Project design document form for CDM project activities

(Version 05.0)

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

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Wind Power Project in Tamil Nadu, India
Version number of the PDD	06.0
Completion date of the PDD	12/03/2015
Project participant(s)	Ratedi Wind Power Private Limited
Host Party	India
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	**Sectoral scope: 01-** Energy industries (renewable / non-renewable sources) **Selected Methodology:** ACM0002 "Grid-connected electricity generation from renewable sources" Version-15.0.0
Estimated amount of annual average GHG emission reductions	42,006 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project activity involves generation of electricity from wind, a renewable source of energy at Tirunelveli district in Tamil Nadu and Jamnagar district in Gujarat. The proposed project activity, an initiative by Ratedi Wind Power Private Limited (RWPPL) (formerly known as IL&FS Wind Power Limited (IWPL)) is aimed at exporting 24 MW of electricity generated using Wind Electric Generators (WEGs) to the regional grids; 12MW to southern regional grid and 12 MW to NEWNE regional grid. The project activity will help in reducing power shortage and abating Green House Gas (GHG) emissions thereby contributing towards sustainable development of the country.

Scenario Existing Prior to Start of the Implementation of the Project Activity

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected fossil fuel dominated power plants (which is also the baseline scenario).

Project Scenario and the Technology employed

The project activity involves installation of 30 WEGs of 0.8 MW capacity each of Wind World (India) Limited (formerly known as Enercon (India) Limited) make, resulting in the total installation capacity of 24 MW. The WEGs generate 3-phase power at 400V, which is stepped up to 33 KV.

These WEGs are based on gearless technology, which helps in eliminating mechanical losses. It also combines the variable speed with variable pitch and hence increases the conversion efficiency. This technology is well established and running successfully at various sites in India.

Contribution to reduction in GHG emissions by the proposed project activity

The electricity generated, as a result of implementation of the project activity, will be supplied to the Southern and NEWNE regional grids which are, at present, dominated by fossil fuel based power plants, thereby reducing an equivalent amount of GHG emissions associated with thermal generating sources of these regional grids.

The project would result into 42,006 tCO_2e of annual average emission reduction and 420,060 tCO_2e of total emissions reductions over 10 years fixed crediting period.

Contribution of project activity to sustainable development

The proposed CDM project activity has following sustainable development aspects:

Social wellbeing:

- The project activity provides direct and indirect job opportunities to the local population during construction of the project as well as during operation stage. Employment
- generation would help poverty alleviation in the local community and bring about reduction in the disparity of income.
- The infrastructure development for the purpose of the project activity would benefit the local community. For instance, roads constructed for connecting the project sites would be used by the villagers.

Environmental well being:

- The wind energy based electricity generation is a renewable energy and replaces fossil fuel based electricity generation, thereby helping in conservation of fossil fuel resources and mitigation of GHG emissions.

Economic well being:

- The generation of electricity by the project activity will improve availability of electricity to the state grid and also provide more opportunities for setting up of industries in the region.
- Communication facilities would improve substantially in the surrounding villages, which are located in remote areas.

Technological well being:

- Wind electric generators deployed in the project activity are from well-known manufacturer; the technology is proven and ensures efficient and safe operation of the project activity.

In addition, the project proponent will invest 2% of the CER revenues every year in sustainable development activities in local communities of Tamil Nadu & Gujarat. Details of the same are provided in Appendix 7.

A.2. Location of project activity

A.2.1. Host Party

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India

A.2.2. Region/State/Province etc.

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State 1: Tamil Nadu
State 2: Gujarat

A.2.3. City/Town/Community etc.

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Tamil Nadu-
Village- Muthammalpuram, Ukkirankottai, Vagaikulam, Pillayayrkulam, Kattarankulam, Alagiapandiapuram
Taluka(s): Tirunelveli and VK Pudur
District: Tirunelveli

Gujarat-
Village- Rabarika, Lakhasar Hapa, Mahadeviya, Aher Sinhan, Govana
Taluka(s): Kambhaliya, Lalpur and Jamjodhpur
District: Jamnagar

A.2.4. Physical/Geographical location

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Tamil Nadu- The wind farm is situated in talukas Tirunelveli and V K Pudur in Tirunelveli district. The site comes under wind class II as per C-WET classification. The project consists of installation of 15 WEGs of 800 kW capacity each.

Gujarat- The wind farm is located in Kambhaliya, Lalpur and Jamjodhpur Talukas, in Jamnagar district of Gujarat. The project consists of installation of 15 WEGs of 800 kW capacity each.

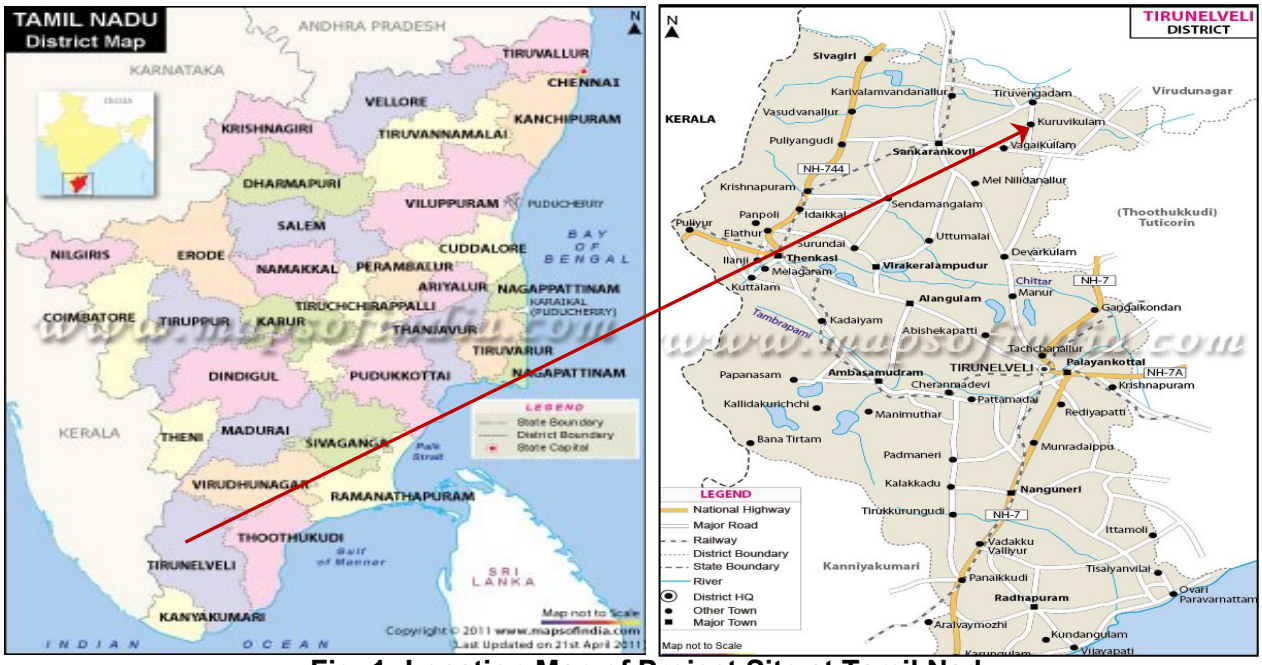

Fig. 1- Location Map of Project Site at Tamil Nadu

Map of Project Site at Gujarat

ect sites are given in Appendix 8.

of wind is converted into mechanical energy and owing at high speeds has a considerable amount of asses through the blades of the wind turbines, it is s the wind blades. When the wind blades rotate, the producing electricity. The plant load factor (PLF)[1] is rat wind farms respectively.

The proposed project activity involves installation of total 30 WEGs of 800 kW capacity each, i.e. total installed capacity of 24 MW. The WEGs have both Enercon's (now Wind World (India) Limited) model, E-53 and WW-53 with newly designed blades, type tested and approved by the Ministry of New and Renewable Energy (MNRE). The specifications of the WEGs installed at the site are specified below:

Table A1: Technical specifications of WEGs[2]

Parameter	Specification
Turbine Model	E-53

[1] The PLF values used for calculating emission reductions are 20.45% and 21.97% respectively for Tamil Nadu and Gujarat which are based on Wind Assessment report whereas the values used in financial analysis are based on investment decision as on Sep, 2011 for revised project activity and Oct, 2010 for old project in Tamil Nadu.

[2] http://www.windworldindia.com/our-product.jsp and revised technical specifications submitted by Wind World dated 12/10/2013

Rated Power	800 kW
Rotor Diameter	53 m
Hub Height	75 m (with concrete tower)
Turbine type	Direct driven, horizontal axis wind turbine with variable rotor speed
Power Regulation	Independent pitch system for each blade
Cut-in wind speed	3 m/s
Rated wind speed	12.6 m/s
Cut-out wind speed	28 m/s
Extreme wind speed	57 m/s
Rated rotational speed	29 rpm
Operating range rotational speed	11-29.5 rpm
Orientation	Upwind
Number of blades	3
Blade Material	Fibre glass epoxy reinforced
Gear box type	Gear less
Generator type	Synchronous type
Braking	Aerodynamic
Output voltage	400 V
Yaw system	Active yawning with 4 electric yaw drives with brake motor
Turbine life	20 years

Parameter	**Specification**
Turbine Model	WW-53
Make	Wind World
Rated Power	800 kW
Rotor Diameter	52.9 m
Hub Height	75 m (with concrete tower)
Turbine type	Direct driven, horizontal axis wind turbine with variable rotor speed
Power Regulation	Independent pitch system for each blade
Cut-in wind speed	3.0 m/s
Rated wind speed	12 m/s
Cut-out wind speed	25 m/s
50 year extreme wind speed	52.5 m/s
Rated rotational speed	29 rpm
Operating range rotational speed	11-29.5 rpm
Orientation	Upwind
Number of blades	3
Blade Material	Fibre glass epoxy reinforced
Gear box type	Gear less
Generator type	Synchronous generator
Braking	Aerodynamic
Output voltage	400 V
Yaw system	Active yawning with 4 electric yaw drives with brake motor
Tower	74m (Concrete)
Turbine life	20 years

The baseline scenario is same as the scenario existing prior to the project activity. Emission reductions will be claimed based on the net electrical energy that is supplied to the regional grid. The metering of the electricity generated would be done at Substation location using the appropriate metering devices. The detailed monitoring plan is in section B.7.3.

The project activity does not involve any technology transfer.

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)	**Private entity**: Ratedi Wind Power Private Limited	No

A.5. Public funding of project activity

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No public funding and no ODA from Parties included in Annex I is involved in this project activity.

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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Methodology: ACM0002, version 15.0.0
Name of the methodology: Grid-connected electricity generation from renewable sources
Tool and Methodologies:
- Tool for demonstration and assessment of additionality, version 07.0.0 [EB70 Annex08]

Reference: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
- Tool to calculate emission factor for an electricity system, version 04.0.0 [EB75 Annex15]

Reference: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

B.2. Applicability of methodology and standardized baseline

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The project meets all the applicability criteria as set out in the approved methodology ACM0002 Version 15.0.0 as described below:

Table B1: Justification of the methodology applied

Applicability conditions under ACM0002, Ver. 15.0.0	Project activity is eligible since:
This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) install a greenfield power plant; (b) involve a capacity addition to (an) existing plant(s); (c) involve a retrofit of (an) existing operating plant(s); or (d) involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) involve a replacement of (an) existing plant(s)/unit(s).	The project activity involves option (a) installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant). Hence, this criterion is justified.
The project activity may include renewable energy power plant/ unit of one of the following types: hydro power plant/ unit with or without reservoir, wind power plant/ unit, geothermal power plant/ unit, solar power plant/ unit, wave power plant/ unit or tidal power plant/unit	The project activity is installation of a new wind power plant/ unit; satisfying the applicability condition.
In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind,	This condition is not applicable as the project activity is installation of a new

solar, wave or tidal power capacity addition projects), the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	wind power plant and does not involve capacity additions, retrofits or replacements.
In case of hydro power plants, one of the following conditions shall apply : ↳ The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or ↳ The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density calculated using equation 3, is greater than 4 W/m^2; or ↳ The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m^2. ↳ The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m2 , all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2 ; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	The proposed project activity involves installation of wind power plants; hence this condition is not applicable.
In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or ↳ (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be	The proposed project is installation of a new wind power plant; hence this condition is not applicable.

carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	
The methodology is not applicable to: ➢ Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; ➢ Biomass fired power plants/units; ➢	➢ The proposed project activity is installation of a new grid connected wind power project at site and does not involve fuel switching. Therefore, this criterion is not applicable. ➢ The proposed project activity is installation of new grid connected wind power project at site and not a biomass fired power plants. Therefore, this criterion is also not applicable. ➢
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance". In addition, the applicability conditions included in the tools referred to below apply.	The project activity is a new grid connected wind power plant and not a retrofit, rehabilitation, replacement or capacity addition. Therefore, this criterion is not applicable to the project activity.
Applicability conditions under "Tool to calculate the emission factor for an electricity system", Ver. 04.0.0	**Project activity is eligible since:**
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The project activity involves installation of a Greenfield wind farm and the power generated by the project activity will substitute the grid electricity, i.e. the power generated by the project activity will be supplied to the regional grid. Therefore, this tool is applied to estimate the Operating Margin (OM), Build Margin (BM) and/or Combined Margin (CM) when calculating baseline emissions for a project activity, thus satisfying the applicability criterion.
The emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in "Appendix 2: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10% of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10% of the total electricity generation by grid power plants in the	In the host country as off-grid power generation is not significant. Therefore, emission factor for the project electricity system is calculated only for the grid power plants. Thus, this applicability criterion is satisfied.

electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The proposed CDM project is located in India which is not an Annex I country. Hence, this criterion is not applicable.
Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The proposed CDM project does not involve usage or displacement of any biofuel.
Tool for the demonstration and assessment of additionality", Version 07.0.0	**Project activity is eligible since:**
The use of the "Tool for the demonstration and assessment of additionality" is not mandatory for project participants when proposing new methodologies. Project participants may propose alternative methods to demonstrate additionality for consideration by the Executive Board. They may also submit revisions to approved methodologies using the additionality tool.	The project applies an already Approved Large scale Methodology ACM0002, version 15.0.0. Hence, this applicability criterion is not applicable.
Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory.	The methodology used for the project, ACM0002 Version 15.0.0 mandates the application of this tool for the demonstration and assessment of additionality of the project. Hence, this criterion is satisfied.

B.3. Project boundary

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The project boundary for the project activity is selected as per the approved methodology ACM0002 (Version 15.0.0). As per the methodology, 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.

Tool to calculate emission factor for an electricity system (Version 04.0.0) defines grid/ project electricity system by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

The project activity evacuates power to the Southern regional as well as NEWNE grids. A diagrammatic presentation of the project boundary is given below:

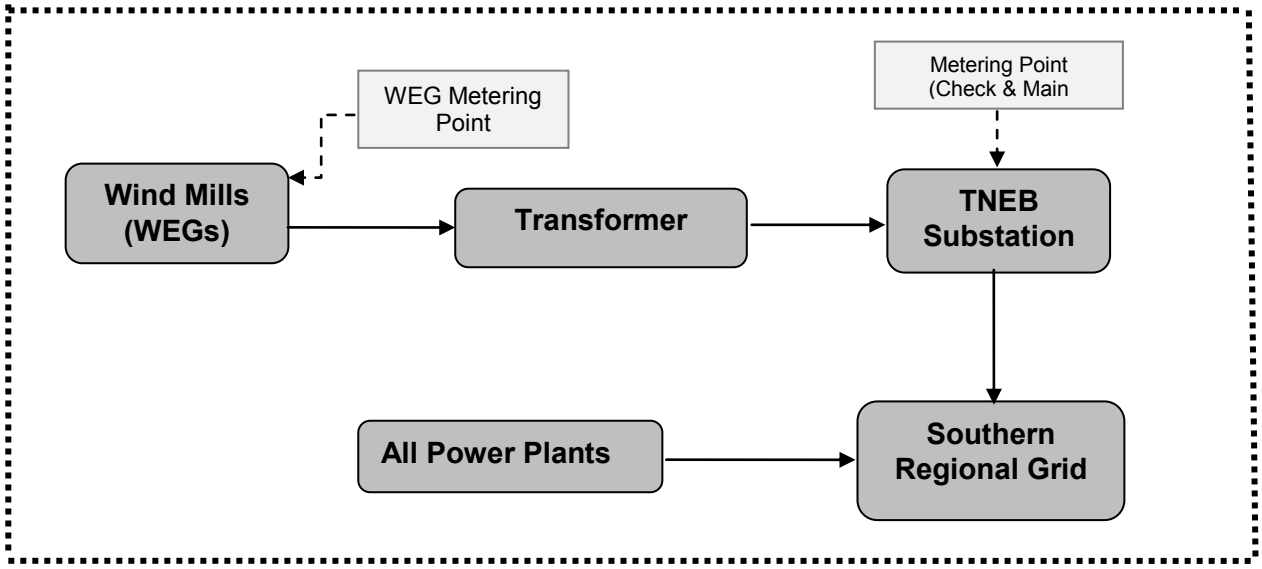

Fig.3.1- Project Boundary (Tamil Nadu)

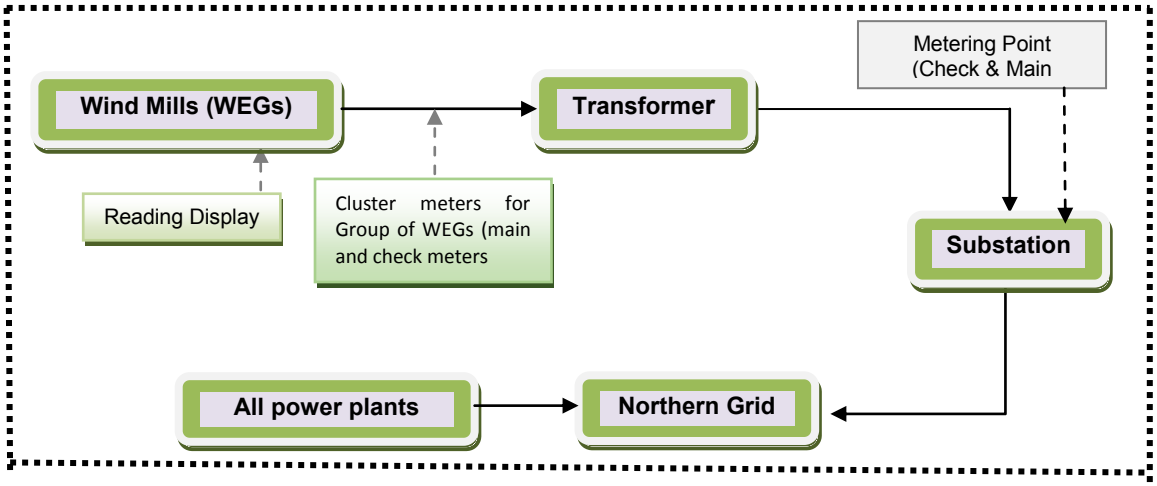

Fig.3.2- Project Boundary (Gujarat)

The GHGs and emission sources included in or excluded from the project boundary are listed in the table below:

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	The project activity is aimed at displacing the grid power, and thus reducing CO_2 emissions resulting from the power generation.
		CH_4	No	No CH_4 generation is expected
		N_2O	No	No N_2O generation is expected
Project scenario	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	No	Not applicable for wind projects
		CH_4	No	Not applicable for wind projects
		N_2O	No	Not applicable for wind projects
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Not applicable for wind projects
		CH_4	No	Not applicable for wind projects
		N_2O	No	Not applicable for wind projects
	For the hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	Not applicable for wind projects
		CH_4	No	Not applicable for wind projects
		N_2O	No	Not applicable for wind projects

B.4. Establishment and description of baseline scenario

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According to the approved methodology ACM0002, Version 15.0.0, if the project activity is the installation of a new grid-connected renewable power plant/ unit, the baseline scenario is the following:

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

As the project activity is a greenfield project involving installation of WEGs the above mentioned baseline scenario is applicable for the project activity.

National and/or sectoral policies and circumstances

The PP has identified that Renewable Energy Certificate (REC) benefits were introduced on 14/01/2010 to provide comparative advantage to renewable energy projects, including wind power project, in terms of additional revenues from selling of REC. Notification of REC was introduced on 14 January 2010 which included the Terms and Conditions for recognition and issuance of Renewable Energy Certificate. This policy was announced after the adoption of M&P for CDM, i.e. 11 November 2001. Therefore, REC policy can be considered as E- policy and need not be considered for determining baseline scenario in line with para 51 (b) of CDM Project Standard version 07. Further, para 70 of the EB meeting 73 confirms that E- policies will not be used for demonstration and assessment of additionality during the first seven years from effective implementation date of E- policy.

B.5. Demonstration of additionality

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As per ACM0002, Version 15.0.0 the proposed project activity uses "Tool for the demonstration and assessment of additionality" version 07.0.0 to determine the additionality.

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

For identifying the alternatives to the project activity consistent with current laws and regulations, following sub-steps are applied:

Sub-step 1a: Define alternatives to the project activity:

Identify credible and realistic alternative(s) available to the project participant or similar project developers that provide outputs or services comparable with proposed CDM activity. These alternatives are to include:

a) The proposed project activity undertaken without being registered as a CDM project activity;
b) Other realistic and credible alternative scenario(s) to the proposed CDM project activity scenario that deliver outputs services (e.g., cement) or services (e.g. electricity, heat) with comparable quality, properties and application areas and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology;
c) If applicable, continuation of the current situation (no project activity or other alternatives undertaken).

If the proposed CDM project activity includes several different facilities, technologies, outputs or services, alternative scenarios for each of them should be identified separately. Realistic

combinations of these should be considered as possible alternative scenarios to the proposed project activity.

For the purpose of identifying relevant alternative scenarios, the project participant should include the technologies or practices that provide outputs (e.g. cement) or services (e.g. electricity, heat) with comparable quality, properties and application areas as the proposed CDM project activity and that have been implemented previously or are currently being introduced in the relevant country/region.

Of all the alternatives provided, Alternative (a) and (c) are the most credible and realistic alternatives available to the project activity.

Sub-step 1b: Consistency with Mandatory Laws and Regulations:

The above identified realistic and credible alternative scenario(s) to the project activity are in compliance with all mandatory legislation and regulations, taking into account the enforcement in the country and EB decisions on national and/or sectoral policies and regulations.

The project activity conforms to all the applicable laws and regulations in India:

- Power generation using wind energy is not a legal requirement or a mandatory option. There are state and sectoral policies, framed primarily to encourage wind power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.
- There is no legal requirement on the choice of a particular technology for power generation.
- As per Income Tax Act (Section 80-IA), power projects are eligible for tax holiday for 10 years.
- Generation Based Incentives (GBI), announced by the Ministry of New and Renewable Energy (MNRE), for Grid Interactive Wind Power Projects commissioned after 17/12/2009, of Rs. 0.50 per unit of electricity fed into the grid with a cap of Rs. 62 Lakh/MW.

Thus, there are no legal and regulatory requirements that prevent Alternatives (a) and (c) from occurring.

Step 2: Investment analysis

Sub-step2a: Determine appropriate analysis method

According to the "Tool for the demonstration and assessment of additionality" (version 07.0.0) there are three options for the execution of the investment analysis.

Option I: Simple cost analysis (the CDM project activity generates no financial or economic benefits other than CDM related income)
Option II: Investment comparison analysis [the relevant financial indicator (IRR, NPV) is determined and compared], or
Option III: Benchmark analysis (the relevant financial indicator, such as IRR, is compared to a benchmark)

The project will generate revenues from energy sale and also from credits of emissions reduction, therefore Option I is not applicable.

The "Guidelines on the Assessment of Investment Analysis" version 05, Annex 5, EB 62, Guidance 19 stipulates that if the proposed baseline scenario leaves the project participant no other choice

than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate.

The alternative to the project activity is supply of electricity from the grid, therefore, Option III (benchmark analysis) has been considered for the investment analysis.

Sub-step2b: Option III. Apply benchmark analysis

The additionality tool allows the project developer to choose the financial indicator, IRR to demonstrate the additionality of the project. The additionality tool provides an option to choose between project IRR and the equity IRR. Equity IRR is widely accepted and used by investors as financial indicator in financial decision making. Project participants has chosen Equity IRR as a financial indicator to demonstrate the additionality.

As per the Guidelines on the Assessment of Investment Analysis version 05, If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix A; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors.

In accordance with the values provided in the Appendix A of "Guidelines on the assessment of Investment Analysis" version 05, the benchmark has been calculated.

The default values of the expected return on equity for different type of project activities in different countries have been provided in the appendix to "Guidelines on the assessment of Investment Analysis" version 5. The project activity falls in the Group 1 type of project activity (Renewable Energy) and therefore relevant value from the appendix is used.

The default value for the expected returns on equity (in real terms) = 11.75%

As per paragraph 7 of the appendix to the "Guidelines on the assessment of Investment Analysis" version 05, EB 62, Annex 5
"*In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used."*

The inflation rate available at the time of investment decision i.e. 16 October 2010 has been taken from forecast for the ten years published in Reserve Bank of India "Results of 12th Round (Q1:2010-11) of Survey of Professional Forecasters on Macroeconomic Indicators" dated 5th August 2010[3] is 5%. The benchmark calculation would be:

Average forecasted inflation rate for 2010-2019 = 5.0%

Benchmark[4] = (1+ Expected return on equity (in real terms))*(1+inflation rate) - 1
= (1+11.75 %)*(1+5.0%) - 1
= 17.34%

[3] http://www.rbi.org.in/scripts/PublicationsView.aspx?id=12477

[4] Financial Management 9th Edition by I.M. Pandey (page 211)

Whereas, the inflation rate available during revised investment date i.e. 23rd September 2011 forecast for the ten years published in Reserve Bank of India "Results of 15th Round (Q4:2010-11) of Survey of Professional Forecasters on Macroeconomic Indicators" dated 25th May 2011[5] is 5.4%. The benchmark calculation would be:

Average forecasted inflation rate for 2011-2020 = 5.4%

Benchmark[6] = (1+ Expected return on equity (in real terms))*(1+inflation rate) - 1
= (1+11.75 %)*(1+5.4%) - 1
= 17.78%

In accordance with the "Guidelines on the assessment of Investment Analysis" version 05, EB 62, Annex 5 the benchmark (Expected return on equity) of 17.34% has been considered to be conservative.

Sub-step2c: Calculation and comparison of financial indicators

The equity IRR has been computed based on the following assumptions:

Table B3: Assumptions for Investment Analysis

Parameters	Value Applied	
Plant Capacity (30 nos. of WEGs of 0.8 MW capacity each)	12MW+12MW=24 MW	Previous Project Activity *(24 MW Tamil Nadu)*
Cost of Project (Rs. in millions)	1408.70	1365.50
Plant Load Factor[7] (%)	Tamil Nadu=26.45 Gujarat = 23	26.45
Tariff (in Rs./kWh)	Gujarat = 3.56 Tamil Nadu = 3.39	3.39
Financing Pattern – Equity (%)	25	25
Financing Pattern – Debt (%)	75	75
Interest on Term Loan (%)	11	11
Working Capital Interest Rate (%)	11	11
Book Depreciation – annual rate (%)	4.5	4.5
Depreciation as per Income Tax Act (WDV basis) (%)	15	15
Corporate tax rate (%)	33.22	33.22

[5] http://www.rbi.org.in/scripts/PublicationsView.aspx?id=13360

[6] Financial Management 9th Edition by I.M. Pandey (page 211)

[7] The values given here are based on the values used in making investment decision as on Sep, 2011 for revised project activity and Oct, 2010 for old project in Tamil Nadu. However, the PLF values used for calculating emission reductions are 20.45% and 21.97% respectively for Tamil Nadu and Gujarat which are based on Wind Assessment report

MAT rate (%)	19.93	19.93
Tax holiday under section 80-IA	10 years	10 years
Operation & Maintenance costs per WEG (Rs. in millions)	0.60	0.60
Yearly escalation in O&M costs	6%	6%

The equity IRR for the revised project activity works out to be 5.00%. As evident, the equity IRR is lower than the corresponding benchmark rate of 17.34%. Further, in the previous case (24MW Tamil Nadu Project) the equity IRR was 8.16% which is also lower than the benchmark.
Therefore, it can be concluded that the project activity is additional and requires CDM revenues to alleviate the investment barrier to the project activity.

Sub-step 2d: Sensitivity analysis

"Guidelines on the Assessment of Investment Analysis" require the project developer to subject critical assumptions to reasonable variation to ascertain the robustness of the conclusion drawn, that is, the project is unlikely to be the most financially attractive. As required, a sensitivity analysis has been conducted to measure the impact of changes in the chosen parameters.

The project proponent has chosen four factors as critical to the operations of the project namely: Plant Load Factor (PLF), total Project Cost, O&M costs and tariff rate. These factors were subjected to 10% variation on either side to ascertain the impact on the profitability and hence the IRR of the project. The results of the sensitivity analysis are as given below:

Table B4: Sensitivity Analysis for the project activity

Factor	Resultant equity IRR		
	Decrease by 10%	Base case	Increase by 10%
Generation	1.15%	5.00%	9.23%
Project Cost	9.26%	5.00%	1.91%
O&M Cost	5.00%	5.00%	4.33%
Tariff	1.13%	5.00%	9.18%

It is evident from the above table that the equity IRR does not cross the benchmark rate of **17.34 %** even after an increase of 10% in the selected parameters. Hence the project is unlikely to be financially/economically attractive without CDM benefits.

Table B5: Justification of unlikeliness of breaching benchmark

Parameters	Benchmark (17.34%) break-even point		Justification of unlikelihood
	Increase in %	Decrease in %	
Generation	26.90%	-	The electricity generation is based on PLF available at the time of investment decision whereas the wind assessment reports available now has lower value. Therefore to be conservative a higher PLF of 26.45% and 23% respectively has been taken for Tamil Nadu and Gujarat only for financial analysis whereas for CER calculation lower PLF of 20.45% and 21.97% has been considered respectively for Tamil Nadu and Gujarat. Therefore an increase by 26.90% is unlikely for breaching the benchmark IRR.
Project Cost	-	22.33%	The project cost cannot change as all the purchase orders have been placed and the

			project related expenses have already been incurred. The project cost actually incurred is same as values taken for loan application
O&M Cost	-	219.65%	The offer letter by Enercon (now Wind World) to IWPL (now RWPPL) states the O&M cost and escalation is same for all the projects for 10 years, Therefore it is highly unlikely that the O&M cost will change.
Tariff	27.63%	-	The tariff rates assumed for Gujarat and Tamil Nadu at the time of investment decision were Rs. 3.56/kWh and Rs. 3.39/kWh respectively, based on the available tariff order. An increase of 27.63% is not possible as the PPAs have already been signed on average pooled price of Rs. 2.37/kWh for Tamil Nadu and Rs. 2.64/kWh respectively for Gujarat. The project also enjoys REC benefit however it has been excluded from investment analysis based on E- policy as described in section B.4.

Step 4: Common Practice Analysis

As per the tool for "Demonstration and assessment of additionality" Version 07.0.0, the latest **"Guidelines on Common Practice, Version 02.0"** has been followed for the project activity.

Sub-step 4a: The proposed CDM project activity(ies) applies measure(s) that are listed in the definitions section above Analyze other activities similar to the proposed project activity

As per the Guidelines on Common Practice (Version 02.0), the following stepwise approach has been followed:

Step 1: c*alculate applicable capacity or the output range as +/- 50% of the total design capacity or output of the proposed activity.*

The capacity of the project activity is 24 MW. The project capacity has been subject to the variation in the range of +/- 50%, the following table depicts the outcome of the variation applied;

-50%	Capacity (in MW)	+50%
12 MW	24	36 MW

For the analysis, the projects falling in the range of 12 MW to 36 MW capacities have been taken.

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

(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.
(While identifying similar projects, project participants may also use publicly available information, for example from government departments, industry associations, international associations on the market penetration of different technologies, etc.)

India has been considered applicable geographical area as a default, for the common practice analysis of project activity. All power plants generating electricity within the capacity range of 12 MW to 36 MW and having commercial operations date before project activity start date (22/11/2010) have been considered. The power generation plants identified in this step are hydro [8], thermal[9] and wind power projects[10]. The total number of power plants is 287.

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

CDM project activities which have got registered or are under validation have been excluded in this step. The list of the plants identified is provided to the DOE. After excluding the registered and under validation projects the total number of projects, N_{all} = 226

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

As per the guidelines on Common Practice, different technologies are technologies that deliver the same output and differ by at least one of the following:

(i) Energy Source/Fuel
(ii) Feed stock
(iii) Size of installation (power capacity)
- Micro
- Small
- Large

(iv) Investment climate in the date of the investment decision, inter alia:
- Access to technology;
- Subsidies or other financial flows;
- Promotional policies
- Legal regulations

(v) Other features, inter alia:
- Nature of the investment

The project activities have been separated from the different technologies on the basis of the following criteria:

i. Energy Source/fuel: The project activity involves electricity generation from wind. The other project activities identified in Step 2 are hydro and thermal power plants. All these are using water and conventional fuels as energy sources for the generation of electricity respectively. Therefore, all the projects falling under above category, except wind power plants, are considered as plants with different technologies and included under $N_{diff.}$.

Number of thermal Power projects	62
Number of hydro power projects	132
Total	**194**

[8] CO_2 Baseline Database for Indian Power sector, CEA, version 08
[9] CO_2 Baseline Database for Indian Power sector, CEA, version 08
[10] Directory: Indian Wind Power 2011

ii. Size of installation (power capacity): The projects left after excluding thermal and hydro projects i.e. wind projects, are further categorized into small scale and large scale.

Project category	Number of Projects
Wind (large scale)	17
Wind (Small scale)	15
Total wind projects	**32**

The small scale projects (≤15MW) are also considered as different technology. Therefore, the technologies different than the project activity, N_{diff} is 209

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

From step 3 and step 4 following table is arrived at;

N_{all}	226
N_{diff}	209
N_{all}-N_{diff}	17
F = (1-N_{diff}/N_{all})	0.07

As per the Guidelines, t*he proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3.*
The value of factor F as calculated in Step 4 is **0.07** which is less than 0.2. Hence the project activity is not a common practice.

The analysis clearly demonstrates that project activity is not a common practice within the sector in the applicable geographical area. Therefore, it can be concluded that the project activity is additional and requires CDM revenues to alleviate the investment barrier to the project activity.

Serious Consideration of CDM and Continued Action to Secure CDM status

As per EB 62 (paragraph 2, Annex 13):

For project activities with a starting date on or after 02 August 2008, the project participant must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. Such notification must be made within six months of the project activity start date and shall contain the precise geographical location and a brief description of the proposed project activity, using the standardized form F-CDM-Prior Consideration. Such notification is not necessary if a PDD has been published for global stakeholder consultation or a new methodology proposed to the Executive Board for the specific project before the project activity start date.

Serious Consideration of CDM:

The start date of project activity is 22/11/2010. The project participant had informed the Indian DNA and UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. The form of prior consideration was submitted to the Indian DNA and UNFCCC secretariat on 05/05/2011 which is well within six months of the project activity start date.

The project developer has taken parallel action for the implementation of the project and the registration of project as CDM activity.

Table B6: Chronology of Events

Sr. No.	Events	Date
1	Investment Decision to establish wind farm of 24 MW capacity in Tamil Nadu	16/10/2010
2	Purchase Order for supply of WEGs & O&M Contract	22/11/2010
3	Local Stakeholder Consultation Meeting – Tamil Nadu	03/02/2011
4	Submission of Prior Consideration form to UNFCCC and Indian DNA	05/05/2011
5.	Investment Decision to relocate 12 MW to Gujarat	23/09/2011
6.	Local Stakeholder Consultation Meeting-Gujarat	04/06/2012

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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Estimation of Project Emissions

The project activity involves harnessing of wind energy for electricity generation, which does not involve combustion or generation from fossil fuels. Hence according to ACM0002 Version 15.0.0, there will be no project emissions in the project activity ($PE_y = 0$).

Estimation of Baseline Emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are calculated as follows:

$$\mathbf{BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y}} \quad \textbf{(1)}$$

Where:

BE_y	Baseline emissions in year y (tCO_2/yr)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into a grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	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" ver. 04.0.0 (tCO_2/MWh)

Calculation of $EG_{PJ,y}$

Since the project activity is installation of a new grid-connected renewable power plant/ unit at a site where no renewable power plant was operated prior to the implementation of the project activity, therefore:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

$EG_{PJ,y}$	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/yr)
$EG_{facility,y}$	Quantity of net electricity generation supplied by the project plant/ unit to the grid in year y (MWh/yr)

Calculation of $EF_{grid,CM,y}$

As per the approved methodology, ACM0002 Version 15.0.0, "Tool to calculate emission factor for an electricity system" (version 04.0.0) is used to determine the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system by calculating the combined margin CO_2 emission factor of the electricity system. Following steps are applied to determine the combined margin CO_2 emission factor:

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.

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. Central Electricity Authority (CEA) (which is an official source of Ministry of Power, Government of India) has worked out baseline emission factors for two grids in India and made them publicly available in the form of "CO_2 Baseline Database" dated January 2013, version 8[11].

The emission factor of the grid for the ex-ante approach is calculated in the following manner:

Step 1: Identify the relevant electricity systems

The CEA of the host country has published a delineation of the project electricity system and connected electricity systems. For identification of relevant electric power system of the project activity the data published by the CEA of the host country is used and the project activity falls under the NEWNE and Southern regional grid.

Table B7: Geographical scope of the two regional electricity grids (NEWNE and Southern grid)

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

The baseline emission factor (including Imports) of NEWNE and Southern regional grid published by CEA is considered for the calculation of emission reductions due to displacement of electricity in accordance with the "Tool to calculate the emission factor for an electricity system", version 04.0.0.

Step 2: Choose whether to include off-grid power plants in the project electricity system

[11] Central Electricity Authority, 2013, Baseline Carbon Dioxide Emissions from Power Sector, Version 8.0 [online] Available at: <http://cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm>

According to the tool, the following two options are available 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.

Option II provides the option to include off-grid power generation in the grid emission factor, i.e. it aims to reflect that in some countries, off-grid power generation is significant and can be partially displaced by CDM project activities.

In the host country, the electricity grid being considered, i.e. the NEWNE and Southern grid is both reliable and stable. Hence the off-grid power generation is not significant. Therefore, the project proponent has considered Option I for calculation of operating margin and build margin emission factor.

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

According to the "Tool to calculate the emission factor for an electricity system" Version 04.0.0, the calculation of operating margin ($EF_{grid,OM,y}$) is based on one of the following methods:

a) Simple OM; or
b) Simple adjusted OM; or
c) Dispatch data analysis OM; or
d) Average OM.

Any of the four methods can be used, however the simple OM method (option a) can only be used if low cost/must run resources[12] constitute less than 50% of total grid generation.

Table B8: Share of must-run plants[13] (Hydro/Nuclear) (% of Net Generation)

Grid	2007-08	2008-09	2009-10	2010-11	2011-12
NEWNE	**19.0 %**	**17.4 %**	**15.9 %**	**17.6 %**	**19.2%**
South	**27.1 %**	**22.8 %**	**20.6 %**	**21.0 %**	**21.0%**
India	21.0 %	18.7 %	17.1 %	18.4 %	19.6%

The data as mentioned in table B7 clearly shows that percentage of total grid generation by low cost/must run sources for the NEWNE grid is less than 50% of the total generation. Hence, **Simple Operating Margin** method can be used to calculate operating margin emission factor for the proposed project activity.

The project proponent choose an *ex-ante* option for calculation of the OM with a 3-year generation weighted average, based on most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emission factor during the crediting period.

Step 4: Calculate the Operating Margin emission factor ($EF_{grid,OM,y}$) according to the selected method

Simple OM method

The OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. The data vintage option selected is the ex-ante

[12] Defined as Hydro, geothermal, wind, low cost biomass, nuclear and solar generation plants in the Methodological Tool: "Tool to calculate the emission factor for an electricity system", version 4

[13] Source: Generation Data from CEA database, January 2013, Version 8.0

approach, where a 3 year average OM is calculated. The most recent three year CEA data published on the emission factor of NEWNE and Southern region is considered.

The simple OM may be calculated using one of the following two options:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

For calculation of simple OM, option A is chosen because necessary data for the option is available, and option B can only be used if the required data for option A is not available.

Option A - Calculation based on average efficiency and electricity generation of each plant

Under this option, the simple OM emission factor calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (2)$$

Where:

$EF_{grid,OM\ simple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in the year *y* (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
m	All power units serving the grid in year *y* except low-cost/ must-run power units
y	The relevant year as per the data vintage chosen in step 3

Determination of $EF_{EL,m,y}$

For calculation of emission factor of each power unit, the following options have been considered:

Option A1. If for a power unit *m* data on fuel consumption and electricity generation is available
Option A2. If for a power unit *m* only data on electricity generation and the fuel types used is available
Option A3. If for a power unit *m* only data on electricity generation is available

Since data on fuel consumption and electricity generation is available, the emission factor in the CEA database has been determined taking **Option A1**, as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}} \quad (3)$$

Where:

$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$FC_{i,m,y}$	Amount of fuel type *i* consumed by power unit *m* year *y* (Mass or volume unit)

$NCV_{i,y}$	Net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fuel type *i* in the year *y* (tCO_2/GJ)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in the year *y*(MWh)
m	All power units serving the grid in year *y* except low-cost/ must-run power units
i	All fuel types combusted in power plant/ unit *m* in year *y*
y	The relevant year as per the data vintage chosen in step 3

Step 5: Calculate the Build Margin (BM) Emission Factor

In order to calculate the build margin (BM) emission factor any one of the following options should be considered:

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

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

The value for Build Margin is taken from Central Electricity Authority (CEA) CO_2 baseline database Version 8[14].

The Build Margin emission factor has been determined using option 1. Also, the sample group of power units m used to calculate the build margin has been determined by CEA CO_2 baseline database version 8 as per the following procedure:

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);
(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);
(c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

[14] Central Electricity Authority, 2013, Baseline Carbon Dioxide Emissions from Power Sector, Version 8.0 [online] Available at: http://cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm>

Since none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, $SET_{\geq 20\%}$ has been used to calculate the build margin.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times FE_{EL,m,y}}{\sum EG_{m,y}} \quad (4)$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

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

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

The weighted average CM method (option a) should be used as preferred option.

The simplified CM method (option b) can only be used if:
• The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation or in a small island developing states; and
• The data requirements for the application of step 5 above cannot be met.

Since the project activity is not located in a LDC and meets the data requirements for application of step 5, therefore, the weighted average CM method (option A) is used.

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (5)$$

Where:

$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	Weighting of operating margin emission factor (%)
w_{BM}	Weighting of build margin emission factor (%)

As per the "Tool to calculate emission factor for an electricity system"; Version 04.0.0, for wind power projects, the default weights are as follows: w_{OM} = 0.75 and w_{BM} = 0.25.

Project emissions

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

$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$ **(6)**

Where:
PEy = Project emissions in year y (tCO_2e/yr)
$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2/yr)
$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO_2e/yr)
$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

As the project activity is wind power project and no project emission is expected due to any of the above factors. Therefore, $PE_y = 0$

Estimation of Leakage Emissions

As per ACM0002 Version 15.0.0, no leakage emissions are considered ($LE_y = 0$).

Estimation of Emission Reductions

According to the approved methodology ACM0002 (Version 15.0.0) Emission Reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \textbf{(7)}$$

Where:
BE_y Baseline Emissions in year *y* (tCO_2e/yr)
PE_y Project Emissions in year *y* (tCO_2e/yr)

B.6.2. Data and parameters fixed ex ante

Data / Parameter	**$EF_{grid,OM,y}$**
Unit	tCO_2/MWh
Description	Operating Margin CO_2 Emission Factor for the project electricity system in the year *y*
Source of data	"CO_2 Baseline Database for Indian Power Sector" version 8 (January 2013) published by the Central Electricity Authority, Ministry of Power, Government of India[15]
Value(s) applied	Southern grid (Tamil Nadu)- 0. 94820 NEWNE grid (Gujarat)- 0.97226
Choice of data or Measurement methods and procedures	Operating Margin Emission Factor has been calculated using the simple OM approach in accordance with ACM0002 and "Tool to calculate the emission factor for an electricity system" Version 04. The generation weighted average of simple operating margins of the year 2009-10, 2010-11, 2011-12 have been used to calculate ex-ante OM.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	**$EF_{grid,BM,y}$**
Unit	tCO_2/MWh
Description	Build Margin CO_2 Emission Factor for the project electricity system in year *y*

[15] CO_2 Baseline Database, January 2013, Version 8.0

Source of data	"CO_2 Baseline Database for Indian Power Sector" version 8 (January 2013) published by the Central Electricity Authority, Ministry of Power, Government of India for national default values.
Value(s) applied	Southern grid (Tamil Nadu)- 0.85219 NEWNE grid (Gujarat)- 0.91635
Choice of data or Measurement methods and procedures	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002 and "Tool to calculate the emission factor for an electricity system" Version 4. The ex-ante value for the year 2011-12 has been used.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	**$EF_{grid,CM,y}$**
Unit	tCO_2/MWh
Description	Combined Margin CO_2 Emission Factor for grid connected power generation in year *y*
Source of data	"CO_2 Baseline Database for Indian Power Sector" version 8 (January 2013) published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied	Southern grid (Tamil Nadu)- 0.92419 NEWNE grid (Gujarat)- 0.95828
Choice of data or Measurement methods and procedures	Combined Margin Emission Factor ($EF_{grid,CM,y}$) is calculated ex ante as the weighted average CO_2 of Operating Margin Emission Factor ($EF_{grid,OM,y}$) and Build Margin Emission Factor ($EF_{grid,BM,y}$). In case of wind power projects default weights of 0.75 for $EF_{grid,\mathbf{OM},y}$ and 0.25 for $EF_{grid,\mathbf{BM},y}$ are applicable as per ACM0002, version 15.0.0
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

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The baseline emissions are calculated using the combined margin approach. The baseline emission factor is calculated in the following steps:

Step 1: Calculation of Operating Margin Emission Factor $EF_{grid,OM,y}$ (ex ante)

The Operating Margin Emission Factor ($EF_{grid,OM,y}$) , Build Margin and Combined Margin for the NEWNE grid has been calculated as below using formula (3) from Step 4 of Section B.6.1:

	2009-10	2010-11	2011-12
NEWNE Net Generation in OM (GWh)	458,043	476,987	502,300
Net electricity import from SR (GWh)	0	0	0
Net generation incl imports (GWh)	463,384	482,597	507,585
Electricity import from other countries (GWh)	5,341.1	5,610.0	5,284.5
Simple Operating Margin (tCO2/MWh) (incl. Imports)	0.9777	0.9707	0.9688
Weighted Generation Operating Margin	0.97226		

The Operating Margin Emission Factor ($EF_{grid,OM,y}$) , Build Margin and Combined Margin for the Southern grid has been calculated as below using formula (3) from Step 4 of Section B.6.1:

	2009-10	2010-11	2011-12
Net Generation in OM (GWh)	134,716	137,387	151,501
Net electricity import from NEWNE (GWh)	1,057	7,689	6,034
Electricity import from other countries (GWh)	0.00	0.00	0.00
Net generation incl imports (GWh)	135,773	145,076	157,535
Simple Operating Margin (tCO2/MWh) (incl. Imports)	0.9415	0.9419	0.9598
Weighted Generation Operating Margin	0.94820		

Thus the final $EF_{grid,OM,y}$ based on three years generation weighted average is estimated to be –

- NEWNE grid (Gujarat) – **0.97226 tCO_2/ MWh**
- Southern grid (Tamil Nadu) - **0.94820 tCO_2/ MWh**

Step 2: Calculation of the Build Margin Emission Factor $EF_{grid,BM,y}$ (ex ante)

The Build margin emission factor has been calculated *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently as this sample group comprises larger annual generation than the generation of the sample group m consisting of the five power plants that have been built most recently.

The $EF_{grid,BM,Y}$ is estimated as follows:

Build Margin (tCO_2/MWh) (incl. Imports)	2011-12
NEWNE	0.91635
Southern grid	0.85219

Step 3: Calculation of Combined Margin Emission Factor

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

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

Where the weights w_{OM} and w_{BM}, are 0.75 and 0.25 respectively, and $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO_2/MWh.

Baseline Emission factor calculated according to the above formula:

- NEWNE grid (Gujarat) – **0.95828 tCO_2/ MWh**
- Southern grid (Tamil Nadu) – **0.92419 tCO_2/ MWh**

Step 4: Calculation of Baseline Emissions (BE_y)

According to "Consolidated baseline methodology for grid- connected electricity generation from renewable sources' ACM0002, Version 15.0.0, the baseline emissions is calculated as electricity supplied to the grid multiplied by an emission factor (measured in tCO_2/MWh) calculated in a transparent and conservative manner.

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

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2/yr)
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

Therefore, baseline emissions from each site are:

Tamil Nadu:
Baseline Emissions = (21,500[16] × 0.92419)
= 19, 870.09 tCO_2/yr
= 19, 870 tCO_2/yr (rounded down)

Gujarat:
Baseline Emissions = (23,100[16] × 0.95828)
= 22, 136.27 tCO_2/yr
= 22, 136 tCO_2/yr (rounded down)

Total Baseline emissions: Tamil Nadu + Gujarat = 19, 870 + 22, 136 **= 42,006 tCO_2/yr**

Step 5: Calculation of Emission Reductions (ER_y)

The emission reductions by the project activity during a given year *y* is the difference between Baseline emissions (BE_y) and project emissions (PE_y).

$\mathbf{ER_y = BE_y – PE_y}$

Since, Project Emissions by sources of GHGs due to the project activity within the project boundary are zero, net anthropogenic emission reductions due to the proposed project are equal to the baseline emissions on a yearly basis. The project activity will evacuate approximately 44.60 Mn kWh of renewable power annually to the power deficit grids, i.e. Southern and NEWNE, (based on capacity of project which is 24 MW). The annual emissions reductions are equal to **42,006 tCO_2e**.

[16] The PLF values used for calculating emission reductions are 20.45% and 21.97% respectively for Tamil Nadu and Gujarat which are based on Wind Assessment report whereas the values used in financial analysis are based on investment decision as on Sep, 2011 for revised project activity and Oct, 2010 for old project in Tamil Nadu to be conservative.

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

Tamil Nadu:

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	19,870	0	0	19,870
Year 2	19,870	0	0	19,870
Year 3	19,870	0	0	19,870
Year 4	19,870	0	0	19,870
Year 5	19,870	0	0	19,870
Year 6	19,870	0	0	19,870
Year 7	19,870	0	0	19,870
Year 8	19,870	0	0	19,870
Year 9	19,870	0	0	19,870
Year 10	19,870	0	0	19,870
Total	**198,700**	**19,870**	**19,870**	**198,700**
Total number of crediting years	**10**			
Annual average over the crediting period	**19,870**	**0**	**0**	**19,870**

Gujarat:

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	22,136	0	0	22,136
Year 2	22,136	0	0	22,136
Year 3	22,136	0	0	22,136
Year 4	22,136	0	0	22,136
Year 5	22,136	0	0	22,136
Year 6	22,136	0	0	22,136
Year 7	22,136	0	0	22,136
Year 8	22,136	0	0	22,136
Year 9	22,136	0	0	22,136
Year 10	22,136	0	0	22,136
Total	221,360	**0**	**0**	221,360
Total number of crediting years	**10**			
Annual average over the crediting period	22,136	**0**	**0**	22,136

Total of both the sites:

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	42,006	0	0	42,006
Year 2	42,006	0	0	42,006
Year 3	42,006	0	0	42,006
Year 4	42,006	0	0	42,006
Year 5	42,006	0	0	42,006
Year 6	42,006	0	0	42,006
Year 7	42,006	0	0	42,006
Year 8	42,006	0	0	42,006
Year 9	42,006	0	0	42,006
Year 10	42,006	0	0	42,006
Total	**420,060**	**0**	**0**	**420,060**
Total number of crediting years	**10**			
Annual average over the crediting period	**42,006**	**0**	**0**	**42,006**

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter	$EG_{facility,y}$
Unit	MWh/ yr
Description	Quantity of net electricity generation supplied by the project plant/ unit to the southern and NEWNE grid in year *y*
Source of data	Joint Meter Reading (JMR) or statement/ Credit Note
Value(s) applied	Annual electricity supplied to the grid by the Project NEWNE grid- 23,100 Southern grid- 21,500
Measurement methods and procedures	Tamil Nadu- Each WEG has an individual meter. The joint meter reading (JMR) is taken at substation in presence of TNEB and Wind World officials. The electricity generation for the project activity is calculated on as shown in section B. 7.2. Gujarat- Total WEGs installed for the project activity are clubbed into groups. Each group has an electricity meter called "cluster meter" where the joint meter reading (JMR) is taken in presence of GUVNL and Wind World officials to record the electricity generated by the project activity. The invoicing is done based on JMR. The metering system for the project activity consists of electronic bidirectional tri-vector meters *viz*. Main meter and Check meter. Electricity meters: Metering system for the project activity consists of electronic bidirectional tri-vector meters. - Accuracy class 0.2s for both main and check meter for WEG meter (Tamil Nadu) and cluster meter (Gujarat) respectively **Calibration frequency:** Once in 3 years **Responsible person:** Plant operator
Monitoring frequency	Continuous measurement, at least monthly recording
QA/QC procedures	Cross check measurement results with credit note and/or invoices.
Purpose of data	Calculation of baseline emissions
Additional comment	The data (electricity supplied to the grid) will be archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period or the last issuance of CERs for the project activity, whichever occurs later.

B.7.2. Sampling plan

>>

As the parameter to be monitored does not require sampling approach for its determination, this section is not applicable for the proposed project activity.

B.7.3. Other elements of monitoring plan

>>

As per the applicable methodology ACM0002, monitoring is required for electricity generated from the project and the grid emission factor.

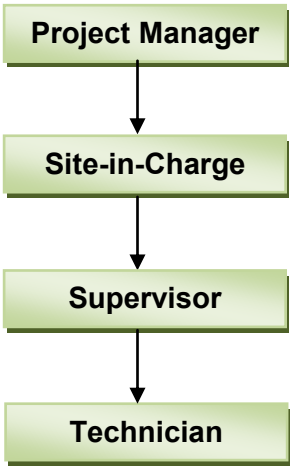
Since the methodology is based on *ex ante* determination of the baseline emissions, the monitoring of the grid emission factor is not required. Thus, the sole parameter for monitoring of the project activity is the electricity supplied to the grid.

The project proponent has entered into comprehensive Operation and Maintenance contract with Wind World Limited, the supplier of Wind Electric Generators.

The activities of the O&M team comprising of Wind World Limited will be supervised by the Project Manager of RWPPL, assisted by the necessary technical and other staff. The following will be maintained during operation of the project activities.

i. Monitoring the functioning of the metering arrangements and getting them calibrated as per the State Electricity Board norms, so that the accuracy and reliability levels are maintained.
ii. Periodic onsite inspections to ensure the quality of the data collected by the team and initiate steps in case of any abnormal conditions.
iii. Ensure monthly recording of the generation particulars.
iv. Obtaining and archiving the generation certificates from the State Electricity Board for aggregation at the required intervals.
v. Verification and reconciliation, if needed, of the generation certificates with the generation data recorded and maintained regularly.
vi. Aggregating the data on net exported energy from the project thus reconciled and submission to RWPPL. This will then be forwarded to the CDM advisor for calculation and reporting of ERs.

The O&M organizational structure is provided as below:



Monitoring system (Tamil Nadu)

- There is an individual meter at the WEG end, and one main meter and a check meter at the substation end.
- The metering will be carried out at the individual WEG end by the Wind World operator on site, on a daily basis to be uploaded on the DGR and to check the healthiness of the Meter.
- A Joint Meter Reading shall be taken by the representatives of respective discom (TANGEDCO) and Wind World (Representative of the Customer) at the WEG and also at the high voltage side of the step up transformer installed at the substation at a particular date.
- In case the main metering system is not in service, then the check metering system shall be used until the main system is back to service.
- Meter reading would be jointly signed by both the representatives.
- The main and the check metering systems shall be sealed in presence of representatives of Power producers, Enercon, and respective discom.
- When any of these metering systems is found to be outside acceptable limits of accuracy or otherwise not functioning properly, it shall be repaired, recalibrated or replaced.
- PP will raise a monthly energy bill/statement based on the JMR at the end of each calendar month and the payment by State Electricity Board is done on this basis. The billing and payment records will be maintained by the PP.

- Calibration and Testing of Meters will be done annually.

Monitoring system (Gujarat)

- The reading will be taken at the cluster meter installed for a group of WEGs by the Wind World operator on site.
- A Joint Meter Reading shall be taken by the representatives of Wind World and GUVNL at the cluster meters on monthly basis.
- In case the main metering system is not in service, then the check metering system shall be used until the main system is back to service.
- Meter reading would be jointly signed by both the representatives.
- The main and the check metering systems shall be sealed in presence of representatives of Power producers, Wind World, and GUVNL representative.
- When any of these metering systems is found to be outside acceptable limits of accuracy or otherwise not functioning properly, it shall be repaired, recalibrated or replaced.
- PP will raise a monthly energy bill/statement based on the JMR at the end of each calendar month and the payment by State Electricity Board is done on this basis. The billing and payment records will be maintained by the PP.
- Calibration and Testing of Meters will be done as per State Electricity Board norms or once in three years.

Calculation Procedure for Credit note/statement by service provider:

Tamil Nadu

$EG_{facility,y} = \sum_{i=1}^{n}$ Net energy for each WEG

Formula for apportionment of net energy for each WEG

Net Energy for each WEG = $(EG_{net,ss} / \sum EG_{net,p}) \times EG_{net.i}$

Where:

$EG_{net,ss}$	=	Net electricity at substation
$EG_{net,i}$	=	Net electricity generated by a WEG
$EG_{net,p}$	=	Net electricity generated by the project
i	=	Individual WEG
n	=	Total number of WEGs

Gujarat

$EG_{export,gross}$	=	Electricity exported from wind farm measured at State Electricity Board substation
$EG_{import,gross}$	=	Electricity imported from the grid measured at State Electricity Board substation
$EG_{gross,windfarm}$	=	Sum of the cluster meter readings of all the WECs connected to the wind farm
$EG_{gross,project}$	=	Sum of the cluster meter readings of all the WECs of the project activity
MF_{export}	=	$EG_{export,gross} / EG_{gross,windfarm}$
EG_{export}	=	$EG_{gross,project} * MF_{export}$
MF_{import}	=	$EG_{import,gross} / EG_{gross,windfarm}$
EG_{import}	=	$EG_{gross,project} * MF_{import}$

Where:

MF_{export} = Export Multiplication Factor, applied to arrive at electricity supplied to the grid by the project activity

EG_{export} = Electricity exported to the grid by the project activity
MF_{import} = Import Multiplication Factor, applied to arrive at electricity imported from the grid by the project activity
EG_{import} = Electricity imported from the grid by the project activity

$EG_{facility,y} = EG_{export} - EG_{import}$

Where $EG_{facility,y}$ is Net electricity supplied to the grid

Cross checking and Internal Audit procedure

The internal audit will be undertaken by RWPPL which will verify the energy data records, billed units as per bills raised to the state electricity board, and cross verify with the reports furnished by the project site managers. The internal audit report will be furnished to the RWPPL management.

QA and QC Procedures

For both the sites electricity meters (main and check) with accuracy class 0.2s at WEG end, cluster meter and substation end will be installed.

Calibration certificates of meters will be kept in records in seriatim.

Data Storage and Archiving

All the data items monitored under the monitoring plan will be kept for 2 years after the end of crediting period or till the last issuance of CERs for this project activity, whichever occurs later. The data will be archived both electronically and manually, and kept in safe storage by RWPPL.

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

>>
14/12/2013
Contact details of entity:
IL&FS Environmental Infrastructure & Services Limited
4th Floor, Dr. Gopal Das Bhawan, 28, Barakhamba Road
New Delhi – 110001 (India)
T: +91-11-49691000/2000

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
22/11/2010 [Date on which first purchase order was issued to the equipment supplier Enercon (India) Ltd. (now Wind World (India) Limited) for WEGs to be installed at the project site in Tamil Nadu]

C.1.2. Expected operational lifetime of project activity

>>
20 years, 0 months

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>

Fixed

C.2.2. Start date of crediting period

>>

15/09/2014 or the date of registration of project, whichever is later

C.2.3. Length of crediting period

>>

10 Years, 00 Months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

Ministry of Environment and Forests (MoEF), in EIA Notification of 1994, or the Amended Notification of 2006 [17], cover projects under 11 categories requiring Environment Impact Assessment (EIA) studies. According to the notification, project developer in India needs to file an application to the Ministry in case the proposed industry or project is listed in the predefined list.

As a wind power generation project is not included in this list, it is not required to conduct an EIA study for the proposed project activity. Also, as the project activity does not cause any negative impact on the environment, no EIA study was conducted.

D.2. Environmental impact assessment

>>

There are no significant environmental impacts due to implementation of the project activity.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

Tamil Nadu-

The Stakeholders' Meet was conducted at the Enercon (India) Ltd. site office, Vagaikullam, Tirunelveli district on 03/02/2011. The notice inviting stakeholders was published in a local newspaper "Daily Thanthi" dated 25/01/2011.
The following stakeholders were identified for project:

- Representatives from IWPL (now RWPPL)
- Representatives from Enercon (India) Ltd. (now Wind World (India) Limited)
- Representatives from IL&FS Environmental Infrastructure & Services Limited
- Local community
- Representatives from local government
- Representatives from Tamil Nadu Electricity Board (TNEB)

Gujarat-

[17] Ministry of Environment & Forests, 2006, S.O. 1533 (E) Environmental Impact Assessment Notification – 2006, Schedule: List of project activities requiring prior environmental clearance, page 10 [online] Available at: <http://moef.nic.in/legis/eia/so1533.pdf>

The Stakeholders' Meet was conducted at Hotel Vishal International, Jamngar on 04/06/2012. The notice inviting stakeholders was published in a local newspaper "Nobat" dated 23/05/2012.

The following stakeholders were identified for project:

- Representatives from IWPL (now RWPPL)
- Representatives from Enercon (India) Ltd. (now Wind World (India) Limited)
- Representatives from IL&FS Environmental Infrastructure & Services Limited
- Local community
- Representatives from local villages

The stakeholders were introduced to the project activity by a representative from the Enercon (Wind World) team. Enercon (now Wind World) representative gave detailed information to the stakeholders about the wind power project. A description of how electricity is generated from wind power was explained. The importance of introducing renewable source of electricity to the grid and benefits to the people in terms of improvement in pollution levels were also highlighted.

E.2. Summary of comments received

>>

Tamil Nadu-

The query raised by the local community was whether the installation of wind mills adversely affects the ground water level, thereby causing agriculture related problems.

Gujarat-

Stakeholders raised few questions as follows:

1. Mr. Pramod Patel- What type of employment opportunities will the project generate?
2. Mr. Harisingh- Why has this site been chosen for the project?

No adverse comments were received regarding the project activity and all the queries raised were satisfactorily addressed. The stakeholders were very observant and supportive.

E.3. Report on consideration of comments received

>>

The following responses were provided in relation to the comments received from the local stakeholders:

Tamil Nadu-

In response to the query of impact on the ground water level, it was clarified that there was no such problem related to wind mills installation. The thick wires going into the ground are used for earthing of the wind mills (from safety point of view) which does not interfere with the underground water.

Gujarat-

Following clarifications were provided for the queries raised by the stakeholders:

1. Depending upon the educational qualification of a person, and the requirement at the plant site, he or she will be employed in various activities during construction, commissioning and operation of the project.
2. This site has got high wind density as per the wind estimate study conducted by the Project Participant (PP).

The project participant was commended for their action towards environment protection.

Apart from the above comments and questions, no major issues were raised that could be related to the environmental or CDM aspect of the project. All comments and questions were duly taken into account by the project developer and addressed satisfactorily.

SECTION F. Approval and authorization

>>

Host Country Approval received from National CDM Authority of India on 09/05/2013.

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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	Ratedi Wind Power Private Limited
Street/P.O. Box	Plot C- 22, G Block, Bandra Kurla complex
Building	8th Floor, IL&FS Financial Centre
City	Mumbai
State/Region	Maharashtra
Postcode	400051
Country	India
Telephone	+91 22 26593470
Fax	+91 22 26533038
E-mail	rohil.kutdarkar@ilfsindia.com
Website	http://www.ilfsindia.com/
Contact person	Mr. Vinod Dhanuka
Title	Director
Salutation	Mr.
Last name	Dhanuka
Middle name	
First name	Vinod
Department	Operations
Mobile	
Direct fax	+91 22 26533038
Direct tel.	+91 22 26593470
Personal e-mail	rohil.kutdarkar@ilfsindia.com

Appendix 2. Affirmation regarding public funding

No public funding and no ODA from a country listed in Annex. 1 is involved in this project activity.

Appendix 3. Applicability of methodology and standardized baseline

Refer to section B.2

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

For baseline calculation

The latest data available has been used for the estimation of baseline emissions. The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Build Margin and the Simple Operating Margin for the NEWNE and the Southern Grid. The details of which is available on the following website and is detailed below:

http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Version 8.0 of the database has been used.

Generation Data

Gross Generation Total (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	531,539	548,956	586,311	622,447	667,244
South	167,379	167,587	180,638	185,257	204,804
India	698,918	716,543	766,950	807,704	872,049
Net Generation Total (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	496,119	510,693	544,915	579,181	621,462
South	157,247	157,336	169,765	173,925	191,844
India	653,366	668,029	714,680	753,106	813,306
Share of Must-Run (Hydro/Nuclear) (% of Net Generation)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	19.0%	17.4%	15.9%	17.6%	19.2%
South	27.1%	22.8%	20.6%	21.0%	21.0%
India	21.0%	18.7%	17.1%	18.4%	19.6%
Net Generation in Operating Margin (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	401,642	421,803	458,043	476,987	502,300
South	114,634	121,471	134,717	137,387	151,502
India	516,275	543,274	592,760	614,374	653,802
20% of Net Generation (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	99,224	102,139	108,983	115,836	124,292
South	31,449	31,467	33,953	34,785	38,369
India	130,673	133,606	142,936	150,621	162,661
Net Generation in Build Margin (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	100,707	102,589	109,064	116,601	125,441

South	31,613	31,606	36,100	35,268	39,414
India	132,320	134,195	145,164	151,869	164,855

Emission Data

Absolute Emissions Total (tCO2)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	406,861,785	430,502,442	453,067,520	468,438,871	491,732,593
South	113,586,133	117,880,640	126,786,215	129,093,636	145,293,729
India	520,447,919	548,383,082	579,853,735	597,532,507	637,026,321
Absolute Emissions OM (tCO2)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	406,861,785	430,502,442	453,067,520	468,438,871	491,732,593
South	113,586,133	117,880,640	126,786,215	129,093,636	145,293,729
India	520,447,919	548,383,082	579,853,735	597,532,507	637,026,321
Absolute Emissions BM (tCO2)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	60,193,616	69,297,387	88,593,337	101,146,601	114,948,188
South	22,550,310	25,851,338	27,558,555	25,882,886	33,588,082
India	82,743,926	95,148,726	116,151,892	127,029,488	148,536,270

Electricity Transfers

Year 2011-2012 (Imports only)			
	Combined	**Southern**	**India**
Combined		**6,034.1**	
Southern	**0.0**		
Bhutan	**5,284.5**	**0.0**	**5,284.5**
Nepal	**0.0**	**0.0**	**0.0**
Total Imports	**5,284.5**	**6,034.1**	**5,284.5**

Emission Factor calculation

Simple Operating Margin (tCO_2/MWh) (incl. Imports)	**2009-10**	**2010-11**	**2011-12**
North	0.97774	0.97066	0.96877

Build Margin (tCO_2/MWh) (incl. Imports)	**2011-12**
North	0.91635

Generation Data for Southern Grid

Gross Generation Total (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	531,539	548,956	586,311	622,447	667,244
South	167,379	167,587	180,638	185,257	204,804
India	698,918	716,543	766,950	807,704	872,049
Net Generation Total (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	496,119	510,693	544,915	579,181	621,462
South	157,247	157,336	169,765	173,925	191,844
India	653,366	668,029	714,680	753,106	813,306
Share of Must-Run (Hydro/Nuclear) (% of Net Generation)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	19.0%	17.4%	15.9%	17.6%	19.2%
South	27.1%	22.8%	20.6%	21.0%	21.0%
India	21.0%	18.7%	17.1%	18.4%	19.6%
Net Generation in Operating Margin (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	401,642	421,803	458,043	476,987	502,300
South	114,634	121,471	134,717	137,387	151,502
India	516,275	543,274	592,760	614,374	653,802
20% of Net Generation (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	99,224	102,139	108,983	115,836	124,292
South	31,449	31,467	33,953	34,785	38,369
India	130,673	133,606	142,936	150,621	162,661
Net Generation in Build Margin (GWh)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	100,707	102,589	109,064	116,601	125,441
South	31,613	31,606	36,100	35,268	39,414
India	132,320	134,195	145,164	151,869	164,855

Emission Data

Absolute Emissions Total (tCO2)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	406,861,785	430,502,442	453,067,520	468,438,871	491,732,593
South	113,586,133	117,880,640	126,786,215	129,093,636	145,293,729
India	520,447,919	548,383,082	579,853,735	597,532,507	637,026,321
Absolute Emissions OM (tCO2)					
	2007-08	**2008-09**	**2009-10**	**2010-11**	**2011-12**
NEWNE	406,861,785	430,502,442	453,067,520	468,438,871	491,732,593
South	113,586,133	117,880,640	126,786,215	129,093,636	145,293,729
India	520,447,919	548,383,082	579,853,735	597,532,507	637,026,321

Absolute Emissions BM (tCO2)					
	2007-08	2008-09	2009-10	2010-11	2011-12
NEWNE	60,193,616	69,297,387	88,593,337	101,146,601	114,948,188
South	22,550,310	25,851,338	27,558,555	25,882,886	33,588,082
India	82,743,926	95,148,726	116,151,892	127,029,488	148,536,270

Electricity Transfers

Year 2011-2012				
From To	Combined	Southern	Bhutan	Nepal
Combined		-6,034.1	5,284.5	0.0
Southern	-6,034.1		0.0	0.0
Bhutan	5,284.5	0.0		0.0
Nepal	0.0	0.0	0.0	
Net imports	-749.6	6.034.1	-5,284.5	0.0
Total Imports	5,284.5	6,034.1	0.0	0.0

Emission Factor calculation

Simple Operating Margin (tCO_2/MWh) (incl. Imports)	2009-10	2010-11	2011-12
South	0.94150	0.94188	0.95979

Build Margin (tCO_2/MWh) (incl. Imports)	2011-12
South	0.85219

Appendix 5. Further background information on monitoring plan

Apportioning Procedures in case the dates of monitoring period do not match with billing cycle dates:

The dates of the monitoring period for the project activity may not coincide with the dates of the Credit Note issued by distribution licensee. In such a scenario, the net electricity generation data would have to be apportioned. For carrying out the apportioning procedures, WEG controller data (data recorded by the WEG controller software) would be utilized. The electricity generation from WEG controllers is recorded on a daily basis in the Power Generation Reports maintained by the O&M contractor. The data from Power Generation Reports would be referred for determination of the apportioning ratio. The following steps will be applied to carry out the apportioning:

$$\text{(i) Apportioning Ratio} = \frac{\text{Generation at WEG controller for apportioning period}}{\text{Generation at WEG controller for period covered under Credit Note period}}$$

(ii) Apportioned Electricity Export = Apportioning Ratio x Electricity Export as per Credit Note

(iii) Apportioned Electricity Import = Apportioning Ratio x Electricity Import as per Credit Note

(iv) Apportioned Net Electricity Supplied to Grid = Apportioned Electricity Export – Apportioned Electricity Import

Appendix 6. Summary of post registration changes

Not applicable

Appendix 7. CONTRIBUTION OF CER REVENUES TO SUSTAINABLE DEVELOPMENT

RWPPL will contribute 2% of its CER revenues every year to fund sustainable development in the local community in Tamil Nadu and Gujarat in the following manner:

Education

- Staff - induction and training to new and old staff
- Building and maintaining networks and linkages with the key representatives of government educational system
- Forming an official partnership with the education department for various activities
- Improving the quality of education in government schools
    - Refurbishment of school infrastructure: Provision and renovation of furniture, electricity appliances etc. and periodic maintenance and repairs
    - Setting up of Libraries
- Capacity building of key stakeholders involved in providing education
    - Regular training of teachers of government schools on English speaking, personality development and other relevant aspects
    - Organizing periodic workshops on innovative and newer methods of teaching
- Reinstating the school dropouts into education system
    - Creation and maintenance of Non-Formal Education centers in the communities across the district
    - Mobilizing the school drop outs and adults to enroll in the non-formal education centers as per their convenience
    - Providing educational classes to the target beneficiary groups
    - Counseling services for the students

Livelihood skills Enhancement and opportunities

- Staff - induction and training to new and old staff
- Livelihood mapping exercise in the district and creation of Interest Inventory based on the exercise
- Mobilization of youth for Vocational Trainings
- Vocational trainings of the eligible youth and provision of placement services for trained youth.

Health care facilities and Community Health Sensitization

- Staff - induction and training to new and old staff
- Building networks and linkages with the key representatives of government health departments in the district
- Improve health care facilities in the district
    - Health Camps for disease like Malaria, Dengue, Chicken guinea, Hepatitis B and C and other pertinent health issues
    - Awareness creation on best practices of personal and community health and hygiene
    - Health talks and health education classes within the community and in schools and colleges through health educators

Appendix 8: Geo- coordinates of project activity

Tamil Nadu:

S. No.	Site	Latitude	Longitude
1	112	8° 55’ 23.7”	77° 40’ 07.6”
2	139	8° 55’ 29.5”	77° 39’ 56.9”
3	VE145	8° 52’ 53.4”	77° 41’ 30.1”
4	208	8° 52’ 34.7”	77° 41’ 49.9”
5	VE146	8° 52’ 51.3”	77° 41’ 16.7”
6	203	8° 56’ 18.6”	77° 38’ 04.4”
7	152	8° 56’ 00.6”	77° 37’ 23.6”
8	207	8° 55’ 20.5”	77° 36’ 51.6”
9	206	8° 55’ 43.3”	77° 36’ 44.7”
10	205	8° 56’ 03.2”	77° 36’ 19.2”
11	166	8° 55’ 56.1”	77° 36’ 25.5”
12	164	8° 56’ 22.9”	77° 36’ 30.0”
13	204	8° 56’ 33.1”	77° 36’ 30.2”
14	161	8° 56’ 40.5”	77° 36’ 40.0”
15	162	8° 56’ 17.6”	77° 36’ 49.2”

Gujarat:

S. No.	Site	Latitude	Longitude
1	80	22° 08' 44.9"	69° 51' 50.3"
2	167	22° 11' 07.2"	69° 46' 29.0"
3	168	22° 11' 13.1"	69° 46' 33.8"
4	170	22° 11' 51.7"	69° 46' 30.4"
5	171	22° 12' 08.3"	69° 46' 45.3"
6	175	22° 12' 28.3"	69° 46' 16.3"
7	176	22° 12' 43.4"	69° 46' 22.7"
8	177	22° 12' 47.0"	69° 46' 11.4"
9	178	22° 12' 49.7"	69° 46' 01.9"
10	179	22° 12' 59.1"	69° 46' 04.9"
11	180	22° 13' 07.1"	69° 46' 03.4"
12	181	22° 13' 13.5"	69° 46' 00.0"
13	182	22° 13' 29.7"	69° 45' 55.9"
14	183	22° 13' 35.5"	69° 45' 43.8"
15	184	22° 13' 41.4"	69° 45' 38.7"

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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 CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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