Project design document form
(Version 11.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the project activity	MCL wind power project in Tamilnadu, India
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	06.0
Completion date of the PDD	11/06/2019
Project participants	The Ramco Cements Limited[1] (formerly Madras Cements Limited) ([1]*Erstwhile the name of the Project Participant was "M/s Madras Cements Limited", however the name has been changed to "THE RAMCO CEMENTS LIMITED" via Tamil Nadu Companies Registrar letter ref no. L26941TN1957PLC003566, dated 05 August 2013.*)
Host Party	India
Applied methodologies and standardized baselines	***"Consolidated baseline methodology for grid-connected electricity generation from renewable sources"*** ACM0002, Reference : Version: 13.0.0
Sectoral scopes linked to the applied methodologies	**Sectoral scope: 01** Energy Industries (renewable / non-renewable sources)
Estimated amount of annual average GHG emission reductions	36,966 tCO_{2e}

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>> The purpose of the project activity is to generate power through the renewable source (wind) of energy and export the net electricity to the grid.

The project activity involves the implementation of 19.8 MW[2] wind power project consists of 12 Wind Turbine Generators (WTGs) of 1650 KW each by Madras Cements Limited, in district Tirpur of Tamilnadu. The project activity generates about 41211.2 MWh[3] of electricity per annum, which is being exported to the Tamil Nadu state Electricity Board part of the Southern grid in India. The spatial extent of the project boundary is the Southern grid which is connected to four southern states, namely, Tamilnadu, Kerala, Karnataka and Andhra Pradesh.

The list specifying location[4], capacity and number of WTGs is provided below in Table:

Organisation name	Status	Location	Number of WTG	Capacity. Of each WTG (kW)	Installed capacity (kW)
The Ramco Cements Limited	**Commissioned**	**Periyapatti, Udumalpet region, Tirpur District, Tamilnadu state, India**	**12**	**1650**	**19800**

A brief background of the project developer
Madras Cements Ltd is a Chennai based flag ship company of Ramco Group, a well known business group of South India. The main product of the company is portland cement manufactured through four advanced production facilities spread over Southern India. Madras Cements Limited is the sixth largest cement producer in the country and the second largest in South India. Madras Cements Limited also produces ready mix concrete and dry mortar products

Reduction of Greenhouse gas emissions due to project activity
The project activity leads to reduced Green House Gases (GHGs) emissions because it displaces equivalent electricity generated from grid connected fossil fuel based power plants. Projects owners have invested in the Wind project with the purpose of selling electricity to the grid, thereby improving the renewable share and power supply in the grid. The generation sources connected to the grid are dominated by fossil fuel based thermal power plants. Total installed power generation capacity in India is 173.626GW and the thermal sector share is 112.824GW[5]. Thermal power plants are associated with emission of GHGs and other pollutants. Thus, project activity helps in reduction of Green House Gases(GHGs) emissions by using renewable resource for generating power which otherwise would have been generated using non-renewable, carbon intensive fuel.

Pre-project scenario
Being Greenfield project; the pre project scenario can be the generation of equivalent amount of electricity by the power plants connected to the Southern grid[6] and by the addition of new generation sources.

[2]The Project proponent has initially started the CDM Project activity with a capacity of 46.2 MW. However, at later stage few WTGs were sold to a different entity and hence the ownership of those machines has got changed. Therefore, PP (i.e. MCL) has freshly started this CDM project activity with the remaining WTGs (12 nos.).

[3]This annual generation is estimated based on a PLF 23.76% which is taken from the third party PLF study report in accordance with the EB48 Annex 11 Tariff order available at the time of investment decision of the project.

[4]WTGs latitude & Longitude details are provided in the Annexure-1.

[5]CEA CO2 baseline Database for Indian Power Sector, Version-7,Pg-6.

[6] CEA CO2 baseline Database for Indian Power Sector, Version-7,Pg-6.

Baseline scenario
The project activity is the installation of a new grid-connected renewable power plant. Therefore, the baseline scenario is the same as the existing scenario prior to the implementation of the project activity.

The main Green House Gas that is prevented from being emitted into the atmosphere is Carbon dioxide (CO_2) which would have otherwise been emitted from the fossil fuel fired power plants that are connected to the grid.

The estimated annual average emission reduction from the project activity will be 36,966 tCO_2e and the total GHG emission reductions for the chosen fixed crediting period will be 3,69,660 tCO_2e.

View of Project Participants on contribution of Project Activity to sustainable development
Ministry of Environment and Forests, Govt. of India has stipulated social, economic, environmental and technological well being as the four indicators of sustainable development for Clean Development Mechanism (CDM) projects

Social well being:
- The project activity helps in Rural and infrastructural development in the areas around the project.
- The project activity is contributing towards alleviation of poverty and uplifting their socio-economic lifestyle by providing employment to the villagers of the surrounding area.
- The project activity has also led to the development of non-conventional renewable energy technology for production of power.
- The project activity leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units. Also, it contributes toward national energy security.

Economic well being:
- The generated electricity from the project activity is being sold to the regional Southern grid, thereby improving the grid frequency and availability of electricity to the local consumers. This will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.
- Economic well being is appraised due to the generation of direct and indirect employment for the implementation and the management of the project.

Environmental well being:
- Project activity is promoting an environment friendly and clean energy technology.
- Project activity helps in reduction of the consumption of fossil fuels in the grid connected fossil fuel based power plants.
- It helps in prevention of emission of GHGs (mainly CO_2) and other pollutants like SOx and NOx in the atmosphere.

Technological well being:
- Project activity promotes technology of wind-based electricity generation.
- The successful implementation of the project activity will encourage other entrepreneurs to adopt this clean technology for generation of electricity. Moreover, wind is a superior form of clean and renewable energy, hence a holistic approach in bringing such Technology, and its promotion to create a technologically sound & advance Nation.

A.2. Location of project activity

A.2.1. Host Party
>> India

A.2.2. Region/State/Province etc.
>> Tamilnadu

A.2.3. City/Town/Community etc.
>> Project is located at villages Illuppainagaram, Anikkadavu, Thottampatti, Virugalpatti inTirpur district of Tamilnadu.

A.2.4. Physical/Geographical location

>> Detailed location of WTGs has been provided in the Annexure 1 of the PDD:

A.3. Technologies/measures

>> The project activity involves installation of 12 WTGs of 1650 KW capacity each having aggregated capacity of 19.8MW in the state of Tamilnadu, India. The WTGs have been supplied by Vestas. The purpose of the project activity is to generate zero-emission power from renewable source (wind) and export it to the Tamil Nadu State Electricity Board which is the part of Southern grid[7]. The project activity supply an annual average generation of 41211.2 MWh to the Southern regional grid and replaces equivalent amount of electricity from the grid connected thermal power plants.

This is a Greenfield project activity and no energy generating units existed at the project activity site before this project activity implementation. The electricity in the grid was generated with the prevalent fuel mix and grid was operating at significant electricity deficit. The technology is a clean technology since there are no GHG emissions associated with the electricity generation i.e., environmentally safe technology.

The baseline scenario and the scenario existing prior to the implementation of the project activity both are the same.

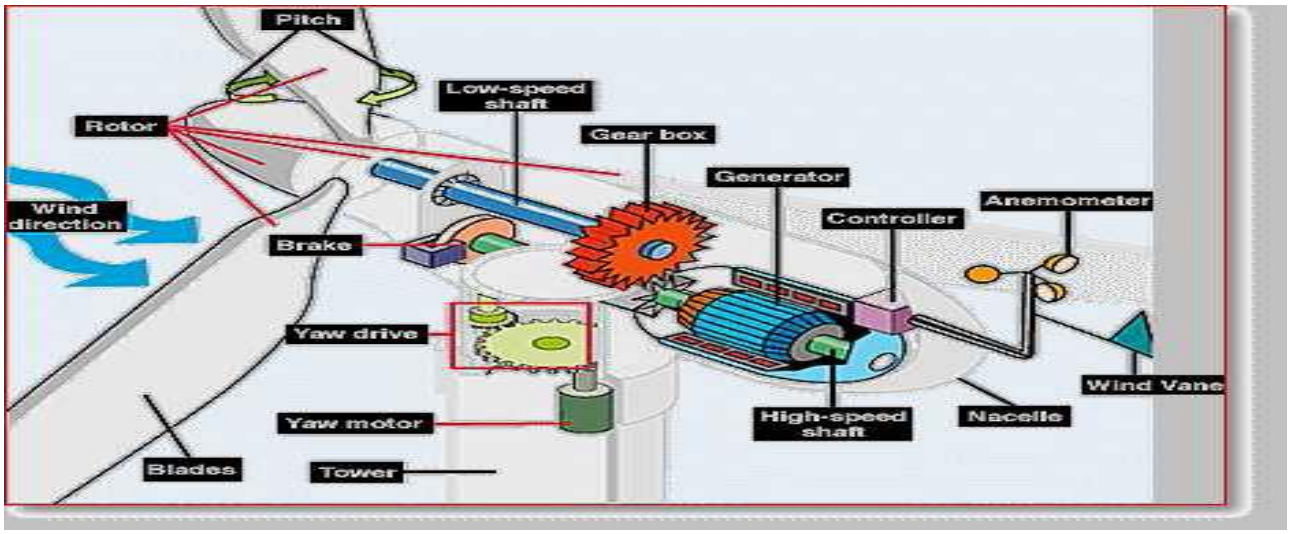
The main greenhouse gas that is prevented from being emitted into atmosphere is CO_2 which would have otherwise been emitted from the fossil fuel fired power plants that are connected to the grid. It is estimated that implementation of project activity reduces approximately 36,966 tCO_2e emissions annually.

Technology

The project activity includes the electricity generation using horizontal axis wind turbine generator. The kinetic energy of the blowing wind is harnessed using the blades on the wind turbine generator and converted to mechanical energy. The blades are connected to the low speed shaft which in turn is connected to the high speed shaft. The gears connect the low speed shaft to the high-speed shaft and increase the rotational speed. The high-speed shaft attached to the generator produces electricity i.e.,converts the mechanical energy into the electrical energy. This form of electricity generators do not emit any GHGs commonly associated with the electricity generation in general. The useful life of WTGs is 20 Years and the Plant Load Factor is considered 23.76% as per the third party PLF Study Report.

[7] CEA CO_2 baseline Database for Indian Power Sector, Version-7,Pg-6

The main parts of a typical WTG are Blades, Rotor, Tower, Gearbox, Generator, Control system, Yaw system, Brakes, Nacelle, Pitch and Hub. Figure shows a typical WTG with arrangement of different parts.



The detailed technical specifications of the WTGs involved in the project activity are as follows:

VESTAS V 82 WTG	
Parameters	**Details**
Operating Data Value	
Nominal Power	1650 KW
Cut-in Wind Speed	3.5 m/s
Cut-out Wind Speed	20 m/s
Maximum rotational Speed	14.4 rpm
Rotor Position	Upwind
Rotor & Blade	
Rotor Diameter	82 m
No. of rotor blade	3
Blade Material	Carbon Fibre/ Epoxy/ Wood
Blade length	40 m
Blade profile	FFA-W3, NACA 63.4
Air Brake	Full Blade
Rotational Speed (Synchronous)	14.4 rpm
Operating Range Rotational Speed	12-29 rpm
Rotor Tilt angle	5º
Swept area	5281m^2
Hub Height	78 m (Concrete)
Generator	
Rated Power	1650KW
Rotational Speed (Synchronous)	1012 RPM at rated power
Insulation Class	F/B
Protection class (IEC529)	F/B
Gear Box	
Gear ratio	1:70.2
Mechanical Power	1800 KW
Mechanical Brake System	
Type	Fail safe – Hydraulic release
Position	Mounted on High speed shaft
No of callipers	1 pc
Control system	
Manufacture	NEGM control systems
Type	Microprocessor based
Yaw System	
Yaw bearing, type	ball bearing, internal gearing
Yaw motor	6 Nos

Yaw gear	6 pcs
Gearing ratio	1/1666
Yaw brake	Hydraulic disc brake, 6 pcs

No transfer of technology is involved in the project activity from Annex-1 countries. Installation and operation of the wind power project does not pose any environmental hazards. The technology is environmentally safe and sound.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host Party)	The Ramco Cements Ltd - Private Entity (formerly Madras Cements Limited)	No

A.5. Public funding of project activity

>> The project does not involve any public funding from Annex – I countries.

A.6. History of project activity

>> The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA) and the proposed CDM project activity is not a project activity that has been deregistered.

The proposed CDM project activity was also not a project activity that was a CPA that has been excluded from a registered CDM PoA.

A.7. Debundling

>> Not Applicable

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

>> A. Approved consolidated baseline and monitoring methodology ACM0002 is used for the project Activity.
Title: ***"Consolidated baseline methodology for grid-connected electricity generation from renewable sources[8]"*** Version: 13.0.0

B. The additionality of the project activity shall be demonstrated and assessed using the
"Tool for the demonstration and assessment of additionality" (Version 07.0.0[9])

Other tools referenced in this methodology:
"Tool to calculate the emission factor for an electricity system" (Version 03.0.0[10])

B.2. Applicability of methodologies and standardized baselines

>> The project activity involves generation of electricity using the renewable sources i.e. wind. The project activity satisfies the applicability condition as described below:

[8] http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT
[9] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf/history_view
[10] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v3.0.0.pdf

This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).

The project activity is a grid connected renewable power generation project activity and
(a) The project is a Green field project (prior to the implementation of the project there was no renewable power plant operating at the project site)
(b) Does not involve any capacity addition
(c) Does not involve retrofitting of any or replacement of an existing plant

S.No	Applicability Condition	Justification
1	The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation 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 has installed wind turbine generators for generation of electricity that use renewable energy source wind. Hence, it satisfies the applicability condition.
2	In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use option 2 on page 10 to calculate the parameter $EG_{PJ,y}$): 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 or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	The project activity is a Greenfield setup and does not involve capacity additions, retrofits or replacements. Hence, this applicability condition is not relevant.
3	In case of hydro power plants, one of the following conditions must 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 reservoirs is increased and the power density of each reservoir, as per definitions given in the Project Emissions section, 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 definitions given in the Project Emissions section, is greater than 4 W/m^2.	The project activity is not a hydro power plant. The applicability condition is not relevant.
4	In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m^2 all the following conditions must apply: • The power density calculated for the entire project activity using equation 5 is greater than 4 W/m^2; • Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an	The project activity is not a hydro power plant. The applicability condition is not relevant.

	integrated project that collectively constitutes the generation capacity of the combined power plant; • Water flow between the multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; • Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m^2, is lower than 15MW; • Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m^2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs;	
5	The methodology is not applicable to the following: • 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; • A hydro power plant that results in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4 W/m^2.	As the project activity is neither a biomass fired power plant nor a hydro power plant. The project activity is a Greenfield wind power plant. Hence, there is no fuel-switch from fossil fuel to renewable energy source in the project activity. Thus project activity satisfies the applicability condition.

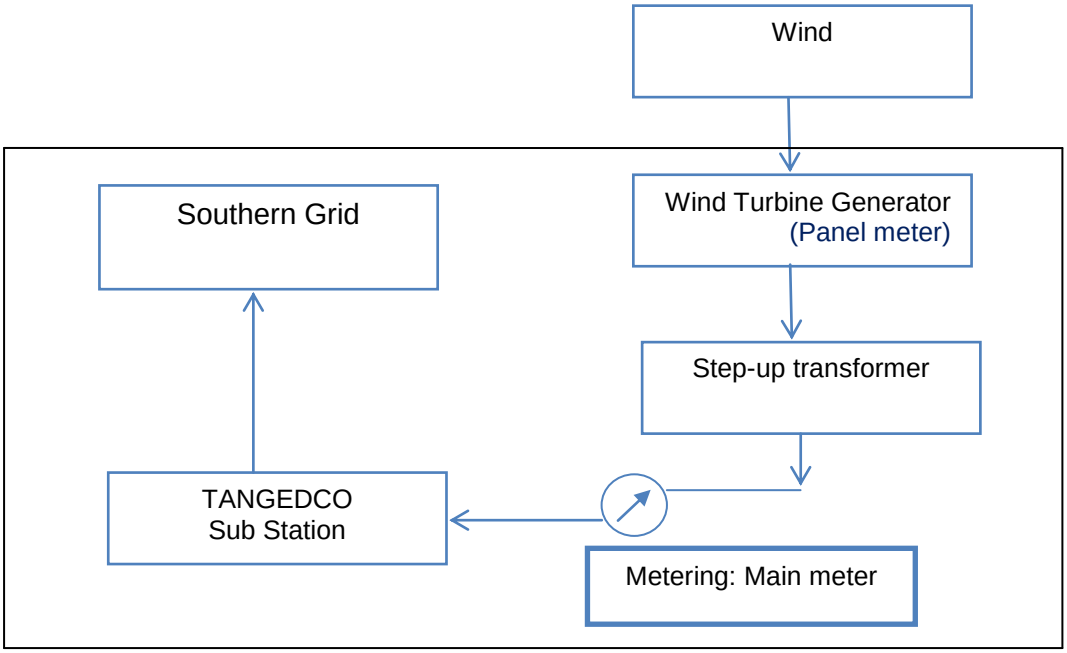
B.3. Project boundary, sources and greenhouse gases (GHGs)

>> As per the applicable methodology ACM0002 version 13.0.0, The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system[11] that the CDM project power plant is connected to. This project activity supplies electricity to the southern regional grid and hence the project activity encompasses the southern grid in this project activity also in the project boundary. The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table.

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	Main emission source
		CH_4	No	Minor emission source, excluded for simplicity
		N_2O	No	Minor emission source, excluded for simplicity
Project scenario	Electricity Generation by Wind turbine generators	CO_2	No	As per ACM0002 version 13.0.0, Wind energy project which does not create any GHG emissions.
		CH_4	No	The project activity is a renewable energy project which does not create any GHG emission.
		N_2O	No	The project activity is a renewable energy project which does not create any GHG emission.

[11]Refer to the latest approved version of the "Tool to calculate the emission factor for an electricity system" for definition of an electricity system.

Project Boundary



B.4. Establishment and description of baseline scenario

>> The project activity involves installation of new WTGs for the generation of electricity. This project activity comprises 12 WTGs and the generated electricity from the project activity is exported to TANGEDCO (formerly known as TNEB*), integral part of Southern Grid. The southern grid, which is the relevant one, possesses a mix of generation types with fossil fuel fired power plants in dominance.
Hence, as per the methodology ACM0002 version 13.0.0, the baseline scenario applicable is:

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

** As per Government Order Ms No 114 dated 08/10/2008, Government of Tamil Nadu, regarding re-organisation of TNEB, the subsidiary Tamil Nadu Generation and Distribution Corporation Ltd (TANGEDCO) has become the current State Electricity Utility with respect to generation and distribution of electricity in the state of Tamilnadu*.

Determination of emission factor figures have been calculated and provided in section B.6.1 of this PDD.

Data / Parameter used to determine the baseline scenario

Parameters	Value	Nomenclature	Source
EF grid CM, y	0.8970 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y (Southern grid)	Calculated as the weighted average of the operating margin (0.75) & build margin (.25) values, sourced from Baseline CO_2 Emission Database, Version 7.0, published by Central Electricity Authority (CEA), Government of India
EF grid,OM, y	0.9513 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2008-09, 2009-10, 2010-11) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 7.0, published by Central Electricity Authority (CEA), Government of India
EF grid,BM, y	0.7339 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 7.0, published by Central Electricity Authority (CEA), Government of India

EG PJ,y (Variable)	41211.2 MWh	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in a year y	Calculated;

B.5. Demonstration of additionality

>> The project activity is displacing equivalent amount of electricity that would otherwise have been generated from the operation and expansion of the fossil fuel based power plants in the Southern regional grid, hence reducing the emission of Green House Gases. Within the scope of the adopted baseline methodology, "Tool for the demonstration and assessment of additionality", Version 07.0.0 has been used to demonstrate the additionality.

As per "**Tool for the demonstration and assessment of additionality", Version 07.0.0, t**he step-wise approach to demonstrate and assess additionality is presented below:

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

Step 1- Identification of alternatives to the project activity;

Step 2- Investment analysis to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible;

Step 3- Barriers analysis; and

Step 4- Common practice analysis.

Step 0 – ***Demonstration whether the proposed project activity is the first-of its-kind***
This step is optional and PP has not chosen the same as the demonstration of additionality is not by means of the first-of-its-kind.

Step 1: ***Identification of alternatives to the project activity consistent with current laws and regulations***
Here the realistic and credible alternatives to the project activity(s) are defined through the following Sub-steps:

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

Alternative 1:- ***The proposed project activity undertaken without being registered as a CDM project activity;***

Alternative 2:- ***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, taking into account, where relevant, examples of scenarios identified in the underlying methodology;***

Alternative 3:- If applicable, continuation of the current situation (no project activity or other alternatives undertaken);

Outcome of Step 1a: Of the above three alternatives, Alternative (3) stands out to be the most plausible baseline scenario, since in the absence of project activity, the current situation would have continued, i.e. power generation from existing thermal power plants using fossil fuels and undertaking business as usual maintenance. The additional power generated under the project would be generated in existing and new grid-connected power plants in the electricity system.

Sub-step 1b: ***Consistency with mandatory laws and regulations:***
All the alternatives described in sub step 1a are in compliance with all mandatory applicable legal and regulatory requirements. Hence, the proposed project activity is not the only alternative that is in compliance with all mandatory applicable legal and regulatory requirements.

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

National and sectoral policies relevant to project activity:

Electricity generation from wind farm is not a legal requirement or a mandatory choice. There are states and sectoral policies which are primarily framed to encourage wind based power project to attract more private investment as there are many anticipated risks under the project and requires good amount of equity to be involved. The Indian Electricity Act of 2003 does not restrict or empower any authority to restrict the fuel choice for power generation. In addition, it may be noted that the draft National Electricity Policy (revised in August 2004) asserts 'coal would necessarily continue to remain the major fuel'. The applicable environmental regulations do not restrict the use of wind energy for power generation.

The Electricity Act, 2003 provides an enabling framework for accelerated and more efficient development of the power sector. The Act seeks to encourage competition with appropriate regulatory intervention. Competition is expected to yield efficiency gains and in turn result in availability of quality supply of electricity to consumers at competitive rates.

The Section 3 (1) of the Electricity Act 2003 requires the Central Government to formulate, inter alia, the National Electricity Policy in consultation with Central Electricity Authority (CEA) and State Governments. The provision is quoted below:

"The Central Government shall, from time to time, prepare the National Electricity Policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy".

Further, as per section 5.2.12 of the National Electricity Plan:

Even with full development of the feasible hydro potential in the country, coal would necessarily continue to remain the primary fuel for meeting future electricity demand. The National Electricity Plan also emphasizes the use of other fossil fuel like gas, LNG, Lignite, other imported fossil fuels in meeting the future electricity need.

Outcome of Step 1b: The above identified realistic and credible alternative scenarios to the project activity are in compliance with all mandatory legislation and regulations, taking into account the enforcement in the host country and EB decisions on national and/or sectoral policies and regulations.

The project activity has crossed sub-step 1 of additionality demonstration, and hence this assessment has moved to the next step 2 investment analysis. The project activity demonstrated additionality through investment analysis only and did not opt for barrier analysis.

Step 2: *Investment analysis*
To conduct the above analysis, following Sub-steps has been followed

Sub-step 2a: *Determine appropriate analysis method*
As the project generates income other than the CDM benefits (revenues from the sale of electricity to the grid), Option I that is the Simple Cost Analysis cannot be applied in this case. Among the two options- Investment Comparison analysis (Option II) and Benchmark analysis (Option III), the benchmark analysis has been applied for investment analysis. The financial indicator chosen is the internal rate of return of the project activity.

Sub-step 2b: *Option III. Apply benchmark analysis*
Since it is a predominant investment decision in non core business, the management was particularly interested in the return of the investment as 100% equity is employed for the project activity. Hence an

investment analysis of the project activity was conducted considering equity IRR (Post-tax) as the financial indicator.

As per Guidelines on the Assessment of Investment analysis, version 05, annex 5 of EB 62, it states under guidance 12 that "***In cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate if the DOE can validate that they are applicable to the project activity and the type of IRR calculation presented."***

And under guidance 15 it states that ***"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. The values in the table in Appendix A may also be used, as a simple default option, if a company internal benchmark is used.***

Selection of Benchmark
The equity IRR (Post -tax) of the project activity has been computed over a period of 20 years and then compared against a benchmark return. The approach that has been used to arrive at the benchmark is explained below

As per paragraph 38 (b) of the additionality tool '*Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects;'*. The capital structure of the project involves only equity component.

The cost of equity has been determined based upon the Capital Asset Pricing Model (CAPM). CAPM is an economic model which is used towards assigning value to any stocks, securities, derivatives by means of relating risk and expected return. The underlying algorithm of CAPM is as follows

$$r = R_{f1} + Beta\ (R_m - R_{f2})$$

Where,

r = Expected return from a security
R_{f1} = Rate of a risk free investment
R_m = Expected market return
R_{f2} = Average Return of a risk free investment
Beta = Indicator towards measuring the volatility of the security, relative to the asset class.

It is apparent from the above equation that the expected return from a security is the return of a risk-free investment plus Beta times the difference between the expected market return and the return from the risk-free investment (termed as market risk premium). Hence CAPM justifies that the expected return of an investor should be commensurate with the higher expected risk of the investment.

In words, the algorithm says,
Expected Return from a security = Risk free return + Market risk Premium * Beta

Thus, in order to apply CAPM, the following estimates are required

- Risk Free rate
- Market Risk Premium
- Beta

Risk Free Rate
The risk free rate is the return on a security (or a portfolio of securities) that is free from default risk. Typically, the rates of long term government bonds are used to determine the risk free rate. In the context of the present project activity YTM (Yield to Maturity) at primary issues over a period of 20 years has been considered to represent the risk free rate. The value is 7.80[12]%.

[12] http://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/83484.pdf

Market Risk Premium
The market risk premium is the difference between the expected market rate of return and the average risk free rate and is typically measured by looking at the average of the historical returns on a market portfolio.

In the context of the present project activity, the period of January - 1991 to March - 2007 has been selected to calculate the average risk free return and a period of April 1979 to March 2008 has been selected to calculate the expected market rate of return.

Average Risk Free return
The geometric mean of government dated securities from the year 1991 to 2007[13] represents the average risk free return. In the context of the present project activity this value is 10.04 %.

Expected market rate of return
In the context of the present project activity, the period of 1979 to 2008 has been selected to calculate the expected market return. The stock index (Bombay Stock Exchange)[14] over a period of 29 years (01/04/1979 to 31/03/2008) prior to the investment decision making has been used towards determining the market return (R_m). The market return during that period has been estimated at 19.03 %. Thus the market risk premium estimated is

Market risk premium (R_m – Rf_2) = 19.03 % – 10.04 %
= 8.99%

However the market risk premium should not be viewed on a standalone basis.
The overall risk premium depends on market risk premium as well as on a parameter called Beta, which is explained below

Beta:
Equity Beta is the measure of the expected volatility of a particular stock relative to a well-diversified market portfolio. It measures the systematic risk of a stock, i.e. the risk that cannot be eliminated in a well-balanced, diversified portfolio. The beta of equity is calculated as the covariance between its return and the return on a well-diversified market portfolio, divided by the variance of the return on a well diversified market portfolio.

Equity Beta (e) = Covariance (r, rm) / Variance (rm)
Towards determining the value of Equity Beta, listed companies which are also involved in the similar business domain have to be compared.

In India, the only power generating company that has its presence entirely in the wind sector is BF Utilities. However, the other listed companies which are also involved in the similar business domain have been compared. The data for all these companies were regressed individually with the overall market data which gave the 'equity beta' or 'beta levered' (βe) for all these companies.

Thus, the average equity beta value has been calculated - 1.48. PP has further calculated the unlevered beta– 1.11 which has been used in the computation of benchmark.

Hence, after accounting for all the variables discussed above the expected return on equity is

Expected Return on Equity = Risk free return + Market risk Premium * Beta
= 7.80 % + (8.99%) * 1.11
= 17.77 %

An investment analysis of the project activity was conducted considering equity IRR (Post-tax) as the financial indicator. The equity IRR (Post -tax) of the project activity has been computed over a period of 20 years and then compared against the benchmark return of 17.77 % which has been established based upon the tool for the demonstration and assessment of additionality, version 07.0.0.

Sub-step 2c. Calculation and comparison of financial indicators

The internal rate of return (IRR) on investment as financial indicator is one of the known financial indicator used by banks, financial institutions and project developer for making investment decision. The financial indicator chosen is the internal rate of return of the project (equity IRR) as suggested by additionality tool. For the investment analysis a useful life of 20 years has been considered for projections of cash flow.

[13] http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/80303.pdf
[14] http://www.bseindia.com/histdata/hindices.asp

Parameters	Values	Sources
No. of WTG	12.0	Vestas Techno Commercial offer, Dated 20.06.2008
Capacity of each WTG (MW)	1.650	Vestas Techno Commercial offer, Dated 20.06.2008
Installed Capacity (MW)	19.8	Vestas Techno Commercial offer, Dated 20.06.2008
Installed Capacity (MW)	1374.0	Vestas Techno Commercial offer, Dated 20.06.2008
PLF	23.76%	Third Party PLF Study Report
Net Electricity transported to grid (GWh)	41.2112	Calculated
Electricity price from grid (INR/kWh)	2.90	TNERC Tariff Order 2006, pg 91
Insurance Cost (% of the project Cost)	0.75%	TNERC Tariff Order 2006, pg 90
% Reduction in Insurance Cost per year after 5th year	0.50%	TNERC Tariff Order 2006, pg 90
Employee expenses (INR.Million / MW/WTG)	0.04	Based on MCL past data (Trail Balance)
Administrative expenses (INR.Million / MW/ WTG)	0.05	Based on MCL past data (Trail Balance)
O & M Expenses (INR.Millions per WTG)	1.260	Techno Commercial offer
Escalation every year after 2nd year.	7.5%	Techno Commercial offer
MAT Rate	11.33%	IT Rule http://finance.indiamart.com/taxation/ corporate_tax/index.html
Corporate Tax Rate	33.99%	IT Rule http://finance.indiamart.com/taxation/ corporate_tax/index.html, http://elagaan.com/india-taxinfo/ income-tax-rates
Project Cost (INR.Millions)	1374.0	Techno Commercial offer
Debt	0%	
Equity	100%	MCL Own Fund
Emission Factor (tCO_2/GWh)	897	CEA Database Version 7

The equity IRR (Post-tax) with and without CDM for the project activity is provided in Table below:

Table: Equity IRR (Post-tax) with and without CDM funds

Company	Equity IRR (Post-tax) without CDM (%)
The Ramco Cements Ltd	**2.85%**

It is evident that the CDM project activity has a less favourable indicator (lower IRR) than the benchmark. Thus, as per EB 70 annex 8 paragraph 42 b, the project activity cannot be considered as financially attractive.

Sub-step 2d. Sensitivity analysis

In accordance with the EB 62 Annex 5, 'Guidelines on the assessment of Investment analysis' para 20, "*Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude), and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets. Where a DOE considers that a variable which constitute less than 20% has a material impact on the analysis they shall raise a corrective action request to include this variable in the sensitivity analysis.*"

The identified project being a grid connected renewable energy power generation activity would be extremely susceptible to the annual generation which in turn is a function of the availability of wind in the region. The Plant Load Factor (PLF) indicates the extent of energy used out of the available energy. The PLF for the WTGs 23.76% affects the total project revenues. Similarly, tariff for the sale of electricity also affects the total project revenues directly. Hence, Plant Load Factor of the project activity and tariff are considered as the most suitable variable parameters to carry out the sensitivity analysis. However, other significant parameters are also considered in the sensitivity analysis. Following are the parameters:

1. Plant Load Factor (PLF)
2. Project Cost
3. O & M Cost
4. Tariff

In accordance with the para 21 of 'Guidelines on the assessment of Investment analysis', "*Past trends may be a guide to determine the reasonable range. As a general point of departure variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances."* Therefore, above parameters are subjected to +10 % and -10% variation range and the results of this variation are presented below[15]

Table : **Sensitivity analysis**

Parameter	+10%	Base Case	-10%
PLF	4.51%	2.85%	1.31%
Project Cost	1.79%	2.85%	4.31%
O & M Cost	2.52%	2.85%	3.16%
Tariff	4.51%	2.85%	1.31%

The financial analysis shows that the project is not the most financially attractive alternative, and the sensitivity analysis shows that it is unlikely to be financially attractive compared to the benchmark under reasonable variations in the assumptions. However, the revenue from the CERs will greatly improve the financial feasibility of the proposed project.

Comparison against the benchmark of 17.77 %

Thus in light of the above discussion it can be concluded that the project activity is not the most economically attractive option without CDM revenues. Even with a 10 % increase in the PLF and tariff, which is highly unlikely considering prevailing trends, the IRR remains well below of the benchmark, if CDM benefits are not opted for. As apparent, CDM funds would certainly enable the project activity in ensuring financial sustainability to a certain extent. However, to make the assessment more transparent and explicit a detail analysis has been carried out in the IRR spreadsheet for different range of variations to check the limits (for each sensitive parameter) at which the IRR touches or crosses the benchmark.

The project IRR can cross the benchmark in the scenarios as shown below:

Variation in PLF	97.74%
Variation in Project Cost	-53.91%
Variation in O&M Cost	-665.50%
Variation in Tariff	97.74%

But the above scenarios are highly optimistic. As seen from the analysis, IRR of the project will cross the benchmark only when the PLF goes beyond 97.74% which would lead to the average annual PLF of 47% which is highly optimistic scenario. As per the third party PLF study report the overall PLF is found to be 23.76% for Vestas WTGs which is considered for the project activity in accordance with the para 3b of the EB 48 Annex 11. PP has also checked the sensitivity with the PLF 26.7% provided by the TNERC in TNERC Tariff order 2006 and found that the IRR will not cross the benchmark up to the variation of 76% which is also an optimistic scenario. Also, the IRR will cross the benchmark only when the project cost goes below - 3.91% (i.e. INR 633.28 Million), but the same is not possible as the project has already got commissioned and the actual cost is INR.1362.0 Million as per the purchase order. The variation of - 665.5% in O&M cost is not a realistic scenario as at this variation the O&M cost will become negative. Furthermore, the IRR will not touch the benchmark up to the increase of tariff by 97.74% i.e. up to the tariff @ 5.73 Rs/kWh. But such a higher power tariff would be too optimistic to accept as the project has already got commissioned and PPA signed @3.39 Rs./unit tariff, which is fixed for 20 years of time.

Hence, in view of the above it is concluded that project activity is unlikely to be the most financially attractive proposition without availing the CDM benefits.

[15] Results are transparent and can be reproducible in the MCL financial spreadsheets

Step 4. Common Practice Analysis

The proposed CDM project activity (ies) applies measure(s) that are listed in the definitions section of the 'Tool for the demonstration and assessment of additionality', version 07.0.0. Hence, PP has followed the substep 4a and demonstrated the common practice analysis[16] as per the EB69 Annex 8 through the following sub-steps:

Sub-step 4a. Analyze other activities similar to the proposed project activity:

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

The Project is an electricity generation project with installed capacity of 19.8 MW. Basing on the applicable output range is calculate as +/-50% of the design output or capacity, the applicable output range of the proposed project is the installed capacity between 9.9 MW – 29.7 MW.

Step (2): In the applicable geographical area, identify all plants (both CDM and non-CDM) that deliver the same output or capacity, within the applicable output range calculated in Step (1), use the same energy source/fuel and feedstock as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM project activities shall not be included in this step.

Identification of the applicable geographical area:
As per the para 1 of the Annex 8 of EB 69, applicable geographical area should be the entire host country i.e. India. However, as per the para 1 **"**Project participants may provide justification that the applicable geographical area is smaller than the host country for technologies that vary considerably from location to location depending on local conditions"

Project participant has selected the option'd' of the para 4 of EB 69 Annex 8 i.e **"Investment climate on the date of the investment decision"** for selection of applicable geographical area.

In India, every state has its own State Electricity Regulatory Commission (SERC) and Electricity Boards (power off takers). Each SERC issues its own wind energy tariff order (in renewable tariff order) on regular basis considering various factors (e.g. PLF, project cost, tariff etc). Hence, the investment climate for any project activity depends on that state prevailing regulatory framework and promotional policies during the investment decision.

Due to such state specific SERC wind energy orders, Investment Climate in each state varies significantly. Therefore, as the project activity is located in Tamilnadu, due to its unique "Investment climate", only Tamilnadu state has been chosen as the applicable geographical area for the common practice analysis.

Identify the output and its range:

The Project activity is a wind power project, and its output is electricity. Thermal power, geothermal power, hydropower power, biomass power, solar power, nuclear power and tidal power can produce the same output as wind, i.e. generating electricity to the grid. As mentioned in Step (1), the applicable output range of the proposed project is installed capacity between 9.9 – 29.7 MW.

Identify the same energy source/fuel feedstock:

The project activity is a wind power project that takes use of wind energy to produce electricity for the purpose of supplying renewable electricity to the grid. Therefore, only wind power plants have been considered as similar projects in the analysis.

Identify the applicable time range:

The wind power project installed prior to September 2001 in Tamil Nadu was governed by Ministry of New and Renewable Energy (MNES) policy which offered an annual escalation of 5 % every year over the base year. However, MNES policy which is applicable to all states of India was superseded by the regional state regulatory order wherein project commission after Sep 2001 is governed by TNERC order.

[16] Common Practice Analysis data sources and references are provided in Annexure -2

The TNEB order 2001 offered a fixed tariff without escalations. Hence, project prior to September 2001 is not considered for common practice analysis. The comparisons of similar projects are limited to wind power projects that are commissioned up to 22nd July 2008 (Start date for the Project activity.)

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}.

It has been observed[17] from wind directory and UNFCCC website that in Tamil Nadu, wind power project development is substantiality dependent on revenue from sale of carbon credits and wind energy generation without this additional revenue stream is not widely observed[18].

Hence, **$N_{all} = 0$**

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 explained above, only wind power plants have been considered as similar projects in the analysis. It has been found that there are 29 wind power projects within the +/- 50% project capacity range and all these projects are under different stages of CDM cycle.

Hence, $N_{diff} = 0$
i.e. $N_{diff} = N_{all}$

Step (4): Calculate factor $F=1 - N_{diff} / N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

$F = 1 – N_{diff} / N_{all} = 1 – 0 / 0$ = no value / cannot be defined.

$N_{all} – N_{diff} = 0 < 3$

The proposed project activity is not a "common practice" within the sector in the applicable geographical area as $N_{all} - N_{diff}$ is less than 3.

Sub-step 4b. Discuss any similar options that are occurring:

According to the demonstration in sub-step 4a, parameter F is greater than 0.2, and $N_{all} – N_{diff}$ is smaller than 3. It could be concluded that, the proposed project should not be considered as a common practice within the applicable geographical area. As analyzed above, the project is not a common practice.

Prior Consideration of CDM
Awareness of CDM prior to the start date of project activity, CDM consideration and real action taken towards securing CDM status has been demonstrated by the project participant in line with the para 28 of the Project Standard.

CDM revenue has been considered for determining the project cash flows towards analysing the financial viability of the project activity during the project designing stage itself. The certified true copy of the Board Resolution evidences CDM consideration and other related third party communication is made available to the DOE during validation.

It is to be noted that for the WTGs that were installed prior to the start date of the project activity MCL was developing a bundled CDM project. A consultant and DoE were appointed to carry out the CDM advisory services for that particular project. The PDD for the bundled project was webhosted on the UNFCCC web site (http://cdm.unfccc.int/Projects/Validation/DB/AOLO0C51SE7IUL19FP3B27HORLRSK0/view.html) for global stakeholder comments during April 2006 – May 2006, which clearly indicate that MCL had awareness of CDM prior to the conceptualization of current project activity and CDM has been an integral and essential part for MCL to develop wind power project.

[17] Supporting documents has been provided to DOE for validation.
[18] Refer Annex 2

Initially Madras Cements Limited has started the current CDM project activity with capacity 46.2 MW. A consultant and a DOE were appointed to carry out the CDM advisory services for the project. The PDD for the project was webhosted on the UNFCCC website for global stakeholder comments[19]. However on account of the significant amount of delays and hold ups that the project was experiencing and unsatisfactory performance of the consultant in this project, the project proponent went ahead and appointed a new consultant for their WTGs on 28th August ' 2007. Also, in due course of time and the delay in CDM revenue the management has decided to sell out 33 of the WTGs of Enercon make commissioned in 2009 in Tirpur & Dindigul district of Tamil Nadu which was the part of MCL 46.2MW CDM[20] wind project.

The table below explains in detail the chronology of event

Date	Chronology of Events
28/5/2008	Proposal from Enercon for supply of WTG
20/6/2008	Proposal from Vestas for supply of WTG
4/7/2008	MCL Board decision to invest in the project activity of total capacity 46.2 MW with consideration of CDM revenues.
22/07/2008	MCL Letter of Intent (LoI) issued to Vestas for purchase of WTGs (project activity start date)
12/12/2008	MCL Letter of Intent (LoI) issued to Enercon for purchase of WTGs
Sep 08 to Mar 09	Commissioning of the WTGs.
28/10/2008	MCL has conducted CDM Local stakeholders meeting for the project activity.
21/04/2009	Appointment of DoE for the validation of project activity
23/06/2009	PDD web hosted for global stakeholder commenting period on UNFCC
24/02/2010	Project submitted to host country Designated National Authority (MoEF) for getting the Host Country Approval for the project activity.
29/04/2010	Date of DNA Meeting for Host Country Approval
17/6/2010	Submission of Draft Validation report by TUV Nord
2/8/2010	MCL Board has decided to sell 33 numbers of the Enercon make WTGs and passed a Board Resolution
30/09/2010	MCL has sold the WTGs to the RML and Group concern.
7/12/2010	Communication with CDM consultant intimating the selling of wind machines and seeking advice for further proceeding with CDM post selling of 33 WTGs of Enercon make of capacity of 0.8 MW each.
14/2/2011	Communication between RML & MCL regarding to further proceeding of project under CDM.
4/4/2011	MCL Board has decided to move with 19.8 MW capacity as a separate CDM Project activity.
9/5/2011	MCL communicated the board decision to CDM consultant and asked for proposal for the revised capacity and the other formalities to be done.
23/09/2011	MCL signed the CDM Consultancy agreement for revised capacity- 19.8MW with Ecoinvest Carbon SA
Feb - March 2012	MCL submitted the withdrawal request for 46.2 MW project to the DOE appointed for the 46.2 MW project and communicated with the DOE for validation quotation for the revised capacity i.e. -19.8MW.
12/3/2012	Appointment of the BVCH for 19.8 MW project.
15/03/2012	Termination of contract with the DOE (TUV)
6/06/2012 – 05/07/2012	19.8 MW PDD[21] Webhosted for global stakeholder comment on UNFCCC website.
28/09/2012	19.8 MW DoE Validation Site visit

[19] https://cdm.unfccc.int/Projects/Validation/DB/OB98HGOB9W6DUNN60IUBED9VHZRTUQ/view.html
[20] http://cdm.unfccc.int/Projects/Validation/DB/OB98HGOB9W6DUNN60IUBED9VHZRTUQ/view.html
[21] https://cdm.unfccc.int/Projects/Validation/DB/Q861X5CIWDLQSWCRTY3HP0MHMBDM7S/view.html

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

>> The methodology chosen for the project activity is ACM0002 (version 13.0.0) "*Consolidated Methodology for the grid connected renewable electricity generation*"

Description of formulae used to estimate baseline emissions (emissions units of tCO_2e):
According to the approved methodology ACM0002 (Version 13.0.0) emission reductions are calculated as per equation 11.

$ERy = BEy – PEy$

Where:
ERy = Emission reductions in year *y* (t CO_2e)
BEy = Baseline emissions in year *y* (t CO_2e)
PEy = Project emissions in year *y* (t CO_2e)

According to the baseline methodology ACM0002 (Version 13.0.0), the GHG emission of the project activity within the project boundary is zero, i.e. PEy = 0.

Therefore the above equation is simplified to
ERy = BEy

Baseline emission calculation:
According to ACM0002 version 13.0.0, the 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 to be calculated as per equation **6** of the methodology as follows:

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

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

Calculation of $EG_{PJ,y}$

The project activity is the 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, then the calculation of $EG_{PJ,y}$ as per equation 7 of the applicable methodology for Greenfield renewable energy power plants:

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

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)

The applicable methodology ACM0002 version 13.0.0 refers to use of "Tool to calculate the emission factor for an electricity system" version 03.0.0. This tool provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{grid,CM,y}$	tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year *y*

$EF_{grid,BM,y}$	tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year *y*
$EF_{grid,OM,y}$	tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year *y*

Tool provides the following Steps for the calculation of 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

STEP 1: Identify the relevant electricity systems
The tool defines the project electricity system as 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. Keeping this into consideration, the Central Electricity Authority (CEA), Government of India (Host Country) has given the delineations of the project electricity system and the connected electricity system in India. As per CEA, the Indian Power System is divided into two Regional Grids, viz. NEWNE Grid and Southern Grid.

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

Since 2007-08, the four regional grids except the Southern Grid have been synchronized and they are now being considered as one and named as NEWNE Grid.

The project activity falls in Tamil Nadu which is a part of the Southern Grid, therefore, emissions generated due to the electricity generated by the Southern Grid, will serve as the baseline for this project activity.

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)
Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

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

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

The Project Participant has opted for Option I and hence chosen only grid power plants in the calculation. Option I corresponds to the procedure contained in earlier versions of this tool.

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

The calculation of the operating margin emission factor (EFgrid,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.

As per Emission Factor Tool, the simple OM method (Option a) can only be used if Low-Cost/Must-Run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

In India, as per available data with CEA Baseline Database, Version 7.0, the Low-Cost/Must-Run resources constitute 17.698% (NEWNE GRID) and 23.974% (Southern Grid) respectively (on the basis of average of five most recent years), which is less than 50% of total grid generation.

[22]Share of Low Cost / Must-Run (% of Net Generation)					
	2006-07	**2007-08**	**2008-09**	**2009-10**	**2010-11**
NEWNE	18.46%	19.04%	17.41%	15.94%	17.64%
Southern	**28.31%**	**27.10%**	**22.80%**	**20.65%**	**21.01%**
India	20.89%	20.98%	18.68%	17.06%	18.4%
Average of most recent 5 years (NEWNE Grid)	17.698%				
Average of most recent 5 years (Southern Grid)	23.974%				

The 'Simple Operating Margin' has been calculated as per the weighted average emissions (in tCO_2e/MWh) of all generating sources serving the system, excluding hydro, geo-thermal, wind, low-cost biomass, nuclear and solar generation; and therefore selected for calculation of operating margin emission factor for the project activity.

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

In the project activity, (*ex-ante*) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission has been considered. The data is published annually by the Central Electricity Authority. The CEA database version 7 is the latest available government data source at the time of webhosting of the PDD which is based on the "Tool to Calculate the Emission Factor for an Electricity System", Version 03.0.0.

It is confirmed that ex-ante vintage is considered in the project activity and cannot be changed during the crediting period.

Net Generation in Operating Margin (GWh)			
Grid	**2008-09**	**2009-10**	**2010-11**
Southern	**121471.25**	**134716.87**	**137,387**
Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
Grid	**2008-09**	**2009-10**	**2010-11**
Southern	**0.9729**	**0.9415**	**0.9418**
Generation-Weighted Average Emissions (tCO_2/MWh) for Southern Grid			**0.9513**
Parameter	**Value**	**Source**	
Operating Margin Emission Factor ($EF_{grid,OM,y}$)	0.9513 tCO_2e/MWh	The OM is based on ACM0002, Version 13.0.0 [23](As calculated in CEA Database for Grid Emission Factor)	

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

In terms of vintage of data, project participants can choose between one of the following two options:

[22] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
[23] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

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 project participant has chosen Option 1 for vintage of the data.

As per the CEA CO_2 Baseline Database, the BM for the 2010-11 has been calculated to be $EF_{grid, BM,y}$ = 0.7339 tCO_2e/MWh.

Build Margin (tCO_2/MWh)			
Grid	**2008-09**	**2009-10**	**2010-11**
Southern	0.8179	0.7634	0.7339
Build Margin (tCO_2/MWh) for Southern Grid			**0.7339**

STEP 6: Calculate the combined margin emissions factor
The weighted average CM method (option A) is preferred for calculation of combined margin emission factor. As per equation 14 of the "Tool to calculate the Emission Factor for an electricity system":

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

Where:
$EF_{grid,OM,y}$: Operating Margin CO_2 emission factor in the year *y* (tCO_2/MWh)
W_{OM} : Weighting of operating margin emission factor (%)
$EF_{grid,BM,y}$: Build Margin CO_2 emission factor in the year *y* (tCO_2/MWh)
W_{BM} : Weighting of build margin emission factor (%)

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

Thus, the Combined Margin Emission Factor ($EF_{grid, CM, y}$) for the project has been calculated to be **$EF_{grid,CM,y}$ = 0.8970** and is fixed for the entire crediting period.

In the project activity, **Combined Margin Emission Factor has been chosen as the Grid Emission Factor**.

Parameter	**Value (tCO_2/MWh)**
Operating Margin Emission Factor ($EF_{grid,OM,y}$)	**0.9513**
Build Margin Emission Factor ($EF_{grid,BM,y}$)	**0.7339**
Combined Margin Emission Factor ($EF_{grid,CM,y}$)	**0.8970**

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{grid,OM,y}$
Data Unit	tCO_2 / MWh
Description	Operating Margin CO_2 emission factor for southern grid in the year y
Source of data	Central Electricity Authority "CO_2 Baseline Database for the Indian Power Sector" Version-7
Value(s) applied	0.9513
Choice of data or Measurement methods and procedures	The database is Government of India‟s official publication based on the "Tool to calculate the emission factor for an electricity system" version 03.0.0 and the values are taken based on the generation – weighted average of the latest 3 year (2008-09, 2009-10, 2010-11). http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EF_{grid,BM,y}$
Data Unit	tCO_2 / MWh
Description	Build margin CO_2 emission factor for southern grid
Source of data	Central Electricity Authority "CO_2 Baseline Database for the Indian Power Sector" Version-7
Value(s) applied	0.7339
Choice of data or Measurement methods and procedures	The database is Government of India‟s official publication based on the "Tool to calculate the emission factor for an electricity system" version 03.0.0. http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Purpose of data	Calculation of baseline emissions
Additional comment	Build margin value available for the recent year

Data / Parameter	$EF_{grid,CM,y}$
Data Unit	tCO_2 / MWh
Description	Combined Margin for Southern Grid
Source of data	Estimated figure based on the weighted average of OM and BM values calculated using data obtained from CEA database on CO_2 baseline emission factor for Indian Power Sector. Default weights of 0.75 and 0.25 have been ascribed to OM and BM respectively because of the intermittent and non dispatch able nature of wind energy.
Value(s) applied	0.8970
Choice of data or Measurement methods and procedures	The database is Government of India's official publication based on the "Tool to calculate the emission factor for an electricity system" version 03.0.0
Purpose of data	Calculation of baseline emissions
Additional comment	Combined Margin emission Factor for Southern Grid has been fixed ex-ante for the crediting period

B.6.3. Ex ante calculation of emission reductions

>>

Parameter	Value	Source
Total Installed Capacity	19.8MW	Techno Commercial offer, Dated 20.06.2008
Estimated PLF	23.76%	Third Party Report
Operating hours	= 24 X 365 = 8760 hr/year	
Total Electricity exported to grid (EG_{Export})	= 19.8 X 8760 X 23.76% = 41211.24 MWh	Calculated
Total Electricity Imported from the grid (EG_{Import})	Nil	Assumed for simplification. However, will be considered on actual as per JMR.
Quantity of net electricity generation supplied by the project plant/unit to the grid in year y ($EG_{facility,y} = EG_{PJ,y}$)	= Total Export-Total Import = 41211.24 MWh	
Combined margin CO_2 emission factor for Southern grid connected power generation in year y ($EF_{grid,CM,y}$)	0.8970 tCO_2/MWh	Calculated in accordance to the "Tool to calculate the emission factor for an electricity system"
Calculation of Baseline Emission		
Baseline emissions in year y (BEy) tCO_2/year	= $EG_{PJ,y}$ X $EF_{grid,CM,y}$ = 41211.24 X 0.8970 = 36966.48 tCO_2/MWh	Calculated
Project Emission	= 0 tCO_2/MWh	As per ACM0002 Version 13.0.0
Emission reductions are calculated as follows:		
Emission reductions (ERy) (t CO_2e/year)	= BEy – PEy = 36966.48 – 0 = 36966 tCO_2/Year	Calculated

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	36,966	0	0	36,966
Year 2	36,966	0	0	36,966
Year 3	36,966	0	0	36,966
Year 4	36,966	0	0	36,966
Year 5	36,966	0	0	36,966
Year 6	36,966	0	0	36,966
Year 7	36,966	0	0	36,966
Year 8	36,966	0	0	36,966
Year 9	36,966	0	0	36,966
Year 10	36,966	0	0	36,966
Total	3,69,660	0	0	3,69,660
Total number of crediting years	10 years			
Annual average over the crediting period	36,966	0	0	36,966

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{PJ,y}$
Data Unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y ($EG_{facility,y} = EG_{PJ,y}$)
Source of data	Joint Meter Reading (JMR)
Value(s) applied	41211.24
Measurement methods and procedures	Calculated. $EG_{PJ,y} = EG_{Export} – EG_{Import}$ The metering equipment is located at each WTG's location and the energy is metered by the TANGEDCO at the high voltage side of the step up transformers installed at each HTSC connection. Monthly meter reading is recorded by the authorized representatives of TANGEDCO in presence of the representative of Madras Cements Limited. Metering system for the project activity consists of one main (tri-vector) meter of accuracy class 0.2[24]. Gross electricity supplied to grid will be measured through meter readings of the two-way export/ import meter installed by TANGEDCO and net electricity supplied to the grid will be calculated as mentioned in above formulae by TANGEDCO. The procedures for metering and meter reading will be as per the provisions of the power purchase agreement. In the event when verification period dates and billing cycle (or dates of JMRs) of WTGs in the project activity, do not coincide data apportioning procedure will be adopted as per the procedure given under section B.7.3.
Monitoring frequency	Calculated based on monthly Joint Meter Reading
QA/QC procedures	Regular calibration of all the meters will be undertaken at required intervals as mentioned in PPA (or once in five years) and faulty meters will be duly replaced immediately with information to concerned Authority. Also the monthly reading of main meters will be taken by skilled technician to check the consistency of the meters, if during any reading difference of more than standard variation is found the faulty meter will be replaced with information to concerned authority. The detail procedure followed in case of faulty meter identification and consideration of electricity is provided in the section B.7.3. The same is conservative and will be used for the CDM monitoring as well. This can be verified with the net export monthly billing.
Purpose of data	Calculation of baseline emissions
Additional comment	Archiving: Data shall be maintained for the crediting period and period of two years after the end of the Crediting Period.

Data / Parameter	EG_{Export}
Data Unit	MWh
Description	Total Electricity Export to the Grid by the Project Activity
Source of data	Joint Meter Reading (JMR)
Value(s) applied	41211.24

Measurement methods and procedures	The metering equipment is located at each WTG's location and the energy is metered by the TANGEDCO at the high voltage side of the step up transformers installed at each HTSC connection. Monthly meter reading is recorded by the authorized representatives of TANGEDCO in presence of the representative of Madras Cements Limited. Metering system for the project activity consists of one main (tri-vector) meter of accuracy class 0.2[25]. Gross electricity supplied to grid will be measured through meter readings of the two-way export/ import meter installed by TANGEDCO and net electricity supplied to the grid will be calculated as mentioned in above formulae by TANGEDCO. The procedures for metering and meter reading will be as per the provisions of the power purchase agreement. In the event when verification period dates and billing cycle (or dates of JMRs) of WTGs in the project activity, do not coincide data apportioning procedure will be adopted as per the procedure given under section B.7.3.
Monitoring frequency	Monitoring Frequency is continuous with monthly recording of energy exported.
QA/QC procedures	Regular calibration of all the meters will be undertaken at required intervals as mentioned in PPA (or once in five years) and faulty meters will be duly replaced immediately with information to concerned Authority. Also the monthly reading of main meters will be taken by skilled technician to check the consistency of the meters, if during any reading difference of more than standard variation is found the faulty meter will be replaced with information to concerned authority. The detail procedure followed in case of faulty meter identification and consideration of electricity is provided in the section B.7.3. The same is conservative and will be used for the CDM monitoring as well. This can be verified with the net export monthly billing.
Purpose of data	Calculation of baseline emissions.
Additional comment	Archiving: Data shall be maintained for the crediting period and period of two years after the end of the Crediting Period.

Data / Parameter	EG_{Import}
Data Unit	MWh
Description	Total Electricity Import from the Grid by the Project Activity
Source of data	Joint Meter Reading (JMR)
Value(s) applied	Nil (Will be monitored and taken on actuals)
Measurement methods and procedures	The metering equipment is located at each WTG's location and the energy is metered by the TANGEDCO at the high voltage side of the step up transformers installed at each HTSC connection. Monthly meter reading is recorded by the authorized representatives of TANGEDCO in presence of the representative of Madras Cements Limited. Metering system for the project activity consists of one main (tri-vector) meter of accuracy class 0.2[26]. Gross electricity supplied to grid will be measured through meter readings of the two-way export/ import meter installed by TANGEDCO and net electricity supplied to the grid will be calculated as mentioned in above formulae by TANGEDCO. The procedures for metering and meter reading will be as per the provisions of the power purchase agreement. In the event when verification period dates and billing cycle (or dates of JMRs) of WTGs in the project activity, do not coincide data apportioning procedure will be adopted as per the procedure given under section B.7.3.
Monitoring frequency	Monitoring Frequency is continuous with monthly recording of energy exported.

QA/QC procedures	Regular calibration of all the meters will be undertaken at required intervals as mentioned in PPA (or once in five years) and faulty meters will be duly replaced immediately with information to concerned Authority. Also the monthly reading of main meters will be taken by skilled technician to check the consistency of the meters, if during any reading difference of more than standard variation is found the faulty meter will be replaced with information to concerned authority. The detail procedure followed in case of faulty meter identification and consideration of electricity is provided in the section B.7.3. The same is conservative and will be used for the CDM monitoring as well. This can be verified with the net export monthly billing.
Purpose of data	Calculation of baseline emissions.
Additional comment	Archiving: Data shall be maintained for the crediting period and period of two years after the end of the Crediting Period.

B.7.2. Sampling plan

>> Not Applicable, as the data and parameters monitored in section B.7.1 above are not to be determined by a sampling approach.

B.7.3. Other elements of monitoring plan

>> As the emission reductions from the project are determined by the number of units exported to the grid it is mandatory to have a monitoring system in place and ensure that the project activity produces and supplies the rated power at the stipulated norms. The sole objective of having monitoring system is to have a constant watch on the net electricity exported to the grid for the estimation of emission reductions.

The delivered energy is metered by the project proponents and TANGEDCO at the high voltage side of the step up transformers installed at each HTSC connection. The metering equipment is located for individual WTGs depending upon their location.

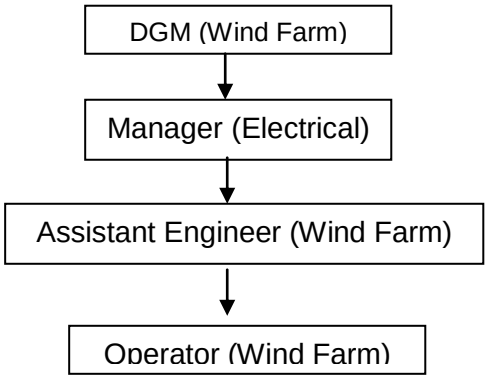
Metering equipment:
In accordance with electricity standards electronic tri-vector meters capable of recording and storing the parameters have been installed. The main meters are maintained and owned by TANGEDCO whereas the panel meters are maintained and owned by the equipment suppliers. The readings are recorded once in thirty days by the authorised representative of TANGEDCO in presence of the representative of Madras Cements Limited. The net electricity supplied to the grid is calculated (by deducting the quantum of power imported during off season for machine start up or any other requirement from the gross power supplied to the grid) and issued by TANGEDCO as a “Monthly statement”. The monthly statement is the basis of emission reductions.

The main meters and the meter boxes are kept sealed by the TANGEDCO and a joint inspection is carried out on behalf of Madras Cements Limited and TANGEDCO, in the presence of its authorised representatives. TANGEDCO hold the responsibility of carrying out calibration of all the metering instruments. The frequency of calibration of energy meters is proposed to be once in five years.

Organisation structure:
The day to day operation of the WTGs at the ground level is looked after by the operator. The operator reports to the Assistant Engineer (AE) - Wind Farm, who is responsible for collecting the required information from the operator. The AE – Wind Farm records the generation on a daily basis for each service connection point and reports the cumulative generation to the Manager - Electrical. The Manager – Electrical reports to the DGM – Wind Farm on a daily basis. The data will be archived in paper/electronic for two years beyond the crediting period by DGM.

[24, 25 & 26] As per the TANGEDCO notification process, all the energy meters with accuracy class of 0.5 during registration of project activity (except HTSC no 1554 which had 0.2 accuracy class) have been replaced by new meter of accuracy class 0.2.

The DGM – Wind Farm is responsible for overall operation of the WTGs. The organisation structure is given below in Fig B-2:



CDM internal audit
The same project management team (detailed in the organisation structure above) is responsible for carrying out the CDM related internal audit programme.

Training and operation and maintenance arrangement
Since the project promoter does not have experience in the area of wind energy, individual agencies having requisite experience in establishing wind power plants have been appointed by Madras Cements Limited so as to implement the identified project activity. Thus no training is required prior to the start of the project activity. All the agencies as appointed by Madras Cements Limited are responsible for operation and maintenance (O&M) of the installed WTGs. The related documentary evidences would be provided to the DOE during validation.

Procedures for maintenance of monitoring equipment
In the context of the identified project activity, main energy meter is the only equipment which is required to track the monitoring parameters. As per the Power Purchase Agreement (PPA) with TANGEDCO, all the energy meters and the meter boxes will be kept sealed by TANGEDCO. Hence TANGEDCO is responsible for maintenance of the main energy meter.

Procedures for handling data uncertainties
In the event of failure of energy meter:
The net electricity supplied to the grid by the project activity is the key parameter to be monitored. In the event of Faulty Meter which leads to replacement / change the following are the steps involved:
1. LCS Meter reading and EB meter readings are noted by site operators on daily basis.
2. If the EB energy meter found faulty then site operator will inform the concerned Electricity Board officials.
3. The Electricity Board officials will check the meter at site and if the meter is found faulty the meter would be replaced with the new energy meter.
4 The officials provide a billing recommendation to the electricity board to prepare the JMR. .Incase of minor fault EB officials found that there is no need to replace the meter then they will check and if needed calibration of the meter would be performed.

Further it may be noted that in case of failure of meter, during the period when the faulty meter is replaced by new calibrated meter, the WTG would not be in operation therefore the readings from the concerned WTG would not be available and hence no electricity generation and no emission reductions would be accounted for. In this context it is to be noted that there would be separate joint meter readings (JMRs) for the faulty meter and new meter (for the faulty meter up to the time of replacement and for the new meter from the time of replacing the old faulty meter).

As the emission reductions would be estimated based on JMRs, the readings during the period of replacement of old faulty meter by new meter would not be accounted for in the calculations.

Procedure for Data Apportioning
In the event when verification period dates and billing cycle (or dates of JMRs) of WTGs in the project activity, do not coincide:

Each WTG is equipped with the Integrated Electronic Meter which is connected to Central Monitoring System (CMS). The system continuously monitors the generation from each WTG. A daily consolidated report of the generation data is generated in the form of 'Daily Performance Report' and recorded.

The following procedure would be adopted to estimate the net electricity supplied to the grid during the specific period/ or days where there is a mis-match.
For example if the JMR date is 30th of a month whereas the crediting period starts on 15th of that month.

The net electricity supplied to the grid for that month will be calculated as below:

X	Sum of generation during partial days (i.e., from 15th to 30th) of the month recorded at Panel Meter (kWh)
Y	Total generation during the month recorded at Panel Meter (kWh/month)
Z = X / Y	Fraction of generation during partial days
B	Energy export as per JMR during the month (kWh/month)
(B * Z)	Net electricity exported for Partial days exported as per JMR will be used for emission reduction calculation (kWh)

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>> 22/07/08, the date of Purchase order of the first lot of WTGs under the project activity.

C.2. Expected operational lifetime of project activity

>> 20 years, 00 months

C.3. Crediting period of project activity

C.3.1. Type of crediting period

>> Fixed crediting period is chosen

C.3.2. Start date of crediting period

>> 25/09/2013 or expected date of registration of project activity whichever is later.

C.3.3. Duration of crediting period

>> 10 years, 00 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>> The project activity does not fall under the purview of Environmental Impact Assessment[27] notification of the Ministry of Environment and Forests (MoEF), Government of India (GOI) and the project activity is exempted from environmental clearances. The project activity has no significant impact on the environment. However, certain foreseen impacts due to the project activity are discussed below:

During construction
Impact on air
Movement of construction material during construction phase would have caused some air quality impacts which are negligible.

Impact on water
Proper sanitary arrangements were provided by project proponents and therefore impact on water was minimized.

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

Impact on Land use
The project proponents have bought the land for a worthwhile application (promoting renewable energy) and obtained necessary approvals for installation of windmills. There was no dislocation of people due to the project activity.

Impact due to noise
Personal protective equipments were provided to workers involved in the construction activity to mitigate the effects of noise pollution. However the project construction did not have impact on ambient noise levels.
Taking into consideration the project life cycle, the magnitude of the impacts during the construction phase is found to be negligible and would exist for a temporary period, till the end of construction phase. Therefore, it would not effect the environment considerably. The impacts on the environment due to construction activities of wind turbines are negligible.

Operation and Maintenance Phase
Systematic and scientific maintenance of all equipments has been undertaken to ensure the best safety standards.

Impact on air
Wind power plants do not contribute to atmospheric pollution as no fuel combustion is involved during any stage of the operation.

Impact on water
There is absolutely no effluent discharge during operation of wind turbine generators.

Impact on ecology
There are no known migratory birds/endangered species in the region of project activity. Therefore no harm on the ecological environment is envisaged.

Impact due to noise
Noise is generated due to the movement of rotor blades. Noise levels are much below the regulatory norms. It has no direct effect on the population, as the area is less populated and noise generated will be attenuated by ambient conditions

Conclusion
The net impact under environmental pollution category would be positive as all necessary abatement measures would be adopted and periodically monitored. The project activity does not have any major adverse impacts on environment during its construction or operational phase

D.2. Environmental impact assessment

>> The project activity does not fall under the purview of Environmental Impact Assessment notification of the Ministry of Environment and Forests (MoEF), Government of India (GOI) and the project activity is exempted from environmental clearances. The details of environmental impacts during construction and operational stages are already provided in section D.1 which indicates that the impacts are insignificant.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>> The following are the local stakeholders identified for the project activity:

- Local community
- Local village administration
- Tamil Nadu Generation and Distribution Corporation Ltd TANGEDCO

All the stakeholders have been invited through public notice on 25/09/2008. The documentary evidence towards the same will be submitted to the DOE during validation. Madras Cements Limited requested the stakeholders attended the meeting on 28.10.2008 to provide their comments on the project activity and have gathered the comments which are detailed below.

E.2. Summary of comments received

>> Stakeholders present in the meeting on 28.10.2008, appreciated the work done by Madras Cements Limited and thanked them for the various job opportunities created. Stakeholders were of the opinion that due to the establishment of the windmills, the following benefits have been achieved:

- Employment opportunities have increased;
- Standard of living has improved;
- Businesses are flourishing;
- Roads have been built and there has been a marked improvement in the infrastructure

The details of the minutes of the meeting with the comments received will be provided to the DOE during the validation. However, a compilation is presented in the table below:

Question/comment	Response
PP: Is the wind project helping our environment?	S.Manoharan: Yes, also provide electricity regularly. S.Vardharajan: Yes, also helps in improving infrastructure.
PP: What negative impact have you experienced for this project activity?	R.Ramachandran: No negative impact from the project activity. R.Anitha: There is no negative impact experienced from the project activity. It helps in reducing power cuts.
PP: Have you got any direct or indirect benefits from this project?	R.Ramchandran: Project will help in the development of new industries in the area. R.Anitha: Project will generate employment for local people. Thus increase in financial transaction in the area. S.Manoharan: Increase in employment, increase in general standards of living.
PP: Is there any other development witnessed because of this wind project	S.Manoharan: Project will help in development of roads of the area. R.Anitha: Increase in land value, increase in revenues to local bodies, improvements in roads R.Ramchandran: Project will improve the standard of living.
PP: Any Other Comment?	S.Manoharan: Project will lead to overall improvement in our area. R.Ramchandran: We feel windmill project have positive impact to us.

E.3. Consideration of comments received

>> There were no adverse comments received during the meeting.

SECTION F. Approval and authorization

>> Letter of Approval from host country Designated National Authority (Ministry of Environment & Forest, Government of India) (Dated: 23/04/2013) both has been received for the project activity and submitted to DoE.

Appendix 1. Contact information of project participants

Organization name	The Ramco Cements Limited (formerly Madras Cements Limited)
Country	India
Address	98 A , Dr. Radhakrishna Road , Mylapore 5th floor , Corporate Office , "Auras Corporate Centre" Chennai, Tamil Nadu – 600 004
Telephone	+9144 28478666
Fax	+9144 28478676
E-mail	ksn@madrascements.co.in
Website	ramcocements.co.in
Contact person	Mr. K. Selvanayagam

Appendix 2. Affirmation regarding public funding

No Public Funding from the parties included in Annex I to the Convention is involved for the project activity.

Appendix 3. Applicability of methodologies and standardized baselines

Justification of the choice of Methodology has been described in Section B.2.

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

[28]CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE			
Version	7.0		
Date	Jan 2012		
Baseline Methodology	ACM0002 / Version 13.0.0 and 'Tool to Calculate the Emission Factor for an Electricity System' Version 02.2.1, Annex 19 to EB 63		
Net Generation in Operating Margin (GWh)			
	2008-09	2009-10	2010-11
South	**121,471**	**134,717**	**137,387**
Simple Operating Margin (tCO2/MWh) (incl. Imports) (1) (2)			
	2008-09	2009-10	2010-11
South	0.97	0.94	0.94
(3 year) Generation-Weighted Average			
	118182391	126836567	129402715
	121471251	134716872	137387257
Operating Margin	0.9513		
Build Margin	0.7339		
Combined Margin Emission Factor (tCO2/MWh)	0.8970		

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

Appendix 5. Further background information on monitoring plan

Refer section B.7

Appendix 6. Summary report of comments received from local stakeholders

Refer section E.2

Appendix 7. Summary of post-registration changes

A permanent change to the registered PDD version 04 dated 10/08/2013 is being requested under this Appendix 7 of this PDD. In line with the Appendix to the CDM Project Standard for project activities Version 02.0, PP is requesting hereby a 'Post Registration Change' (PRC) submission with regard to the following:
a). Change in Project Participant name
b). Frequency of calibration of energy meters.

a). Change in Project Participant name
The name of the project participant has changed from "Madras Cements Limited" to "The Ramco Cements Limited". The change has been done *via Tamil Nadu Companies Registrar letter ref no. L26941TN1957PLC003566, dated 05 August 2013.*

b). Frequency of calibration of energy meters
The registered PDD prescribes that the Regular calibration of all the meters will be undertaken at required intervals as mentioned in PPA (or once in two years) and TANGEDCO holds the responsibility of maintenance / calibration of the energy meter. However, the actual and current situation is different.

There is delay in calibration witnessed in the project site which is not under the control of PP. During the current monitoring period, the project activity has experienced significant delay in meter calibration for which the registered frequency of calibration of once in two years could not be adhered. PP has given efforts to conduct regular/periodic calibration by means of follow ups with TANGEDCO requesting calibration/testing of the meters in the project site. However, there is no regular/periodic calibration activity conducted by TANGEDCO.

Therefore, in view of the above situation and uncertainty in meter calibration at TANGEDCO, PP is requesting for a permanent change[29] in the registered PDD to readdress the frequency of calibration. In this regard, PP has referred to the CEA notification 2006[30], which confirms that *"all interface meters shall be tested at least once in five years. These meters shall also be tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters"*. **Hence the revised frequency of all the energy meters installed in the project activity shall be once in five years.**

The relevant sections of this revised PDD (version 6.0, dated 11/06/2019) are updated to include the above mentioned changes.

[29]This PRC is in line with the Appendix to the CDM Project Standard for project activities Version 02.0.

[30]Reference: http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf.

Annexure – 1

Details of the WTGs locations

WTGs HTSC NO	WTG Capacity (KW)	Make	SF No	Wind Farm Location	Village/ District	Latitude	Longitude
U1550	1650	Vestas	340/C(P)	Periyapatti	Illuppainagaram Village, Tirpur district	N10 43.603	E77 11.729
U1551	1650	Vestas	357	Periyapatti	Illuppainagaram Village, Tirpur District	N10 43.697	E77 11.395
U1552	1650	Vestas	316/1(P)	Periyapatti	Illuppainagaram Village, Tirpur District	N10 43.624	E77 10.847
U1553	1650	Vestas	315(P)	Periyapatti	Illuppainagaram Village, Tirpur District	N10 43.103	E77 11.059
U1554	1650	Vestas	244/B,C, 224/A(P) 225/D,E	Periyapatti	Anikkadavu village, Tirpur district	N10 43.209	E77 10.711
U1555	1650	Vestas	218(P)	Periyapatti	Anikkadavu village, Tirpur district	N10 43.457	E77 11.357
U1565	1650	Vestas	118(P)	Periyapatti	Thottampatti Village, Tirpur district	N10 43.233	E77 11.343
U1566	1650	Vestas	427/2A(P)	Periyapatti	Virugalpatti, Tirpur district	N10 44.323	E77 1.553
U1567	1650	Vestas	379/1(P)	Periyapatti	Illuppainagaram Village, Tirpur district	N10 44.544	E77 10.850
U1568	1650	Vestas	284/3A(P),3 B (P) 280/2(P)	Periyapatti	Anikkadavu village, Tirpur district	N10 42.684	E77 11.108
U1569	1650	Vestas	204(P)	Periyapatti	Anikkadavu village, Tirpur district	N10 39.719	E77 11.786
U1574	1650	Vestas	105/2	Periyapatti	Thottampatti Village, Tirpur district	N10 39.191	E77 11.745

Annexure – 2

Common Practice Analysis Sources and References

S. No.	Investor Name[31]	Project Capacity (MW)	CDM Reference
1	Ambika cotton mills	13.8	"Bundled Wind power project in Tamilnadu, India co-ordinated by the TamilNadu Spinning Mills Association (TASMA)" http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXII12SBXNF29XDKVT2BCEWG
2	Arvind A Traders	19.3	The installations are under the PDDs titled 1) "16.45 MW bundled grid connected renewable energy project In Tamil Nadu, India" http://www.tuvdotcom.com/pi/web/PinDownload.xml?strUrlId=3&strUserId=&TUVdotCOMID=9105043814&strType=UserManualDownload&strDocumentID=19694&strTypeID=8&menuOption=process&isManualNeeded=true&isPictureNeeded=false&isRatingNeeded=false&isSecureNeeded=false&isIDNeeded=false&isTypeNeeded=true&isHolderNeeded=true 2) 37.6 MW Bundled Wind Power Project in Nagercoil, Tamilnadu http://www.dnv.com/focus/climate_change/Upload/Nagercoil%20PDD.pdf
3	Ashok Leyland Fin.Ltd	20.025	The installations are in the CDM PDD titled 1) "56.25 MW bundled wind energy project in Tirunelveli and Coimbatore districts in Tamilnadu, India." http://cdm.unfccc.int/Projects/Validation/DB/37X42BG16GG63VK5L84D6WZ0UM8YGG/view.html
4	Bannari Amman Spinning Mills Ltd	16.2	The installations are under the CDM PDDs titled 1) "STL Wind Power Project" http://www.dnv.com/focus/climate_change/upload/version%202%20-%20pdd%20%20sept%2005.pdf 2) Eco Friendly Electricity Export to Grid http://cdm.unfccc.int/UserManagement/FileStorage/5YH92G186JW12SR91FFB9RC302T651
5	Best & Co.	25	The installations are all under the CDM PDD titled 1) "Bundled Wind power project in Tamil Nadu, India, coordinated by Tamil Nadu Spinning Mills Association (TASMAII)" http://cdm.unfccc.int/UserManagement/FileStorage/6QDL0CJW95NYIX8U14H3STGKAF2BEV
6	Best International	12.4	The installations are under the CDM PDDs titled 1) "Bundled Wind power project in Tamil Nadu, India, coordinated by Tamil Nadu Spinning Mills Association (TASMAII)" http://cdm.unfccc.int/UserManagement/FileStorage/6QDL0CJW95NYIX8U14H3STGKAF2BEV 2) "Bundled Wind power project in Tamilnadu, India coordinated by the TamilNadu Spinning Mills Association (TASMA)" http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXII12SBXNF29XDKVT2BCEWG
7	Cheran Spinners ltd	11.9	The installations are under the CDM PDDs titled 1) "Bundled Wind power project in Tamil Nadu, India, coordinated by Tamil Nadu Spinning Mills Association (TASMAII)" http://cdm.unfccc.int/UserManagement/FileStorage/6QDL0CJW95NYIX8U14H3STGKAF2BEV 2) "Bundled Wind power project in Tamilnadu, India coordinated

			by the TamilNadu Spinning Mills Association (TASMA)" http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXI I12SBXNF29XDKVT2BCEWG
8	Grace Infrastructure (P) Ltd	31	Installations under CDM PDD titled 1)"31 MW Wind energy project in, India by Grace Infrastructure Pvt Ltd" http://www.globalwarming. de/files/new_mediagallery/2008-05-09Grace.pdf
9	Jayajyoti & Co Ltd	15	The installations are under the PDD titled 1) "Bundled Wind power project in Tamilnadu, India coordinated bythe TamilNadu Spinning Mills Association (TASMA)" http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXI I12SBXNF29XDKVT2BCEWG
10	Kandagiri Spinning Mills	9.9	http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXI I12SBXNF29XDKVT2BCEWG
11	Lakshmi Machine works	23	http://cdm.unfccc.int/UserManagement/FileStorage/7LXZLFECVX R5YBOJ5TH8J6XNHIPOCN
12	Lanco Infratech Ltd	10	http://cdm.unfccc.int/UserManagement/FileStorage/FG1L6KNUKQ XT1QVJJZA75NFBR1FVGY
13	Loyal Textile Mills Ltd	20.45	The installations are under the PDD titled 1) "22.25 MW Captive Wind Power Project in Tamil Nadu" http://cdm.unfccc.int/UserManagement/FileStorage/TPAONMX 73CHPZ69AQ5CSP9BI1UKU99
14	MRF Ltd	14.4	Installations under the CDM PDD titled "MRF wind power project in Tamil Nadu managed by Enercon India Limited" http://cdm.unfccc.int/Projects/Validation/DB/13DKIX7L6AMFR 8O1MGVF4WNG0T52IE/view.html
15	Prabhu Spinning Mills (P) Ltd	12.3	The installations are under the CDM PDDs titled 1) "Bundled Wind power project in Tamil Nadu, India, coordinated by Tamil Nadu Spinning Mills Association (TASMAII)" http://cdm.unfccc.int/UserManagement/FileStorage/6QDL0CJW 95NYIX8U14H3STGKAF2BEV 2) "Bundled Wind power project in Tamilnadu, India coordinated by the TamilNadu Spinning Mills Association (TASMA)" http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXI I12SBXNF29XDKVT2BCEWG
16	Premier Fine Yarns Pvt. Ltd	22.85	http://cdm.unfccc.int/Projects/Validation/DB/J0J2B6K3O92EEU AFD3OGYLE03TNZ7I/view.html http://cdm.unfccc.int/Projects/Validation/DB/SSPNJ9BYJAJEJV 22N2ZX4I4URQ7SXI/view.html
17	Premier Spg & wvg mills ltd	16.250	http://cdm.unfccc.int/Projects/Validation/DB/4QBCUVMF56B0I 5IHYMAAK4M35X7CDW/view.html
18	Rasi Seeds (P) Ltd.	16.25	The installations are under the CDM PDDs titled 1) "Bundled Wind power project in Tamil Nadu, India, coordinated by Tamil Nadu Spinning Mills Association (TASMAII)" http://cdm.unfccc.int/UserManagement/FileStorage/6QDL0CJW 95NYIX8U14H3STGKAF2BEV 2) "Bundled Wind power project in Tamilnadu, India coordinated by the TamilNadu Spinning Mills Association (TASMA)" http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXI I12SBXNF29XDKVT2BCEWG
19	Samband	11.175	The installations are under the PDD titled

	am spinning mills		1) "Bundled Wind power project in Tamilnadu, India coordinated bythe TamilNadu Spinning Mills Association (TASMA)" http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXII12SBXNF29XDKVT2BCEWG
20	Sapthagiri Distilleries	28.50	The installations are under CDM project titled 1) "53.75 MW Bundled wind Power project in Tamil Nadu and Karnataka by KBD Group, India" http://cdm.unfccc.int/UserManagement/FileStorage/QN0BCHDRZ8PI17S2JEMLVW9TYFGO65
21	SCM Creations	12.75	1) "Bundled Wind power project in Tamilnadu, India coordinated by the TamilNadu Spinning Mills Association (TASMA)" http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXII12SBXNF29XDKVT2BCEWG
22	Shanmugavel Group	25.5	The installations are under the PDD titled 1) "Bundled Wind power project in Tamilnadu, India coordinated by the TamilNadu Spinning Mills Association (TASMA)" http://cdm.unfccc.int/UserManagement/FileStorage/AE2042RXII12SBXNF29XDKVT2BCEWG
23	Shriram City Union Fin	12.8	http://www.dnv.com/focus/climate_change/upload/karnataka%20125%20mw%20wind.pdf
24	Shriram Investments Ltd	11.95	http://www.dnv.com/focus/climate_change/upload/karnataka%20125%20mw%20wind.pdf
25	Sree Narasimha Textiles Ltd	13.2	http://cdm.unfccc.int/Projects/Validation/DB/J0J2B6K3O92EEUAFD3OGYLE03TNZ7I/view.html http://cdm.unfccc.int/Projects/Validation/DB/SSPNJ9BYJAJEJV22N2ZX4I4URQ7SXI/view.html
26	Suzlon Infrastructure Limited	17.5	The installations are under the PDDs 1) "16.25 MW grid connected electricity generation project at Coimbatore in Tamil Nadu" http://cdm.unfccc.int/UserManagement/FileStorage/FM6BIMO4FTLNNUKVLSTLYJLM14NRCM 2) "38.75 MW grid connected electricity generation project at Tirunelveli in Tamil Nadu" http://cdm.unfccc.int/UserManagement/FileStorage/Y5UO445ZIR7VMGE34PQUDGRTHCKRSB 3) "23.75MW grid connected electricity generation project at Tirunelveli in Tamil Nadu" http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/512/PDD%2023.75MW%20grid%20connected%20electricity%20generation%20project%20at%20Tirunelveli%20in%20Tamil%20Nadu..pdf
27	TCS Textile Limited	20.750	https://cdm.unfccc.int/filestorage/F/6/U/F6UP274DD1DCT3XJTKRJCJZDZNPZY7/CDM%20PDD-%20TCS%20Textiles.pdf?t=ZTR8bXJ2YnJ1fDB3pMUy8zA4BNbquIRm8xG1
28	Tirupur Textiles Pvt Ltd	12.5	http://cdm.unfccc.int/Projects/Validation/DB/X1W2URT6QDN2GVGATM1WN7EXSFH89N/view.html
29	Tamilnadu Newsprint and paper Ltd	28	http://cdm.unfccc.int/Projects/DB/BVQI1323706561.41/view

[31]Source : Wind Directory 2009

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Document information

Version	*Date*	*Description*
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
05.0	25 June 2014	Revision 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; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.

Version	*Date*	*Description*
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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