**PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	**Wind project by LWEPL-2**
Version number of the PDD	**1**
Completion date of the PDD	**30/09/2013**
Project participant(s)	**Lalpur Wind Energy Private Limited**
Host Party(ies)	**India**
Sectoral scope and selected methodology(ies)	**Sectoral Scope: 1; Energy industries (renewable / non-renewable sources)** **Methodology: ACM0002** **Consolidated baseline methodology for grid-connected electricity generation from renewable sources; Version 13.0.0**
Estimated amount of annual average GHG emission reductions	**79,082 tCO_2e**

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Brief Summary of the Project

The objective of the proposed project activity, an initiative by Lalpur Wind Energy Private Limited (LWEPL), is to set up a 44 MW wind farm at Haveri and Dharwad districts in the state of Karnataka, India. A total of 55 Wind Electric Generators (WEGs) of 800 kW capacity each will be installed at the site. The project would help in reducing greenhouse gas emissions and provide clean renewable power to the Southern regional grid.

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 consists of 55 nos. of Wind World (formerly Enercon (India) Limited) make 0.8 MW WEGs totaling to a capacity of 44 MW. The WEG generates 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

With the implementation of the proposed project activity, the electricity generated from wind turbines is supplied to the Southern regional grid which is dominated by fossil fuel based power plants there by reducing an equivalent amount of GHG emission, associated with thermal energy generating sources of the Southern grid.

The project would result into 79,082 tCO_2e of annual average emission reduction and 790,820 tCO_2e of total emissions reductions over 10 years fixed crediting period.

Contribution of project activity to sustainable development

Proposed CDM project activity has the following sustainable development aspects:

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

2. Economic well being
   - The generation of electricity by the project activity will improve availability of electricity to the state grid and also provide more opportunities for setting up of industries in the region.

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

4. Technological well being
   - Wind electric generators 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

A.2. Location of project activity

A.2.1. Host Party(ies)

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India

A.2.2. Region/State/Province etc.

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State: Karnataka

A.2.3. City/Town/Community etc.

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Village: Chik Harakuni, Kamadolly, Kunkoor, Hirebudhhal, Tarlagatta, Kubihal, Rampur, Hanamanhalli, Kunkoor, Jigalur, Kyalkonda, Hulagur, Basavanal, Hirebendigeri
District: Haveri, Dharwad

A.2.4. Physical/Geographical location

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The project site is located in Haveri district of Karnataka, India. The project consists of 55 WEGs of 800 kW capacities each. The geo-coordinates are mentioned in Appendix 7. The location map is given below:

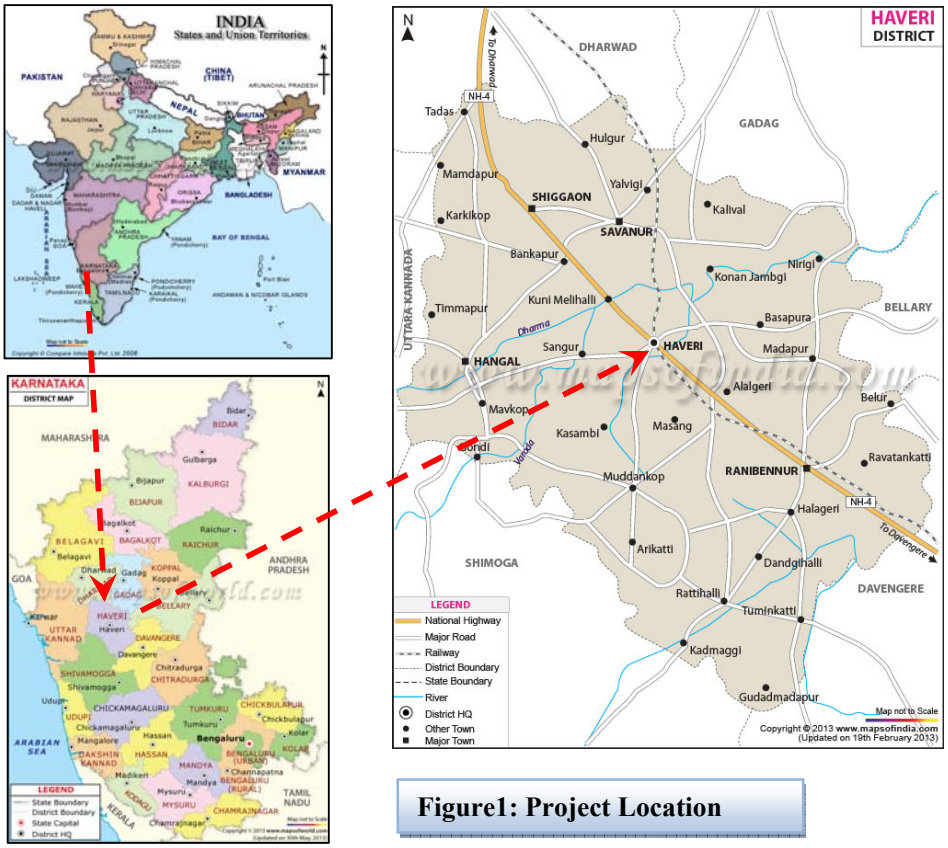

Figure1: Project Location

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 55 WEGs of 800 KW capacities each, i.e. total installed capacity of 44 MW and a PLF of 22.31 %. The WEGs are of Wind World's E-53 model, with newly designed blades, type tested and approved by the Ministry of New and Renewable Energy (MNRE).

All manufacturing units, training academy, corporate office, projects and service sites of Wind World (India) Limited are ISO 9001 certified.

The specifications of the WEGs installed at each of the sites are specified below:

Table A2: Technical Specifications for WEGs

Parameter	Description
Turbine Model	Enercon E-53
Rated Power	800 kW
Rotor Diameter	52.9 m
Hub Height	75 m
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 m/s
Cut-out wind speed	25 m/s
Extreme wind speed	52.5 m/s
Rated rotational speed	29 rpm
Operating range rotational speed	11-29.5 rpm
Orientation	Upwind
Number of blades	3
Blade Material	Fibre Glass Epoxy reinforced
Gear box type	Gear less
Generator type	Synchronous type
Braking	Aerodynamic
Output voltage	400 V
Yaw system	Active yawning with 4 electric yaw drives with brake on motor
Turbine	74 m (Concrete tower)
Turbine Life	20 Years

The electricity generated by the project activity is being supplied to the regional grid, i.e. Southern grid. The major contributor of electricity to the regional grids is fossil fuel based thermal power plants. Fossil fuel based electricity generation contributes to GHG emissions of carbon dioxide into the atmosphere. The project activity is a wind electricity generation which is a clean source of energy. In addition to contributing to the electricity generation to the state of Karnataka, the project activity also helps to displace electricity generated from fossil fuel based thermal power plants into the grid thereby reducing

GHG emissions. Prior to the project activity the same amount of electricity would be supplied from the connected grid system.

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 WEG & substation location using the appropriate metering devices. The detailed monitoring plan is at section B.7.3.

The project activity is wind electricity generation which is renewable source of energy and therefore is an environmentally safe technology.

Technology Transfer:
The project activity does not involve any technology transfer.

A.4. Parties and project participants

Party involved (host) indicates a 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)
Party A (host) - India	Private entity - Lalpur Wind Energy Private Limited (LWEPL)	No

A.5. Public funding of project activity
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No public funding and no ODA from a country listed in Annex 1, is involved in this project activity.

SECTION B. Application of selected approved baseline and monitoring methodology
B.1. Reference of methodology
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"Consolidated baseline methodology for grid-connected electricity generation from renewable sources"; ACM0002, Version 13.0.0 which uses the following methodological tools:

- "Tool to calculate the emission factor for an electricity system", Version 03.0.0
- "Tool for the demonstration and assessment of additionality", Version 07.0.0

B.2. Applicability of methodology
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The project meets all applicability criteria as set out in the approved methodology, ACM0002/Version 13.0.0, Sectoral Scope: 01, EB 66 and Tool to calculate the emission factor for an electricity system, Version 03.0.0, EB 70 as described below:

Applicability conditions under ACM0002, version 13.0.0:	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 (green field plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing	The proposed project a green field project involving installation of grid connected wind power plant at a site where no renewable power plant was operated prior to implementation of the project activity. Therefore, this

plant(s); or (d) involve a replacement of (an) existing plant(s).	applicability condition is met by the project
The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	The project activity is the installation of wind power plant, therefore the methodology is applicable to the project.
In the case of capacity additions, retrofits or replacements (except for capacity addition projects for which the electricity generation of the existing power plant(s) or unit(s) is not affected): 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 addition or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	The proposed project activity does not involve capacity additions, retrofits or replacements, hence this applicability condition is not applicable.
In case of hydro power plants, at least one of the following conditions must apply: • The project activity is implemented in an existing reservoir, with no change in the volume of reservoirs; or • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2 after implementation of the project activity; or • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2 after the implementation of the project activity.	The proposed project activity involves installation of a grid connected wind power plant; 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/m2 after the implementation of the project activity all of the following conditions must apply: • The power density calculated for the entire project activity using equation 5 is greater than 4 W/m^2; • All reservoirs and hydro power plants are located at the same river and were designed together to function as an integrated project that collectively constitutes the generation capacity of the combined power plant; • The water flow between the multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; • The total installed capacity of the power units, which are driven using water from the reservoirs with a power density lower than 4 W/m^2, is lower than 15 MW; The total installed capacity of the power units, which are driven using water from reservoirs with a power density	The proposed project activity involves installation of a grid connected wind power plant; hence this condition is not applicable.

lower than 4 W/m2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.	
The methodology is not applicable to the following: • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; • Biomass fired power plants; A hydro power plant that results in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the reservoir is less than 4 W/m2.	The proposed project activity is installation of new grid connected wind power project at site and does not involve fuel switching, biomass fired power plant or hydro energy generation.
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 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".	The project activity is a new grid connected wind power plant and not a retrofit, replacement or capacity additions and therefore this criterion is not applicable to the project activity.
Applicability conditions under Tool:	**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 that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The wind power project results in supply of electricity to the grid that would have been provided by conventional power units in the absence of the project activity. Thus meeting the applicability criteria.
The emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in "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.	The project activity involves supply of electricity to the grid and the emission factor for the Southern grid is calculated only for grid power plants. Therefore, 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 project electricity system is within the geographical boundary of India with exports and import to neighbouring countries which does not include Annex I countries. Hence the applicability criterion is met.
Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The project activity does not entail biofuel at any stage, therefore, this critierion is not applicable.

B.3. Project boundary

According to the approved methodology ACM0002, Version 13.0.0 the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to. The project activity supplies power to the Southern grid, therefore all the power plants connected to the Southern grid are considered for the calculation of the baseline emissions.

A diagrammatic presentation of the project boundary has been given below:

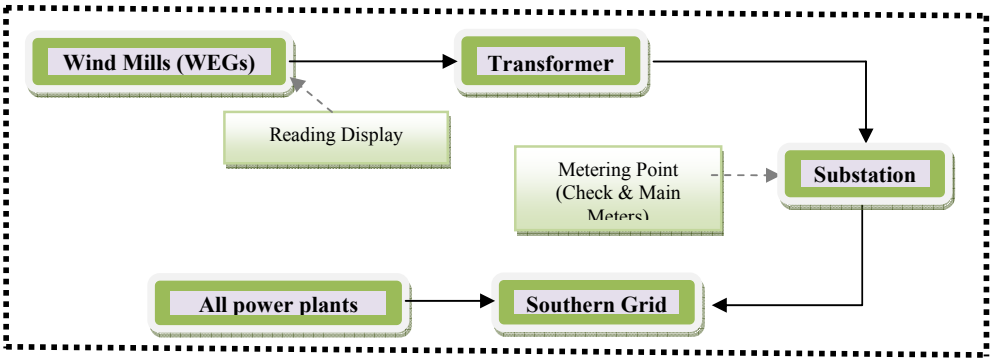

Figure B1: Project Boundary

Table B1: Emissions sources included in or excluded from the project boundary

	Source	Gas	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	In the baseline scenario the electricity would have been sourced from the Southern grid which is predominantly connected to fossil fuel fired power plants which emit CO_2.
		CH_4	No	Minor emission source. Neglected
		N_2O	No	Minor emission source. Neglected
Project scenario	For Greenfield wind power plants	CO_2	No	The project activity does not result into generation of GHG emissions.
		CH_4	No	No methane emissions are expected.
		N_2O	No	No nitrous oxide emissions are expected.

B.4. Establishment and description of baseline scenario

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As the project activity involves installation of a new grid-connected wind power plant/unit and is not a modification/retrofit of an existing plant/unit, the baseline scenario, as per the methodology ACM0002, Version 13.0.0 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" (Version 03.0.0).

B.5. Demonstration of additionality

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As per ACM0002, Version 13.0.0 the proposed project activity uses "Tool for the demonstration and assessment of additionality" version 07.0.0 to determine the additionality.

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

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 07.0.0 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.
- As per Income Tax Act (Section 80-IA), power projects are eligible for tax holiday for 10 years.
- Generation Based Incentives (GBI), announced by the Ministry of New and Renewable Energy (MNRE), for Grid Interactive Wind Power Projects commissioned after 17/12/2009, of Rs. 0.50 per unit of electricity fed into the grid with a cap of Rs. 62 Lakh/MW. The total disbursement in a year should not exceed one fourth of the maximum limit of the incentive i.e. Rs. 15.50 lakhs per MW during the first four years. The Scheme includes captive wind power projects, but excludes third party sale, (viz. merchant power plants).

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

Step 2: Investment Analysis

Sub-step2a: Determine appropriate analysis method

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

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

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

The "Guidelines on the Assessment of Investment Analysis" version 05, Annex 5, EB 62, Guidance 19 stipulates that if the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate.

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

Sub-step2b: Option III. Apply benchmark analysis

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

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

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

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

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

As per paragraph 7 of the appendix to the "Guidelines on the assessment of Investment Analysis" version 05, EB 62, Annex 5
"*In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for*

the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used."

The inflation rate forecast for the ten years published in Reserve Bank of India "Results of 16th Round (Q1:2011-12) of Survey of Professional Forecasters on Macroeconomic Indicators" dated 12th August 2011[1] is 5.70% whereas the average forecasted inflation rate for India for 2013-2018 published by International Monetary Fund (IMF) is 6.02%[2] . Therefore to be conservative RBI inflation rate has been used for benchmark calculation.

Average forecasted inflation rate for 2012-2016 =5.70%

Benchmark = (1+ Expected return on equity (in real terms))*(1+inflation rate) - 1
= (1+11.75 %)*(1+5.70%) - 1
= 18.12 %

In accordance with the "Guidelines on the assessment of Investment Analysis" version 05, EB 62, Annex 5 the benchmark (Expected return on equity) of 18.12 % has been considered for the project activity.

Table B2: Assumptions for Investment Analysis

Parameters	Value	Source
Plant Capacity in MW (55 nos. Of WEGs, 0.8 MW capacity each)	44	Proposal
Plant Load Factor	22.31%	Calculation based on Wind Assessment Report
Project cost (Rs. In Million)	2690.99	Proposal, Internal Assessment PIM
Financing Pattern – Equity	25%	Management Assumption based on previous projects
Financing Pattern – Debt	75%	Management Assumption based on previous projects
Interest on Term Loan	12%	Management Assumption based on previous projects PIM
Interest on Working Capital	14.75%	Management Assumption based on previous projects
Tariff Rate – (Rs./KWh)	3.70	KERC Tariff Order
Book Depreciation – annual rate	4.50%	Companies Act
Depreciation as per Income Tax Act (WDV basis)	15%	Income tax Act
Corporate tax rate	33.22%	Income tax Act PIM
MAT rate	19.33%	Income tax Act PIM
Operation & Maintenance costs per WEG	0.6	Wind World Proposal

[1] http://www.rbi.org.in/scripts/PublicationsView.aspx?id=13554

[2] http://www.imf.org/external/pubs/ft/weo/2011/02/weodata/weorept.aspx?pr.x=46&pr.y=9&sy=2012&ey=2016&scsm=1&ssd=1&sort=country&ds=.&br=1&c=534&s=PCPI%2CPCPIPCH&grp=0&a=

(Rs. in million)		
Yearly increase in O&M cost	6%	Wind World Proposal

The equity IRR of the project works out to be 4.12 % which is significantly lower than the corresponding benchmark rate of 18.12 %. This clearly indicates that investment barrier exists in project activity implementation. Therefore, it can be concluded that the project activity is additional and requires CDM revenues to alleviate the investment barrier to the project activity.

Sub-step2d: Sensitivity Analysis

"Guidelines on the Assessment of Investment Analysis" require the project developer to subject critical assumptions to reasonable variation to ascertain the robustness of the conclusion drawn, that is, the project is 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: Electricity generation units, total Project Cost, O&M costs and tariff rate. These factors were subjected to 10% variation on either side to ascertain the impact on the profitability and hence the IRR of the project. The results of the sensitivity analysis are as given below:

Table B3: Sensitivity Analysis

Factor	Resultant equity IRR		
	Decrease by 10%	Base case	Increase by 10%
Generation units	1.18	4.12	7.02
Project Cost	6.99	4.12	1.79
O&M Cost	4.62	4.12	3.61
Tariff	1.19	4.12	6.99

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 CDM revenues are required to alleviate the investment barrier to the project activity.

Step 4: Common Practice Analysis

As per the tool for "Demonstration and assessment of additionality" Version 07.0.0, the following **Stepwise approach for Common Practice** has been followed for the project activity.

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

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

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

The capacity of the project activity is 44 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%
22 MW	44	66 MW

For the analysis, the projects falling in the range of 22 MW to 44 MW capacities have been taken.

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

(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.
(While identifying similar projects, project participants may also use publicly available information, for example from government departments, industry associations, international associations on the market penetration of different technologies, etc.)

India has been considered applicable geographical area as a default for the common practice analysis of project activity. The projects apply the same measure of switch of technology and use of renewable energies with supply of electricity to grid. All power plants generating electricity within the capacity range of 22 MW to 66 MW and having commercial operations date before project activity start date (30/06/2012) have been considered. The power generation plants identified in this step are hydro, thermal[3] and wind power projects[4]. The total number of power plants is 459

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

CDM project activities which have got registered or are under validation have been excluded in this step. The list of the plants identified is provided to the DOE. After excluding the registered and under validation projects the total number of projects, $N_{all} = 421$

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

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

(a) Energy Source/Fuel
(b) Feed stock
(c) Size of installation (power capacity)
    (i) Micro
    (ii) Small
    (iii) Large
(d) Investment climate in the date of the investment decision, inter alia:
    (i) Access to technology;
    (ii) Subsidies or other financial flows;
    (iii) Promotional policies

[3] CO_2 Baseline Database for Indian Power sector, CEA, version 08

[4] Directory: Indian Wind Power 2012

(iv) Legal regulations

(e) Other features, *inter alia*:

(i) Nature of investment

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

(a) 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	154
Number of hydro power projects	257
Total	**411**

(b) Investment climate in the date of the investment decision: The investment decision date was, taken by the Board of the project activity, 01/10/2011. The investment decision of the project activity was taken considering Generation Based Incentive (GBI) scheme[5] 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 into effect on 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.

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}).

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

Project category	Number of Projects
Thermal	154
Hydro	257
Wind (Without GBI)	8
N_{diff}	**419**

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

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

N_{all}	421
N_{diff}	419
N_{all}-N_{diff}	**2**
$F = (1-N_{diff}/N_{all})$	**0.0047**

As per the Guidelines, t*he proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3.*

[5] http://www.mnre.gov.in/file-manager/grid-wind/gbi-scheme.pdf

The value of factor F as calculated in Step 4 is 0.0047 which is less than 0.2 and the value of N_{all}-N_{diff} is 2, which is also 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

Serious Consideration of CDM:

The start date for the project activity is 30/06/2012. The project proponent has (as per EB 62, Annex 13, paragraph 2) informed the Indian DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. The form for prior consideration was submitted to the host DNA and UNFCCC on 19/12/2012, which is within six months of the project activity start date.

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

Table B4: Chronology of Events

Sr. No.	Events	Date
1.	Board Resolution Date	01/10/2011
2	First Purchase Order to WEG supplier (Project Start Date)	30/06/2012
3	Submission of form for Prior Consideration of CDM to UNFCCC	19/12/2012
4	Submission of form for Prior Consideration of CDM to National CDM Authority	28/12/2012
5	Local Stakeholder Consultation Meeting	15/04/2013

B.6. Emission reductions
B.6.1. Explanation of methodological choices
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The project activity involves harnessing of wind energy for electricity generation, which does not involve combustion or generation from fossil fuels. Hence according to ACM0002 Version 13.0.0, there will be no project emissions in the project activity ($PE_y = 0$).

Estimation of Baseline Emissions

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

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

Where:

BE_y Baseline emissions in year y (tCO_2/yr)
$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into 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 "Tool to calculate the emission factor for an electricity system" ver. 03.0.0 (tCO_2/MWh)

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

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

Where:
$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EG_{facility,y}$ Quantity of net electricity generation supplied by the project plant/ unit to the grid in year y (MWh/yr)

Therefore Equation 1 becomes:

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

Calculation of $EF_{grid,CM,y}$
As per the approved methodology, ACM0002 Version 13.0.0, "Tool to calculate emission factor for an electricity system" (version 03.0.0) is used to determine the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system by calculating the combined margin emission factor of the electricity system. Following steps are applied to determine the combined margin CO_2 emission factor:

As per approved methodology ACM0002, version 13.0.0, the baseline emission factor for a grid system has to be calculated as per "Tool to calculate the emission factor for an electricity system" the following steps shall be applied;

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

As per the Tool, i*f 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) have worked out baseline emission factors for two grids in India and made them publicly available in the form of "CO_2 Baseline Database" dated January 2013, version 8[6].

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

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

Step 1: Identify the relevant electricity system

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

Table B5: Geographical scope of the two regional electricity grids

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

The baseline emission factor (including imports) of Southern grid, for the southern state Karnataka, published by CEA is considered for calculation of emission reductions due to displacement of electricity in accordance with the "Tool to calculate the emission factor for an electricity system", version 03.0.0.

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

According to the tool, the following two options are available to calculate the operating margin and build margin emission factor:

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

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

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

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

According to the "Tool to calculate the emission factor for an electricity system" Version 03.0.0, the calculation of operating margin ($EF_{grid,OM,y}$) is based on one of the following methods:

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

Any of the four methods can be used, however the simple OM method (option a) can only be used if low cost/must run resources constitute less than 50% of total grid generation (excluding electricity generated by off-grid power plants) in average of the five most recent years.

Table B6: Share of must-run plants[7] (Hydro/Nuclear) (% of Net Generation)

Grid	2007-08	2008-09	2009-10	2010-11	2011-2012
NEWNE	19 %	17.4 %	15.9 %	17.6 %	19.2%
South	**27.1 %**	**22.8 %**	**20.6 %**	**21.0 %**	**21.0%**
India	21 %	18.7 %	17.1 %	18.4 %	19.6%

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

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

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

Simple OM method

The OM emission factor 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
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.

$$\mathbf{EF_{grid,OM\ simple,\ y}} = \frac{\sum_{\mathbf{m}} \mathbf{EG_{m,y}} \times \mathbf{EF_{EL,m,y}}}{\sum_{\mathbf{m}} \mathbf{EG_{m,y}}} \quad \textbf{(2)}$$

Where:

$EF_{grid,OM\ simple,y}$ Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$ Net quantity of electricity generated and delivered to the grid by power unit *m* in the year *y* (MWh)
$EF_{EL,m,y}$ CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)

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

m	All power units serving the grid in year *y* except low-cost/ must-run power units
y	The relevant year as per the data vintage chosen in step 3

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

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

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

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

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

Where:

$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$FC_{i,m,y}$	Amount of 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 plant/ unit *m* in year *y*
y	The relevant year as per the data vintage chosen in step 3

Step 5: Calculate the Build Margin (BM) Emission Factor $EF_{grid,BM,y}$

As per the Tool, in terms of vintage of data, project participants can choose between one of the following two options:

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

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

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

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

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

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

Since in India, $SET_{\geq 20\%}$ yields larger sample and excludes CDM projects, $SET_{\geq 20\%}$ has been used to calculate the build margin.

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

$$\mathbf{EF_{grid,BM,y}} = \frac{\sum_{\mathbf{m}} \mathbf{EG_{m,y}} \times \mathbf{EF_{EL,m,y}}}{\sum_{\mathbf{m}} \mathbf{EG_{m,y}}} \quad \textbf{(4)}$$

Where:

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

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

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

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

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

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, therefore, the weighted average CM method (option a) is used.

The combined margin emission factor is calculated as follows:

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

Where:

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

As per the "Tool to calculate emission factor for an electricity system"; Version 03.0.0, for wind power projects, the default weights are as follows: $w_{OM} = 0.75$ and $w_{BM} = 0.25$.

Estimation of Leakage Emissions

No leakage emissions are to be accounted under this methodology.

Estimation of Emission Reductions

According to the approved methodology ACM0002 (Version 13.0.0) Emission Reductions are calculated as follows:

$$\mathbf{ER_y} = \mathbf{BE_y - PE_y} \quad \mathbf{(6)}$$

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)

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, NEWNE Electricity Grid) in year *y*
Source of data	"CO_2 Baseline Database for Indian Power Sector" version 8 (January 2013) published by the Central Electricity Authority, Ministry of Power, Government of India[9].
Value(s) applied	0.94820
Choice of data or Measurement methods and procedures	Operating Margin Emission Factor has been calculated using the simple OM approach in accordance with ACM0002 and "Tool to calculate the emission factor for an electricity system" Version 03.0.0. The generation weighted average of simple operating margins of the years 2009-10, 2010-11 and 2011-12 have been used to calculate ex-ante OM.
Purpose of data	To calculate 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, NEWNE Electricity Grid) in year *y*
Source of data	"CO_2 Baseline Database for Indian Power Sector" version 8 (January 2013) published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied	0.85219
Choice of data or Measurement methods and procedures	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002 and "Tool to calculate the emission factor for an electricity system" Version 03.0.0. The ex-ante value for the year 2011-12 has been used.
Purpose of data	To calculate baseline emissions
Additional comment	-

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

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined Margin CO2 Emission Factor for grid connected power generation in year y calculated using the latest version of "Tool to calculate the emission factor for an electricity system."
Source of data	As per the "Tool to calculate the emission factor for an electricity system." - "CO2 Baseline Database for Indian Power Sector" version 8 (January 2013) published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied	0.92419
Choice of data or Measurement methods and procedures	Combined Margin Emission Factor ($EF_{CM,y}$) is calculated ex ante as the weighted average of Operating Margin Emission Factor ($EF_{OM,y}$) and Build Margin Emission Factor ($EF_{BM,y}$). In case of wind power projects default weights of 0.75 for w_{OM} and 0.25 for w_{BM} are applicable as per ACM0002, version 13.0.0
Purpose of data	To carry out baseline emission calculation
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

>>

In accordance with ACM0002 version 13.0.0 and "Tool to calculate the emission factor for an electricity system" version 03.0.0, the baseline is 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)	2009-10	2010-11	2011-12
Southern Grid	0.94150	0.94188	0.95979

Thus the final $EF_{grid,OM,y}$ based on three year weighted average calculation is estimated to be **0.94820 tCO_2/ MWh**.

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

The build margin has to be calculated by constituting a sample group m from either the 5 most recently built power plants or the power capacity additions in the electricity system that comprise 20% of the system generation (that have been built most recently). The sample group that comprises larger annual generation from either of these has to be chosen. It is observed that the generation from the sample group that comprises 20% of the system generation has larger generation than the 5 most recently built plants. So the Build Margin is calculated from the sample group comprising the most recently additions to the grid that constitute 20% of the system generation.

Build Margin (tCO_2/MWh) (incl. Imports)	2009-10	2010-11	2011-12
Southern Grid	0.76340	0.73389	0.85219

The $EF_{grid,BM,y}$ is estimated at **0.85219 tCO_2/ MWh** (with sample group m constituting most recent capacity additions to the grid comprising 20% of the system generation).

Step 3: Calculation of Baseline Emission Factor

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

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

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: **0.92419 tCO_2 /MWh**

Step 4: Calculation of Baseline Emissions (BE_y)

According to "Tool to Calculate the Emission Factor for an Electricity System" the baseline emissions is calculated as electricity supplied to the grid multiplied by an emission factor (measured in tCO_2/MWh) calculated in a transparent and conservative manner.

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

Where:

BE_y	Baseline emissions in year *y* (tCO_2/yr)
$EG_{facility,y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh)
$EF_{grid,CM,y}$	Combined margin CO_2 emissions factor grid connected power generation (tCO_2e/MWh)

Therefore,

Baseline Emissions	=	85570 MWh/yr × 0.92419 tCO_2/MWh
	=	79082.94 tCO2/yr
	=	**79,082 tCO_2/yr (round down value)**

Step 5: Calculation of Emission Reductions (ER_y)

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

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

Project Emissions by sources of GHGs due to the project activity within the project boundary are zero since wind power is a GHG emission free source of energy.

Therefore, net anthropogenic emission reductions due to the proposed project are equal to the baseline emissions on a yearly basis. The project activity results into evacuation of approximately 85.570 Million KWh of renewable power annually to the Southern grid and the annual emissions reductions are equal to **79,082 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	79,082	0	0	79,082
Year 2	79,082	0	0	79,082
Year 3	79,082	0	0	79,082
Year 4	79,082	0	0	79,082
Year 5	79,082	0	0	79,082
Year 6	79,082	0	0	79,082
Year 7	79,082	0	0	79,082
Year 8	79,082	0	0	79,082
Year 9	79,082	0	0	79,082
Year 10	79,082	0	0	79,082
Total	**790,820**	**0**	**0**	**790,820**
Total number of crediting years	**10**			
Annual average over the crediting period	**790,820**	**0**	**0**	**790,820**

B.7. Monitoring plan
B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility,y}$
Unit	MWh/yr
Description	Quantity of net electricity supplied by the project plant to the grid in year *y*
Source of data	Joint Meter Reading (JMR) or statement
Value(s) applied	85570
Measurement methods and procedures	**Electricity meters**: metering system for the project activity consists of three set of electronic bidirectional tri-vector meters *viz*. Yard Meters (individual WEG site), ABT meter and line meter. Accuracy class is - 0.2s at substation for ABT meter and Line meter - 0.5s for yard meters **Recording frequency:** Continuous measurement, at least monthly recording **Calibration frequency:** Once in three years based on PPA **Responsible person:** Plant operator
Monitoring frequency	Monthly
QA/QC procedures	Cross check the measurement results with bill or invoice.
Purpose of data	To calculate baseline emissions
Additional comment	The data (electricity supplied to the grid) will be archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period or the last issuance of CERs for the project activity, whichever occurs later.

B.7.2. Sampling plan

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NA

B.7.3. Other elements of monitoring plan

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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, 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.

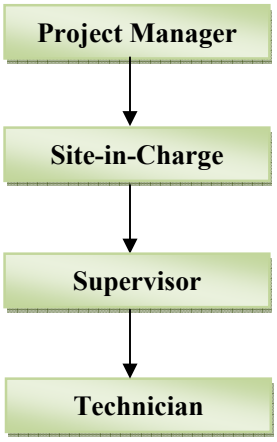
The project proponent has entered into comprehensive Operation & Maintenance contract with Wind World (India) Limited, the supplier of Wind Electric Generators.

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

i. Monitoring the functioning of the metering arrangements and getting them calibrated as per the State Electricity Board norms, or once in three years, so that the accuracy and reliability levels are maintained.
ii. Periodic onsite inspections to ensure the quality of the data collected by the team and initiate steps in case of any abnormal conditions.
iii. Ensure monthly recording of the generation particulars
iv. Obtaining and archiving the generation certificates from the state electricity boards for aggregation at the required intervals.

v. Verification and reconciliation, if needed, of the generation certificates with the generation data recorded and maintained regularly.
vi. Aggregating the data on net exported energy from the project thus reconciled and submission to LWEPL. This will then be forwarded to the CDM advisor for calculation and reporting of ERs.

The O&M organizational structure is provided as below:



Metering system and monitoring plan:

- The reading will be taken at the individual WEG end by the Wind World operator on site.
- There is a panel meter at each wind turbine to measure electricity output generation.
- There is a main meter and a check meter at the wind farm substation (located on the high voltage side of the step up transformer) to measure electricity output generation.
- The generation attributed to an individual wind turbine is defined by the ratio of the generation of that wind turbine to the summation of the generation of the wind farm (as also recorded at the wind turbine meters) multiplied by the generation recorded at the wind farm substation.
- The customer is then allocated the summation of its generation across its wind turbines
- A Joint Meter Reading shall be taken by the representatives of Wind World and Hubli Electricity Supply Company Limited (HESCOM) 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, Wind World, and HESCOM representative.
- When any of these metering systems is found to be outside acceptable limits of accuracy or otherwise not functioning properly, it shall be repaired, recalibrated or replaced.
- PP will raise a monthly energy bill/statement based on the JMR at the end of each calendar month and the payment by State Electricity Board is done on this basis. The billing and payment records will be maintained by the PP.
- Calibration and Testing of Meters will be done as per State Electricity Board norms or once in three years.

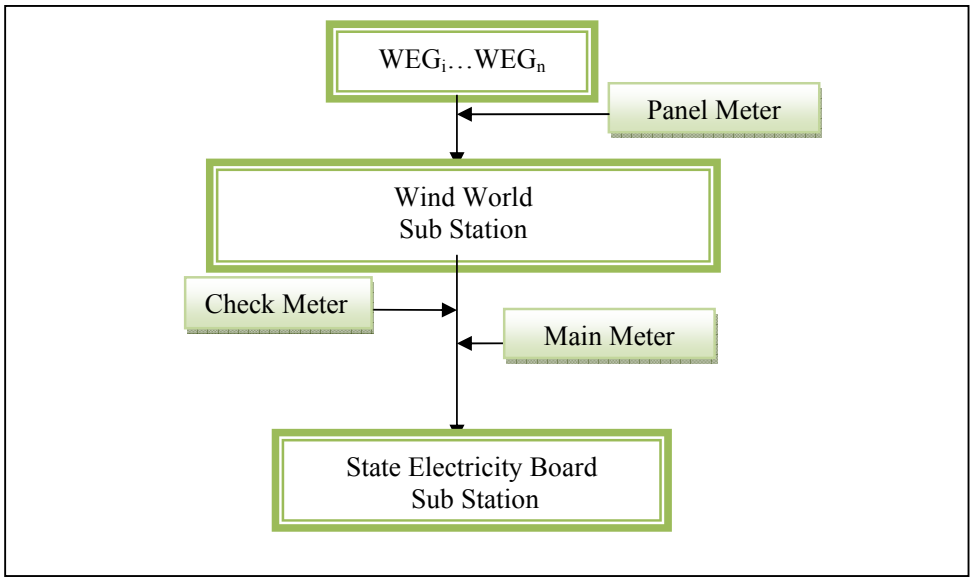


Figure B2: Metering Arrangement

Calculation of data:

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

DE = Xi – (Xi × 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

$$Z = \left\{\frac{(X1+X2+X3+\cdots Xn)-Y}{(X1+X2+X3+\cdots Xn)}\right\} \times 100$$

Where:

Y	Reading of the bulk energy meter installed on the 200 KV side of receiving station
X1,X2,...Xn	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

Cross checking and Internal Audit procedure

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

QA and QC Procedures

There is a reading panel at each WEG end and 0.2 accuracy class electricity meter at substation (one main and one check meter) to measure the energy generated from the project activity. The 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 LWEPL.

SECTION C. Duration and crediting period
C.1. Duration of project activity
C.1.1. Start date of project activity
>>
30/06/2012
(Date on which first purchase order was issued to the equipment supplier Wind World (India) Ltd. for wind electricity generators to be installed at the site)

C.1.2. Expected operational lifetime of project activity
>>
20 years, 0 months

C.2. Crediting period of project activity
C.2.1. Type of crediting period
>>
Fixed

C.2.2. Start date of crediting period
>>
31/12/2013

C.2.3. Length of crediting period
>>
10 years, 0, months

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts
>>
As per the Ministry of Environment & Forest (MoEF), Government of India, Environmental Impact Assessment (EIA) studies of the wind power generation plant is not an essential requirement as it is not covered under the eleven categories[10] as described in EIA Notification of 1994, or the Amended Notifications of 2006 and 2010.

As the project activity does not cause any negative impact on the environment, no EIA study was conducted.

D.2. Environmental impact assessment
>>
There are no significant environmental impacts due to implementation of the project activity.

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

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

The Stakeholders' Meet was conducted at Hotel Ananth Residency in Hubli District of Karnataka on 15/04/2013. The notice inviting stakeholders was published in the local daily *The Times of India, Hubli Dharwad Belgaum* on 05/04/2013.

The following stakeholders were identified for project:

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

The stakeholders were introduced to the project activity by a representative from the Wind World team. The representatives from Wind World and LWEPL 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 local people also actively participated in the meeting. The queries raised by them are given as below:-

- Will the installation of wind mills affect the water level of the area?
- Can the villagers buy electricity directly from the PP?

E.3. Report on consideration of comments received

>>

The doubts of stakeholders were patiently addressed by the project proponent. The answers given to the above queries are:

- There is no adverse effect of wind mill installation on the ground water level or water quality.
- It is possible, but in the present scenario the PP has committed to sign a Power Purchase Agreement (PPA) with the State Grid Authority and the electricity generated will be supplied to the grid.

The stakeholders expressed their satisfaction and were happy as they have got employment opportunities from the project. They welcomed the installation and assured their full support wherever required.

Picture E1: Stakeholder Consultation in process

SECTION F. Approval and authorization

>>

Host Country Approval yet to be received.

- - - - -

Appendix 1: Contact information of project participants

Organization name	Lalpur Wind Energy Private Limited
Street/P.O. Box	Plot C- 22, G Block, Bandra Kurla complex
Building	8th Floor, IL&FS Financial Centre
City	Mumbai
State/Region	Maharashtra
Postcode	400051
Country	India
Telephone	+91 22 26533038
Fax	+91 22 26593728
E-mail	rohil.kudtarkar@ilfsindia.com
Website	http://www.ilfsindia.com/
Contact person	Mr Vinod Dhanuka
Title	
Salutation	Mr.
Last name	Dhanuka
Middle name	
First name	Vinod
Department	Operations
Mobile	
Direct fax	+91 22 26533038
Direct tel.	+91 22 26593728
Personal e-mail	rohil.kudtarkar@ilfsindia.com

Appendix 2: Affirmation regarding public funding

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

Appendix 3: Applicability of selected methodology

Refer Section B.2

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

(For Baseline Calculation)
The latest data available has been used for the estimation of baseline emissions. The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Built Margin and the Simple Operating Margin for the NEWNE and the Southern Grid., the details of which is available on the following website and is detailed below:
Version 8.0 of the database has been used.

Generation Data

Gross Generation Total (GWh)

	2007-08	2008-09	2009-10	2010-11	2011-12
NEWNE	531,539	548,956	586,311	622,447	667,244
South	167,379	167,587	180,638	185,257	204,804
India	698,918	716,543	766,950	807,704	872,049

Net Generation Total (GWh)

	2007-08	2008-09	2009-10	2010-11	2011-12
NEWNE	496,119	510,693	544,915	579,181	621,462
South	157,247	157,336	169,765	173,925	191,844
India	653,366	668,029	714,680	753,106	813,306

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

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

Net Generation in Operating Margin (GWh)

	2007-08	2008-09	2009-10	2010-11	2011-12
NEWNE	401,642	421,803	458,043	476,987	502,300
South	114,634	121,471	134,717	137,387	151,502
India	516,275	543,274	592,760	614,374	653,802

20% of Net Generation (GWh)

	2007-08	2008-09	2009-10	2010-11	2011-12
NEWNE	99,224	102,139	108,983	115,836	124,292
South	31,449	31,467	33,953	34,785	38,369
India	130,673	133,606	142,936	150,621	162,661

Net Generation in Build Margin (GWh)

	2007-08	2008-09	2009-10	2010-11	2011-12
NEWNE	100,707	102,589	109,064	116,601	125,441
South	31,613	31,606	36,100	35,268	39,414
India	132,320	134,195	145,164	151,869	164,855

Emission Data

Absolute Emissions Total (tCO2)

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

Absolute Emissions OM (tCO2)

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

Absolute Emissions BM (tCO2)

	2007-08	2008-09	2009-10	2010-11	2011-12
NEWNE	60,193,616	69,310,182	88,593,337	100,164,507	114,948,188
South	22,550,310	25,851,338	27,558,555	25,882,886	33,588,082
India	82,743,926	95,161,520	116,151,892	126,047,394	148,536,270

Electricity Transfers

Year 2011-2012 (Imports only)

From	To	Combined	Southern	India
Combined			6,034.1	
Southern		0.0		
Bhutan		5,284.5	0.0	5,284.5
Nepal		0.0	0.0	0.0
Total Imports		5,284.5	6,034.1	5,284.5

Emission Factor calculation

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

Build Margin (tCO_2/MWh) (incl. Imports)	**2011-12**
Southern Grid	0.85219

Appendix 5: Further background information on monitoring plan

In addition to sections B.7.1 and B.7.3

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:

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

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

$$\text{Net electricity export from WEG} = \text{Export from WEG} - \text{Import from WEG}$$

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 x Electricity Export as per Credit Note

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

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

Appendix 6: Summary of post registration changes

NA

Appendix 7: Geo-coordinates

Location No.	Latitude (N)			Longitude (E)		
	Degree	Minutes	Seconds	Degree	Minutes	Seconds
714	15	6	54.40706	75	17	49.05494
967	15	7	2.830859	75	17	54.19348
377	15	6	25.09797	75	16	16.23333
422E	15	10	29.05999	75	15	23.58593
486	15	8	46.03086	75	16	25.05894
485B	15	5	10.92001	75	15	44.54513
178N	15	5	26.60215	75	14	22.98088
179N	15	5	18.30139	75	14	23.30661
180N	15	5	9.122257	75	14	23.1623
181B	15	4	59.81819	75	14	18.02586
402	15	8	23.95394	75	17	48.5094
403C	15	9	14.89763	75	16	2.44028
404B	15	8	28.72093	75	17	11.98757
405B	15	8	45.62654	75	17	2.526104
407 B	15	8	59.32667	75	17	5.359529
408A	15	9	18.67046	75	16	32.00489
409C	15	9	25.99277	75	16	33.25442
411C	15	9	36.50221	75	16	9.907835
412C	15	9	33.12399	75	16	31.05167
414B	15	9	30.382	75	15	42.8869
415B	15	9	23.74538	75	15	39.72833
416C	15	9	35.14161	75	15	36.62539
418B	15	9	50.77114	75	15	31.98577
419	15	10	3.808565	75	15	16.81862
360A	15	4	39.83039	75	16	15.42976
365C	15	5	28.02573	75	15	30.05865
370A	15	5	44.83803	75	15	44.28521
371A	15	5	47.94429	75	15	32.16006
372C	15	5	35.83813	75	15	29.83356
374	15	5	52.51778	75	16	13.81308
375	15	6	1.669261	75	16	9.803946
376	15	6	16.67176	75	16	12.57041
387 A	15	6	27.16348	75	17	48.17938
388 A	15	6	38.69329	75	17	42.8677
484E	15	5	21.05957	75	15	30.35177
788	15	6	3.17198	75	17	49.5533
861	15	6	19.60646	75	17	52.22319
864	15	5	3.839773	75	15	58.90945

872A	15	6	13.52907	75	17	44.94381
917	15	5	31.57418	75	17	42.87546
417C	15	9	44.22509	75	15	34.96071
413B	15	9	55.53255	75	16	19.5846
420B	15	10	37.19821	75	15	23.02594
854	15	10	7.98838	75	15	33.64905
368	15	4	41.23613	75	15	13.95442
197A	15	2	50.97028	75	14	29.53972
196	15	3	1.675612	75	14	33.16959
198A	15	2	42.96095	75	14	31.27256
352	15	2	30.22256	75	14	41.57523
837	15	2	17.66287	75	14	37.00539
366	15	5	9.711198	75	15	19.95189
914	15	5	1.124812	75	15	42.3554
353A	15	3	43.94452	75	16	12.44455
369	15	4	31.01288	75	15	16.05293
338	15	3	3.464315	75	17	21.29938

Appendix 8

CONTRIBUTION OF CER REVENUES TO SUSTAINABLE DEVELOPMENT

LWEPL 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