



**Project design document form for
small-scale CDM project activities**

(Version 06.0)

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Solar Power Project by Fortum FinnSurya (EKIESL-CDM.February-15-01)
Version number of the PDD	02
Completion date of the PDD	16/11/2015
Project participant(s)	Fortum FinnSurya Energy Pvt. Ltd.
Host Party	India
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral Scope 1: Energy Industries (renewable - /non renewable sources) Methodology: - AMS-I.D "Grid connected renewable electricity generation" (EB 81, Version 18)
Estimated amount of annual average GHG emission reductions	19,374 tCO ₂ e / annum

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy source. Fortum FinnSurya Energy Pvt. Ltd. is the promoter of the proposed project activity. The project activity involves installation of 12 MWp (10 MW AC) solar power project at Ujjain, Madhya Pradesh. The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 19,374 tCO₂e per year, thereon displacing 19,831 MWh/year amount of electricity from the generation-mix of power plants connected to the NEWNE regional grid, which is mainly dominated by thermal/fossil fuel based power plant.

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

Project Promoters' Name	Capacity in MW	Connection with Grid	State
Fortum FinnSurya Energy Pvt. Ltd.	12 MWp	NEWNE	Madhya Pradesh

Sectoral Scope: 01 : "Grid connected renewable electricity generation", AMS I.D. (Version 18)

Project Type: (i) : Renewable energy projects

Tools referred with above methodology are:

Tool to calculate the emission factor for an electricity system¹ - Version 05.0 (EB 87, Annex 09)

Scenario existing prior to the implementation of project activity:

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

Baseline Scenario:

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

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

The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

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

Sustainable development indicators

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment and Forests (MoEF), has mentioned four indicators for the sustainable development in the interim approval guidelines for Clean

¹ <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

Development Mechanism (CDM) projects from India³. 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 solar plant. This directly and indirectly positively effects the economy of villages and nearby area.

Environmental well being

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

Economic well being

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

Technological well being

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

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

A.2. Location of project activity**A.2.1. Host Party**

India

A.2.2. Region/State/Province etc.

Madhya Pradesh

A.2.3. City/Town/Community etc.

Village : Kapeli
Tehsil : Tarana
District : Ujjain

³ http://www.cdmindia.gov.in/approval_process.php

A.2.4. Physical/Geographical location

Project Promoters' Name	Latitude	Longitude	Date of Commissioning
Fortum FinnSurya Energy Pvt. Ltd.	N 23° 07' 23.0"	E 76° 07' 14.0"	31/12/2014

Location Map



A.3. Technologies and/or measures

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

The project activity aims to harness solar energy through installation of PV with total installed capacity of 12 MWp.

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

Technical detail of the equipment	Remark
Technology	Thin Film-CdTe modules on Fixed Tilt at 20 degrees
Solar photovoltaic module	95 Wp Modules of make - First Solar- FS395
No. of modules	126360
Total Number of Invertors	15 Units
Transformer	10 Numbers (2 Nos of 125KVA- for Auxiliary- 33kV/415 V, 1 Nos 700 kVA- 380 V/33kV and 7 Nos. 1400 kVA- 380 V/33 kV)
Central inverters of nominal AC power output	680 kVA-CONEXT CORE XC 680, Schneider Make), three phase , 50 Hz.
Technical & Operational Lifetime	25 years

Section B.3. & B.7. mentions information related to metering & monitoring system.

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.

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

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Fortum FinnSurya Energy Pvt. Ltd.	No

A.5. Public funding of project activity

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

A.6. Debundling for project activity

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

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

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

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

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

B.1. Reference of methodology and standardized baseline

Title: Grid connected renewable electricity generation⁴

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)⁵

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 system⁶ - Version 05.0 (EB 87, Annex 09)

B.2. Project activity eligibility

The project activity involves generation of grid connected electricity from renewable solar energy. The project activity has an installed capacity of 12 MWp which will remain less than the maximum qualifying capacity of 15 MW for a small scale CDM project activity under Type-I of the small scale methodologies. The installed capacity will not increase throughout and even after the crediting period therefore the project activity will remain within the limit of small scale in each year of the crediting period. The project status is corresponding to the methodology AMS-I.D and applicability of methodology AMS-I.D are discussed below:

Applicability reference)	Criterion (with Para number)	Project Case
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⁴ <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>

⁵ <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

⁶ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf>

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 Power Project which falls under applicability criteria option 1 (a) i.e., "Supplying electricity to a national or a regional grid". Hence the project activity meets the given applicability criterion.
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included in Table 2 ⁸	The 1 st option of Table 2 of AMS I.D. Version 18, EB 61 is applicable (please refer footnote) as project supplies electricity to a national/regional 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 based electricity generation plants (not addition to existing system). Option a is applicable.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: <ul style="list-style-type: none"> The project activity is implemented in an existing reservoir with no change in the volume of reservoir; The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²; The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m². 	The project is solar power project and thus the criterion is not applicable to this project activity.

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	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 ⁸ 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	√		

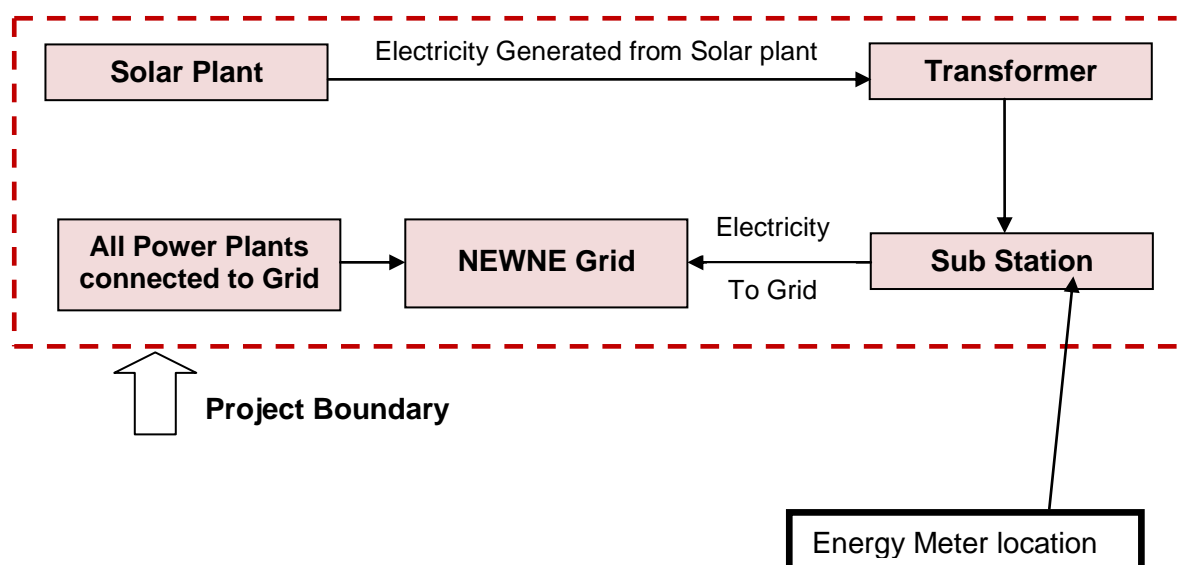
5. If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity is a 12 MWp solar electricity generation. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The Project activity is a renewable solar energy project and is not a combined heat and power system. Hence the criteria is not applicable to the project activity.
7. In the case of project activities that involve the capacity 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 from the existing units	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
8. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	Not applicable, the solar project is a Green field project activity and this project is not the enhancement or up gradation project.
9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	The Project activity is a renewable solar energy 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
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The Project activity is a renewable solar energy project and is not a biomass project. Hence the criteria is not applicable to the project activity.

The project activity qualifies as Type I during every year of the crediting period in accordance with applicable provisions for project activity eligibility as discussed above. Also the total installed capacity of project activity is 12 MWp which is less than 15 MW threshold limit for small scale project activities as per **AMS-I.D.: Grid connected renewable electricity generation, version 18**. The project capacity will be always remain the same and hence the project activity will always be under the threshold limit of small scale project activities throughout the crediting period and thereafter.

B.3. Project boundary

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

The project boundary includes the solar project, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the NEWNE grid. Therefore the entire NEWNE grid and all connected power plants have been considered in the project boundary for the proposed CDM project activity.



The GHG emission sources considered for the project boundary and their explanations are as follows:

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Grid-connected electricity generation	CO ₂	Yes	Major emission sources.
		CH ₄	No	Excluded for simplification. This is conservative
		N ₂ O	No	Excluded for simplification. This is conservative
Project scenario	Greenfield solar energy conversion system	CO ₂	No	The project activity does not emit any emissions.
		CH ₄	No	No methane generation is expected to be emitted.
		N ₂ O	No	No nitrous oxide generation is expected to be emitted.

B.4. Establishment and description of baseline scenario

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

The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

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

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

The combined margin ($EF_{grid,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM). Calculations for this combined margin must be based on data from an official source⁹ (where available) and made publically available.

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

Parameter	Value	Nomenclature	Source
$EF_{grid,y}$	0.9770 tCO ₂ /MWh	Combined margin CO ₂ emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO ₂ Emission Database, Version 10.0, December 2014 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9862 tCO ₂ /MWh	Operating margin CO ₂ emission factor for the project electricity system in year y	Calculated as the last 3 year (2011-12, 2012-13, 2013-14) generation-weighted average, sourced from Baseline CO ₂ Emission Database, Version 10.0, December 2014 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.9495 tCO ₂ /MWh	Build margin CO ₂ emission factor for the project electricity system in year y	Baseline CO ₂ Emission Database, Version 10.0, December 2014 published by Central Electricity Authority (CEA), Government of India

B.5. Demonstration of additionality

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

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

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

Prior Consideration of CDM

⁹http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

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, Fortum FinnSurya Energy Pvt. Ltd. intimated the UNFCCC and host party DNA i.e. National CDM Authority (NCDMA) of its intention to seek CDM for the proposed project activity in a defined F-CDM form on 13/12/2014, which is within six months of the project activity start date (as mentioned in section C.1.1). Hence from the above it can be clearly established that CDM was seriously considered in the decision to proceed with the proposed project activity.

Additionality Assessment

As per the ‘Guidance on demonstration of Additionality of small scale Project Activity’ (version 09), a positive list of grid-connected renewable electricity generation technologies are listed that are automatically defined as additional, without further documentation of barriers. The positive list comprises of the following grid-connected renewable electricity generation technologies of installed capacity up to 15 MW:

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

Since the project activity is a solar photovoltaic electricity generation project of capacity 12 MWp, it can be concluded from the above list that the project activity is automatically additional and does not require demonstration of barriers.

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

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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

Baseline emissions:

The baseline emission calculation for the project activity is attributable to the CO₂ 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 NEWNE grid will be multiplied by the grid emission factor to calculate the baseline emissions reduced by the proposed project activity.

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

Where,

BE_y	=	Baseline emissions in year y (t CO ₂)
EG_{PJ,y}	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
EF_{grid,y}	=	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (t CO ₂ /MWh)

The methodology provides following approaches for emission factor calculations:

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

OR

- (b) *The weighted average emissions (in t CO₂/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.

CO₂ Baseline Database for the Indian Power Sector, Version 10.0, December 2014¹⁰, published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per the "Tool to calculate the emission factor for an electricity system" Version 05.0, EB 87, Annex 09, the following steps have been followed.

STEP 1: Identify the relevant electricity systems;

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

STEP 3: Select a method to determine the operating margin (OM);

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

STEP 5: Calculate the build margin (BM) emission factor;

STEP 6: Calculate the combined margin (CM) emission factor.

STEP 1: Identify the relevant electricity power systems

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

However since 2007-08 as the four regional grids except the Southern grid has been synchronized, they are now being considered as one and named as NEWNE grid. Since the project supplies electricity to the NEWNE grid, emissions generated due to the electricity generated by the NEWNE grid as per CM calculations will serve as the baseline for this project.

Table: Grid Classification

NEWNE				Southern
Northern	Eastern	Western	North-Eastern	
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Kerala
Delhi	Jharkhand	Gujarat	Assam	Karnataka
Haryana	Orissa	Daman & Diu	Manipur	Tamil Nadu

¹⁰ http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

Himachal Pradesh	West Bengal	Dadar & Nagar Haveli	Meghalaya	Andhra Pradesh
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Telangana
Punjab	Andaman & Nicobar	Maharashtra	Nagaland	
Rajasthan		Goa	Tripura	
Uttar Pradesh				
Uttarakhand				

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

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

Option I: Only grid power plants are included in the calculation.

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

The Project Participant has chosen only grid power plants in the calculation.

STEP 3: Select a method to determine the operating margin (OM) method

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

- (a) Simple OM, or
- (b) Simple adjusted OM, or
- (c) Dispatch data analysis OM, or
- (d) Average OM.

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

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)					
	2009-10	2010-11	2011-12	2012-13	2013-14
NEWNE	15.9%	17.6%	19.0%	17.2%	18.0%
India	17.1%	18.4%	19.6%	16.9%	18.6%

Data Source: Central Electricity Authority (CEA) database Version 10, Dec'2014

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of three most recent years) for the NEWNE 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 crediting period.

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

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

Net Generation in Operating Margin (MWh) (incl. Imports)			
	2011-12	2012-13	2013-14
NEWNE	508,004,381	546,941,372	569,215,756

Simple Operating Margin (tCO ₂ /MWh) (incl. Imports)			
	2011-12	2012-13	2013-14
NEWNE	0.9699	0.9919	0.9953

Weighted Generation Operating Margin	
NEWNE	0.9862

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

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

Build Margin (tCO ₂ /MWh) (not adjusted for imports)	
	2013-14
NEWNE	0.9495

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

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

Combined Margin – The combined margin is the weighted average of the simple operating Margin and the build margin. In particular, for intermittent and non-dispatchable generation types such as wind and solar photovoltaic, the Tool to calculate the emission factor for an electricity system, Version 05.0.0, EB 87, Annex 09, allows to weigh the operating margin and Build margin at 75% and 25%, respectively.

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

Calculation of Baseline Emission Factor EF_y

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

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

Where,

w_{OM}	75% weight for solar energy projects
w_{BM}	25% weight for solar energy projects
$EF_{OM,y}$	calculated as described in Steps 3&4 above (tCO ₂ /MWh)
$EF_{BM,y}$	calculated as described in Steps 5 above (tCO ₂ /MWh)

$$\text{Baseline Emission factor (NEWNE Grid)} = 0.75 * 0.9862 + 0.25 * 0.9495 \\ = 0.9770 \text{ tCO}_2/\text{MW}$$

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

Hence $PE_y = 0$

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

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 tCO₂/year
 BE_y = Baseline emission in tCO₂/year
 PE_y = Project emissions in tCO₂/year
 LE_y = Leakage Emissions in tCO₂/year

B.6.2. Data and parameters fixed ex ante

Data / Parameter	EF _{grid,OM,y}
Unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014 ¹¹
Value(s) applied	0.9862
Choice of data or Measurement methods and procedures	Calculated as per “Tool to calculate the emission factor for an electricity system, version 05.0.0” as 3-year generation weighted average using data for the years 2011-2012, 2012-2013, & 2013-2014. The data are obtained from “CO2 Baseline Database for Indian Power Sector” version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid,BM,y}
Unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value(s) applied	0.9495
Choice of data or Measurement methods and procedures	Calculated as per “Tool to calculate the emission factor for an electricity system, version 05.0.0” for the year 2013-2014. The data is obtained from “CO2 Baseline Database for Indian Power Sector” version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid,y}
Unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value(s) applied	0.9770
Choice of data or Measurement methods and procedures	Calculated as per “Tool to calculate the emission factor for an electricity system, version 05.0.0”. The data is obtained from “CO2 Baseline Database for Indian Power Sector” version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

B.6.3. Ex ante calculation of emission reductions

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

$$ER_y = BE_y - PE_y - LE_y$$

Where,

ER_y = Emission Reduction in tCO₂/year

¹¹ http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

BE_y = Baseline emission in tCO₂/year
 PE_y = Project emissions in tCO₂/year
 LE_y = Leakage Emissions in tCO₂/year

Baseline Emission (BE_y)

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

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

Where,

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

Project Investors' Name	Average PLF (%)	Grid	Generated Power (MWh) p.a	Baseline Emission Factor (tCO ₂ /MWh)	Baseline emissions (tCO ₂ / year)
Fortum FinnSurya Energy Pvt. Ltd.	18.86%	NEWNE	19,831	0.9770	19,374

$EF_{grid,y}$ = Baseline emission factor
 = 0.9770 tCO₂/MWh

BE_y = 19,831 * 0.9770
 = 19,374

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,

$ER_y = BE_y = 19,374$

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

Year	Baseline emissions (t CO ₂ e)	Project emissions (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions (t CO ₂ e)
Year 1	19,374	0	0	19,374
Year 2	19,374	0	0	19,374
Year 3	19,374	0	0	19,374
Year 4	19,374	0	0	19,374
Year 5	19,374	0	0	19,374
Year 6	19,374	0	0	19,374
Year 7	19,374	0	0	19,374
Total	135,621	0	0	135,621
Total number of crediting years	7			

Annual average over the crediting period	19,374	0	0	19,374
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B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{PJ,y}$
Unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh).
Source of data	Meter Reading Statement issued by MPPKVVCL which provide input values ($EG_{export,y}$ & $EG_{import,y}$), used for calculation of $EG_{PJ,y}$.
Value(s) applied	19,831 (Estimated Value)
Measurement methods and procedures	<p>Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. The value electrical units supplied by the project activity to grid and electrical units consumed by the project activity is provided in Meter Reading Statement which is issued monthly by MPPKVVCL. The quantity of net electricity supplied to the grid can be obtained, by following calculations:</p> $EG_{PJ,y} = EG_{export,y} - EG_{import,y}$ <p>Where, $EG_{export,y}$: Electricity exported to the grid by the project activity, $EG_{import,y}$: Electricity imported from the grid by the project activity</p> <p>The calculation is done by MPPKVVCL and the PP has no say in the calculation.</p> <p>The electricity supplied to the grid by the project activity connected to the substation is measured by electronic meters of accuracy class 0.2s. The net electricity supplied will be measured continuously using Main and Check meters at the substation. Readings of Main and Check meters shall be taken on monthly basis by authorized officer(s) of MPPKVVCL in the presence of PP or representative of PP.</p> <p>Cross Checking:</p> <p>$EG_{export,y}$: Quantity of electricity exported to the grid can be cross checked from the invoices raised by the project participant to Solar Energy Corporation of India $EG_{import,y}$: Quantity of electricity imported from the grid can be cross checked from electricity bills raised by MPPKVVCL to Fortum FinnSurya Energy Pvt. Ltd. $EG_{PJ,y}$: Calculated value.</p> <p>Data Type: Measured Monitoring equipment: Bi-directional Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: Once in 5 years¹³ the data records maintained by the project participant</p>
Monitoring frequency	Monthly
QA/QC procedures	Calibration of all the meters will be undertaken once in 5 years and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2.

¹³ http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf, page 12

Purpose of data	The Data/Parameter is required to calculate the baseline emission
Additional comment	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

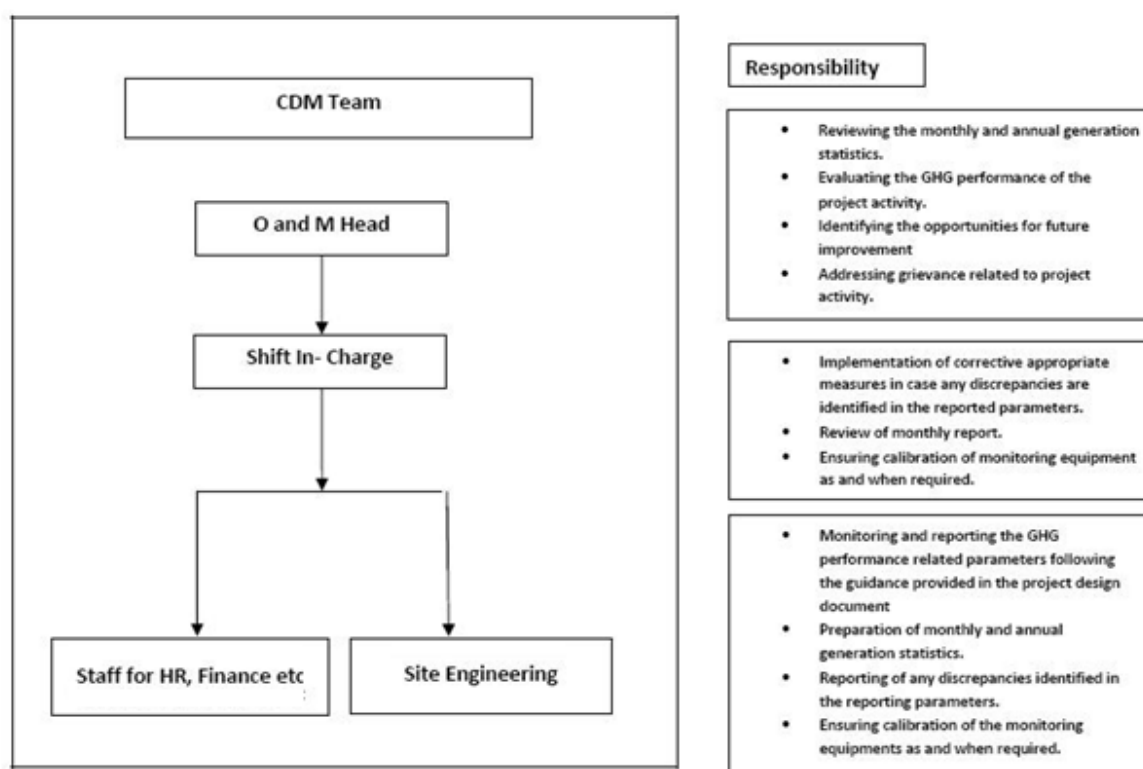
B.7.2. Sampling plan

Sampling is not required for the given project activity.

B.7.3. Other elements of monitoring plan

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected solar power project being implemented in Madhya Pradesh, India. The monitoring plan, which will be implemented by the project participant 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 participant. 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:



Data Measurement

The export and import energy will be measured continuously using above mentioned Main and Check meters located at the substation. Readings of meters shall be taken on monthly basis by authorized officer of MPPKVVCL in the presence of PP or representative of PP. MPPKVVCL then issues the Meter Reading Statement to Fortum FinnSurya Energy Pvt. Ltd. which then issues invoice based on this Meter Reading Statement.

Data collection and archiving

Readings from meters will be collected in the presence of the plant in-charge. 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.

Personnel training

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

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

02/12/2015 is the date of completion of study on application of the selected methodology (AMS-I.D - version 18). Further, the standardized baseline is not applicable for this project activity.

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

SECTION C. Duration and crediting period**C.1. Duration of project activity****C.1.1. Start date of project activity**

Start date of the project activity is the date of purchase order as on 20/06/2014.

C.1.2. Expected operational lifetime of project activity

25 Years 00 Months

C.2. Crediting period of project activity**C.2.1. Type of crediting period**

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

C.2.2. Start date of crediting period

31/10/2015 or Date of submission of complete request for registration by the DOE whichever is later.

C.2.3. Length of crediting period

07 Years 00 Months

SECTION D. Environmental impacts**D.1. Analysis of environmental impacts**

The project activity has no significant impact on the environment. Solar PV projects are not included in the Schedule I of the EIA notification S.O.1533 (E) dated 14th September 2006¹⁴ and thus an EIA is not required. Ministry of Environment & forests vide their OM J-11013/41/2006 - IA II (I) dated 13th May 2011¹⁵ has re-affirmed this and exempted Solar PV power plants from EIA and EC requirement.

SECTION E. Local stakeholder consultation**E.1. Solicitation of comments from local stakeholders**

The Local Stakeholder Meetings were organized for local stakeholder consultation and informed local stakeholder regarding the meeting. The followings are the local stakeholders for the project activity:

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

Date of invitation – 1 May 15

Date of Meeting – 15 May 15

Location of Meeting - Kapeli , Ujjain , MP

All the stakeholders have been invited through invitation letters (delivered in hand) and public notice to attend the stakeholders meeting.

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

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

E.2. Summary of comments received

Meeting started with opening speech by representative of project participant. He introduced all guests on dais. The representative of project participant explained Technical aspects of project to stakeholders. He also explained about social, environmental & economical benefits of the project.

¹⁴ <http://envfor.nic.in/legis/eia/so1533.pdf>

¹⁵ <http://moef.nic.in/downloads/public-information/OM-SolarPV.pdf>

He also elaborated about CDM & its requirement for the current project. After the presentation, the session was open for questions/feedback from stakeholders.

The villagers raised various queries as summarised below:

- How many units will be generated annually?
- What is the life of the plant?
- Will the project help in improving the electricity supply to the villagers and to neighbourhood areas?
- Does this project affect the ground water level?
- Does the project provide employment opportunities or improve the economic development of area?

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

E.3. Report on consideration of comments received

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

SECTION F. Approval and authorization

The Designated National Authority of India; *National CDM Authority, Ministry of Environment, Forest and Climate Change, Government of India*, in its subsequent meeting conducted on 30/10/2015, has granted a letter of approval to the project participant in the said CDM project activity. The issuing date of letter of approval is 16/11/2015 via ministry's letter no. 4/3/2015-CCC. The letter of approval from the party involved (India) is been submitted to the validating DOE, before request for registration.

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

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Fortum FinnSurya Energy Pvt. Ltd.
Street/P.O. Box	1A, VANDANA BUILDING,
Building	11, TOLSTOY MARG,
City	New Delhi
State/Region	New Delhi
Postcode	110001
Country	India
Telephone	
Fax	
E-mail	awadhesh.jha@fortum.com
Website	
Contact person	Mr. Awadhesh Jha
Title	Vice President
Salutation	Mr.
Last name	Jha
Middle name	
First name	Awadhesh
Department	NA
Mobile	+91-85276-94527
Direct fax	NA
Direct tel.	+91-124-4418827
Personal e-mail	awadhesh.jha@fortum.com

Project participant and/or responsible person/ entity	<input type="checkbox"/> Project participant <input checked="" type="checkbox"/> Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	EKI Energy Services Limited
Street/P.O. Box	Office No. 201, Plot 48 part 2 Vijay Nagar
Building	Near Brilliant Convention Centre
City	Indore
State/Region	Madhya Pradesh
Postcode	452010
Country	India
Telephone	+91-7566-661647
Fax	NA
E-mail	rucha@enkingint.org
Website	www.enkingint.org
Contact person	Miss. Rucha Natu

Title	Manager
Salutation	Miss.
Last name	Natu
Middle name	-
First name	Rucha
Department	CDM Services Dept.
Mobile	+91-9907534900
Direct fax	NA
Direct tel.	NA
Personal e-mail	rucha@enkingint.org

Appendix 2. Affirmation regarding public funding

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

Appendix 3. Applicability of methodology and standardized baseline

Please refer section B of the PDD for the same.

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

Refer section B.6.1 of the PDD for information on ex ante calculation.

Appendix 5. Further background information on monitoring plan

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

Appendix 6. Summary of post registration changes

Not Applicable

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
06.0	9 March 2015	<p>Revisions to:</p> <ul style="list-style-type: none"> • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.
05.0	25 June 2014	<p>Revisions to:</p> <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the project design document form for small-scale CDM project activities (these instructions supersede the "Guidelines for completing the project design document form for small-scale CDM project activities" (Version 01.1)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and ¡Error! No se encuentra el origen de la referencia.; • Change the reference number from <i>F-CDM-SSC-PDD</i> to <i>CDM-SSC-PDD-FORM</i>; • Editorial improvement.
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	13 March 2012	EB 66, Annex 9 Revision required to ensure consistency with the “Guidelines for completing the project design document form for small-scale CDM project activities”
03.0	15 December 2006	EB 28, Annex 34 <ul style="list-style-type: none"> The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02.0	08 July 2005	EB 20, Annex 14 <ul style="list-style-type: none"> The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at http://cdm.unfccc.int/Reference/Documents.
01.0	21 January 2003	EB 07, Annex 05 Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Registration Keywords: project design document, SSC project activities		