of Head- Projects: Tracking and reviewing the overall functioning and maintenance of the project activity from Head (Operations). Head (Operations) will be reporting Head (Projects).
Responsibilities of Head - Operations: Overall functioning of the project activity and Coordinating with the O & M Team for the proper functioning of Project activity. He will be reporting to Head (Projects).
Responsibilities of O & M Team: O & M team is responsible for Operations and Maintenance related issues, they are also responsible for day to day data collection and monitoring, ensures completeness and reliability of data (calibration of equipment).

Data Measurement
Projects activity comprises of installation of 4 Energy meters, 2 Energy meters (1 main meter and 1 check meter for each 10 MW) at project site and 2 Energy meters (1 main meter and 1 check meter for each 10 MW) at substation.

The export and import energy will be measured continuously using above mentioned Main & Check meters installed at Sub-station. Export & Import readings of Main & Check meters shall be taken on monthly basis by authorized officer of SEB in the presence of PP or representative of PP. The meter reading will be taken jointly and signed by the representatives of the SEB and PP or representative of PP. Based on the readings, invoices/ monthly bills will be raised by PP or representative of PP. These invoices/ monthly bills can be used for cross checking the meter readings taken for the respective project activity.

It is to be noted though Project owner or their representatives are available during meter reading, the calculations of net electricity supplied to grid is completely under purview of SEB/Discom officer and Project owner do not have any control on it. Also accuracy class of meters and calibration frequency is under purview of SEB/Discom officer and Project owner do not have any control on it. Project owner gets the monthly credit report from where net electricity supplied to grid is obtained and used for emission reduction calculations.

Data collection and archiving
Export & Import readings from main & check meter will be collected under the supervision of the O & M Team or authorized representatives of PP. The net electricity supplied to grid would be calculated based on export & import readings. Export and Import data would be recorded and stored in electronic&/or Paper. The records are checked periodically by the Head (Operations) and discussed thoroughly with the O & M Team. 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.

Mismatch in Monitoring Period and the Billing Period
In case the dates of a particular monitoring period do not match with the dates of the billing period, the net electricity exported to the grid would be calculated from:

D = (A/B)*C

A = Difference of number of days which are not matching of billing period and monitoring period.
B = Number of days of the billingperiod/ month which was not matched with the monitoring period.
C = Net Electricity supplied to the grid for that given billing period/ month.
The calculated value after apportioning would be used for calculation of emission reductions during that period.

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 unlikely event of failure of both Main meter & Check meter installed at sub-station, where both the faulty meters are required to repair or replaced simultaneously, the export & import readings from Main & Check Meter installed at the inter-connection point at the project site will be used for monitoring of net electricity exported to the grid.

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.

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

01/07/2017 is the date of completion of study on application of the selected methodology (Approved Consolidated Methodology : ACM0002 “Grid-connected electricity generation fromrenewable sources” - version 17.0 , EB 89, Annex 1). Further, the standardized baseline is not applicable for this project activity.

Infinite Solutions is the entity responsible for the application of the selected methodology for this project activity. The contact 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 date on which the first purchase order was realised, i.e. 20/07/2016.

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

01/08/2017 or Date of submission of complete request for registration by the DOE whichever is later.

C.2.3. Length of crediting period

7 Years 00 Months (First Crediting Period)

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

The proposed project activity is using renewable energy generation technology (Sun's Radiation) which is free from any kind of anthropogenic emission. Project activity is not having any negative environmental impacts.

D.2. Environmental impact assessment

As per the notification from MoEF dated September 14, 2006[18] and its amendment notification S.O.-3067(E) dated 1/12/2009[19], the list of project activities which require prior environmental clearance is stipulated. This does not include the proposed project activity type as it involves solar power generation. Hence the proposed project activity does not require any Environmental impact analysis. Project activity has no significant emissions. Hence no environmental impact analysis was conducted.

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. 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 public notice (dated 20 June 2016)which were displayed/ placed to the nearby areas. Further, stakeholders were invited individually to attend the stakeholders meeting. The meeting was held on 11 July 2016.

In the introductory speech, the representatives of Project Participant welcomed the gathering and given a brief about the CDM project activity. Subsequent to the introductory speech, stakeholders were explained about the electricity generation from solar project is an environmental friendly power generation technology contributing to reduction in GHG emissions. They were also explained about the benefits of the solar power projects like, increasing energy availability and improving quality of power and its assistance to the local population by providing employment opportunities to both skilled & unskilled labours.

Apart from this, a Local Stakeholder Feedback round has been carried out on 03/02/2017 inline with the requirements of Gold Standard process.

[18] http://envfor.nic.in/legis/eia/so1533.pdf

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

The Minutes of LSH meeting and Feedback roundalong with List of Attendees and copy of Public Notice and Photographsare submitted to the DOE.

E.2. Summary of comments received

Meeting started with opening speech by representative of project participant and EPC Contractors. 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/ comments/ feedback from stakeholders.

The villagers raised various queries and clarification provided is as summarised below:

Name of the stakeholder:	Mrs. Lata Paliwal
Occupation& Village:	Sanwreej Village
*Concerns:*What are the employment opportunities during the project construction stage and later to its Operation stage? *Reply from PP/ PP Representative:*Preference will be given to local population in employment, who have desired skills and qualifications. Possibility of imparting training to the educated unemployed youth will also be considered.	

Name of the stakeholder:	Mr. Mahipal Badhu
Occupation& Village:	Sanwreej Village
*Concerns:*Which type of fuel will be used in plant/project? *Reply from PP/ PP Representative:*Project is a clean energy project based on renewable resource – solar energy. Hence, no burning of fuels will be there.	

Name of the stakeholder:	Mr. Abhishek Badhu
Occupation& Village:	Phalodi Village
*Concerns:*What are negative impacts arising due to the project activity like Land pollution, Air pollution or Water pollution, and what steps will be taken to address those negative impacts? *Reply from PP/ PP Representative:*Project activity has no negative impact instead this project is establish to reduce the GHG emissions and in addition also helps in sustainable development of community, thus creating a positive impact on environment.	

Name of the stakeholder:	Mr. Krishnaram Bishnoi
Occupation& Village:	Sanwreej Village
*Concerns:*How the project activity will help in the growth/ development of the local populace? *Reply from PP/ PP Representative:*There are various direct and indirect benefits for local populace were associated with the Project activity, Employment opportunities for local people is increased and other benefits like increase visit of outside people will increase trade and business opportunities. And with the officials engaged with the Project activity there will be enhancement in technological as well as social well-being in the area. In addition PP will contribute 2% of sharing of CER Revenue in the CSR Activities.	

Name of the stakeholder:	Mr. Pannalal Mokha
Occupation& Village:	Sanwreej Village
*Concerns:*What would be the operational life cycleof the project activity? *Reply from PP/ PP Representative:*The expected operating life time of the project is 25 years	

Name of the stakeholder:	Mr. Mahipal Bishnoi
Occupation& Village:	Farmer from Shiv Nagar Village
*Concerns:*Will the implementation of project improvement electricity supply position in the local region after the commissioning of project? *Reply from PP/ PP Representative:*PP has informed him that as the project exports the electricity to local substation first, there is clear possibility that the local electricity supply situation will be better and local populace will get benefited as a result of it. However, they have also mentioned the preference of supply of electricity is not under the control of project. Since, the electricity is generated in the region, we sincerely hope that the local requirements of electricity are given due consideration by the discom.	

Before the closing remarks, Mr. Ashwini Kumar summarised the concerns expressed by stakeholders and clarifications provided. He informed stakeholders that the project activity would contribute to the sustainable development in the nearby areas of project. 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 negative 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 No. 4/7/2016-CC, dated 24-May-2017from DNA of India; the host party involved in the project activity has been provided to the DOE.

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	Janardan Wind Energy Pvt. Ltd.
Street/P.O. Box	Road No. 3, Banjara Hills
Building	LN Bangur Group of Companies, 3rd Floor Uptown Banjara,
City	Hyderabad
State/Region	Telengana
Postcode	500034
Country	India
Telephone	
Fax	
E-mail	rjhawar@lnbgroup.com
Website	http://www.lnbgroup.com/
Contact person	Mr. Rohan Jhawar
Title	Principle Executive
Salutation	Mr.
Last name	Jhawar
Middle name	
First name	Rohan
Department	
Mobile	+91-99083-99963
Direct fax	+91-40-47861111
Direct tel.	+91-40-47861111
Personal e-mail	rjhawar@lnbgroup.com

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	Infinite Solutions
Street/P.O. Box	R.N.T Marg
Building	611, 6th Floor, Chetak Center Main, 12/2
City	Indore
State/Region	Madhya Pradesh
Postcode	452001
Country	India
Telephone	+91-731-4050174
Fax	
E-mail	jimmy@infisolutions.org
Website	http://infisolutions.org/
Contact person	Mr. Jimmy Sah

Title	Head - Sustainability
Salutation	Mr.
Last name	Sah
Middle name	
First name	Jimmy
Department	
Mobile	+91-9644130430
Direct fax	
Direct tel.	+91-731-4050174
Personal e-mail	jimmy@infisolutions.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

From CO2 database of CEA, Version 11 published by Government of India, Ministry of Power Central Electricity Authority, Government of India.

CENTRAL ELECTRICITY AUTHORITY: CO_2 BASELINE DATABASE	
VERSION	11
DATE	April 2016
BASELINE METHODOLOGY	ACM0002 / Ver 16.0 and "Tool to Calculate the Emission Factor for an Electricity System", Version 5.0

Net Generation in Operating Margin (MWh) (incl. Imports)			
	2012-13	**2013-14**	**2014-15**
Indian Grid	697,187,149	721,631,736	808,417,293

Simple Operating Margin (tCO_2/MWh) (incl. Imports) (1) (2)			
	2012-13	**2013-14**	**2014-15**
Indian Grid	0.99	1.00	0.99

Weighted Generation Operating Margin	
Indian Grid	0.9941

Build Margin (tCO_2/MWh) (not adjusted for imports)			
	2012-13	**2013-14**	**2014-15**
Indian Grid	0.9692	0.9550	0.9285

Combined Margin Emission Factor	
Indian Grid	**0.9770**

Appendix 5. Further background information on monitoring plan

Please refer section B.7 for information on monitoring.

Appendix 6. Summary of post registration changes

Not Applicable.

- - - - -

Document information

Version	*Date*	*Description*
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
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 CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • 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-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	• Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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