Project design document form for CDM project activities (Version 06.0)

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

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Tadas Wind Farm in Karnataka
Version number of the PDD	03.0
Completion date of the PDD	01/07/2015
Project participant(s)	Tadas Wind Energy Private Limited (*previously known as Tadas Wind Energy Limited*)
Host Party	India
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	**Sectoral Scope**: 01 [Energy Industries (renewable/ non-renewable sources) **Methodology**: ACM0002, v13.0.0 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"
Estimated amount of annual average GHG emission reductions	181,436 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>>

The project activity involves generation of electricity from wind, a renewable source of energy at Haveri district in Karnataka. The proposed project activity, an initiative by Tadas Wind Energy Ltd. (TWEL) is aimed at generating 100 MW of renewable electricity using Wind Electric Generators (WEGs). The project activity (all 125 windmills) has been successfully commissioned 29/09/2012 and it is transferring electricity to the Southern regional grid since then.

The project activity would help in reducing power shortage, abatement of Green House Gas (GHG) emissions and would contribute towards sustainable development of the country.

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

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

Project Scenario and the Technology employed

The project activity involves installation of 125 WEGs of 0.8 MW capacity each of Enercon make, resulting in the total installed capacity of 100 MW. The WEGs generate 3-phase power at 400V, which is stepped up to 33 KV.

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

Contribution to reduction in GHG emissions by the proposed project activity

The electricity generated as a result of implementation of the project activity will be supplied to the southern regional grid which at present is dominated by fossil fuel based power plant, thereby reducing an equivalent amount of GHG emissions associated with thermal generating sources.

The project would result into 181,436 tCO_2e of annual average emission reduction and 1,814,360 tCO_2e of total emissions reductions over 10 years fixed crediting period.

Contribution of project activity to sustainable development

The proposed project activity has the following sustainable development aspects:

Social Wellbeing:

- The project activity would help in providing job opportunities to the local population during installation and operation of the WEGs.
- The project activity would also lead to development of infrastructure like construction of approach roads. These factors will give a boost to the social amelioration of the community.

Environmental Wellbeing:

- The project activity produces electricity with the help of renewable energy. In the absence of project activity, power would have been generated using fossil fuel leading to GHG emissions.
- The project activity not only helps in reducing GHG emissions but also help towards conservation of fossil fuels. Therefore, the project activity is contributing towards mitigation of impacts of climate change and hence the environmental wellbeing.

Economic Wellbeing:

- The electricity generated as a result of project activity will be fed to the regional grid, thereby improving the availability of electricity to the consumers.

Technology Wellbeing:

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

In addition to this, the project proponent will invest 2% of the CER revenues every year in sustainable development activities in the local community of Karnataka. Details of the same are provided in Appendix 7.

A.2. Location of project activity

A.2.1. Host Party

>>
India

A.2.2. Region/State/Province etc.

>>
State : Karnataka

A.2.3. City/Town/Community etc.

>>
District : Haveri, Dharwad
Tehsil : Kundagol, Shiggaon, Savanur

A.2.4. Physical/Geographical location

>>
The project consists of installation of 125 WEGs of 0.8 MW, capacity each. Details of their geo-coordinates are provided in Appendix 8.

A.3. Technologies and/or measures

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In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind blowing at high speeds has a considerable amount of kinetic energy. When this kinetic energy passes through the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity.

The proposed project activity involves installation of 125 WEGs of 0.8 MW capacity each, i.e. total installed capacity of 100 MW. The plant load factor (PLF) is 23.44%[1]. The WEGs are Enercon model, E-53, with newly designed blades, type tested and approved by the Ministry of New and Renewable Energy (MNRE). The specifications of the WEGs installed at each of the sites are specified below:

Table 1: Technical specifications of WEGs[2]

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

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

The project activity does not involve any technology transfer.

A.4. Parties and project participants

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

[1] Tadas Wind Farm Energy Estimate Report by Entura Hydro Tasmania dated 11 June 2011

[2] WRAP Agreement between Enercon (India) Limited and TWEL dated 27 July 2011

India (host)	**Private Entity**: Tadas Wind Energy Private Limited	No

A.5. Public funding of project activity

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

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

B.1. Reference of methodology and standardized baseline

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Methodology: ACM0002, v13.0.0 (EB67 Annex13)

Consolidated baseline methodology for grid-connected electricity generation from renewable sources

UNFCCC Reference:

https://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83

Methodology Tools:

Tool for demonstration and assessment of additionality, v06.1.0 (EB69 Annex20)

https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf

Tool to calculate emission factor for an electricity system, v02.2.1 (EB61 Annex12)

https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

B.2. Applicability of methodology and standardized baseline

>>

The project meets all applicability criteria as set out in the approved methodology ACM0002, v13.0.0 as described below:

Applicability conditions under ACM0002, v13.0.0	***Project activity is eligible since:***
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 involves option (a) installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant). Hence, this criterion is justified.
The project activity 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 accumulated reservoir), wind power plant/ unit, geothermal power plant/ unit, solar power plant/ unit, wave power plant/ unit or tidal power plant/unit	The project activity is installation of a new wind power plant; satisfying the applicability condition.
In the case of capacity additions, retrofits or replacements, 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 reference period and the implementation of the project activity.	This condition is not applicable as the project activity is installation of a new wind power plant and does not involve capacity addition, retrofit or replacement of a power unit.

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 reservoirs; or ➲ The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density 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 the definitions given in the project emissions section, is greater than 4 W/m^2.	The proposed project activity involves installation of wind power plants; hence this condition is not applicable.
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 integrated project that collectively constitute the generation capacity of the combined power plant; ➲ Water flow between 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 reservoirs with power density lower than 4 W/m^2, is lower than 15 MW; ➲ 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.	The proposed project activity involves installation of wind power plants; hence this condition is not applicable.
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; ➲ Hydro power plant that results in the creation of a new single reservoir or in the increase in existing single reservoir where the power density of the reservoir is less than 4W/m^2.	The project activity involves installation of a Greenfield wind power project and does not involve switching from fossil fuels to renewable energy sources at the site of the project activity, biomass fired or hydro power plant. Therefore, this condition is not applicable to the project activity.
In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the	The project activity is a new grid connected wind power plant and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to

continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance". In addition, the applicability conditions included in the tools referred to above apply.	the project activity.
Applicability conditions under Methodology Tool, "Tool to calculate the emission factor for an electricity system", v02.2.1	**Project activity is eligible since:**
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity results in savings of electricity that would have been provided by the grid (e.g. demand- side energy efficiency projects).	The project activity involves installation of a Greenfield wind farm and the power generated by the project activity will substitute the grid electricity, i.e. the power generated by the project activity will be supplied to the regional grid. Therefore, this tool is applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity, thus satisfying the applicability criterion.
Under this tool, the emission factor for the project electricity system can be calculated either for the grid power plants only or, as an option, can include off- grid power plants. In the latter case, the conditions specified in "Annex 2- Procedures related to off- grid power generation" should be met. Namely, the total capacity of off- grid power plants (in MW) should be at least 10 % of the total capacity of grid power plants in the electricity system; or the total electricity generation by off- grid power plants (in MWh) should be at least 10 % of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	In the host country as off-grid power generation is not significant. Therefore, emission factor for the project electricity system is calculated only for the grid power plants. Thus, this applicability criterion is satisfied.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The proposed CDM project is located in India which is not an Annex I country. Hence, this applicability criterion is not applicable.
Tool for the demonstration and assessment of additionality, v06.1.0	**Project activity is eligible since:**
This tool provides for a step-wise approach to demonstrate and assess additionality. These Steps include: a) Identification of alternatives to the project activity b) 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; c) Barriers analysis; and d) Common practice analysis;	The step-wise approach has been undertaken to demonstrate and assess additionality of the project activity (Section B.5).
Based on the information about activities similar to the proposed project activity, the common practice analysis is to complement and reinforce	Common practice analysis has been carried out to complement and reinforce the investment analysis (Section B.5).

the investment and/or barriers analysis. The Steps are summarized in the flow chart on page 2 of this document.	
The document provides a general framework for demonstrating and assessing additionality and is applicable to a wide range of project types. Some project types may require adjustments to this general framework.	The project activity follows the framework laid down in the document for demonstrating and assessing the additionality.
This tool does not replace the need for the baseline methodology to provide a step-wise approach to identify the baseline scenario. Project participants that propose new baseline methodologies shall ensure consistency between the determination of additionality of a project activity and the determination of a baseline scenario. Project participants can also use the .Combined tool to identify the baseline scenario and demonstrate additionality, which provides a procedure for baseline scenario identification as well as additionality demonstration.	The baseline methodology ACM0002, v13.0.0 is separately applied to the project activity for identifying the baseline scenario.

B.3. Project boundary

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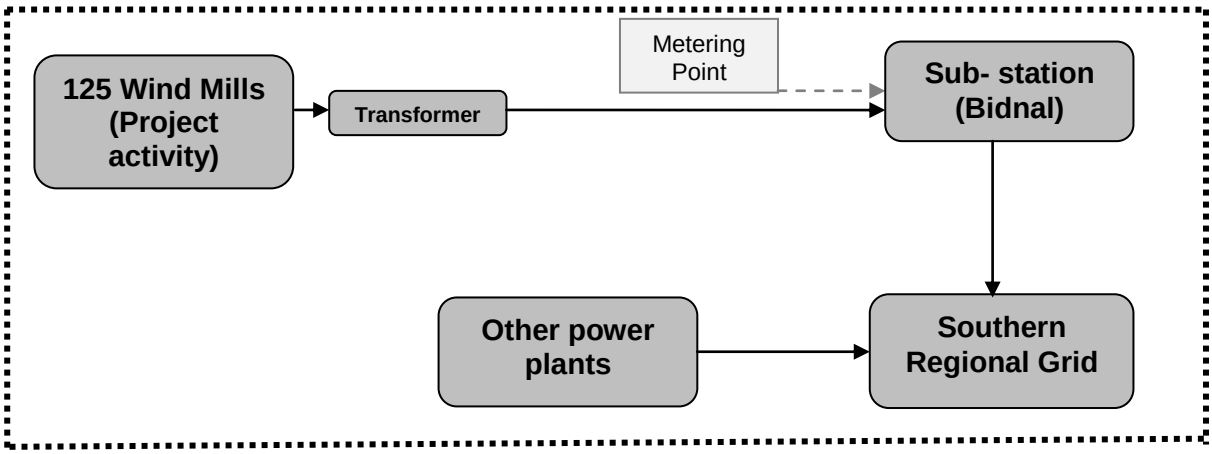
The project boundary for the project activity is selected as per the approved methodology ACM0002, v13.0.0. As per the methodology, spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

Tool to calculate emission factor for an electricity system, v02.2.1 defines grid/ project electricity system by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

The project boundary for the project activity includes the 125 windmills which operate on wind energy and transfer the power generated to the 33kV transformer maintained by Enercon. The power it then stepped up and transferred to 220kV Hubli Electricity Supply Company Limited (HESCOM) sub-station at Bidnal where the metering of the electricity is carried out. Finally, the electricity from Bidnal sub-station is transferred to the Southern regional grid. The project activity evacuates power to the Southern regional grid. A diagrammatic representation of the project boundary is given below:



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

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

B.4. Establishment and description of baseline scenario

>>

According to the approved methodology ACM0002, v13.0.0, if the project activity is the installation of a new grid-connected renewable power plant/ unit, the baseline scenario 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 the project activity is a Greenfield project involving installation of WEGs and does not involve capacity addition, retrofit or replacement of existing grid-connected renewable power plant/ unit, the above mentioned baseline scenario would be applicable for the project activity.

National policies relevant to the project activity

The project participant has invested in this wind power project activity voluntarily and has not done so because of any mandate or regulation.

Power projects in India (conventional and renewable) are governed by the Electricity Act (EA), 2003, prior to which there were no specific provisions that would promote renewable sources of energy. The EA, 2003, applicable environmental regulations and all policy support for grid interactive renewable power[7] promotes additional generation of electricity from renewable sources of energy and does not restrict or empower any authority to restrict the choice of fuel or the technology employed.

The EA, 2003 enacted by Government of India on June 10, 2003 has repealed the three acts which were in existence namely (i) The Indian Electricity Act 1910 (ii) The Electricity (Supply) Act, 1948 and (iii) The Electricity Regulatory Commissions Act, 1998. The EA, 2003 was enacted to harmonize and rationalize the provisions in the existing laws in India; it consolidated the laws relating to generation, transmission, distribution, trading and use of electricity. The EA, 2003 was in force at the time of completion of the baseline study for the PDD.

Section 5.12.2 of the EA 2003 provides that co-generation and generation of electricity from nonconventional sources would be promoted by the State Electricity Regulatory Commissions (SERCs) by providing suitable measures for connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the

total consumption of electricity in the area of a distribution licensee. Such percentage for purchase of power from nonconventional sources should be made applicable for tariff determination; the act empowered the State Electricity Regulatory Commissions to specify the terms & conditions for the determination of tariffs in their respective area.

As specified in the EA 2003, the appropriate commission, in this case the Karnataka Electricity Regulatory Commission (KERC) (as the project activity is located in the state of Karnataka, the corresponding state regulatory commission is the KERC), shall ensure the promotion of co-generation and generation of electricity from renewable sources of energy while determining tariff and shall promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person.

The data published by planning commission of CEA committee for capacity addition in the Eleventh Plan (2007-12) clearly projects the dominance of the thermal sector based power projects. The data is presented in the table below[3]:

Table 3: Capacity addition to various power generating sectors in the Eleventh Plan (2007-12) by CEA Committee

Source	Central	State	Private	Total
Hydro	8,654	3,482	3,491	15,627
Thermal	24,840	23,301	11,552	59,693
Nuclear	3,380	-	-	3,380
Total	36,874	26,783	15,043	78,700

This scenario and projections indicate that the government favours the fossil fuel based electricity generation. There are no national policies or circumstances that mandate the renewable energy based electricity generation.

The key parameters and data sources used for ex ante calculations are given as follows:

Table 4

Parameter	Value	Source	
		Ex-ante	***Ex-post***
$EG_{facility,y}$ Quantity of net electricity generation supplied by the project plant to the grid in year y (MWh)	202,254.38	PO (for rated capacity), PLF report from third party engineering company	Credit note/JMR Statement, = EG_{export} - EG_{import}
$EF_{grid,OM,y}$ Operating Margin CO_2 Emission Factor of Southern Grid (tCO2/MWh)	0.9515	"CO_2 Baseline Database for Indian Power Sector" v7.0 published by the Central Electricity Authority, Ministry of Power, Government of India	
$EF_{grid,BM,y}$ Build Margin CO_2 Emission Factor of Southern Grid (tCO2/MWh)	0.7339	"CO_2 Baseline Database for Indian Power Sector" v7.0 published by the Central Electricity Authority, Ministry of Power, Government of India	
$EF_{grid,CM,y}$	0.8971	"CO_2 Baseline	

[3] http://www.cea.nic.in/reports/powersystems/nep2012/generation_12.pdf (Table 2.1)

Combined Margin CO_2 Emission Factor of Southern Grid (tCO2/MWh)		Database for Indian Power Sector" v7.0 published by the Central Electricity Authority, Ministry of Power, Government of India	

B.5. Demonstration of additionality

>>

As per ACM0002, the proposed project activity uses "Tool for the demonstration and assessment of additionality", v06.1.0 to determine the additionality.

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

While identifying the alternatives to the project activity, ACM0002, Version 13.0.0 directs to use Step 1 of the latest version of the additionality tool.

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

In order to identify credible and realistic alternative(s) available to the project participant that provide outputs or services comparable with proposed CDM activity "Tool for the demonstration and assessment of additionality" Version 06.1.0 provides the following options:

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

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

Sub-step 1b: Consistency with mandatory laws and regulations:

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

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

- Power generation using wind energy is not a legal requirement or a mandatory option. There are state and sectoral policies, framed primarily to encourage wind power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.
- There is no legal requirement on the choice of a particular technology for power generation.

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

Step 2: Investment analysis

In order to determine whether the proposed project activity is not:

- The most economically or financially attractive; or
- Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

Sub-step 2a: Determine appropriate analysis method

According to the Methodological tool "Demonstration and assessment of additionality" (Version 06.1.0), there are three options for the execution of the investment analysis:

Option I : Simple cost analysis
Option II : Investment comparison analysis
Option III : Benchmark analysis

Since income from the sale of carbon credits is not the only source of revenues to the project activity, therefore Option I is not applicable.

Guidance 19 of "Guidelines on the Assessment of Investment Analysis" v05 stipulates that if the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate. The benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest.

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

Sub-step 2b: Option III. Apply benchmark analysis

The project developer is a limited company and is primarily concerned with the return on equity and associated risks in the investments. Hence, in order to analyse the financial viability of the project activity, the financial indicator that has been used is the equity IRR of the project activity.

Selection and Validation of Appropriate Benchmarks

As per Guidance 12 of "Guidelines on Assessment of investment Analysis" v05, in cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Required/expected returns on equity are appropriate benchmarks for equity IRR. Since the project activity has chosen equity IRR as the financial indicator hence required/expected return on equity is the appropriate benchmark.

"Guidelines on Assessment of investment Analysis" v05, further provides the default values for the approximate expected return on equity for different project types in various host countries. These default values are used to calculate the expected return on equity. The guidance further stipulates that in situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in appendix to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, then average forecasted inflation rate for the host country published by the IMF or the World Bank for next five years after the start of the project activity shall be used.

In accordance with the guidance the benchmark for equity IRR (nominal cost of equity) has been calculated by the following methodology:

The default values of the expected return on equity (real terms) for different type of project activities in different countries have been provided in the appendix to "Guidelines on the assessment of Investment Analysis" version 05. Since the project activity falls in the Group 1 type of project activity (Energy Industries) and therefore relevant value from the appendix is used.

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

The inflation rate forecast for the ten years published in Reserve Bank of India "Results of 15th Round (Q4:2010-11) of Survey of Professional Forecasters on Macroeconomic Indicators" dated 25th May 2011[4] is 5.40% whereas the average forecasted inflation rate for India for 2011-2016 published by International Monetary Fund (IMF) is 4.76%[5]. Therefore to be conservative IMF inflation rate has been used for benchmark calculation.

Average forecasted inflation rate for 2011-2016 = 4.76%

Benchmark = (1+ Expected return on equity (in real terms)) × (1+inflation rate) – 1[6]
= (1+11.75%) × (1+4.76%)-1
= 17.07%

In accordance with the "Guidelines on the assessment of Investment Analysis" v05, EB62, Annex05 the benchmark (Expected return on equity) of 17.07% has been considered for the project activity.

Sub-step2c: Calculation and comparison of financial indicators

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

Parameters	Unit	Value applied
Plant Capacity (125 nos. of WEGs of 800kW capacity each)	MW	100
Cost of Project	₹ millions	5732.84
Plant Load Factor of Tadas (Karnataka)	%	23.44
Financing Pattern – Equity	%	25.00
Financing Pattern – Debt	%	75.00
Interest on Term Loan	%	11.00
Working Capital Interest Rate	%	14.00
Book Depreciation – annual rate	%	4.50
Depreciation as per Income Tax Act (WDV basis)	%	15.00
Corporate tax rate	%	33.22
MAT rate	%	19.93
Operation & Maintenance costs per WEG	₹ millions	0.60
Yearly escalation in O&M costs	%	6.00

The equity IRR for the project without CDM benefit works out to be as 9.04%. As evident, the equity IRR is lower than the corresponding benchmark rate of 17.07%.

This clearly indicates that investment barrier exists in project activity implementation, and the IRR is unattractive as compared to the expected return on equity. The additionality of the project is thus apparent.

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

[5] http://www.imf.org/external/pubs/ft/weo/2011/01/weodata/weorept.aspx?pr.x=33&pr.y=8&sy=2011&ey=2016&scsm=1&ssd=1&sort=country&ds=.&br=1&c=534&s=PCPI%2CPCPIPCH&grp=0&a=

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

Sub-step 2d: Sensitivity analysis

"Guidelines on the Assessment of Investment Analysis", v05 require the project developer to subject critical assumptions to reasonable variation to ascertain the robustness of the conclusion drawn, that is, the project is additional. As required, a sensitivity analysis has been conducted to measure the impact of changes in the chosen parameters.

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

Table 6: Sensitivity Analysis for the project activity

Factor	Resultant equity IRR		
	Decrease by 10%	**Base case**	**Increase by 10%**
Generation	5.82%	9.04%	12.30%
Project Cost	12.38%	9.04%	6.41%
O&M Cost	9.51%	9.04%	8.56%
Tariff	5.85%	9.04%	12.24%

The likelihood/ unlikelihood of occurrence of a scenario where the parameters reach/cross the benchmark value is tabulated below:

Table 7

Parameters	Benchmark (17.07%) break-even point		Justification of unlikelihood
	Increase in %	***Decrease in %***	
Generation	23.9%	-	The PLF is based on the Wind Assessment Study carried out for the project activity. Further an analysis of the projects with issued CERs in Karnataka has been carried out and the PLF has been found to be lower than the PLF considered for the project activity[7]. Therefore, it is unlikely for PLF to further increase by 23.9%
Project Cost	-	20.3%	The project cost cannot change as all the purchase orders have been placed and the project related expenses have already been incurred.
O&M Cost	-	189%	The agreement between Enercon and TWEL has been signed at Rs. 82.7 million/year for 10 years, Therefore it is highly unlikely that the O&M cost will decrease.
Tariff	24.6%	-	The increase in the tariff rate from Rs. 3.70 is unlikely as the tariff has been fixed as per the KERC order and the PPA has been signed.

Outcome of step 2: It is evident from the above table that the equity IRR does not cross the benchmark even after an increase of 10% in the selected parameters. Hence the project is additional and cannot be undertaken under the circumstances lacking CDM benefits.

Step 4: Common practice analysis

[7] Excel sheet with the PLF calculation from 22 UNFCCC registered projects with issued CERs submitted to DOE

As per the tool for "Demonstration and assessment of additionality" Version 06.1.0, following **Stepwise approach for Common Practice** has been followed for the project activity.

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

The capacity of the project activity is 100 MW. The project capacity has been subject to the variation in the range of +/- 50%, the following table depicts the outcome of the variation applied;

-50%	Capacity (in MW)	+50%
50 MW	100	150 MW

For the analysis, the projects falling in the range of 50 MW to 150 MW capacities have been taken.

Step 2: *In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, 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 and project activities undergoing validation shall not be included in this step.*

India has been considered applicable geographical area as a default for the common practice analysis of project activity. All power plants generating electricity within the capacity range of 50 MW to 150 MW and having commercial operations date before project activity start date (27/07/2011) have been considered. The power generation plants identified in this step are hydro, thermal and wind power projects. The total number of power plants is 488.

CDM project activities which have got registered or are under validation have been excluded in this step. The list of the plants identified is provided to the DOE. After excluding the registered and under validation projects the total number of projects, **N_{all} = 483**

Step 3*: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}*

In accordance with Tool for Demonstration and Assessment of Additionality Version 06.1.0, EB 65, Different technologies are technologies that deliver the same output and differ by at least one of the following

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

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

(v) Other features, inter alia:
- Unit cost of output

The project activity has been separated from the different technologies on the basis of the following criteria:

(i) Energy Source/fuel: The project activity involves electricity generation from wind. The other project activities identified in Step 2 are hydro, thermal plants. All these are using water, conventional fuels as energy sources for the generation of electricity respectively. Therefore, all

the projects falling under above category, except wind power plants, are considered as plants with different technologies and included under $N_{diff.}$

Number of thermal Power projects[8]	**240**
Number of hydro power projects[9]	242
Total	482

(iv) Investment climate in the date of the investment decision: The investment decision, of the project activity was taken on 27/07/2011. The investment decision of the project activity was taken considering Generation Based Incentive (GBI) scheme[10] initiated by Ministry of New & Renewable Energy, Government of India. The scheme is to broaden the investor base and create level playing field for various classes of investors. GBI is applicable for grid interactive wind power projects in India. The GBI scheme came in effect from 17/12/2009. The advent of this scheme had played critical role for project proponent to take decision to go ahead with the implementation of the project activity.

On the basis of above promotional scheme (GBI), wind power projects with commissioning date prior to 17/12/2009 have also been considered under different technology projects (N_{diff}). The single large scale wind project which is left after fulfilling all the requirements of the steps of common practice analysis was commissioned prior to the introduction of GBI scheme and hence, it is accounted under $N_{diff.}$

Therefore, the technologies different than the project activity, N_{diff} is calculated as:

Project Category	Number of Projects
Thermal	240
Hydro	242
Wind Large Scale[11] (Without GBI)	1
Total N_{diff}	483

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*

From step 2 and step 3 following table is arrived at;

N_{all}	483
N_{diff}	483
$N_{all}-N_{diff}$	0
$F = (1-N_{diff}/N_{all})$	$(1-483/483) =$ **0.00**

As per the tool, *the proposed project activity is a "common practice" within a sector in the applicable geographical area if both the following conditions are fulfilled:*

(a) The factor F is greater than 0.2, and
(b) $N_{all}-N_{diff}$ is greater than 3.

[8] Central Electricity Authority, 2012, Baseline Carbon Dioxide Emissions from Power Sector, v7.0 [online] Available at: < http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm >
[9] Central Electricity Authority, 2012, Baseline Carbon Dioxide Emissions from Power Sector, v7.0 [online] Available at: < http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm >
[10] www.mnre.gov.in/gbi-scheme.html
[11] Directory Indian Wind Power 2011

The value of factor F as calculated in Step 4 is **0.00** which is less than 0.2 and N_{all}-N_{diff} is 0 which is less than 3. Hence the project activity is not a common practice.
The analysis clearly demonstrates that project activity is not a common practice within a sector in the applicable geographical area. Therefore, it can be concluded that the project activity is additional and requires CDM revenues to alleviate the investment barrier to the project activity.

Serious Consideration of CDM and Continued Action to Secure CDM status

As per EB 62, Annex 13, Paragraph 2:

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

The start date of project activity is 27/07/2011. The project participant had informed the Indian DNA and UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. The form of prior consideration was submitted to the Indian DNA and UNFCCC secretariat on 23/01/2012 which is well within six months of the project activity start date.

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

S. No.	Events	Date
1	Purchase Order for supply of WEGs and O&M Contract	27/07/2011
2	Submission of form for Prior Consideration of CDM to UNFCCC	23/01/2012
3	Local Stakeholder Consultation Meeting	06/06/2012

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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Estimation of Baseline Emissions

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

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

Where:

BE_y = Baseline emissions in year *y* (tCO_2/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

Calculation of $EG_{PJ,y}$

Since the project activity involves 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:

$$EG_{PJ,y} = EG_{facility,y} \quad (2)$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

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

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

According to the approved methodology ACM0002 v13.0.0 the "Tool to calculate emission factor for an electricity system", v02.2.1 is used to determine the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "combined margin" CO_2 emission factor (CM) of the electricity system. Following steps are applied to determine the combined margin emission factor:

Step 1 Identify the relevant electricity systems;
Step 2 Choose whether to include off-grid power plants in the project electricity system (optional);
Step 3 Select a method to determine the operating margin (OM);
Step 4 Calculate the operating margin emission factor according to the selected method;
Step 5 Calculate the build margin (BM) emission factor;
Step 6 Calculate the combined margin (CM) emission factor.

If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. Central Electricity Authority (CEA) (which is an official source of Ministry of Power, Government of India) has worked out baseline emission factors for two grids in India and made them publicly available in the form of "CO_2 Baseline Database", v7.0[12].

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

Step 1: Identify the relevant electricity systems

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

NEWNE Grid				Southern Grid
Northern	**Eastern**	**Western**	**North-Eastern**	**Southern**
Chandigarh, Delhi, Haryana, Himachal **P**radesh, 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

[12] Central Electricity Authority, 2012, Baseline Carbon Dioxide Emissions from Power Sector, v7.0 [online] Available at: < http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm >

The baseline emission factor (including Imports) of Southern grid published by CEA is considered for calculation of emission reductions due to displacement of electricity in accordance with the baseline methodology of "Tool to calculate the emission factor for an electricity system", Version 02.2.1.

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

Project participant 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 the grid power plants and off-grid power plants are included in the calculation.

Option II allows the inclusion of off-grid power generation in the grid emission factor. In the host country, off-grid power generation is not significant. Therefore, Option I is considered for calculation of operating margin and build margin emission factor.

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

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

According to the "Tool to calculate the emission factor for an electricity system", version 02.2.1 calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:
a) Simple OM; or
b) Simple adjusted OM; or
c) Dispatch data analysis OM; or
d) Average OM.
Any of the four methods can be used, however the simple OM method (option a) can only be used if low cost/must run resources[13] constitute less than 50% of total grid generation.

	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	18.5%	19.0%	17.4%	15.9%	17.6%
South	**28.3%**	**27.1%**	**22.8%**	**20.6%**	**21.0%**
India	20.9%	21.0%	18.7%	17.1%	18.4%

The above data clearly shows that the percentage of total grid generation by low cost/ must run sources (on the basis of average of five most recent years) for Southern grid is less than 50% of the total generation. Therefore, Simple OM method can be used for calculating operating margin emission factor for the proposed project activity.

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

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

Simple OM method

[13] Low- cost/ must- run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation plants; according to the Methodological Tool: "Tool to calculate the emission factor for an electricity system", version 02.2.1

The OM emission factor under this method is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. The data vintage option selected is the ex-ante approach, where a 3 year average OM is calculated. The most recent three year CEA data published on the emission factor of southern region is considered.

The simple OM may be calculated using:

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

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

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

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

Under this option, the CEA baseline is derived using the following formulae to calculate simple OM.

$$EF_{grid,OMsimple,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (3)$$

Where:

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

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

For calculation of emission factor of each power unit *m*, the following options should be considered:

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

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

$$EF_{EL,m,y} = \frac{\sum_{i} FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}} \quad (4)$$

Where:

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)

$FC_{i,m,y}$ = Amount of fossil fuel type i consumed by power unit m year y (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type i in the year y (tCO_2/GJ)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in the year y (MWh)

m = All power units serving the grid in year y except low-cost/ must-run power units

i = All fossil fuel types combusted in power unit m in year y

y = the relevant year as per the data vintage chosen in step 3

Step 5: Calculate the build margin (BM) emission factor

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

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

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

The value for Build Margin is taken from Central Electricity Authority (CEA) published CO_2 baseline database on Indian Power sector, v7.0[14].

The Build Margin emission factor has been determined using option 1. Also, the sample group of power units *m* used to calculate the build margin has been determined by CO_2 baseline database on Indian Power sector, v7.0 as per the following procedure:

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

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

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

[14] Central Electricity Authority, 2012, Baseline Carbon Dioxide Emissions from Power Sector, Version 7.0 [online] Available at: <http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm >

(c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}).

Since none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, and $SET_{\geq 20\%}$ comprises larger annual electricity generation than $SET_{5\text{-units}}$ therefore $SET_{\geq 20\%}$ has been used to calculate the build margin.

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times FE_{EL,m,y}}{\sum_m EG_{m,y}} \quad (5)$$

The value for Build Margin is taken from Central Electricity Authority (CEA) CO_2 baseline database for Indian Power sector, version 7.0.

Step 6: Calculation of the combined margin (CM) emission factor

The combined margin (CM) emission factor *($EF_{grid,CM,y}$)* can be calculated by either of the following methods:
(a) Weighted average CM; or
(b) Simplified CM

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

Since the project activity is not located in a LDC and meets the data requirements for application of step 5, option (a) has been opted to calculate the CM emission factor which uses the following formula:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (6)$$

Where:

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

As per the "Tool to calculate emission factor for an electricity system" version 02.2.1, the default weights for wind power projects are as follows: $w_{OM} = 0.75$ and $w_{BM} = 0.25$.

Estimation of Project emissions

According to the chosen baseline methodology ACM0002 Version 13.0.0, for wind energy based renewable energy project activities, PE_y are considered 0 ($PE_y = 0$).

Estimation of Leakage emissions

As per ACM0002 Version 13.0.0, no leakage emissions are considered ($LE_y = 0$).

Estimation of Emission Reductions

According to the approved methodology ACM0002 (Version 13.0) Emission Reductions are calculated as follows:

$$ER_y = BE_y – PE_y \quad (7)$$

Where:

ER_y = Emission reductions in year *y* (tCO_2e/yr)
BE_y = Baseline emissions in year *y* (tCO_2e/yr)
PE_y = Project emissions in year *y* (tCO_2e/yr)

Since, the proposed project activity does not involve any project emissions the Emission Reductions resulting from the activity are calculated as:

$$ER_y = BE_y$$

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{grid,OM,y}$
Unit	tCO_2/MWh
Description	Operating Margin CO_2 Emission Factor for the project electricity system in the year *y*
Source of data	"CO_2 Baseline Database for Indian Power Sector" v7.0 (January 2012) published by the Central Electricity Authority, Ministry of Power, Government of India[15].
Value(s) applied	Southern regional grid: 0.9515
Choice of data or Measurement methods and procedures	Operating Margin Emission Factor has been calculated using the simple OM approach in accordance with ACM0002 and "Tool to calculate the emission factor for an electricity system" v02.2.1. The generation weighted average of simple operating margins of the year 2008-09, 2009-10, 2010-11 have been used to calculate ex-ante OM.
Purpose of data	Calculation of baseline emissions.
Additional comment	---

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO_2/MWh
Description	Build Margin CO_2 Emission Factor for the project electricity system in year *y*
Source of data	"CO_2 Baseline Database for Indian Power Sector" v7.0 (January 2012) published by the Central Electricity Authority, Ministry of Power, Government of India for national default values.
Value(s) applied	Southern regional grid: 0.7339
Choice of data or Measurement methods and procedures	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002 and "Tool to calculate the emission factor for an electricity system" v02.2.1. The ex-ante value for the year 2010-11 has been used.
Purpose of data	Calculation of baseline emissions
Additional comment	----

[15] Central Electricity Authority, 2012, Baseline Carbon Dioxide Emissions from Power Sector, Version 7.0 [online] Available at: < http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm >

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined Margin CO_2 Emission Factor for grid connected power generation in year *y*
Source of data	"CO_2 Baseline Database for Indian Power Sector" v7.0 (January 2012) published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied	Southern regional grid: 0.8971
Choice of data or Measurement methods and procedures	Combined Margin Emission Factor ($EF_{grid,CM,y}$) is calculated ex ante as the weighted average CO_2 of Operating Margin Emission Factor ($EF_{grid,OM,y}$) and Build Margin Emission Factor ($EF_{grid,BM,y}$). In case of wind power projects default weights of 0.75 for $EF_{grid,OM,y}$ and 0.25 for $EF_{grid,BM,y}$ are applicable as per ACM0002, v13.0.0.
Purpose of data	Calculation of baseline emissions
Additional comment	----

B.6.3. Ex ante calculation of emission reductions

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

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

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

Simple Operating Margin (tCO_2/MWh) (incl. Imports)	2008-09	2009-10	2010-11
Southern Grid	0.9729	0.9415	0.9419

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

	2008-09	2009-10	2010-11
Southern Grid Net Generation in OM (GWh) (1)	121,471	134,717	137,387
Net electricity import from Southern (GWh) (2)	6,326	1,057	7,689.2
Electricity import from other countries (GWh) (3)	0	0	0
Net generation including import (GWh) (1+2+3)	127,797	135,774	145,076
Simple Operating Margin (tCO2/MWh) (incl. Imports)	0.9729	0.9415	0.9419
Weighted –generation emission factor ($EF_{grid,OM,y}$)	0.9515		

Thus the final $EF_{grid,OM,y}$ for the Southern grid based on three years average is estimated to be **0.9515 tCO_2/ MWh**.

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

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

The $EF_{grid,BM,y}$ estimated for Southern grid is **0.7339 tCO_2/MWh**.

Step 3: Calculation of Combined Margin Emission Factor $EF_{grid,CM,y}$ (ex-ante)

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

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

Where the weights w_{OM} and w_{BM}, are 0.75 and 0.25 respectively, and $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO_2/MWh.
Baseline Emission factor calculated according to the above formula for Southern grid is **0.8971 tCO_2/ MWh**.

Step 4: Calculation of baseline Emissions (BE_y)

According to "Consolidated baseline methodology for grid- connected electricity generation from renewable sources' ACM0002, v13.0.0, the baseline emissions is calculated as electricity supplied to the grid multiplied by an emission factor (measured in tCO_2/MWh) calculated in a transparent and conservative manner.

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

Where:

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

Therefore, the baseline emissions from the proposed project activity are:
= (202,254.38 × 0.8971)
= 181,436.75 tCO_2e/yr
= **181,436 tCO_2e/yr** (rounded down)

Step 5: Calculation of Emission Reductions

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

$$ER_y = BE_y - PE_y$$

Since, Project Emissions by sources of GHGs due to the project activity within the project boundary are zero, net anthropogenic emission reductions due to the proposed project are equal to the baseline emissions on a yearly basis. The project activity will evacuate approximately 202.25 Million kWh of renewable power annually to the power deficit Southern grid (based on capacity of project which is 100 MW). The annual emissions reductions are equal to **181,436 tCO_2e**.

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	181,436	0	0	181,436
Year 2	181,436	0	0	181,436

Year 3	181,436	0	0	181,436
Year 4	181,436	0	0	181,436
Year 5	181,436	0	0	181,436
Year 6	181,436	0	0	181,436
Year 7	181,436	0	0	181,436
Year 8	181,436	0	0	181,436
Year 9	181,436	0	0	181,436
Year 10	181,436	0	0	181,436
Total	1,814,360	0	0	1,814,360
Total number of crediting years	10			
Annual average over the crediting period	181,436	0	0	181,436

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility,y}$
Unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data	Distribution Licensee report on energy delivered to grid (Credit Note/JMR)
Value(s) applied	202,254.38
Measurement methods and procedures	The electricity generated and fed into the grid shall be continuously monitored using energy meters. For measuring the net electricity supplied by the project activity, the state electricity board has installed energy meters at the substation of the project activity. Monthly readings are taken jointly by the representative of State Electricity Supply Company Limited and site in charge of Operator and a statement is prepared and signed by the representatives of both the parties for total electricity exported to grid, total electricity imported from the grid and the net electricity supplied. The net electricity supplied is calculated as the difference of the total electricity exported to grid and total electricity imported from the grid by the project activity. The meter have accuracy class of 0.2s. The net electricity supplied to grid is a calculated value and would be determined as the difference between the electricity exported to the grid and the electricity imported from the grid by the project activity. The emission reduction would be computed on the basis of $EG_{facility,y}$. $EG_{facility,y} = EG_{export,y} - EG_{import,y}$
Monitoring frequency	Monitoring: Continuous measurement and monthly recording. Recording: Electronic/ Paper Recording Frequency: Continuous monitoring and monthly recording Responsibility: The plant management shall be responsible for the regular recording of data. Archiving: Crediting Period + 2 years Calibration Frequency: State Board norms or Annual

QA/QC procedures	The meter readings can be cross checked with the invoices for sale of power to ensure correctness. The meter(s) shall be calibrated annually and maintained by the state utility.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter	EG_{WEG}
Unit	MWh
Description	Daily electricity generation at the WEG controller
Source of data	Power Generation Reports from O&M Contractor
Value(s) applied	0
Measurement methods and procedures	The data will be monitored via project activity WEG Controllers and will be recorded daily in Power Generation Reports by Enercon. This data will be used only for determination of apportioning ratio, and will be applied only in cases where the monitoring period does not coincide with the initial/final meter reading dates in the Credit Notes. Detailed apportioning procedures are described in section Appendix 5.
Monitoring frequency	Monitoring: Continuous measurement. Recording: Electronic/ Paper Recording Frequency: Continuous monitoring and monthly recording Responsibility: The plant management shall be responsible for the regular recording of data. Archiving: Crediting Period + 2 years
QA/QC procedures	In case of any fault with the WEG Controller, the same would be immediately identified through an interlocking mechanism. In such a scenario the WEG Controller would be automatically shut down. The WEG Controller would then be replaced.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

B.7.2. Sampling plan

>>

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

B.7.3. Other elements of monitoring plan

>>

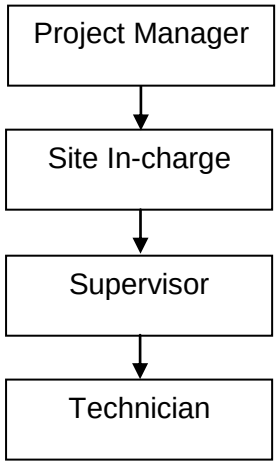
As per the applicable methodology ACM0002, monitoring is required for electricity generated from the project and the grid emission factor. Since the methodology is based on ex ante determination of the baseline emissions, the monitoring of the grid emission factor is not required. Thus, the sole parameter for monitoring for the project activity is the electricity supplied to the grid.

The project proponent has entered into comprehensive Operation & Maintenance contract with Enercon (India) Limited, the supplier of Wind Electric Generators.

The activities of the O&M team comprising of Enercon (India) Ltd. will be supervised by the Project Manager of TWEL, assisted by the necessary technical and other staff. The following will be maintained during operation of the project activities.

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

The O&M organizational structure is provided as below:



Monitoring System:

- The metering will be carried out at the individual WEG end by the Enercon operator on site.
- A Joint Meter Reading shall be taken by the representatives of respective discom [Hubli Electricity Supply Company Limited (HESCOM)] and Enercon at the high voltage side of the step up transformer installed at the substation at a particular date.
- In case the main metering system is not in service, then the check metering system shall be used until the main system is back to service.
- Meter reading would be jointly signed by both the representatives.
- The main and the check metering systems shall be sealed in presence of representatives of Power producers, Enercon, and respective discom (HESCOM).
- When any of these metering systems is found to be outside acceptable limits of accuracy or otherwise not functioning properly, it shall be repaired, recalibrated or replaced.
- PP will raise a monthly energy bill/statement based on the JMR at the end of each calendar month and the payment by State Electricity Board is done on this basis. The billing and payment records will be maintained by the PP.
- Calibration and Testing of Meters will be done as per State Board norms or annually.

Calculation of Data:

Monthly invoice shall be determined for the receiving stations as follows:

$DE = X_i – (X_i \times Z\%)$

Where:

DE Delivered energy pertaining to the project activity

Xi reading of the energy meter installed at the project's receiving stations

Z Transmission loss (%) incurred in the transmission line between the project & Receiving station

i i varies from 1 to n which is the number of Receiving stations of the project activity where the reading from multiple WEGs is recorded

$$Z = \frac{(X_1+X_2+X_3+----+X_n) - Y}{(X_1+X_2+X_3+----+X_n)} \times 100$$

Where:

Y	:	Reading of the bulk energy meter installed on the 200kV side of the receiving station
$X_1, X_2, X_3, ---, X_n$	:	Readings of the energy meters installed at the various individual wind mill power projects being developed/ proposed to be set up in the area and connected to the receiving station

Further information on the monitoring plan and apportionment calculation has been given in Appendix 5.

Cross checking and Internal Audit procedure

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

QA and QC Procedures

The electricity meter with accuracy class 0.2 at substation end (i.e. one main and one check meter) will be installed. Calibration certificates of meters will be kept in records in seriatim.

Data Storage and Archiving

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

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

Date of Completion: 23/11/2012

Contact Information:
Subrata Chakrabarty (*Consultant to PP*)
IL&FS Environmental Infrastructure and Services Limited
4th floor, Gopaldas Bhavan, 28, Barakhamba Road
Connaught Place, New Delhi – 110001, India

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
27/07/2011 (Purchase Order for supply of WEGs)

C.1.2. Expected operational lifetime of project activity

>>
20 years, 0 months[16]

[16] "Tool to determine the remaining lifetime of equipment" version 01; Annex 15 of EB 50

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>
Fixed

C.2.2. Start date of crediting period

>>
30/12/2012 or the date of registration of project, whichever is later.

C.2.3. Length of crediting period

>>
10 years, 0 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

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

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

D.2. Environmental impact assessment

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

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>
The Stakeholders' Meet was conducted at Hotel Anant Residency at Hubli in Karnataka on 06/06/2012. The notice inviting stakeholders was published in a local newspaper "Karnataka Daily" on 24/05/2012.

The following stakeholders were identified for project:

- Representatives from Tadas Wind Energy Limited.
- Representatives from Enercon (India) Ltd.
- Representatives from IL&FS Environmental Infrastructure and Services Limited
- Local community i.e. village Panchayat and people from surrounding villages

The stakeholders were introduced to the project activity by a representative from the Enercon team. The representatives from Enercon and TWEL gave detailed information to the stakeholders about the wind power project. A description of how electricity is generated from wind power was explained. The role of the project activity in mitigating the GHG emissions and benefits to the people in terms of improvement in pollution levels were also highlighted.

E.2. Summary of comments received

>>
The stakeholders took active participation in the meeting. A project related query was raised as mentioned below:-

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

➲ Are there any chances of reduction in Air Moisture due to heat produced by running of WEGs?

E.3. Report on consideration of comments received

>>

In response to the raised query it was clarified that WEGs are running with very less speed and not like other motors running with 1000 rpm or so. Hence there is no question of generating heat and reduction of moisture in the atmosphere.

The stakeholders were satisfied with the project and assured of their full support wherever required.

SECTION F. Approval and authorization

>>

Host Country Approval has been received from the National CDM Authority of India.

- - - - -

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

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Tadas Wind Energy Private Limited (*previously known as Tadas Wind Energy Limited*)
Street/P.O. Box	Plot C- 22, G Block, Bandra Kurla complex, Bandra-East
Building	The IL&FS Financial Centre
City	Mumbai
State/Region	Maharashtra
Postcode	400051
Country	India
Telephone	+912226593728
Fax	+912226593728
E-mail	rohil.kudtarkar@ilfsindia.com
Website	http://www.ilfsindia.com/
Contact person	Rohil Kudtarkar
Title	Authorized Signatory
Salutation	Mr.
Last name	Kudtarkar
Middle name	-
First name	Rohil
Department	Finance
Mobile	+919892655948
Direct fax	+912226593728
Direct tel.	+912226593728
Personal e-mail	rohil.kudtarkar@ilfsindia.com

Project participant and/or responsible person/ entity	☐ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	IL&FS Environmental Infrastructure & Services Limited
Street/P.O. Box	4th floor, 28 Barakhamba Road
Building	Dr. Gopaldas Bhawan
City	New Delhi
State/Region	Delhi
Postcode	110001
Country	India
Telephone	+91 11 4969 1000
Fax	+91 11 4969 1099
E-mail	subrata.chakrabarty@ilfsenv.com
Website	www.ilfsenv.com
Contact person	Subrata Chakrabarty
Title	-
Salutation	Mr.
Last name	Chakrabarty

Middle name	-
First name	Subrata
Department	CDM
Mobile	-
Direct fax	+91 11 4969 1099
Direct tel.	+91 11 4969 1000
Personal e-mail	-

Appendix 2. Affirmation regarding public funding

No public funding and no ODA from a country listed in Annex1, is involved in the project activity.

Appendix 3. Applicability of methodology and standardized baseline

Please refer to section B.2 of CDM-PDD-FORM for details.

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

Baseline Information

The latest data available has been used for the estimation of baseline emissions. The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Build Margin and the Simple Operating Margin for the Southern Grid. The details of which is available on the following website and is detailed below:
http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Version 7.0 of the database has been used.

Gross generation Total (GWh)			
	2008-09	**2009-10**	**2010-11**
NEWNE	548,956	586,311	622,447
South	167,587	180,638	185,257
Net Generation Total (GWh)			
	2008-09	**2009-10**	**2010-11**
NEWNE	510,693	544,915	579,181
South	157,336	169,765	173,925
Share of Must-Run (Hydro/Nuclear) (% of Net Generation)			
	2008-09	**2009-10**	**2010-11**
NEWNE	17.4%	15.9%	17.6%
South	22.8%	20.6%	21.0%
India	18.7%	17.1%	18.4%
Net Generation in Operating Margin (GWh)			
	2008-09	**2009-10**	**2010-11**
NEWNE	421,803	458,043	476,987
South	121,471	134,717	137,387
India	543,274	592,760	614,374
Net Generation in Build Margin (GWh)			
	2008-09	**2009-10**	**2010-11**
NEWNE	102,589	109,064	117,779
South	31,606	36,100	35,268
India	134,195	145,164	153,047

Emission Data

Absolute Emissions Total (tCO_2)			
	2008-09	**2009-10**	**2010-11**
NEWNE	430,502,442	453,067,520	468,438,871
South	117,880,640	126,786,215	129,093,636
Absolute Emissions OM (tCO_2)			
	2008-09	**2009-10**	**2010-11**
NEWNE	430,502,442	453,067,520	468,438,871
South	117,880,640	126,786,215	129,093,636
Absolute Emissions BM (tCO_2)			
	2008-09	**2009-10**	**2010-11**
NEWNE	69,297,387	88,593,337	101,146,601
South	25,851,338	27,558,555	25,882,886

Emission Factor

Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2008-09	**2009-10**	**2010-11**
NEWNE	1.0066	0.9777	0.9707
South	0.9729	0.9415	0.9419
Build Margin (tCO_2/MWh) (not adjusted for imports)			
	2008-09	**2009-10**	**2010-11**
NEWNE	0.6755	0.8123	0.8588
South	0.8179	0.7634	0.7339

Appendix 5. Further background information on monitoring plan

The purpose of the monitoring plan is to measure the net electricity supplied to the grid by the project activity, on the basis of which emission reductions are calculated. The source of the monitored data will be Credit Notes purchase of electricity generated from the WEGs.

For each WEG in the project activity, the distribution licensee would report electricity exported and imported from the grid. The net electricity supplied to the grid would be reported as the difference between the export and import from the WEG. The electricity export and import data will be monitored via main and check meters connected to feeders at the respective sub-stations. Multiple WEGs would be connected to each feeder, some of which would be part of the project activity (WEGs under this project activity) and some of which would not be part of the project activity (WEGs owned by other entities). Distribution licensee follows an apportioning procedure to account for electricity generation from individual WEGs based on data from individual WEG controllers.

The electricity exported and imported from the grid is recorded on a monthly basis, jointly in the presence of representatives of O&M Contractor and distribution licensee personnel. Following the joint meter readings, the O&M Contractors provide the readings of the WEG controller to Distribution licensee. Based on the monthly export and import data as per main/check meters and the WEG controller readings, distribution licensee provides a break-up of the electricity exported and imported for each WEG.

The net electricity generation from each WEG is determined by distribution licensee as follows:

$$\text{Export from WEG main/check meter} = \frac{\text{Generation at WEG controller}}{\text{Total generation at all WEG controllers for the feeder}} \times \text{Export from distribution licensee}$$

$$\text{Import from WEG main/check meter} = \frac{\text{Generation at WEG controller}}{\text{Total generation at all WEG controllers for the feeder}} \times \text{Import from distribution licensee}$$

Net electricity export from WEG = Export from WEG – Import from WEG

The above calculations would be carried out solely by distribution licensee and only the final apportioned electricity export, import, and net export for each WEG would be reported by distribution licensee in the Credit Notes. The details of the joint meter readings are not reported in the credit notes issued by distribution licensee.

Monitoring frequency: A monthly joint meter reading of the energy meters would be carried out by distribution licensee officials and O&M contractor (representatives of the project promoter).

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

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

(ii) Apportioned electricity export = Apportioning Ratio × Electricity export as per credit note

(iii) Apportioned electricity import = Apportioning Ratio × Electricity import as per credit note
(iv) Apportioned Net electricity supplied to the grid = Apportioned electricity export – Apportioned electricity import.

Appendix 6. Summary of post registration changes

Corrections: The location numbers and geographical coordinates of 12 WEGs have not been correctly stated in the registered F-CDM-PDD, v02 dated 23/11/2012. Consequently, the location numbers and geo-coordinates have changed from the previous validated values, which was based on the information provided by the service provider at the time of validation. Therefore, in-line with §1 of Appendix 1 of CDM Project Standard, v07.0; the location numbers and the geographical coordinates have now been correctly updated for 12 WEGs in Appendix 8 of the revised CDM-PDD-FORM, v03.0. In addition, the geographical coordinates of 02 WEGs were not correctly mentioned in the registered F-CDM-PDD, v02 dated 23/11/2012. Same has also been corrected in Appendix 8 of revised CDM-PDD-FORM, v03.0, in-line with the requirement of §1 of Appendix 1 of CDM Project Standard, v07.0. Also, location numbers of 03 WEGs were not correctly stated in registered F-CDM-PDD, v02 dated 23/11/2012. The correct location numbers have now been incorporated in Appendix 8 of revised CDM-PDD-FORM, v03.0.

Appendix 7. Contribution of CER Revenue to Sustainable Development

TWEL will contribute 2% of its CER revenues every year towards sustainable in the local community in Karnataka for the following activities:

Education:

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

Livelihood skills Enhancement and Opportunities

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

Health care facilities and Community Health Sensitization

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

Appendix 8. Geographical Co-ordinates

LOCATION NO.	LATITUDE N	LONGITUDE E
77	15.108131	75.166095
19A	15.042202	75.183992
302A	15.077415	75.190509
70B	15.098044	75.185101
70N	15.099979	75.184731
72A	15.096998	75.191792
74B	15.096008	75.187119
75A	15.093882	75.187760
75B	15.092443	75.189741
76A	15.090685	75.183653
78N	15.086613	75.187660
79B	15.083982	75.186643
80N	15.082607	75.187731
82N	15.078826	75.189375
44	15.108131	75.166095
511	15.079129	75.195117
310A	15.009233	75.297157
311B	15.010879	75.296871
319A	15.017770	75.289131
31A	15.081522	75.176581
321A	15.019696	75.288584
322A	15.023374	75.290441
323B	15.025453	75.290685
32A	15.083150	75.176313
330A	15.030032	75.280578
331B	15.031252	75.281547
332A	15.035866	75.279451
335A	15.043004	75.290170
33A	15.084787	75.175169
340C	15.057073	75.290282
341D	15.059986	75.289383
342C	15.063573	75.284391
343G	15.061991	75.283700
344A	15.061454	75.286891
346A	15.055198	75.271231
349A	15.045083	75.268632
34C	15.087788	75.176977
350B	15.041431	75.268199
351A	15.040021	75.267779
37A	15.089805	75.175936
42 B	15.101353	75.174019
43 B	15.103523	75.173881
45C	15.105888	75.166810
46N	15.109814	75.164858
478B	15.016330	75.290496
479A	15.021623	75.281088
47A	15.111742	75.161779
480A	15.031786	75.288005
481B	15.040237	75.276088
483B	15.065340	75.281173
55A	15.120266	75.164876

595A	15.055355	75.290754
62C	15.115023	75.186745
493	15.091068	75.200871
697	14.999190	75.288222
778	15.038127	75.202198
798	15.002850	75.290060
116N	15.123174	75.212629
117A	15.119660	75.208586
132A	15.076779	75.223387
133A	15.073776	75.224036
13A	15.053987	75.179955
14A	15.052303	75.182121
15B	15.050433	75.180194
16 A	15.048724	75.180974
203A	15.059690	75.213441
212A	15.057039	75.205994
215A	15.043221	75.198313
23A	15.063738	75.175003
306D	15.096103	75.201936
308C	15.088642	75.170668
312B	15.000990	75.287341
314B	15.004855	75.291318
334A	15.041069	75.290800
336A	15.046088	75.289783
38A	15.090378	75.171944
467B	15.113804	75.161259
477C	15.092739	75.203311
482D	15.052294	75.272344
489A	15.110535	75.201233
490A	15.106798	75.194258
492C	15.098500	75.201603
520A	14.997828	75.285225
54 A	15.126516	75.174068
81B	15.080807	75.188111
96A	15.082495	75.201998
693	15.131291	75.161384
831	15.013276	75.288864
114C	15.133103	75.211941
115C	15.130616	75.212432
200B	15.038050	75.216201
307F	15.086136	75.172583
317D	15.013479	75.293181
318B	15.014794	75.289648
329D	15.032832	75.283131
333E	15.039247	75.279985
337A	15.047924	75.289497
468C	15.116526	75.159800
491B	15.107010	75.199852
61B	15.118670	75.183146
64B	15.109861	75.186182
715	15.128294	75.166539
130B	15.079205	75.220096
65C	15.110099	75.182208
524	15.141280	75.187252
836	15.124114	75.170091

160A	15.143261	75.186826
160D	15.140651	75.182234
517D	15.087924	75.186991
690A	15.120513	75.161013
928	15.128633	75.214543
217A	15.040488	75.200711
354E	15.068772	75.276767
355B	15.071269	75.268246
357C	15.071914	75.280754
358A	15.071813	75.274509
359B	15.074330	75.271758
361D	15.080252	75.272175
501B	15.057053	75.179232
548A	15.133571	75.193305
557B	15.139280	75.210141
63B	15.113007	75.185989
66 A	15.103025	75.185692
716c	15.133023	75.166561
841B	15.129624	75.165302

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