	<b>Project design document form</b> <b>(Version 11.0)</b>
<b>BASIC INFORMATION</b>	
<b>Title of the project activity</b>	Solar and Wind Project by Agrawal Renewable Energy Pvt. Ltd.
<b>Scale of the project activity</b>	<input type="checkbox"/> Large-scale <input checked="" type="checkbox"/> Small-scale
<b>Version number of the PDD</b>	02
<b>Completion date of the PDD</b>	01/12/2020
<b>Project participants</b>	Agrawal Renewable Energy Pvt. Ltd.
<b>Host Party</b>	INDIA
<b>Applied methodologies and standardized baselines</b>	<b>Methodology:</b> AMS-I.D “Grid connected renewable electricity generation” (Version 18.0 <sup>1</sup> )  <b>Standardized Baseline:</b> Not Applicable
<b>Sectoral scopes</b>	01- Energy industries (renewable/non-renewable sources)
<b>Estimated amount of annual average GHG emission reductions</b>	14,103 tCO <sub>2</sub> e/ annum

<sup>1</sup> <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK>

## 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 and wind energy source. Agrawal Renewable Energy Pvt. Ltd. and Agrawal Solar Power (UP) Private Limited are the investors of the proposed project activity. The project activity involves installation of 4.2 MW Wind power project and 5 MWp Solar PV plant.

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

Project Investor's Name	Capacity in MW	COD <sup>2</sup>	Technology	Connection with Grid	State	Use of Electricity
Agrawal Renewable Energy Pvt. Ltd.	2.1 MW	23/03/2016	Wind	INDIAN	Madhya Pradesh	Sale to Grid
	2.1 MW	31/03/2016				
Agrawal Solar Power (UP) Private Limited	5 MWp	19/06/2017	Solar	INDIAN	Uttar Pradesh	Sale to Grid

The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 14,103 tCO<sub>2</sub>e per year, thereon displacing 14,425 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 will be exported to the state grids of Madhya Pradesh and Uttar Pradesh, which is part of the Indian electricity grid of India and sold to respective state electricity boards under a formal power purchase agreement which will be fixed for a specific period of the project activity.

The purpose of the project activity is to utilize renewable wind and 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.

### 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:

<sup>2</sup> Commercial Date of Operation

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.

**Sectoral Scope and Project Type:**

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

**Methodology:** AMS-I.D “Grid connected renewable electricity generation” (Version 18.0<sup>3</sup>)

**Project Type:** I- Renewable energy projects

**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 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<sup>4</sup>. 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, technical and industrialist increase due to installation /site visit/operation and maintenance work related to wind and solar plant. This directly and indirectly positively effects the economy of villages and nearby area.

**Environmental well-being:**

Solar and wind power are 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.

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<sup>3</sup> <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

<sup>4</sup> [http://www.cdmindia.gov.in/approval\\_process.php](http://www.cdmindia.gov.in/approval_process.php)

**Technological well-being:**

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

**A.2. Location of project activity**

The location details of the project activity have been provided below:

Project Investor's Name	Capacity in MW	Village	Tehsil	District	State	Geo-Coordinates	
						Latitude	Longitude
Agrawal Renewable Energy Pvt. Ltd.	4.2 MW	Ringnod	Jaora	Ratlam	Madhya Pradesh	23° 43' 51.19" N	75° 10' 15.20" E
						23° 43' 38.74" N	75° 10' 14.79" E
Agrawal Solar Power (UP) Private Limited	5 MWp	Karahara Kala	-	Mahoba	Uttar Pradesh	25° 19' 0.58" N	79° 48' 46.93" E

**Physical/Geographical location****Wind 4.2 MW Location:**

Mamatkheda site is located in the North East part of the state of Madhya Pradesh in central India. It is located 170 km from Indore, in North East direction & 7 km North of Jaora city.

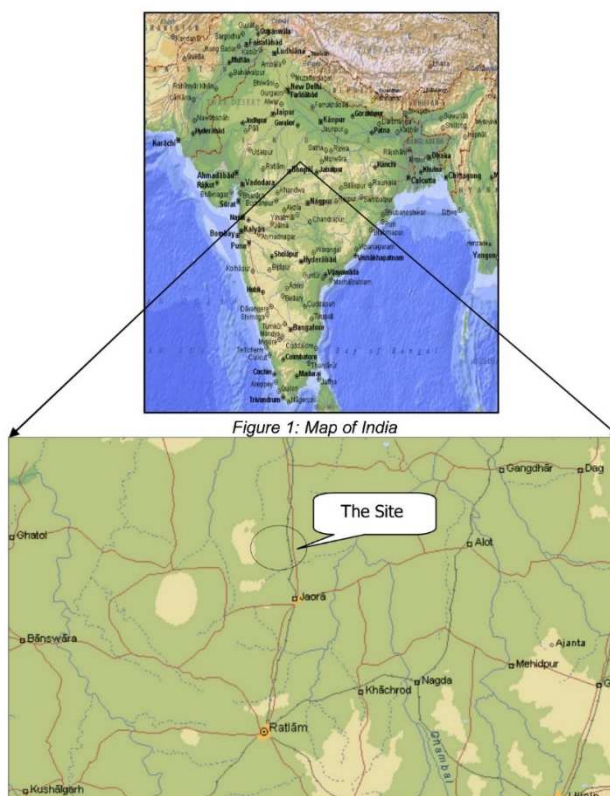


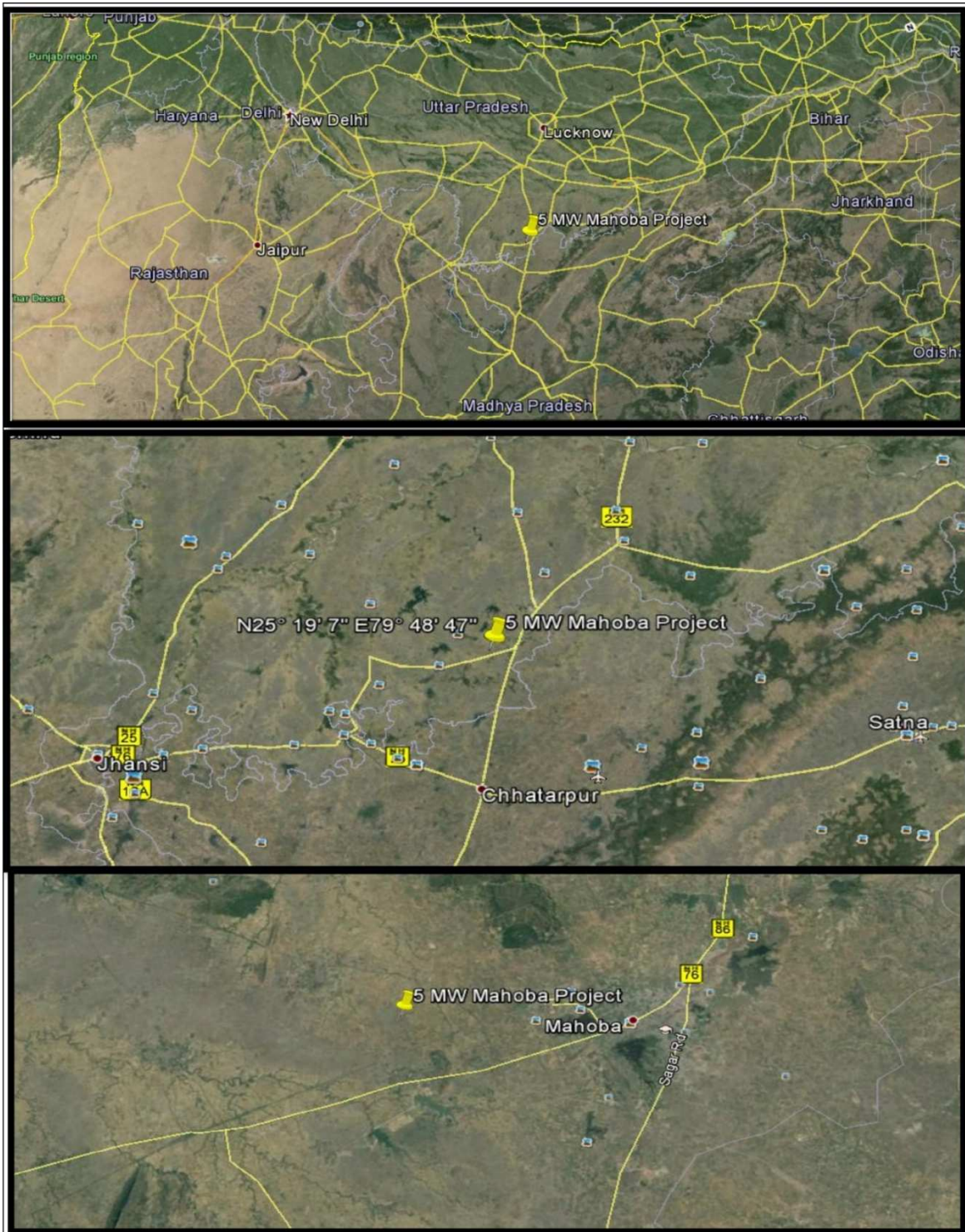
Figure 1: Map of India



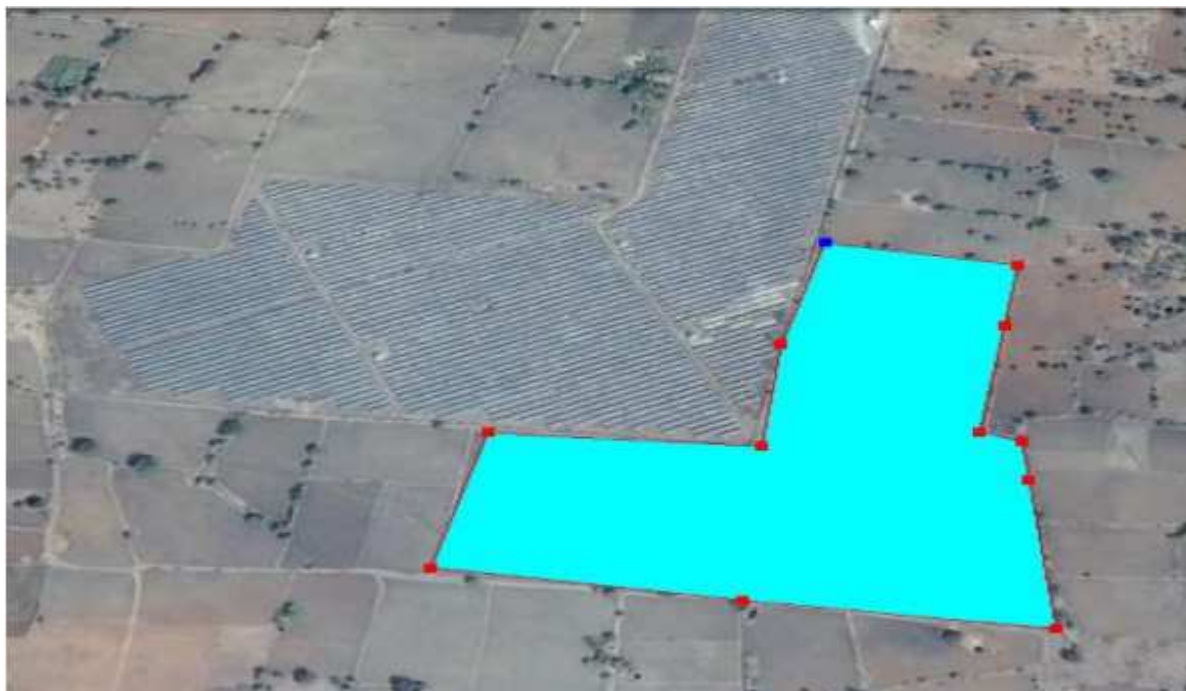
**Solar 5.00 MW location:**

From Mahoba railway station land is 8-10 km; nearest 132 kV substation is 2.5-3 km and feed in capacity in the substation. Mahoba is 170 km from Jhansi. The location of the project is close to the Muskara-Mahoba Charkhari Marg (as Main Road) connecting to National Highway (NH) 76, that links Allahabad in Uttar Pradesh.

The following figure gives an overview of the location of the plant:



The total area of the land is 26.5 Acres. A CAD-drawing of the given area of land is shown.



### A.3. Technologies/measures

The project activity aims to harness wind energy through installations of 2 WTGs with a capacity of 2.1 MW each and solar energy through installation of PV with total installed capacity of 5 MWp. Solar and wind energy are 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 wind energy and solar energy, which is a renewable source of energy.

#### About 4.2 MW wind project activity:

The total capacity of the wind project activity is 4.2 MW, which comprises of total 2 Wind Turbine Generators (WTGs) in Madhya Pradesh. The WTGs used in the project activity are of Suzlon<sup>5</sup>.

The technical features of the WTG is summarized below:

Particulars	Details
Rated power	2100 kW
Cut-in wind speed	3.5 m/s
Cut-out wind speed	20 m/s
Rated wind speed	11 m/s
Hub height	90 m
Diameter	97 m
Swept area	7,386 m <sup>2</sup>
Generator type	Asynchronous 3 phase induction generator with slip ring operated with royor circuit inverter system (DFIG)
Design Lifetime	25 years
Number of blades	3, SB47 make

#### About 5 MW Solar project activity:

<sup>5</sup> [https://www.suzlon.com/s97-wind-turbine.php/pdf/media\\_kit/pdf/media\\_kit/Product\\_bochure\\_July\\_2017.pdf](https://www.suzlon.com/s97-wind-turbine.php/pdf/media_kit/pdf/media_kit/Product_bochure_July_2017.pdf)

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 the State Electricity grid. The life time of the project activity is 25 years.

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

ELECTRICAL PERFORMANCE							
Electrical parameters at Standard Test Conditions (STC)							
Module type	DHOOP Series						
Power output	$P_{max}$	W	310	305	300	290	280
Power output tolerances	$\Delta P_{max}$	W	0 / 5				
Module efficiency	$\eta_m$	%	16.5	16.0	15.8	15.5	15.2
Voltage at $P_{max}$	$V_{mpp}$	V	36	35.8	35.8	35.6	35.4
Current at $P_{max}$	$I_{mpp}$	A	8.61	8.52	8.38	8.15	7.90
Open-circuit voltage	$V_{oc}$	V	44.4	44.4	44.4	44.4	44.4
Short-circuit current	$I_{sc}$	A	9.3	9.25	9.2	9.1	9
Cell Efficiency			17.6%	17.4%	17.3%	17.1%	17%

STC: 1000W/m<sup>2</sup> irradiance, 25°C cell temperature, AM1.5g spectrum according to EN 60904-3.  
Average relative efficiency reduction of 5% at 200W/m<sup>2</sup> according to EN 60904-1.

#### A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
INDIA (Host Party)	Agrawal Renewable 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.

#### A.6. History of project activity

The proposed CDM project activity is not a registered CDM project activity and applying for the CDM registration of the Project.

The proposed project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA). The project activity is also not a project activity that has been deregistered. The project activity was not a CPA that has been excluded from a registered CDM PoA.

No registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity.



## A.7. De-bundling

As per the provisions prescribed in “Clean development mechanism project standard” and further referring to “Methodological Tool- “Assessment of debundling for small scale Project Activities<sup>6</sup>” EB 83, Annex 13, Version 4.0, “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 methodologies and standardized baselines

### B.1. References to methodologies and standardized baselines

Grid connected renewable electricity generation<sup>7</sup>

**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)<sup>8</sup>

**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<sup>9</sup> - Version 07.0 (EB 100, Annex 4)
- Investment Analysis<sup>10</sup> - Version 10.0 (EB 105, Annex 06)

<sup>6</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-20-v1.pdf>

<sup>7</sup> <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>

<sup>8</sup> <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQOQFQQH4SBK>

<sup>9</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

<sup>10</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v10.0.pdf>



**B.2. Applicability of methodologies and standardized baselines**

The project activity involves generation of grid connected electricity from renewable wind and solar energy. The project activity has an installed capacity of 9.2 MW 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:

<b>Applicability Criterion as per methodology</b>	<b>Project Case</b>
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 and wind energy project which falls under applicability criteria option 1(a) i.e., "Supplying electricity to a national or a regional grid".
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 the user) applies is included in the appendix <sup>11</sup> .	The 1 <sup>st</sup> option for 9.2 MW capacity of Table 2 of AMS I.D. Version 18 is applicable (please refer footnote) as project supplies electricity to national grid.
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 and wind based electricity generation plants (not addition to existing system). Option (a) is applicable.

<sup>11</sup>

	Project type	AMS-I.A	AMS-I.D	AMS-I.F
1	Project supplies electricity to a national/regional grid		√	
2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			√
3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)		√	
4	Project supplies electricity to a mini grid <sup>11</sup> 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	√		

<p>4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</p> <ul style="list-style-type: none"> <li>• The project activity is implemented in an existing reservoir with no change in the volume of reservoir;</li> <li>• 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<sup>2</sup>;</li> <li>• 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<sup>2</sup>.</li> </ul>	<p>The project is wind energy and solar power project and thus the criterion is not applicable to this project activity.</p>
<p>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.</p>	<p>The project activity is a 9.2 MW wind and solar electricity generation. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.</p>
<p>6. Combined heat and power (co-generation) systems are not eligible under this category.</p>	<p>The Project activity is a renewable wind and solar energy project and is not a combined heat and power system. Hence the criteria is not applicable to the project activity</p>
<p>7. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct<sup>12</sup> from the existing units.</p>	<p>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</p>
<p>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.</p>	<p>Not applicable, the wind and solar project is a Green field project activity and this project is not the enhancement or up gradation project.</p>
<p>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.</p>	<p>The Project activity is a renewable wind energy and solar Photovoltaic power project and is not a landfill gas, waste gas, wastewater treatment and agro-industries projects or recovered methane emissions project. Hence the criteria is not applicable to the project activity</p>

<sup>12</sup> 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".

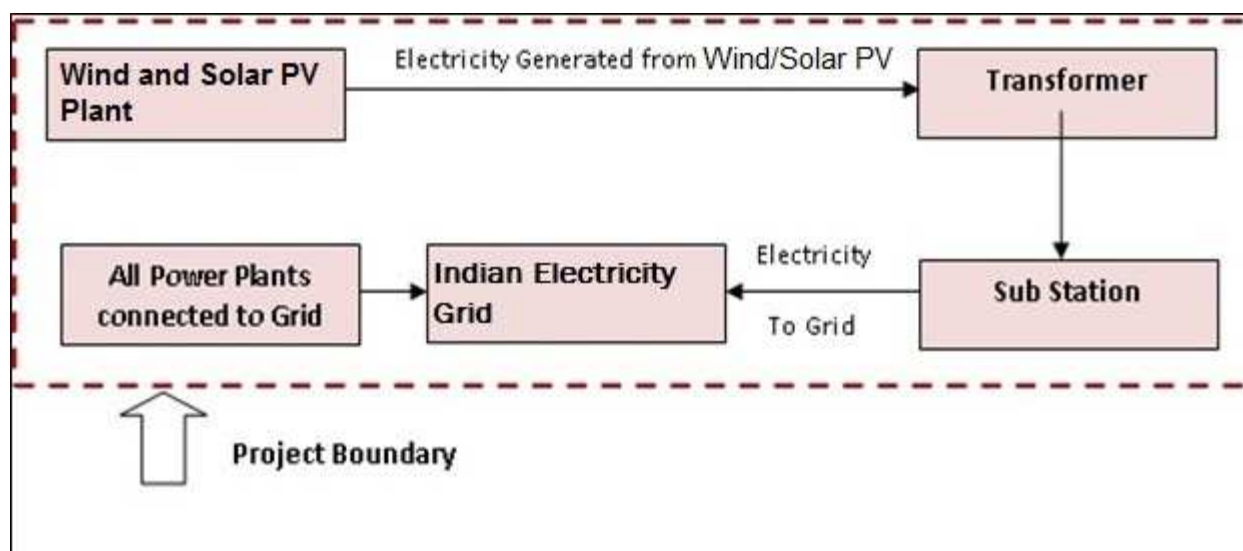
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The Project activity is a renewable wind energy and Solar Photovoltaic power project and is not a biomass project. Hence the criteria is not applicable to the project activity.
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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 9.2 MW 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, sources and greenhouse gases (GHGs)

As per AMS-I.D Version 18- "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 wind and 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 have been considered in the project boundary for the proposed CDM project activity.

Source		GHG	Included?	Justification/Explanation
Baseline	Grid connected electricity generation	CO <sub>2</sub>	Yes	Main emission source
		CH <sub>4</sub>	No	Minor emission source
		N <sub>2</sub> O	No	Minor emission source
		Other	No	Project activity does not emit other forms of GHG emissions
Project activity	Greenfield Solar PV and Wind Power Project Activity.	CO <sub>2</sub>	No	No CO <sub>2</sub> emissions are emitted from the project
		CH <sub>4</sub>	No	Project activity does not emit CH <sub>4</sub>
		N <sub>2</sub> O	No	Project activity does not emit N <sub>2</sub> O
		Other	No	Project activity does not emit other forms of GHG emissions

#### 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 and wind parks to harness the power of the wind 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 ( $EF_{grid,CM,y}$ ) 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<sup>13</sup> (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 <sub>2</sub> /MWh	Combined margin CO <sub>2</sub> 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 <sub>2</sub> Emission Database, Version 11.0 Dated April 2016 published by Central Electricity Authority (CEA), Government of India.
$EF_{grid,OM,y}$	0.9941 tCO <sub>2</sub> /MWh	Operating margin CO <sub>2</sub> emission factor for the project electricity system in year y	Calculated as the last 3 year (2012-2013, 2013-2014 & 2014-2015) generation-weighted average, sourced from Baseline CO <sub>2</sub> Emission Database, Version 11.0, Dated April 2016 published by Central Electricity Authority (CEA), Government of India.
$EF_{grid,BM,y}$	0.9285 tCO <sub>2</sub> /MWh	Build margin CO <sub>2</sub> emission factor	Baseline CO <sub>2</sub> Emission Database, Version 11.0, Dated April 2016 published by Central

<sup>13</sup> [http://cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver11.pdf](http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)

		for the project electricity system in year y	Electricity Authority (CEA), Government of India.
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### B.5. Demonstration of additionality

#### Additionality assessment for Solar 5 MW at UP:

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 methodology, tool, standardized baseline or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by a DNA and approved by the Board.

Specify the methodology, tool, standardized baseline or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by DNAs and approved by the Board, that establish automatic additionality for the proposed project activity (including the version number and the specific paragraph, if applicable).	Methodology: AMS-I.D “Grid connected renewable electricity generation” (Version 18)  Guidelines on the Methodological Tool for the demonstration of additionality of small- scale project activities <sup>14</sup> - Version 13.1 (EB 105, Annex 4),
Describe how the proposed project activity meets the criteria for automatic additionality in the relevant methodology, tool, standardized baselines or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by a DNA and approved by the Board.	As per Guidelines on the Methodological Tool for the demonstration of additionality of small-scale project activities <sup>15</sup> - Version 13.1 (EB 105, Annex 4), 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 proposed Solar project activity is of 5 MW, it can be concluded from the above list that this project activity is automatically additional and does not require demonstration of barriers, and hence it is auto additional.

#### Additionality Assessment for 4.2 MW Wind Power Project

<sup>14</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v13.1.pdf>

<sup>15</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v13.1.pdf>



As per Guidelines on the Demonstration of Additionality of Small-scale Project Activities (Ver. 13.1 EB 105 Annex 4)<sup>16</sup>, to establish the project additionality, it has to be shown that the project activity would not have occurred anyway due to at least one of the following barriers:

- **Investment barrier:** a financially more viable alternative to the project activity would have led to higher emissions;
- **Technological barrier:** a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;
- **Barrier due to prevailing practice:** prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
- **Other barriers:** without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

The project investor has selected Investment barrier to demonstrate in a conservative and transparent manner that the proposed CDM project activity is financially unattractive. In line with the guidelines stipulated under Annex 34 of EB 35<sup>17</sup> ("Non-binding best practice examples to demonstrate additionality for SSC project activities"), a benchmark analysis is used in the project case under investment barrier.

#### **Appropriateness of using benchmark analysis for additionality demonstration and its conformity to Annex 6, EB 105<sup>18</sup> -**

Considering the fact that the alternative to the project is the supply of electricity from the grid & the choice of the developer is to invest or not to invest, benchmark analysis has been considered appropriate for demonstration of additionality, which is in conformity with "Investment Analysis"<sup>19</sup> Annex 6 EB 105.

#### **Selection of Benchmark & Financial Indicator:**

According to the "Tool for demonstration and assessment of Additionality<sup>20</sup>", *the financial indicator can be based either on (1) project IRR or (2) equity IRR. There is no general preference between the approaches (1) or (2). The benchmark chosen for analysis shall be fully consistent with the choice of approach.* Therefore in accordance with the guidance, the relevant financial indicator for project activity has been chosen as post tax equity IRR.

#### **Determine appropriate analysis method**

As per Sub-step 2a, Paragraph (1), as the project activity is selling the generated electricity to grid & getting financial benefits other than CDM benefits, hence, Option- I (Apply simple cost analysis) is not applicable under this situation. Also as per EB-105, Annex 6, "If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate". Hence, Option-II (Apply investment comparison

<sup>16</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v13.1.pdf>

<sup>17</sup> [https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC\\_guid15\\_v01.pdf](https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid15_v01.pdf)

<sup>18</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v10.0.pdf>

<sup>19</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v10.0.pdf>

<sup>20</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

analysis) is also not applicable under this situation. So, the project promoter has chosen Option- III or benchmark analysis as an appropriate analysis method to demonstrate the investment barrier.

### Benchmark Calculation

At the time of decision made of project activity, Version 05 of methodological tool "Investment Analysis" (EB 62, Annex 5) was the latest available tool to PP. However, the request for registration for Version 5 could be submitted till 23/07/2015. Hence, PP has used Methodological Tool for Investment Analysis version 10 (EB 105, Annex 06). Upon comparison of the detail of version 05.0 and version 10.0 of the methodological tools, it was observed that, there is no major difference in the versions except for the change of default value for benchmark calculation. The default value as mentioned in version 05 was 11.75% for the group 1 projects in India and Value as mentioned in version 10 is 10.24% for group 1 project in India, which is clearly more conservative than version 05 values. Hence, version 10 is used which is appropriate and more conservative for benchmark calculation and PP has considered the same tool for default value of return on equity for the project. The default value of Return on Equity for Group-1 projects in India is 10.24 % as per EB 105, Annex 06.

The benchmark has been considered in accordance with EB 105 Annex 6, "The values in the table in Appendix A may also be used, as a simple default option".

As suggested in Appendix A, in EB 105 Annex 6 of the "investment analysis"<sup>21</sup> version 10, the default value benchmark of expected return on equity, in real terms for Energy Industries (Group 1) in India = **10.24%**

Methodology deployed for arriving at a suitable value of Benchmark using Default Value has been described below:

- As the proposed project activity generates power utilizing wind energy, Group 1 as per para 5 of Appendix of EB 105, Annex 6 has been identified as a suitable category.
- The investment analysis has been carried out in Nominal terms. Accordingly, Default value as given in Para 16, Annex 6, EB 105 has been adjusted by adding suitable forecasted inflation rate taken from RBI (Central Bank, India).
- Project investor has calculated Benchmark based on WPI median inflation rate. As per Para 16 of Appendix of EB 105, Annex 6, the inflation forecast should be for the duration of the crediting period. However, since RBI provides forecast inflation only for 5 & 10 years, the project investor has calculated benchmark using inflation forecast (WPI Mean) for 10 years as the most conservative value for the project activity.

The benchmark has been computed in the following manner:

$$\text{Nominal Benchmark}^{22} = \{(1 + \text{Real Benchmark}) * (1 + \text{Inflation rate})\} - 1$$

Where,

Real Benchmark = Default Value, i.e., 10.24% (as per Appendix of Annex 6, EB 105)

Inflation rate = Projected Inflation Rate for India

### Default Value Benchmark:

<sup>21</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v10.0.pdf>

<sup>22</sup> As per Pg. 320 of Corporate Finance, Second Edition of Aswath Damodaran

Benchmark Calculations	Value	Sources Link	Document Date
Default Value for India as per UNFCCC guidelines	10.24%	<a href="http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v1.pdf">http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v1.pdf</a>	29-Nov-18
Inflation forecast (WPI Mean) as per RBI for 10yrs	4.10%	<a href="https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=16422">https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=16422</a>	03-Feb-15
Benchmark (with 10yrs Forecast)	14.76%		

Kindly refer Annex-1 of this report for key Assumptions supporting financial projections. The IRR sheets along with all supporting documents for used for the financial calculation, have been submitted to the DOE.

Input values are based on project specific documents and publicly available data sources which can be clearly validated by the DOE. Thus, it complies with guidance 15 of EB 105, Annex 6.

**The result of the analysis is as follows:**

Project Investor	Equity IRR without CDM	Default Value Benchmark
Agrawal Renewable Energy Pvt. Ltd.	7.17%	14.76%

**This substantiates that, the investment is not financially attractive (equity IRR for the project activity is less than the Benchmark) for all WTGs. Thus, it can be easily concluded that, project activity is additional and is not a business as usual scenario.**

**Sensitivity Analysis**

As per Guidance 27 and 28 of Annex 6 of EB 105, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets. Guidance also states, "All parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude". The Annex also states, as a general point of departure, variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances.

Since the project cost is already firmed up, the cost is not variable. The tariff is determined by PPA which is fixed for years mentioned as per the respective State Electricity Board's tariff order and hence it need not be subjected to variation. All other expenses are much less than 20% of the total cost. Hence, only PLF needs to be subjected to reasonable variation. Nevertheless, following factors have been subjected to sensitivity analysis:

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

The results of sensitivity analysis are as follows:

Equity IRR	Agrawal Renewable Energy Pvt. Ltd.
------------	------------------------------------

Variation %	-10%	Normal	10%	Breaching Value
PLF	5.86%	7.17%	8.41%	67.40%
O&M Cost	7.38%	7.17%	6.95%	-492.93%
Project Cost	8.31%	7.17%	6.21%	-44.08%
Tariff Rate	5.86%	7.17%	8.41%	67.40%

Addressing Guidance 27 & 28 of EB 105, Annex 6, Sensitivity Analysis has been carried out. 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."*

Variable	Probability to breach the benchmark
PLF	PLF has been considered from Third Party Report which is in line with <b>"Guidelines for the reporting and validation of Plant load factors" stated in EB48 Annex11<sup>23</sup></b> and was available at the time of investment making decision.  Hence, variation in PLF of more than 10% is unlikely to happen.
O&M Cost	With the country experiencing 5% inflation on an average, the question of O&M coming down is ruled out. Moreover, the purchase orders for all the Project Participants states that annual O&M Cost will be fixed for entire lifetime of the project activity, i.e. 25 years. The PP has also provided for sensitivity on O&M cost for the actual variation in the Offer letter and the Purchase Order. However, the IRR does not reach the benchmark.
Project Cost	The Purchase Order cost for all WTGs is within 10% of the Offer letter cost which was considered during decision making. However, we have conducted sensitivity analysis for all Project Participants for project cost being 10% less than that considered during decision making. Even at this level, the IRR does not breach the Benchmark. Hence, there is no any probability of the Benchmark being breached.
Tariff Rate	Tariff Rate has been determined as per the executed PPA as well as State Electricity Board Tariff Order. Hence, there is no probability of any variation for the same.

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.

### 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, F-CDM form sent on Date: 19/02/2016 to the UNFCCC and host party DNA i.e. National CDM Authority (NCDMA) for projects intention to seek CDM, which is within six months of the project activity start date (as mentioned in section C.1.1). Hence, from the

<sup>23</sup> [http://cdm.unfccc.int/EB/048/eb48\\_repan11.pdf](http://cdm.unfccc.int/EB/048/eb48_repan11.pdf)

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

## B.6. Estimation of emission reductions

### B.6.1. Explanation of methodological choices

**Applied Methodology:** AMS - I.D, version 18

#### Baseline emissions:

The baseline emission calculation for the project activity is attributable to the CO<sub>2</sub> 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.

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

Where,

- BE<sub>y</sub>** = Baseline emissions in year y (t CO<sub>2</sub>)
- EG<sub>PJ,y</sub>** = 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<sub>grid,y</sub>** = Combined margin CO<sub>2</sub> 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<sub>2</sub>/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<sub>2</sub>/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<sub>2</sub> Baseline Database for the Indian Power Sector, Version 11.0, April 2016<sup>24</sup>, published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction. This version 15 is the latest available database at the time of PDD submission to DOE for validation purpose.

**As per the "Tool to calculate the emission factor for an electricity system"<sup>25</sup> Version 07.0, EB 100, Annex 4, the following steps have been followed.**

STEP 1: Identify the relevant electricity systems;

<sup>24</sup> [http://cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver11.pdf](http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)

<sup>25</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>



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

### **STEP 1: Identify the relevant electricity power systems**

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

However since Since August 2006, however, all regional grids except the Southern Grid had been integrated and were operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids were treated as a single grid named as NEWNE grid from FY 2007-08 onwards for the purpose of this CO<sub>2</sub> 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**

<b>Northern</b>	<b>Eastern</b>	<b>Western</b>	<b>North-Eastern</b>	<b>Southern</b>
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	Tamil Nadu
Jammu & Kashmir	Sikkim	<b>Madhya Pradesh</b>	Mizoram	Puducherry
Punjab	Andaman & Nicobar	Maharashtra	Nagaland	Lakshadweep
Rajasthan		Goa	Tripura	
<b>Uttar Pradesh</b>				
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<sup>26</sup>*

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 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.

<sup>26</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver15.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf)

**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	701,976	725,037	810,011

Simple Operating Margin (tCO <sub>2</sub> /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<sub>BM,y</sub>)**

As per Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex 4) para 72:

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 PD 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 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 <sub>2</sub> /MWh) (not adjusted for imports)	
	2014-15
INDIAN Grid	0.9285

**STEP 6: Calculate the combined margin (CM) emissions factor (EF<sub>grid,CM,y</sub>)**

As per Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex 4) para 81:

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:

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

**Where:**

$EF_{grid,BM,y}$	= Build margin CO <sub>2</sub> emission factor in year y (t CO <sub>2</sub> /MWh)
$EF_{grid,OM,y}$	= Operating margin CO <sub>2</sub> emission factor in year y (t CO <sub>2</sub> /MWh)
$W_{OM}$	= Weighting of operating margin emissions factor (per cent)
$W_{BM}$	= Weighting of build margin emissions factor (per cent)

The following default values should be used for  $W_{OM}$  and  $W_{BM}$ :

For solar project activities:  $W_{OM} = 0.75$  and  $W_{BM} = 0.25$  (owing to their intermittent and non-dispatchable nature) for the second crediting period and for subsequent crediting periods. Since project activity is of power generation by using biomass, the above weightage has been considered for OM and BM.

$$\begin{aligned} \text{Therefore, } EF_{grid,CM,y} &= 0.9941 * 0.75 + 0.9285 * 0.25 \\ &= 0.9777 \text{ tCO}_2/\text{MWh} \end{aligned}$$

**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 wind & 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.

**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<sub>2</sub>/year  
 $BE_y$  = Baseline emission in tCO<sub>2</sub>/year  
 $PE_y$  = Project emissions in tCO<sub>2</sub>/year  
 $LE_y$  = Leakage Emissions in tCO<sub>2</sub>/year

### B.6.2. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,OM,y}$
Data unit	tCO <sub>2</sub> /MWh
Description	Operating Margin CO <sub>2</sub> emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016 <sup>27</sup>
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 07.0" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO <sub>2</sub> 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	$EF_{grid,BM,y}$
Data unit	tCO <sub>2</sub> /MWh
Description	Build Margin CO <sub>2</sub> emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016 <sup>28</sup>
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 07" as per the latest data available for the most recent year 2014-15. The data is obtained from "CO <sub>2</sub> Baseline Database for Indian Power Sector" version 11, 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.

<sup>27</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver11.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)

<sup>28</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver11.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)



Data/Parameter	EF <sub>grid,CM,y</sub>
Data unit	tCO <sub>2</sub> /MWh
Description	Combined Margin CO <sub>2</sub> emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016 <sup>29</sup>
Value(s) applied	0.9777
Choice of data or measurement methods and procedures	<p>The combined margin emissions factor is calculated as follows:</p> $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ <p>Where:</p> <p>EF<sub>grid,BM,y</sub> = Build margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)  EF<sub>grid,OM,y</sub> = Operating margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)  W<sub>OM</sub> = Weighting of operating margin emissions factor (%) = 75%  W<sub>BM</sub> = Weighting of build margin emissions factor (%) = 25%</p>
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<sub>y</sub> = Emission Reduction in tCO<sub>2</sub>/year  
BE<sub>y</sub> = Baseline emission in tCO<sub>2</sub>/year  
PE<sub>y</sub> = Project emissions in tCO<sub>2</sub>/year  
LE<sub>y</sub> = Leakage Emissions in tCO<sub>2</sub>/year

#### Baseline Emission (BE<sub>y</sub>)

The baseline emissions are the product of electrical energy baseline EG<sub>PJ,y</sub> 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<sub>PJ,y</sub> = Total quantity of net electricity delivered to the Indian grid

Project Investors' Name	Capacity (MW)	Location	PLF (%)	Grid	Generated Power (MWh) p.a	Baseline Emission Factor (tCO <sub>2</sub> /MWh)	Baseline emissions (tCO <sub>2</sub> /year)
Agrawal Renewable Energy Pvt. Ltd.	4.2	Madhya Pradesh	20%	INDIAN	7,358	0.9777	7,194

<sup>29</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver11.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)

Agrawal Solar Power (UP) Private Limited	5	Uttar Pradesh	19.50%	INDIAN	7,067 <sup>30</sup>	0.9777	6,909
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As per EB 48, Annex- 11, Option 3(b), PLF for all the Projects has been considered as the values based upon the report provided by a Third Party Engineering Company contracted by the PP.

$EF_{grid,y}$  = Baseline emission factor (INDIAN Grid)  
= 0.9777 tCO<sub>2</sub>/MWh

$BE_y$  = 14,425 \* 0.9777  
= 14,103 t CO<sub>2</sub>e

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,

$ER_y = BE_y = 14,103 \text{ t CO}_2\text{e}$

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

Year	Baseline emissions (t CO <sub>2</sub> e)	Project emissions (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	Emission reductions (t CO <sub>2</sub> e)
Year 1	14,103	0	0	14,103
Year 2	14,103	0	0	14,103
Year 3	14,103	0	0	14,103
Year 4	14,103	0	0	14,103
Year 5	14,103	0	0	14,103
Year 6	14,103	0	0	14,103
Year 7	14,103	0	0	14,103
<b>Total</b>	<b>104,818</b>	<b>0</b>	<b>0</b>	<b>104,818</b>
<b>Total number of crediting years</b>	<b>7</b>			
<b>Annual average over the crediting period</b>	<b>14,103</b>	<b>0</b>	<b>0</b>	<b>14,103</b>

#### B.7. Monitoring plan

##### B.7.1. Data and parameters to be monitored

For Wind Project at Madhya Pradesh

<sup>30</sup> Since this is solar project, degradation factor of 0.5% has been considered for the calculation. Detailed calculation can be referred from the estimated ER calculation sheet.

<b>Data/Parameter</b>	<b>EG<sub>PJ,y</sub></b>
Data 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	7,358 (Estimated Value)
Measurement methods and procedures	<p><b>Data Type:</b> Measured  <b>Monitoring equipment:</b> Energy Meters of accuracy class 0.2 are used for monitoring  <b>Recording Frequency:</b> Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually  <b>Archiving Policy:</b> Paper &amp; Electronic  <b>Calibration frequency:</b> Once in 5 years<sup>31</sup></p> <p>Electricity exported/imported to the grid is in kWh. However, for the calculation purpose electricity exported is converted in MWh.</p> <p>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:</p> <p><b>EG<sub>PJ,y</sub> = EG<sub>Export</sub> - EG<sub>Import</sub></b></p> <p><b>Cross Checking:</b></p> <p>The export and import energy will be measured continuously using Main &amp; Check meters at the switchyard. Export &amp; 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.</p>
Monitoring frequency	Monthly
QA/QC procedures	The energy meters used are trivector meters which are of accuracy class 0.2. 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 <sup>32</sup> 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 Project at Uttar Pradesh

<b>Data/Parameter</b>	<b>EG<sub>PJ,y</sub></b>
-----------------------	--------------------------

<sup>31</sup> [http://www.aegcl.co.in/Metering\\_Regulations\\_Of\\_CEA\\_17\\_03\\_2006.pdf](http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf), page 12

<sup>32</sup> [http://www.aegcl.co.in/Metering\\_Regulations\\_Of\\_CEA\\_17\\_03\\_2006.pdf](http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf), page 12

Data 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	7,067 <sup>33</sup> (Estimated Value)
Measurement methods and procedures	<p><b>Data Type:</b> Measured</p> <p><b>Monitoring equipment:</b> Energy Meters of accuracy class 0.2 are used for monitoring</p> <p><b>Recording Frequency:</b> Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually</p> <p><b>Archiving Policy:</b> Paper &amp; Electronic</p> <p><b>Calibration frequency:</b> Once in 5 years<sup>34</sup></p> <p>Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh.</p> <p>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 as per below equation:</p> $EG_{PJ,y} = EG_{Export} - EG_{Import}$ <p><b>Cross Checking:</b></p> <p>The export and import energy will be measured continuously using Main &amp; Check meters at the switchyard. Export &amp; 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.</p>
Monitoring frequency	Monthly
QA/QC procedures	The energy meters used are trivector meters which are of accuracy class 0.2. The meters are monitored continuously & cumulative readings are taken at the end of the month by joint meter reading procedure. These are sealed by SEBs to avoid malfunctioning with meter readings. 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 Project Investor.
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.

<sup>33</sup> As this is a solar project, degradation factor of 0.5% has been considered for the calculation. The detailed calculation can be referred from the estimated ER calculation sheet.

<sup>34</sup> [http://www.aegcl.co.in/Metering\\_Regulations\\_Of\\_CEA\\_17\\_03\\_2006.pdf](http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf), page 12

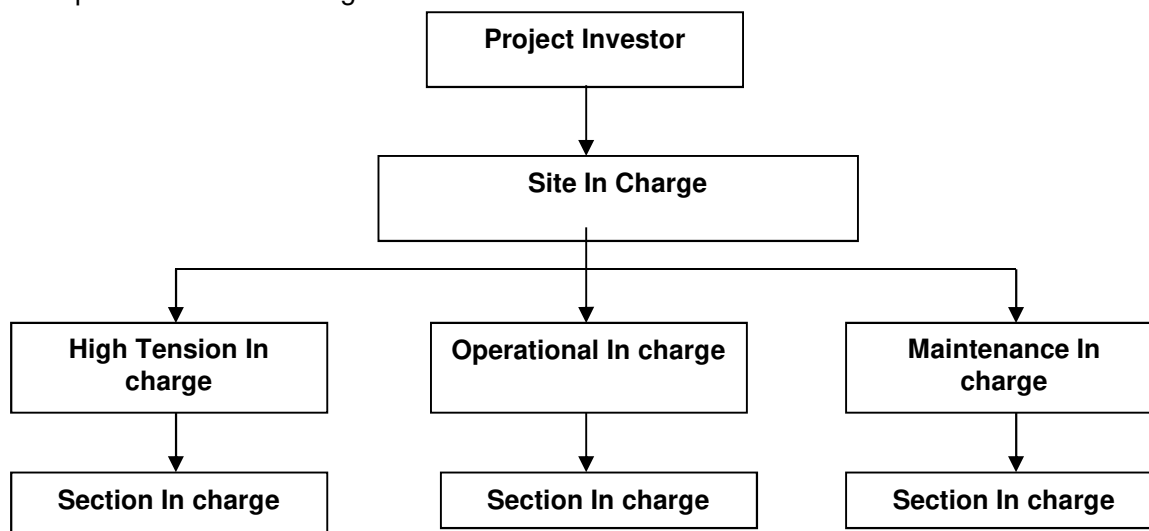
### B.7.3. Other elements of monitoring plan

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected wind and solar power project being implemented in Madhya Pradesh and Uttar Pradesh, India. The monitoring plan, which will be implemented by the project participants describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

#### For 4.2 MW Wind Power Projects

The monitoring plan, which will be implemented by the project participants 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. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity. The team comprises of the following members:



PP has assigned the responsibility of operation and maintenance of WTGs to the respective WTG Supplier and is having a valid O&M Contract. The Plant In-charge and Shift In-Charge would be deployed by WTG Supplier.

#### Monitoring Requirements

The monitoring plan includes monitoring of energy parameters such as net energy export to the regional grid which is further used for captive purpose. Emission reductions resulted from the project activity will be calculated based on the net energy exported to the grid. Sales records will be used and kept for checking the consistency of the recorded data.

Project participant will calibrate the meter at-least once in 5 year<sup>35</sup>. For the WTGs in project activity, the monthly reading is taken from the meter at substation by state utility and representative of PP. This reading gives the net electricity exported to the grid by all WTGs connected to the substation. The WTGs of other owners are also connected to the substation. Apportioning is not under the control of PP and generation report forms the basis of emission reductions calculations.

<sup>35</sup> [http://www.aegcl.co.in/Metering\\_Regulations\\_Of\\_CEA\\_17\\_03\\_2006.pdf](http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf)



## **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 State Discom in the presence of PP or representative of PP. The meter reading will be taken jointly and signed by the representatives of the State Electricity Board and authorized representatives of 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 electricity board officer and PP do not have any control on it. Also accuracy class of meters and calibration frequency is under purview of 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.

## **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.

## **Apportioning**

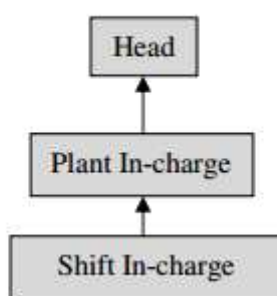
In case of mismatch of date between the start date of the billing cycle and the start date of monitoring period, the data will be apportioned in line to the daily generation values for the said mismatch period.

### For 5 MW Solar PV Project in Uttar Pradesh State

The monitoring plan, which will be implemented by the project participants 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. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity. The team comprises of the following members:

#### Organisational Structure for Monitoring



**Responsibilities of Head:** Overall functioning and maintenance of the project activity.

**Responsibilities of Plant In-charge:** Responsibility for Maintains the data records, ensures completeness of data, and reliability of data (calibration of equipments).

**Responsibilities of Shift In-charge:** Responsibility for day to day data collection and maintains day to day log book for monitored data.

### 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 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 will be raised by PP or representative of PP. These invoices can be used for cross checking the meter readings taken for the respective project activity.

### 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.

In case the dates of a particular monitoring period do not match with the dates of the billing cycle, the net electricity exported to the grid would be calculated from:

- Apportioning the net electricity exported to grid, as recorded in the consolidated Share Certificate / JMR Report / Credit Notes certified by the respective state discom, based on the number of days in the monitoring period and the number of days for which Share Certificate / JMR Report / Credit Notes was prepared.

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.

### **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.

## **SECTION C. Start date, crediting period type and duration**

### **C.1. Start date of project activity**

Start date of the project activity is the date of purchase order of 4.2 MW Wind Power plant was signed on 21/10/2015. Whereas, the purchase order for 5 MW solar plant was signed on 07/11/2016. Hence, the earliest PO date i.e. 21/10/2015 is considered as start date.

### **C.2. Expected operational lifetime of project activity**

25 Years 00 Months

### **C.3. Crediting period of project activity**

#### **C.3.1. Type of crediting period**

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

#### **C.3.2. Start date of crediting period**

30/12/2020 or Date of submission of complete request for registration by the DOE whichever is later.

#### **C.3.3. Duration 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 and wind projects are not included in the Schedule I of the EIA notification S.O.1533 (E) dated 14<sup>th</sup> September 2006<sup>36</sup>

<sup>36</sup> <http://envfor.nic.in/legis/eia/so1533.pdf>

and thus an EIA is not required. Ministry of Environment & forests vide their OM J-11013/41/2006 - IA II (I) dated 13<sup>th</sup> May 2011<sup>37</sup> has re-affirmed this and exempted Solar PV and wind power plants from EIA and EC requirement.

## D.2. Environmental impact assessment

The guidelines on Environmental Impact Assessment have been published by Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India (GOI) under Environmental Impact Assessment notification 14/09/2006<sup>38</sup>. Further amendments to the notification have been done on 14/07/2018<sup>39</sup>. As per the notification:

“The following projects or activities shall require prior environmental clearance from the concerned regulatory authority, which shall hereinafter referred to be as the Central Government in the Ministry of Environment and Forests for matters falling under Category ‘A’ in the Schedule and at State level the State Environment Impact Assessment Authority (SEIAA) for matters falling under Category ‘B’ in the said Schedule, before any construction work, or preparation of land by the project management except for securing the land, is started on the project or activity:

- All new projects or activities listed in the Schedule to this notification;
- Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;
- Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range.”

As the wind and solar power generation projects are not listed in any of the categories of the schedule, so, the project is considered environmentally safe and as per Host party- India, no EIA is required.

## SECTION E. Local stakeholder consultation

### E.1. Modalities for local stakeholder consultation

The Local Stakeholder Meetings were organized for local stakeholder consultation on 03/04/2015 and 15/10/2016 respectively at Jaora site and Mahoba project site. Local stakeholders were informed about the meeting on 27/03/2015 and 08/10/2016 by means of Public Notice as well as through personal interactions with the locals.

The following are identified as the stakeholders for the project activity:

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

All the stakeholders had been invited, through public notice, to attend the stakeholders meeting on 03/04/2015 and 15/10/2016.

The names of the Stakeholder Meeting Participants on 03/04/2015 for Agrawal Renewable Energy Pvt. Ltd. (2.1 x 2 MW) Project at Village- Dhatrawda, Tehsil- Jaora, District- Ratlam are as follows:

1. Dipesh Patel- School Teacher

<sup>37</sup> <http://moef.nic.in/downloads/public-information/OM-SolarPV.pdf>

<sup>38</sup> EIA Notification 2006: <http://envfor.nic.in/legis/eia/so1533.pdf>

<sup>39</sup> EIA Notification 2018: <http://www.egcipl.com/Doc/Gazette%20Notification.pdf>

2. Narendra Bhai- Shopkeeper
3. Mohit Patel- Farmer
4. Ayushi- Teacher
5. Suraj Bhai- Farmer
6. Mukesh Deep- Villager
7. Satya Lal- Student
8. Arun- Student
9. Vijay Shankar- Driver
10. Sanjay Patel- Shopkeeper

The names of the Stakeholder Meeting Participants on 15/10/2016 for Agrawal Solar Power (UP) Private Limited (5 MW Solar PV) Project at Village: Mauja, Tehsil: Karhara Kalan, District- Mahoba Uttar Pradesh are as follows:

1. Ankur Misra- School Teacher
2. Himanshu Singh- Shopkeeper
3. Ankit Jadav- Farmer
4. Pooja Kumari- Teacher
5. Suraj Tiwari- Farmer
6. Mukesh Sahu- Villager
7. Kamal- Student
8. Arjun- Student

In the introductory speech, the representative of Project investor, Mr. Manoj Sail, welcomed the gathering and gave a brief about the CDM project activity. Subsequent to the introductory speech, stakeholders were explained about, the electricity generation from wind and solar project is environmental friendly power generation technology, contributing to reduction in GHG emissions. They were also explained about, the benefits of the wind 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, etc.

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 mitigate the immense stress on the environment.
- Spread of the commercialization of the wind and solar projects in the region.
- Contribute to sustainable development of the region, socially, environmentally & economically.

The Minutes of meeting from LSH, Public Notice and the list of attendees have been submitted to the DOE.

## **E.2. Summary of comments received**

**For the 5 MW, Solar Project Site:**

After the detailed discussion, the session was open for questions/feedback from stakeholders. The villagers raised various queries as summarised below:

- Will the project provide any employment opportunities to locals for improving economic development of area?

**Reply:** Yes, the project shall generate employment opportunities and the locals shall be benefited as per their skills.

- Will the project help in improving the electricity supply to the villagers or the neighbourhood areas?

**Reply:** Yes, the project will to improve the power supplied by the Indian grid.

- How will the project activity benefit the villages around the project site and their residents?

**Reply:** Many developmental initiatives shall be taken by the project PP for providing benefits to the nearby villages around the project site.

#### **For the 4.2 MW, Wind Project Site:**

After the detailed discussion, some of the stakeholders, raised questions on the proposed wind energy based power project to clear their doubts. Following questions were asked by the locals, which were adequately explained and answered by the PP representative:

**Q:** How does local people will utilise this power?

**A:** The generated power will be fed in the grid. Project promoter can't supply directly power to the local people. They have to get authorized connection from Govt. body. But due to the project activity the supply of power in the area will increase.

**Q:** Is it affecting the rain?

**A:** No, wind generation does not have any impact on rain.

**Q:** Whether the project will provide employment opportunities?

**A:** Sure, already the PP has employed many local people for the project activity, such as drivers, security guards, technicians etc. Apart from that indirect benefits are also there for the local people.

**Q:** What social services will be done by project investors?

**A:** A lot of initiatives like farmer trainings, animal health, check-up camps and computer training to children will be provided by the project investors to the local people.

All the above queries, have been suitably and satisfactorily replied/clarified by project participant's representative. The local stakeholders welcomed and expressed their support to the project. The meeting was then concluded by giving vote of thanks to all the participants, those attended the meeting.

#### **E.3. Consideration of comments received**

There were no other 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 project obtained Host country Approval from Indian DNA i.e. Ministry of Environment Forest and Climate Change vide letter no. 13008/81/2017-CC dated 15<sup>th</sup> April, 2019.

**Annex-1: Input Parameters and Assumptions for Additionality Assessment**

Assumptions and Values considered for Financial and Sensitivity Analysis for the 4.2 MW Wind Project.

Details of the project		Source
State where the project is situated	Madhya Pradesh	As Per Offer Letter
No. of machines	2	As Per Offer Letter
Capacity /machine (MW)	2.10	As Per Offer Letter
Total Capacity (MW)	4.20	Calculated Value
Expected Date of Commissioning	31-Mar-16	Assumption
Life of the plant (Yrs.)	25	WTG manufacturer specifications and as per MPERC Tariff Order dated 26-03-2013 <sup>40</sup>
<b>Generation of electricity</b>		
PLF (%)	20.00%	As per Third Party PLF Report and in accordance with EB 48, Annex- 11
Annual generation (kWh)	73,58,400	Calculated Value
<b>Operation and maintenance cost and Insurance</b>		
Tariff Rate	5.92	As per MPERC Tariff Order dated 26-03-2013 <sup>41</sup>
O&M Expenses (INR Mn.)	4.70	As Per Offer Letter
Escalation in the operational expenses (%)	5.72%	As Per Offer Letter
O & M free for (Yr.)	1	As Per Offer Letter
Insurance (INR Mn.)	0.46	As per TAC order 2001, Sheet No. 31 <sup>42</sup>
<b>Financial parameters</b>		
Total Cost (INR Mn.)	305.15	As Per Offer Letter
Loan Amount (INR Mn.)	-	
Equity Investment (INR Mn.)	305.15	As Per Offer Letter
<b>Book Depreciation (SLM Method)</b>		
Land Cost	8.1	As Per Offer Letter
Gross Depreciable Value (INR Mn.)	297.05	Calculated Value
Salvage Value (%)	10.00%	Standard accounting practise
Salvage value (INR Mn.)	29.71	Calculated Value
Net Depreciable Value (INR Mn.)	267.35	Calculated Value
Residual Value (INR Mn.)	29.71	Calculated Value
<b>IT Depreciation</b>		
IT Depreciation (SLM Method) (%) for 10 years	7%	As per MPERC Tariff Order dated 26-03-2013 <sup>43</sup>
IT Depreciation (SLM Method) (%) from 11th to 25th year	1.33%	
<b>Income Tax</b>		
Financial Year	FY 2015-16	
Income tax rate (%)	30.00%	As Per Income Tax Rule, Pg 29 Para E(I) <sup>44</sup>

<sup>40</sup> <http://www.mperc.in/26032013-Wind-tariff-order.pdf>

<sup>41</sup> <http://www.mperc.in/26032013-Wind-tariff-order.pdf>

<sup>42</sup> <https://iib.gov.in/IIB/tac/tariffs/AIFT2001.pdf>

<sup>43</sup> <http://www.mperc.in/26032013-Wind-tariff-order.pdf>

<sup>44</sup> <http://indiabudget.nic.in/budget2015-2016/ub2015-16/fb/bill.pdf>

Corporate Tax/MAT (%)	33.00%	As Per IT rule <sup>45</sup>
Service Tax (%)	12.00%	As Per Income Tax Rule, Pg 14 <sup>46</sup>
Surcharge (%)	10.00%	As Per Income Tax Rule, Pg 29 Para E(I) <sup>47</sup>
Education cess (%)	1.00%	As Per Income Tax Rule, Pg 5, 11 and 12 <sup>48</sup>
<b>Final Tax rates</b>		
Income tax rate (%)	33.33%	Calculated Value
Corporate Tax/MAT (%)	36.66%	Calculated Value
Service Tax (%)	12.12%	Calculated Value

### Sensitivity Analysis

Sensitivity Analysis	Equity IRR			
Variation %	-10%	Normal	10%	Breaching Value
<b>PLF</b>	5.86%	7.17%	8.41%	67.40%
<b>O&amp;M</b>	7.38%	7.17%	6.95%	-492.93%
<b>Project Cost</b>	8.31%	7.17%	6.21%	-44.08%
<b>Tariff Rate</b>	5.86%	7.17%	8.41%	67.40%

### Final Result

Equity IRR without CDM	Benchmark (Equity IRR)
7.17%	14.76%

<sup>45</sup> <https://www.bankbazaar.com/tax/corporate-tax.html>

<sup>46</sup> <http://indiabudget.nic.in/budget2015-2016/ub2015-16/fb/bill.pdf>

<sup>47</sup> <http://indiabudget.nic.in/budget2015-2016/ub2015-16/fb/bill.pdf>

<sup>48</sup> <http://indiabudget.nic.in/ub2015-16/fb/bill.pdf>

## Appendix 1. Contact information of project participants

<b>Organization name</b>	Agrawal Renewable Energy Pvt. Ltd.
<b>Country</b>	India
<b>Address</b>	Anand Bhavan, Old Station Road, Margao, Goa- 403601, India.
<b>Telephone</b>	0832-2704131
<b>Fax</b>	0832-2730372
<b>E-mail</b>	<a href="mailto:aka@agrawalgrouppgoa.com">aka@agrawalgrouppgoa.com</a>
<b>Website</b>	-
<b>Contact person</b>	Mr. Anirudh K. Agrawal

## Appendix 2. Affirmation regarding public funding

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

## Appendix 3. Applicability of methodologies and standardized baselines

Please refer to section B of the PDD for the same.

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

Please refer to 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 report of comments received from local stakeholders

Please refer to section E.2 of the PDD.

## Appendix 7. Summary of post-registration changes

Not applicable

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## Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
11.0	31 May 2019	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 02.0 of the “CDM project standard for project activities”(CDM-EB93-A04-STAN);</li> <li>• Make editorial improvements.</li> </ul>
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: <ul style="list-style-type: none"> <li>• Improve consistency with the “CDM project standard for project activities” and with the PoA-DD and CPA-DD forms;</li> <li>• Make editorial improvement.</li> </ul>
09.0	24 May 2017	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with the “CDM project standard for project activities” (CDM-EB93-A04-STAN) (version 01.0);</li> <li>• Incorporate the “Project design document form for small-scale CDM project activities” (CDM-SSC-PDD-FORM);</li> <li>• Make editorial improvement.</li> </ul>
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	Revision to: <ul style="list-style-type: none"> <li>• Include provisions related to statement on erroneous inclusion of a CPA;</li> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to local stakeholder consultation;</li> <li>• Provisions related to the Host Party;</li> <li>• Make editorial improvement.</li> </ul>
05.0	25 June 2014	Revision to: <ul style="list-style-type: none"> <li>• 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));</li> <li>• Include provisions related to standardized baselines;</li> <li>• 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;</li> <li>• Change the reference number from F-CDM-PDD to CDM-PDD-FORM;</li> <li>• Make editorial improvement.</li> </ul>
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).

<i>Version</i>	<i>Date</i>	<i>Description</i>
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		