Project design document form for small-scale CDM project activities

(Version 05.0)

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

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Bundled Wind Power Project by EKI Energy Services Limited (EKIESL-CDM.January-14-04)
Version number of the PDD	04
Completion date of the PDD	17/112014
Project participant(s)	ReXchange Global Solutions (P73)
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 61, Version 17)
Estimated amount of annual average GHG emission reductions	16,078 t CO2e / annum

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project activity is the installation of 5 Wind Turbine Generators (WTGs) of different make and capacity at Maharashtra and Gujarat state of India. The project activity uses renewable energy (wind) as a clean fuel to generate electrical energy. The total installed capacity of the project is 8.8 MW, which comprises 5 nos. of Wind Machines installed. The details are as follows;

S. No.	WTG Owner	Capacity (MW)	No. of WTGs	Total Capacity (MW)	Connection to the Grid	Power Utilization
1	Surbhi Textile Mills Pvt. Ltd.	2	1	2	NEWNE	Sale to Grid
		2	1	2	NEWNE	Sale to Grid
		0.8	1	0.8	NEWNE	Captive
2	SJP Constructions Private Limited	2	1	2	NEWNE	Sale to Grid
		2	1	2	NEWNE	Sale to Grid

The wind power project is emission free source of energy and will reduce the overall emissions of the respective grids of India. The project activity generates 16,490 MW of electricity annually which displaces approximately 112,546 tCO_2e over the crediting period leading to an estimated value of 16078 tCO_2e per annum. The project activity involves Wind Machines of different make, capacity and manufacturer.

The project activity is a bundled project activity and ReXchange Global Solutions (P73) will act as a focal point and the CER sharing among the participants will be done through internal agreements between the partners.

Purpose of the project activity

The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources and to utilize the generated output for selling it to the state electricity utility as well as for captive purpose thus displacing the electricity at the regional gird (NEWNE) which are dominated by the import of Fossil fuel based power plants and to contribute to climate change mitigation efforts. It's a Greenfield project activity.

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:

The baseline scenario for the project activity is identical to the scenario existing prior to the implementation of the project activity.

Contribution of project activity to sustainable development:

Ministry of Environment & Forest, Govt.[1] Of India has indicated social well being, economical well being, technological well being and environmental well being as four indicators for the sustainable development for any Clean Development Mechanism (CDM) projects in India. This project activity contributed to these entire indicators for the sustainable development in following manner:

I. Social well being:

- The project activity provided / provides job opportunity to local people during erection, commissioning and maintenance of the wind machines. Frequency of visiting villages and nearby areas by skilled, technical and industrialist increase due to installation / site visit / operation and maintenance work related to WTGs. This directly and indirectly positively effects the economy of villages and nearby area.

II. Economic well being:

- The project activity leads to investment to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is fed into the regional grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.
- The proposed CDM project activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; this will create additional employment opportunities.

III. Environmental well being:

- The project utilizes wind energy for generating electricity which otherwise would have been generated through the operation of power plants in the NEWNE grid mix, contributing to reduction in specific emissions (tons of emissions /MWh of energy generated) including GHG emissions.
- As wind power projects produce no end products in the form of waste (e.g. Particulate Matter, Fly ash, Water effluent etc.), therefore contributes to environmental well being..
- Being a renewable resource, using wind energy to generate electricity contributes to conservation of natural scare resource (e.g. Fossil fuel).
- Thus, the project causes no negative impact on the surrounding environment contributing to environmental well being.

IV. Technological well being:

- The project activity leads to the promotion Wind power into the region, demonstrating the success of this type of wind turbines, thus strengthening the grid supply and improving quality of power under the service area of the substation.
- Hence the project leads to technological well being. The project technology manufactured, operated & maintained indigenously and doesn't involve any technology transfer from foreign countries.

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

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

A.2. Location of project activity

A.2.1. Host Party

>>
India

A.2.2. Region/State/Province etc.

>>
India

A.2.3. City/Town/Community etc.

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WTG Owner	Capacity (MW)	Village	District	State
Surbhi Textile Mills Pvt. Ltd.	2	Rawalgundwadi	Sangli	Maharashtra
Surbhi Textile Mills Pvt. Ltd.	2	Rawalgundwadi	Sangli	Maharashtra
Surbhi Textile Mills Pvt. Ltd.	0.8	Khadvavdi	Rajkot	Gujarat
SJP Constructions Pvt. Ltd.	2	Rawalgundwadi	Sangli	Maharashtra
SJP Constructions Pvt. Ltd.	2	Rawalgundwadi	Sangli	Maharashtra

A.2.4. Physical/Geographical location

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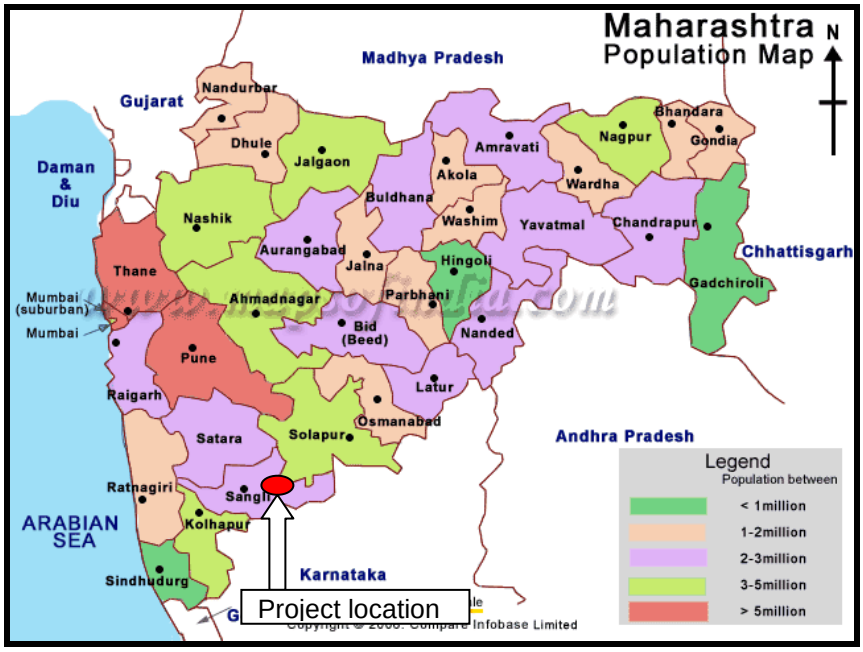
WTG Owner	Capacity (MW)	WTG ID	Latitude			Longitude		
			Deg	Min	Sec	Deg	Min	Sec
Surbhi Textile Mills Pvt. Ltd.	2	MV2T-18	16	59	20.04	75	17	47.083
Surbhi Textile Mills Pvt. Ltd.	2	MV2T-61	16	57	25.7	75	16	10.3
Surbhi Textile Mills Pvt. Ltd.	0.8	WWIL/800/13-14/3420	22	7	7.7	71	5	3
SJP Constructions Pvt. Ltd.	2	MV2-T-19	16	59	28.66	75	17	27.92
SJP Constructions Pvt. Ltd.	2	MV2-T-20	16	59	7.85	75	17	15.91

The geographical locations for the projects are mentioned below;



A.3. Technologies and/or measures

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Project Type : I – Renewable Energy Project

Project Category : I.D. – Grid Connected Renewable Electricity Generation (Version 17, EB 61)

Wind Power Technology Details – The technology being employed, converts wind energy to electrical energy. In wind power generation, energy of wind is converted into mechanical energy and subsequently into electrical energy. The technology is an environment friendly technology since there are no GHG emissions associated with the electricity generation. There is no transfer of technology involved in the project activity. As per the technical details provided from the manufacturer the life of the plant is considered as 20 years.

WTG Owner	Capacity (MW)	Machine Manufacturer	Machine Make
Surbhi Textile Mills Pvt. Ltd.	2	Inox Wind Limited	WT 2000 DF
Surbhi Textile Mills Pvt. Ltd.	2	Inox Wind Limited	WT 2000 DF
Surbhi Textile Mills Pvt. Ltd.	0.8	Wind World India Private Limited	E - 53
SJP Constructions Pvt. Ltd.	2	Inox Wind Limited	WT 2000 DF
SJP Constructions Pvt. Ltd.	2	Inox Wind Limited	WT 2000 DF

Technical Details of the WTGs:-

Technical details for WT 2000 DF Machine manufactured by Inox Wind Limited

Particular	Details

Rated Power	2000 kW
Rotor Diameter	93m
Rotational Speed	15.9 rpm
Swept Area	6785 m^2
Hub Height	80 m
Cut-in Speed	3 m/s
Rated Wind Speed	11 m/s
Cut-off wind Speed	20 m/s
Gear Type	2 Planetary & 1Parallel shaft gear
Gear ratio	1: 114.7
Generator Type	Double feed Induction Generator
Generator Rated Power	2000 kW
Rated Voltage	690 V AC, 3 Phase
Frequency	50 Hz
Estimated design Life time	25 Years

Technical details for Wind World India Limited E-53 Machines;

Turbine model	Wind World India Limited **E- 53**
Rated power	800 KW
Rotor diameter	53 m
Hub height	75 m
Turbine Type	Gearless horizontal axis wind turbine with variable rotor speed
Power regulation	Independent electromechanical pitch system for each blade.
Cut in wind speed	2.5 *m/s*
Rated wind speed	12 *m/s*
Cut out Wind speed	28-34 m/s
Extreme Wind Speed	59.5 *m/s*
Rated rotational speed	32 rpm
Operating range rot. speed	12-29 rpm
Orientation	Upwind
No of Blades	3
Blade Material	Fibre Glass Epoxy reinforced with integral lightning protection
Gear box type	Gear less
Generator type	Synchronous generator
Braking	Aerodynamic
Output Voltage	400 V
Yaw System	Active yawing with 4 electric yaw drives with brake motor and friction bearing
Tower	74 m concrete

The technology being employed is well proven, safe & sound. No technology transfer to host party is there due to project activity. Further, the baseline scenario is a continuation of current practice, thus identical to the scenario existing prior to the implementation of the project activity.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	ReXchange Global Solutions (P73) (Private entity)	No

A.5. Public funding of project activity

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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

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As per the provisions prescribed in “Clean development mechanism project standard” and further referring to “Guidelines on assessment of debundling 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

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Title: Grid connected renewable electricity generation[2]

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

Reference: The project activity meets the eligibility criteria to use the simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7. Details of methodology for baseline calculations for CDM projects of capacity less than 15 MW are available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities".

Methodology: AMS-I.D Grid Connected Renewable Electricity Generation (Version 17, EB 61)[3]
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.

Tool referred with above methodology is –
Version 04.0 (EB 75, Annex 15) of "Tool to calculate the emission factor for an electricity system[4]".
Version 07.0.0 (EB 70, Annex 8) of "Tool for the demonstration and assessment of additionality[5]".

B.2. Project activity eligibility

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The project activity involves generation of grid connected electricity from renewable wind energy. The project activity has an installed capacity of 8.8 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-

Applicability Criterion	Applicability with respect to project activity
1. This category 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 the Renewable Energy Project i.e. Wind Power Project. The purpose of the project activity is to supply electricity to the regional grids i.e., NEWNE and to meet the captive requirements via national grid for (0.8 MW at Gujarat), thus Option (a) and (b) are applicable i.e. (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. Hence the project activity satisfies this applicability criterion.

[3] http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X

[4] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

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

Applicability Criterion	Applicability with respect to project activity
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A2) applies is included in Table 2[6]	The 1st and 3rd option of Table 2 of AMS-I.D Version 17, EB 61 is applicable (please refer footnote). Hence the project activity satisfies this applicability criterion.
3. This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	The project activity is a Greenfield project thus Option (a) is applicable i.e. (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant). Hence the project activity satisfies this applicability criterion.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/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.	As the given project activity is a Wind Power project and is not a Hydro Power Project therefore this eligibility criterion is not applicable to the Project activity.
5. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-	As the project activity is a Greenfield small scale Wind Power Project with installed capacity of 8.8 MW and doesn't involve the

[6]	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[6] system where in the baseline all generators use exclusively fuel oil and/or diesel fuel			√
5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√		

Table 2

Applicability Criterion	Applicability with respect to project activity
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.	installation of any non-renewable component therefore the project fulfils the given eligibility criterion.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The proposed project activity is not a CHP/Co-generation system therefore the given criterion is not applicable to the project activity.
7. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The Given project activity involve the installation of small scale wind power project at a place where there was no power generation facility existing before the installation of given project activity hence it doesn't involve the addition of new unit to any of existing renewable power generation facility therefore the given criteria is not applicable to the project activity.
8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	The Given project activity is the installation of Greenfield wind power project and doesn't involves any retrofit/replacement work and the output capacity will always be within the threshold limit of small scale project as the total installed capacity of project activity is 8.8 MW.

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 8.8 MW which is less than 15MW threshold limit for small scale project activities as per **AMS-I.D.: Grid connected renewable electricity generation, version 17**. 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

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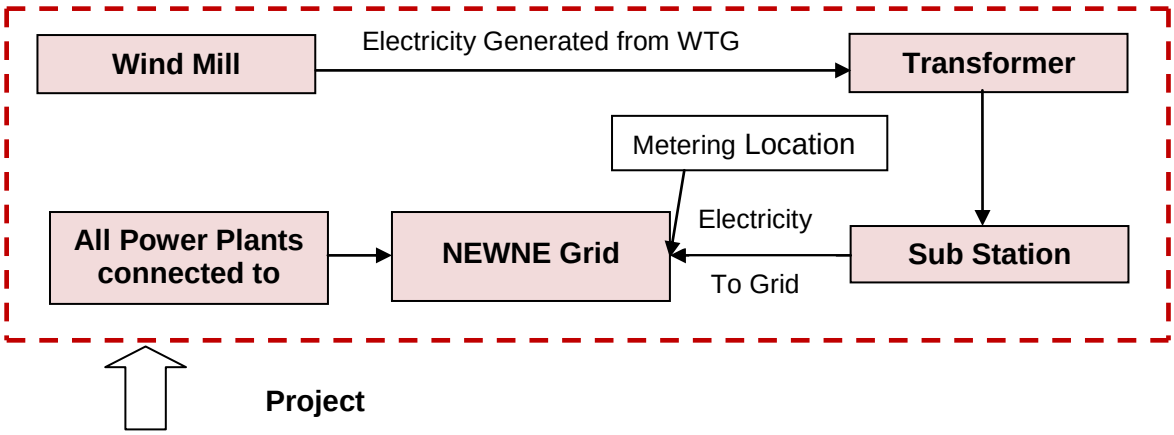
As per AMS-I.D Version 17, EB 61 –"The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to".

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



B.4. Establishment and description of baseline scenario

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As per para 10 of the methodology AMS-I.D. Version 17,

"the baseline scenario is the electricity delivered to the grid by 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 proposed project activity will evacuate power to the NEWNE Grid & completely comply with the para 10 of AMS-I.D, Version 17.

As per para 11 of the methodology AMS-I.D. Version 17,

"The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ *expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor (in* tCO_2 */MWh)."*

Baseline emissions:

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

As per para 11 of AMS-I.D.

$$BE_y = EG_{BL,y} \times EF_{CO2,grid,y}$$

Where,

BE_y	=	Baseline Emissions in year y; t CO_2
$EG_{BL,y}$	=	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{CO_2,grid,y}$	=	CO_2 emission factor of the grid in year y; t CO_2/MWh

Project Emissions:

As per para 20 to AMS-I.D, version 17 **for renewable project activities Project Emission (PE_y)** in tCO_2/year = 0 except geothermal and hydro power plants. Since project activity is a wind power plant. Therefore,

$\mathbf{PE_y} = 0$ ..... (1)

Leakage Emissions:

Since project does not involve transfer of an energy generating equipment from another activity, as per para 22 of AMS-I.D, Version 17:

$\mathbf{LE_y} = 0$ ..... (2)

Emission Reduction:

As per para 23 of AMS-I.D, version 17,

$\mathbf{ER_y = BE_y - PE_y - LE_y}$

Where,

ER_y	=	Emission reductions in year y (tCO_2/y)
BE_y	=	Baseline emissions in year y (tCO_2/y)
PE_y	=	Project Emissions in year y (tCO_2/y)
LE_y	=	Leakage emissions in year y (tCO_2/y)

Using equation 1 & 2 we get,

$\mathbf{ER_y} = \mathbf{BE_y} – 0 – 0$
or
$\mathbf{ER_y = BE_y}$

B.5. Demonstration of additionality

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As per the Guidelines on the demonstration of additionality of small-scale project activities (ver. 09 EB 68 Annex 27)[7] of the simplified modalities and procedures for small scale CDM project activities, 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;

[7] http://cdm.unfccc.int/Reference/Guidclarif/meth/methSSC_guid05.pdf

- **Other barriers**: Without the project activity, for another specific reason identified by the project proponents, 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 PP 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 ("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 guidance 19 of Annex 5, EB 62[8] -

Considering the fact that the alternative to the project is the supply of electricity from the grid (mentioned in para 11 of methodology) & 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 guidance 19 Annex 5 EB 62.

Selection of Benchmark & Financial Indicator:

According to the "Tool for demonstration and assessment of Additionality[9]", 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.
Hence, Project proponents have considered Equity IRR for investment analysis at the time of decision-making. As Project proponents is only interested in the returns project is generating on the portion of investment costs, which is financed by them in the form of equity.

As per Para 12 of the Guidance to Investment Analysis states that required returns on equity is appropriate benchmark for Equity IRR. Therefore, the Expected return on equity is considered appropriate benchmark.

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

Default Value Benchmark:

As suggested in Appendix A in EB62 Annex 5 and latest Clarification from UNFCCC in EB 73 (Applicability of the "Guidelines on the assessment of investment analysis"[10] version 01.0), default value benchmark is presented below:

Appendix A in EB62 Annex 5 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **11.75%**

[8] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

[9] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf

[10] http://cdm.unfccc.int/filestorage/i/4/YZ9W23QKHPJTDECIX84GO7FUV10SNL.pdf/eb73_repan08.pdf?t=ZVZ8bW9rcGhofDAree3aV8lT9gJhRIeBlRtk

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

Nominal Benchmark[11] = {(1+Real Benchmark)*(1+Inflation rate)}-1
Where:

- Default value for Real Benchmark = 11.75% (as per Appendix of Annex 5, EB 62)
- Inflation Rate forecast for by Reserve Bank of India (RBI) (i.e. Central Bank of India) for India

Benchmark Estimation:

Appendix A in EB62 Annex 5 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **11.75%**

Inflation Forecast for India as per RBI website:

Project Investor	Inflation Forecast for 10 Yrs.	Default Benchmark
Surbhi Textile Mills Pvt. Ltd. - (2 x 2.00 MW)	5.60%	18.01%
Surbhi Textile Mills Pvt. Ltd. - (1 x 0.80 MW)	5.60%	18.01%
SJP Constructions Pvt. Ltd. - (2 x 2.00 MW)	5.60%	18.01%

Input values are based on publicly available data sources which can be clearly validated by the DOE, thus it complies with guidance 13 of EB 62, Annex 5.

Surbhi Textile Mills Pvt. Ltd. - (2 x 2.00 MW)

Parameters	Value	Source
State	Maharashtra	As per Offer Letter
Capacity (MW)	2.00	As per Offer Letter
No. of WTGs	2	As per Purchase Order
Total Capacity (MW)	4.00	Calculated Value
Expected Date of Commissioning	31-Mar-14	As per Offer Letter
Life of the plant (Years)	20	As per WTG manufacturer specifications
PLF (%)	21.42%	As per Third Party PLF Report
De-ration after 10th year	5%	As per TERI report
Tariff (INR)	5.81	As per MERC Order dated 22-Mar-13
O&M Expenses (INR MN)	4.04	As per Offer Letter
Escalation in O&M Expenses (%)	5%	As per Offer Letter
O&M free for years	1	As per Offer Letter
Insurance (INR MN)	0.36	As per TAC order
Total Project Cost (INR MN)	241.00	As per Offer Letter
Loan Amount (INR MN)	168.70	As per MERC Order dated 22-Mar-13
Rate of Interest (%)	12.87%	As per MERC Order dated 22-Mar-13
Loan Tenure (Quarters)	40	As per MERC Order dated 22-Mar-13
IT Depreciation (%)	15%	As Per Income Tax Act

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

Corporate Tax (%)	32.45%	As Per IT rule
MAT (%)	20.01%	As Per IT rule
Service Tax (%)	12.36%	As Per IT rule

Surbhi Textile Mills Pvt. Ltd. - (1 x 0.80 MW)

Parameters	Value	Source
State	Gujarat	As per Offer Letter
Capacity (MW)	0.80	As per Offer Letter
No. of WTGs	1	As per Offer Letter
Total Capacity (MW)	0.80	As per Offer Letter
Expected Date of Commissioning	31-Mar-14	As per Offer Letter
Life of the plant (Years)	20	As per WTG manufacturer specifications
PLF (%)	23.45%	As per Third Party PLF Report
De-ration after 10th year	5%	As per TERI report
Tariff (INR)	4.93	Average tariff as per GERC order for HTP-I and LTMD Consumers
O&M Expenses (INR MN)	0.73	As per Offer Letter
Escalation in O&M Expenses (%)	6.50%	As per Offer Letter
O&M free for years	1	As per Offer Letter
Transmission Charges (INR/MW/Day)	2970.00	As Per GETCO order dated 18-Apr-2013
Insurance (INR MN)	0.07	As per TAC order
Total Project Cost (INR MN)	45.00	As per Offer Letter
Loan Amount (INR MN)	31.50	As per GERC Order dated 8-Aug-12
Rate of Interest (%)	13.00%	As per GERC Order dated 8-Aug-12
Loan Tenure (Quarters)	40	As per GERC Order dated 8-Aug-12
IT Depreciation (%)	15%	As Per Income Tax Act
Additional Depreciation (%)	20%	As Per Finance Act 2012
Corporate Tax (%)	32.45%	As Per IT rule
MAT (%)	20.01%	As Per IT rule
Service Tax (%)	12.36%	As Per IT rule

SJP Constructions Pvt. Ltd. - (2 x 2.00 MW)

Parameters	Value	Source
State	Maharashtra	As per Offer Letter
Capacity (MW)	2.00	As per Offer Letter
No. of WTGs	2	As per Purchase Order
Total Capacity (MW)	4.00	Calculated Value
Expected Date of Commissioning	31-Mar-14	As per Offer Letter
Life of the plant (Years)	20	As per WTG manufacturer specifications
PLF (%)	21.42%	As per Third Party PLF Report
De-ration after 10th year	5%	As per TERI report

Tariff (INR)	5.81	As per MERC Order dated 22-Mar-13
O&M Expenses (INR MN)	4.04	As per Offer Letter
Escalation in O&M Expenses (%)	5%	As per Offer Letter
O&M free for years	1	As per Offer Letter
Insurance (INR MN)	0.38	As per TAC order
Total Project Cost (INR MN)	250.00	As per Offer Letter
Loan Amount (INR MN)	175.00	As per MERC Order dated 22-Mar-13
Rate of Interest (%)	12.87%	As per MERC Order dated 22-Mar-13
Loan Tenure (Quarters)	40	As per MERC Order dated 22-Mar-13
IT Depreciation (%)	15%	As Per Income Tax Act
Corporate Tax (%)	32.45%	As Per IT rule
MAT (%)	20.01%	As Per IT rule
Service Tax (%)	12.36%	As Per IT rule

Considering the input values, Equity IRRs for all the WTGs are given below:

Sl. No.	Project Investor	Equity IRR without CDM	Benchmark (Equity IRR)
1	Surbhi Textile Mills Pvt. Ltd. - (2 x 2.00 MW)	15.63%	18.01%
2	Surbhi Textile Mills Pvt. Ltd. - (1 x 0.80 MW)	8.61%	18.01%
3	SJP Constructions Pvt. Ltd. - (2 x 2.00 MW)	14.54%	18.01%

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

Sensitivity Analysis:

Addressing Guidance 20 & 21 of EB 62, Annex 5, following factors has been subjected to sensitivity analysis:

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

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

The results of sensitivity analysis are as follows:

Surbhi Textile Mills Pvt. Ltd. - (2 x 2.00 MW)

Variation %	-10%	Normal	10%	Variation required to reach benchmark
PLF	12.34%	15.63%	18.94%	7.17%
O&M	15.99%	15.63%	15.23%	-66.94%
Project Cost	18.91%	15.63%	12.93%	-7.45%

Tariff Rate	12.34%	15.63%	18.94%	7.17%
Interest Rate	16.36%	15.63%	14.84%	-28.99%
Debt Equity Ratio	14.89%	15.63%	16.48%	21.89%

Surbhi Textile Mills Pvt. Ltd. - (1 x 0.80 MW)

Variation %	-10%	Normal	10%	Variation required to reach benchmark
PLF	5.31%	8.61%	11.79%	30.09%
O&M	9.13%	8.61%	8.17%	-238.11%
Project Cost	11.24%	8.61%	6.49%	-28.63%
Tariff Rate	7.84%	8.61%	9.50%	30.09%
Interest Rate	9.35%	8.61%	8.00%	-97.19%
Debt Equity Ratio	8.62%	8.61%	8.72%	42.86%

SJP Constructions Pvt. Ltd. - (2 x 2.00 MW)

Variation %	-10%	Normal	10%	Variation required to reach benchmark
PLF	11.40%	14.54%	11.91%	10.77%
O&M	14.88%	14.54%	14.20%	-101.40%
Project Cost	17.73%	14.54%	12.07%	-10.78%
Tariff Rate	11.40%	14.54%	17.76%	10.77%
Interest Rate	15.35%	14.54%	13.83%	-41.70%
Debt Equity Ratio	14.01%	14.54%	15.30%	30.73%

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 impacted and in cases even breaches the benchmark. The below tables provides the probability of the situation in which the benchmark is breached. .

Probability to breach the benchmark:

Sensitivity Parameter 1 : PLF

PLF considered in financials for all PPs is as per **"Guidelines for the reporting and validation of Plant load factors" stated in EB48 Annex11**[12].

The sensitivity analysis has been carried out considering a 10% variation in PLF. For WTGs commissioned in Maharashtra the average PLF observed across the state as provided by MNRE[13,14] reveals that the maximum average PLF observed in the state is 15.27%. Further, the project is located in zone 1 as classified by MERC which considers a PLF of 20%, however the project has considered the PLF of 21.42% which is already higher by 7.1% than prescribed by MERC. Thus the probability of another 7.17% higher PLF for a consistent period of 20 years is highly unrealistic.

For WTGs commissioned in Gujarat, the average PLF observed across the state as provided by MNRE[13,14] reveals that the maximum average PLF observed in the state is 19.34%. Also,

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

[13] http://mnre.gov.in/file-manager/UserFiles/wp8.htm

[14] http://mnre.gov.in/file-manager/UserFiles/wp_installed.htm

the GERC tariff order considers a PLF of 23%. The project has considered a PLF of 23.45% which is much higher than the maximum average PLF observed in the state as well as that prescribed by GERC. Thus the probability of 10% higher PLF for a consistent period of 20 years is highly unrealistic.
Sensitivity Parameter 2 : O&M
Breaching value of O&M Cost for all projects is below -50%. Moreover, the O&M cost has been firmed up in the purchase order signed by both the parties. A reduction in the O&M cost by 50% is thus highly unlikely.
Sensitivity Parameter 3 : Project Cost
The Purchase Order cost for all WTGs (except for WTGs of Surbhi Textile Mills Pvt. Ltd. In Maharashtra) is less than 10% of the Offer letter cost which was considered during decision making. However, we have conducted sensitivity analysis for all project proponents for project cost being 10% less than that considered during decision making. Even at this level, the IRR does not breach the Benchmark for any of the WTGs. For WTGs of Surbhi Textile Mills Pvt. Ltd. Commissioned in Maharashtra, the breaching value of project cost is 7.45%. However, the purchase order cost has already been firmed up and there is no difference in the project as cost as per offer letter and the purchase order. Hence, there is no any probability of the Benchmark being breached.
Sensitivity Parameter 4 : Tariff Rate
Tariff Rate for all PPs has been considered as the applicable Tariff order at the time of investment decision. Sensitivity is carried out for +/-10% even then the benchmark (except for WTGs of Surbhi Textile Mills Pvt. Ltd. In Maharashtra) is not breached. For WTGs of Surbhi Textile Mills Pvt. Ltd. In Maharashtra, the breaching point is a increase in tariff by 7.17%. However, since the PPA has already been firmed up, an increase in tariff can be ruled out. **Hence, it is ensured that tariff rate will remain within the range of sensitivity throughout the lifetime of the project activity.**

Demonstration of Parallel and continuing actions as per the ' guidelines on the demonstration and assessment of prior consideration of the CDM' Annex 13 to EB 62.

Project proponent	Purchase Order Date	Commissioning Date	Date of Notification to CDM EB and NCDMA
Surbhi Textile Mills Pvt. Ltd. - (2 x 2.00 MW)	19/11/2013	31/03/2014	19/12/2013
Surbhi Textile Mills Pvt. Ltd. - (1 x 0.80 MW)	30/08/2013	01/05/2014	19/12/2013
SJP Constructions Pvt. Ltd. - (2 x 2.00 MW)	19/11/2013	30/03/2014	21/12/2013

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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Applied Methodology: AMS - I.D, version 17, EB 61

As per para 10 of the methodology AMS-I.D Version 17,
"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 proposed project activity will evacuate power to the NEWNE Grid & completely comply with the para 10 of AMS-I.D, Version 17.

The key methodological steps are as follows:

- Calculating the Project Emissions (PE_y)
- Calculating the Baseline Emissions (BE_y)
- Calculating the Leakage Emissions (LE_y)
- Calculating the Emission Reductions (ER_y)

As per para 11 of the methodology AMS-I.D Version 17
"The baseline emissions are the product of electrical energy baseline $\boldsymbol{EG_{BL,y}}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor (in tCO_2 /MWh)."

Baseline emissions:

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

As per para 11of AMS-I.D

$$\mathbf{BE_y = EG_{BL,y} \times EF_{grid,CM,y}}$$

Where,

$\mathbf{BE_y}$	=	Baseline Emissions in year y; tCO_2
$\mathbf{EG_{BL,y}}$	=	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$\mathbf{EF_{grid,CM,y}}$	=	CO_2 emission factor of the grid in year y; tCO_2/MWh

The methodology provides following approaches for emission factor calculations:

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

OR

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

Option (a) has been considered to calculate the grid emission factor as per the 'Tool to calculate the emission factor for an electricity system' since data is available from an official source.

CO_2 Baseline Database for the Indian Power Sector, Version 9, January 2014[15], 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 04.0 (EB 75, Annex 15), 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 ant 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
Himachal Pradesh	West Bengal	Dadar & Nagar Haveli	Meghalaya	Andhra Pradesh
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	
Punjab	Andaman & Nicobar	Maharashtra	Nagaland	
Rajasthan		Goa	Tripura	
Uttar Pradesh				

[15] http://www.cea.nic.in/reports/planning/cdm_co2/database_9.zip

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)

	2008-09	2009-10	2010-11	2011-12	2012-13
NEWNE	17.4%	15.9%	17.6%	19.2%	17.4%
South	22.8%	20.6%	21.0%	21.0%	15.2%
India	18.7%	17.1%	18.4%	19.6%	16.9%

Data Source: Central Electricity Authority (CEA) database Version 9, Jan'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 and southern grids are 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)			
	2010-11	2011-12	2012-13
NEWNE	476,986,721.35	502,300,380.91	539,385,372.35

Simple Operating Margin (tCO2/MWh) (incl. Imports)			
	2010-11	2011-12	2012-13
NEWNE	0.9710	0.9691	0.9914

Weighted Generation Operating Margin ($EF_{grid,OM,y}$)	
NEWNE	**0.9776**

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

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)	
	2012-13
NEWNE	**0.9673**

(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 04.0 (EB 75, Annex 15), 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 $EF_{grid, CM\ y}$

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

$EF_{grid, CM\ y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * \underline{EF_{grid, BM,y}}$

Where,

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

Baseline Emission factor (NEWNE Grid) = 0.75*0.9776 + 0.25*0.9673
= 0.9750 tCO_2/MW

Project Emissions (PE_y):

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 power project hence no such emission sources are applicable.

Leakage Emissions (LE_y):

Since project does not involve transfer of any energy generating equipment from another activity thus leakage is zero for the project.

Emission Reduction:

$ER_y = BE_y - PE_y - LE_y$

Where

ER_y = Emission reductions in year *y* (t CO_{2e})
BE_y = Baseline Emissions in year *y* (t CO_{2e})
PE_y = Project emissions in year *y* (t CO_2)
LE_y = Leakage emissions in year *y* (t CO_2)

In case of the project activity, $PE_y = 0$ & $LE_y = 0$, therefore,

ER_y = BE_y

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{grid,OM,y}$
Unit	**tCO_2/MWh**
Description	Operating margin emission factor of the grid
Source of data	Central Electricity Authority: "CO_2 Baseline Database for Indian Power Sector", Version 9 http://www.cea.nic.in/reports/planning/cdm_co2/database_9.zip
Value(s) applied	**0.9776 tCO_2/MWh (for the NEWNE Grid)**
Choice of data or Measurement methods and procedures	The operating margin emission factor is used to calculate the baseline emissions. The operating margin emission factor has been deduced from CO_2 database of CEA. The operating margin emission factor is Generation weighted average of the simple operating Margin of 3-years data, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation
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 emission factor of the grid
Source of data	Central Electricity Authority: "CO_2 Baseline Database for Indian Power Sector", Version 9 http://www.cea.nic.in/reports/planning/cdm_co2/database_9.zip
Value(s) applied	**0.9673 tCO_2/MWh (for the NEWNE Grid)**
Choice of data or Measurement methods and procedures	The build margin emission factor is used to calculate the baseline emissions. The build margin emission factor has been deduced from CO_2 database of CEA. The build margin emissions factor has been considered for the most recent year available at the time of submission of the CDM-PDD to the DOE for validation
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Unit	**tCO_2/MWh**
Description	Combined margin emission factor of the grid
Source of data	Central Electricity Authority: "CO_2 Baseline Database for Indian Power

	Sector", Version 9 http://www.cea.nic.in/reports/planning/cdm_co2/database_9.zip
Value(s) applied	**0.9750 tCO_2/MWh (for the NEWNE Grid)**
Choice of data or Measurement methods and procedures	The combined margin emission factor is used to calculate the baseline emissions. The build margin emission factor has been deduced from CO_2 database of CEA. The build margin emissions factor has been considered for the most recent year available at the time of submission of the CDM-PDD to the DOE for validation
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

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Baseline emissions calculated as explained in section B.6.1 above are summarized as below.

$$BE_y = EG_{BL,y} \times EF_{CO2,grid,y}$$

Where,

BE_y	=	Baseline Emissions in year y; tCO_2
$EG_{BL,y}$	=	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{CO_2,grid,y}$	=	CO_2 emission factor of the grid in year y; tCO_2/MWh

Project Emissions:

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

Leakage Emissions:

Since project does not involve transfer of an energy generating equipment from another activity:

Emission Reduction:

$$ER_y = BE_y - PE_y - LE_y$$

Where,

ER_y	=	Emission reductions in year y (t CO_2/y)
BE_y	=	Baseline emissions in year y (t CO_2/y)
PE_y	=	Project Emissions in year y (t CO_2/y)
LE_y	=	Leakage emissions in year y (t CO_2/y)

PP	Capacity (MW)	Grid	PLF	Transmission & Wheeling Losses	Net Generation

					(MWh/yr.)
Surbhi Textile Mills Pvt. Ltd. - (2 x 2.00 MW)	4.00	NEWNE	21.42%	0.00%	7,506
Surbhi Textile Mills Pvt. Ltd. - (1 x 0.80 MW)	0.80	NEWNE	23.45%	10.00%	1,479
SJP Constructions Pvt. Ltd. - (2 x 2.00 MW)	4.00	NEWNE	21.42%	0.00%	7,506
Total	**8.80**				**16,490**

PP	**Baseline Emission factor**	**Baseline emissions**	**Project emissions**	**Leakage Emissions**	**Emission reductions**
	(tCO2/MWh)	**(tCO2e/ yr.)**	**(tCO2e/ yr.)**	**(tCO2e/ yr.)**	**(tCO2e/yr.)**
Surbhi Textile Mills Pvt. Ltd. - (2 x 2.00 MW)	0.9750	7,318	0	0	7,318
Surbhi Textile Mills Pvt. Ltd. - (1 x 0.80 MW)	0.9750	1,442	0	0	1,442
SJP Constructions Pvt. Ltd. - (2 x 2.00 MW)	0.9750	7,318	0	0	7,318
Total		**16,078**	**0**	**0**	**16,078**

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	16,078	0	0	16,078
Year 2	16,078	0	0	16,078
Year 3	16,078	0	0	16,078
Year 4	16,078	0	0	16,078
Year 5	16,078	0	0	16,078
Year 6	16,078	0	0	16,078
Year 7	16,078	0	0	16,078
Total	**112,546**	**0**	**0**	**112,546**
Total number of crediting years	7 Years			
Annual average over the crediting period	16,078	0	0	16,078

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	**$EG_{BL,Gujarat}$**
Unit	**MWh/yr**
Description	Quantity of net electricity supplied to the grid from the project activity in year y in the State of Gujarat
Source of data	Certificate for share of electricity issued by SLDC (State Load Dispatch Center)

Value(s) applied	1,479
Measurement methods and procedures	The net electricity exported to the grid by project activity WTGs will be ascertained by government agency GEDA (Gujarat Energy Development Agency) on the basis of ABT meter reading at substation (includes generation from project and non project WTGs) and meter readings at various transformer yard meters (near WTGs). The net electricity generated by the project activity is taken directly from the share certificate issued by state utility (currently SLDC) on monthly basis. The amount of energy supplied by the WTGs apportioned and the procedure has been described below under section B.7.3. **Type:** All meters are of type 'Electronic tri-vector' **Calibration frequency:** The energy meter installed at individual WTGs will be calibrated once in three years by respective SEB officials/authorized agency. **Validity:** Calibration certificate is valid for five years. However, upon registration of the project with UNFCCC, it has been planned to perform calibration in every three years.
Monitoring frequency	Data monitored continuously. Recording frequency is monthly.
QA/QC procedures	The energy meters used are ABT meters which are of accuracy class of at least 0.2s. The meters are monitored continuously & cumulative readings are taken at the end of the month by joint meter reading procedure. These are sealed by respective state SEB to avoid malfunctioning with meter readings. The officials frequently check the meters for tampering and malfunctioning with the meters. Meter is calibrated once in 3 years by the authority in the presence of O&M Contractor / investors representatives and respective state SEB officials. **Cross Checking:** The net electricity supplied to grid on the monthly Joint Energy Meter Reading Report shall be cross checked with the value of electricity as being offset for the captive consumption. The electricity bill of the entity shall be checked to confirm the values.
Purpose of data	The parameter is used to calculate the baseline emissions.
Additional comment	All data used for emission reduction calculation will be archived for 2 years after the end of last crediting period.

Data / Parameter	$EG_{BL,y,MH}$
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) in the state of Maharashtra
Source of data	Credit Report as per Monthly Generation Report
Value(s) applied	15,011 (Estimated Value)
Measurement methods and procedures	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic

	Calibration frequency: Annually Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by MSEDCL as per below equation: $EG_{BL,y} = EG_{Export} - EG_{Import}$ The joint reading at metering point is carried out once in a month in presence of O&M officials and MSEDCL and the PP has no role in the apportioning and net energy calculations. The detailed calculations for apportioning are provided under section B.7.3 below. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the project proponent to the State Electricity Board.
Monitoring frequency	Monthly
QA/QC procedures	The energy meters used are ABT meters which are of accuracy class of at least 0.2s. The meters are monitored continuously & cumulative readings are taken at the end of the month by joint meter reading procedure. These are sealed by respective state SEB to avoid malfunctioning with meter readings. Annual calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2.
Purpose of data	The Data/Parameter is required to calculate the baseline emission
Additional comment	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

B.7.2. Sampling plan

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Sampling is not required for the given project activity.

B.7.3. Other elements of monitoring plan

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Aim of monitoring:

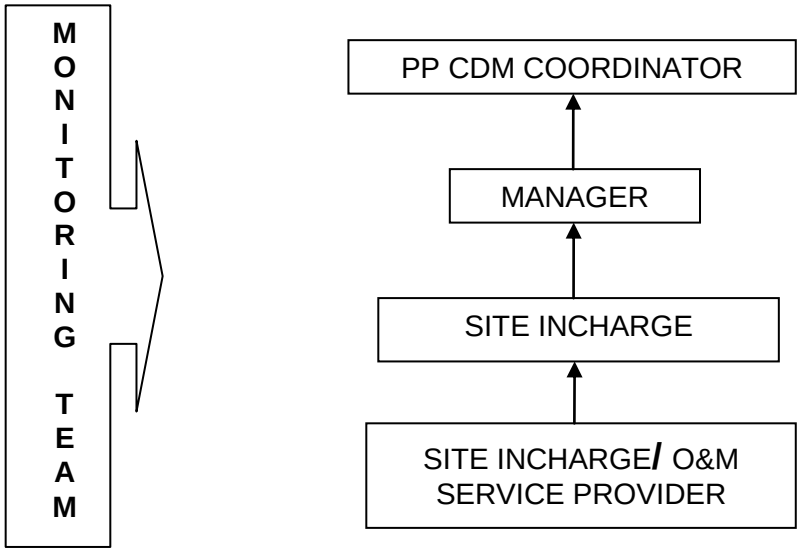
The monitoring procedure will set guidelines for the project investor to monitor the parameters regularly and to ensure quality and accuracy in monitoring. It elaborates on the functions of the monitoring team and procedures to be followed in monitoring of the CDM parameters.

The monitoring shall include all the equipments that contribute towards reduction in GHG emissions. Since the project activity focuses mainly on the generation of renewable power from the WTGs, it is important to monitor all the equipments involved in the metering of all the necessary instruments.

The project investor has a well defined management structure for monitoring the project activity.

The O & M Contractor for the project activity are manufacturers mentioned in the section A.3 above for respective machines.

Organizational Structure for monitoring



Organizational Structure for monitoring (Common for all states):

Designation	Responsibilities
PP CDM COORDINATOR	Overall project monitoring including collecting and aggregating JMRs/Invoices for all WTG investors
MANAGER	Holds complete control over monitoring aspects pertaining to the project
SITE INCHARGE	• Recording • Verification • Storage of Data
SITE INCHARGE/ O&M SERVICE PROVIDER	• Operation and Maintenance • Storage of data • Data Recording

Personnel Training (Common for All states):

The project personnel, including those involved in data recording, maintenance and direct data assessments will be provided with training on the application and usage of the manual.

Training and maintenance requirements (Common for All states):

O&M operator would provide training to the on-site staffs on operation and maintenance of the metering system and adherence to the Monitoring Plan of the project activity.

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the WTGs, it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure that technology providers' service staff is deft at handling technical snags on top of the

turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established.

Monitoring Requirements

The monitoring plan includes monitoring of energy parameters such as net energy export to the regional grid. 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.

Monitoring equipment comprises of energy meter, which will monitor the energy fed by the WTGs to the grid system by the proposed project. Project proponent will calibrate the meter at-least once in a year in Maharashtra and once in 3 year in Gujarat. For the WTGs in project activity, the monthly reading is taken of 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. The O&M contractor takes reading of the controller meters located at WTGs and provided these data to state utility. Based on the meter reading of the meter located at WTG and meter reading at substation meter, the state utility carry out the apportioning of net electricity exported and issues the generation report to each WTG owners. This generation report state net electricity exported to the grid by each owner. The apportioning is not under the control of PP and generation report forms the basis of emission reductions calculations. Apportioning is performed using following formula:

Net Electricity Exported to the Grid by the project activity is calculated as per apportioning procedure followed by state utility:

$$EG_{BL,y} = EG_{,Net\ Export\ at\ Substation} \times (EG_{panel,y} / EG_{panel,\ Project\ \&\ Non\ project\ WTGs})$$

Where,

$$EG_{,Net\ Export\ at\ Sub\text{-}station} = EG_{Export\ at\ Sub\text{-}station} - EG_{Import\ at\ Sub\text{-}station}$$ and,

$EG_{BL,y}$	Net electricity supplied to the grid by WTG y (MWh)
$EG_{,Net\ Export\ at\ Substation}$	Net electricity exported by all WTGs connected to the substation (project activity WTGs and non-project activity WTGs) meter (MWh)
$EG_{Export\ at\ Sub\text{-}station}$	Electricity export to the grid by the Project Activity and the other PPs connected to the same sub-station meter.
$EG_{Import\ at\ Sub\text{-}station}$	Electricity Imported from the grid by the Project Activity and the other PPs connected to the same sub-station meter.
$EG_{panel,y}$	Electricity exported by the project activity WTGs as measured at panel meters installed at every WTG (MWh)
$EG_{panel,\ Project\ \&\ Non\ project\ WTGs}$	Sum of Electricity exported by the project and non-project WTGs connected to the sub-station meter as measured at panel meters installed at every WTG (MWh)

Monitoring equipment comprises of energy meters, which will monitor the energy fed by the plant to the grid system by the proposed project. Project proponent has to install two energy meters one

is main meter and the other is check meter. Project proponent will calibrate both the meters at least once in a year at Maharashtra and once in 3 year for Gujarat WTG.

The baseline emission factor is fixed ex-ante for all the years of the crediting period using the official data published by the Central Electricity Authority for the NEWNE grid and hence is not included in the monitoring procedures.

Procedure for apportioning of electricity supplied to the grid where dates of monitoring period are not matching with dates of joint meter reading reports (Common for All states):

There are instances when the claim of emission reductions will be in middle of any month and apportioning will have to be done to arrive at electricity supplied reading for that certain period. In case any monitoring period starts from the middle of the month a simple daily average shall be calculated for that particular month and accordingly the values for the number of days shall be arrived. This approach is appropriate as the monthly value shall remain the same while as this situation will happen only when the monitoring period falls in between the JMR reporting days. Thus credits considered for first half shall be calculated based on the daily average values while the remaining credits shall be accounted in the subsequent monitoring period. This approach ensures that monthly values remains the same which can be cross-checked with the JMR.

QA/QC Procedures:

The main and backup meter installed at connected substations for monitoring of the project activity are electronic tri-vector energy meters of 0.5 accuracy class. Each meter is jointly inspected and sealed on behalf of project proponent and RRVPNL, in the presence of its authorised representatives. All main and backup meter are calibrated annually by RRVPNL or its representatives.

Data Recording and Storage
For measuring the net energy exported by the project at the interconnection point, one set of Main meter and Check Meter shall be provided by the project proponent. Representatives of both project proponent and State Utility will be present to record the monthly meter readings. The state utility will prepare the credit report for the net energy exported to the grid and same will be used as a basic document for monitoring and verification of the net energy exported to the grid. Utility will pay to the project proponent based on this document.

The above document will be kept at safe storage for verification of emission reductions generated from the project activity. The period of data storage will be 2 years beyond crediting period.

Emergency preparedness
The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. However, in case monitoring equipments get failed or found faulty, they shall be replaced with calibrated meters as quickly as possible. In case main meter get failed or found faulty, the reading of check meter will be considered.

Personnel training
In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff will be trained. The Shift In-charge and Plant In-charge will be trained in equipment operation, data recording, operation and maintenance and emergency procedures in compliance with the monitoring plant.

B.7.4. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>
Date of completion: 17/11/2014
Contact Information: Pls. Refer annex 1 for the same.

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 purchase order date for PP, i.e. 30/08/2013

C.1.2. Expected operational lifetime of project activity

>>
20 years 00 months

C.2. Crediting period of project activity

C.2.1. Type of crediting period

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

C.2.2. Start date of crediting period

>>
01/03/2015 or Date of submission of complete request for registration by the DOE whichever is earlier.

C.2.3. Length of crediting period

>>
07 Years 00 Months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The project activity does not fall under the purview of Environmental Impact Assessment. As per the Schedule 1 of the EIA notification dated 14 September 2006[16], given by the Ministry of Environment and Forests (Government of India) under the Environment (Protection) Act 1986, EIA is not a regulatory requirement in India for wind energy projects.

Thus the project activity doesn't fall under the list of activities requiring EIA. The project activity will not involve any negative environmental impacts, as the WTGs are installed for generation of power using wind which is a clean source of energy. Although an EIA is not required, the possible environmental impacts listed below are analysed:

Impact on Land use

[16] http://envfor.nic.in/legis/eia/eia-2006.htm

The land that has been acquired for the project activity is barren and unfertile. The land was unutilized before the project activity. PP has bought the land for the project activity and has obtained necessary approvals for installation of windmills.

Impact on Soil Use

The quantity of solid / liquid discharge likely to be generated during the construction phase is negligible and has no noticeable impact on soil use.

Impact on Air Environment

WTG is a green technology to generate electricity and there is no emission of GHG during any phase of their operation or construction. The only source of possible GHG emission can be the transport vehicles but they are negligible and can be ignored.

Trans-boundary environmental or social impacts

No trans-boundary effects have been noticed due to the implementation of the project activity

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

PP decided the date and venue 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

All the stakeholders have been invited through submission of the invitation letter (delivered in hand) to attend the stakeholders meeting.

In the introductory speech, the representatives of EKI Energy Services Ltd. welcomed the gathering and informed the stakeholders about the project activity; project's associated benefits with respect to CO_2 emission reductions and explained the purpose of conducting the stakeholder meeting in order to gather the views and comments of the local stakeholders on the project activity. Subsequent to the introductory speech, comments were received from the stakeholders.

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

Name of the PP	Meeting Date	Location of the Local Stakeholder Meeting		
		Village	District	State
Surbhi Textile Mills Pvt. Ltd.	18/02/2014	Khadvavdi	Rajkot	Gujarat
	21/02/2014	Rawalgundwadi	Sangli	Maharashtra
SJP Constructions Pvt. Ltd.	21/02/2014	Rawalgundwadi	Sangli	Maharashtra

E.2. Summary of comments received

>>

Stakeholders had no objections from installations of WTGs; instead they have openly said that wind power projects helped them by:

- Additional revenue generated thro' land / lease to outsiders like contractors & their employees
- Job opportunities for day -to - day maintenance and security of WTGs
- Developments of roads
- No adverse impact on rains, agriculture
- Civil works related to Project Activity
- Hiring of transport services

E.3. Report on consideration of comments received

>>

The stakeholders have given positive feedback and thus no measures were required to be taken.

SECTION F. Approval and authorization

>>

The letter of approval from the party involved in the project activity has been submitted to the validating DOE.

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

Project participant and/or responsible person/ entity	☒ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	ReXchange Global Solutions (P73)
Street/P.O. Box	857, Rajagali, Mhow
Building	-
City	Mhow
State/Region	Madhya Pradesh
Postcode	453441
Country	India
Telephone	
Fax	
E-mail	manish@rexchange.de
Website	
Contact person	Mr. Manish Dabkara
Title	Director
Salutation	Mr.
Last name	Dabkara
Middle name	-
First name	Manish
Department	CDM Services Dept.
Mobile	+91-9907534900
Direct fax	NA
Direct tel.	NA
Personal e-mail	manish@rexchange.de

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

CENTRAL ELECTRICITY AUTHORITY: CO_2 BASELINE DATABASE	
VERSION	9.0
DATE	Jan-14
BASELINE METHODOLOGY	ACM0002 / Ver 14.0 and "Tool to Calculate the Emission Factor for an Electricity System", Version 4.0

Net Generation in Operating Margin (MWh) (incl. Imports)			
	2010-11	2011-12	2012-13
NEWNE	476,986,721.35	502,300,380.91	539,385,372.35

Simple Operating Margin (tCO2/MWh) (incl. Imports) (1) (2)			
	2010-11	2011-12	2012-13
NEWNE	0.9710	0.9691	0.9914

Weighted Generation Operating Margin	
NEWNE	**0.9776**

Build Margin (tCO2/MWh) (not adjusted for imports)			
	2010-11	2011-12	2012-13
NEWNE	0.8713	0.9345	**0.9673**

Combined Margin Emission Factor	
NEWNE	**0.9750**

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

Calculation of emission factor is described below;

CENTRAL ELECTRICITY AUTHORITY: CO_2 BASELINE DATABASE	
VERSION	9.0
DATE	Jan-14
BASELINE METHODOLOGY	ACM0002 / Ver 14.0 and "Tool to Calculate the Emission Factor for an Electricity System", Version 4.0

Net Generation in Operating Margin (MWh) (incl. Imports)			
	2010-11	2011-12	2012-13
NEWNE	476,986,721.35	502,300,380.91	539,385,372.35

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NEWNE	0.9710	0.9691	0.9914

Weighted Generation Operating Margin	
NEWNE	**0.9776**

Build Margin (tCO2/MWh) (not adjusted for imports)			
	2010-11	2011-12	2012-13
NEWNE	0.8713	0.9345	**0.9673**

Combined Margin Emission Factor	
NEWNE	**0.9750**

Further, please refer section B.6 and B.7 for information on ex ante calculation of emission reductions.

Appendix 5. Further background information on monitoring plan

Kindly refer section B.7.1 and B.7.2

Appendix 6. Summary of post registration changes

Not Applicable

- - - - -

Document information

Version	*Date*	*Description*
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for small-scale CDM project activities (these instructions supersede the "Guidelines for completing the project design document form for small-scale CDM project activities" (Version 01.1)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and **Error! Reference source not found.**; • Change the reference number from *F-CDM-SSC-PDD* to *CDM-PDD-SSC-FORM*; • Editorial improvement.
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	13 March 2012	EB 66, Annex 9 Revision required to ensure consistency with the “Guidelines for completing the project design document form for small-scale CDM project activities”
03.0	15 December 2006	EB 28, Annex 34 • The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02.0	08 July 2005	EB 20, Annex 14 • The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01.0	21 January 2003	EB 07, Annex 05 Initial adoption.

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