CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

>>
Wind Electricity Generation Project
Version: 03
Dated: 08/08/2008

A.2. Description of the project activity:

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Reliance Innoventures Limited (RINL), is a Company incorporated under the Indian Companies Act, 1956. The project activity comprises of installation of 30 Wind Electric Generators (WEGs) each of capacity 1500 kW supplied by Suzlon Energy Ltd, at Ambavade Khurd, Chavanwadi, Chalkewadi, Borgewadi, Pawarwadi, Galmewadi, Dhebewadi and Maskarwadi villages of Satara District, Maharashtra.

The objective of the project activity is develop, design, engineering, procure, finance, construct, operate and maintain the 45 MW wind based generation facility in the state of Maharashtra. The Project participant has signed Power Purchase Agreement (PPA) for 13 years period, with Maharashtra State private utility M/s. Reliance Energy Ltd.

The project activity displaces approximately 90 GWh[1] of GHG intensive electricity consumed in western suburbs of Mumbai, which falls under the western regional electricity grid of India. In the absence of the project activity, same amount of electricity would have been procured from conventional thermal power generation facilities.

Ministry of Environment and Forests (MoEF), Govt. of India (GoI) stipulated 4 indicators, i.e., social well being, economic well being, environmental well being and technological well being as parameters for sustainable development in the interim approval guidelines host country approval eligibility criteria for Clean Development Mechanism (CDM) projects.

A> **Social well being**
- Rural and infrastructural development in the areas around the project activity.
- Income generation to the unskilled nearby area workers.
- Create employment opportunities among the local community members.
- Promote community approach among the villagers.

B> **Economic well-being**
- Reduce the energy deficit and peak deficit with in the state.
- Encourage the investors to make similar investments in promoting the clean energy technologies

[1] At the time of submission of this PDD (25/07/2008), 40.5 MW capacity of the project i.e. 27 WEG have been commissioned, the commissioning certificates of the same are submitted to the DOE

- Help in economic development of one of the most remote regions in the western region of India.
- Improves the land usage patterns in the country.

C> **Environmental well being**
- Replaces 90 GWh of electricity with clean energy.
- Reduction in the CO2 emissions.
- Reduction in the consumption of fossil fuels and conservation of fossil fuels.
- Reduction in local air pollutants and particulate matters, solid waste and discharges.

D> **Technological well being**
- Promotion of environmentally safe and sound technologies
- Encourage, adopt and implement sustainable technologies suited for Indian conditions

A.3. Project participants:

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Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies)Project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Reliance Innoventures Limited (RINL) (Private)	No

The contact information of the project participants is provided in the Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

>>
India

A.4.1.2. Region/State/Province etc.:

>>
Maharashtra

A.4.1.3. City/Town/Community etc:

>>
Ambavade Khurd, Chavanwadi, Chalkewadi, Borgewadi, Pawarwadi, Galmewadi, Dhebewadi and Maskarwadi villages of Satara District

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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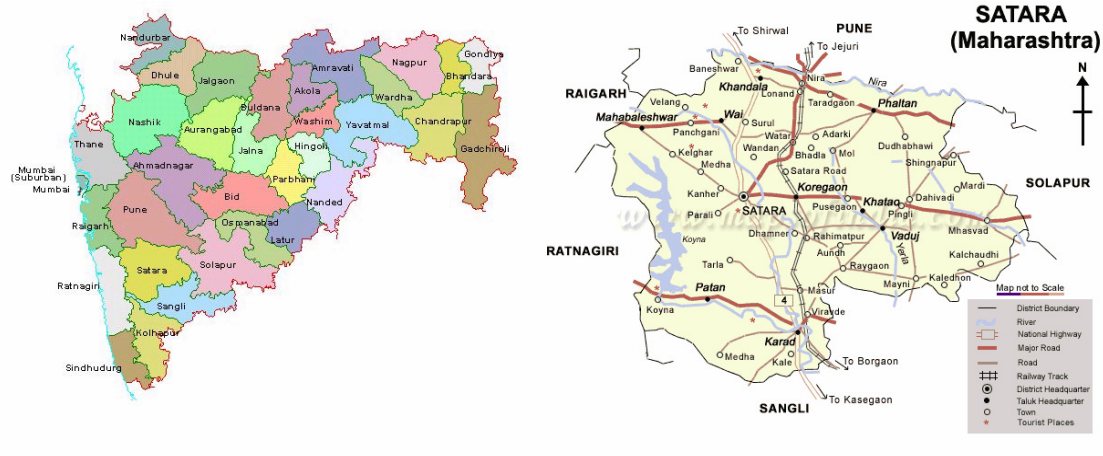
The project activity is located 325 km. from Mumbai. The closest National Highway (NH4) is 30 km. from the location of the project activity and the nearest railway station is located at Satara, 55 km. from the project activity.



The unique identification of individual WEGs are as follows:

Sl. No.	WEG No.	Village	Loc. No.	Latitude	Longitude
1	WEG - 1	Galmewadi	GPP-28	N17^0 10' 51.4"	E73^0 59' 20.7"
2	WEG - 2	Galmewadi	GPP-30	N17^0 11' 17.0"	E73^0 59' 13.5"
3	WEG - 3	Ambewad Khurd	GPP-96	N17^0 11' 37.0"	E73^0 59' 07.0"
4	WEG - 4	Ambewad Khurd	GPP-40	N17^0 13' 59.9"	E73^0 55' 16.3"
5	WEG - 5	Ambewad Khurd	GPP-41	N17^0 14' 12.3"	E73^0 54' 39.3"
6	WEG - 6	Ambewad Khurd	GPP-42	N17^0 14' 23.2"	E73^0 54' 38.4"
7	WEG - 7	Ambewad Khurd	GPP-43	N17^0 14' 34.1"	E73^0 54' 43.5"
8	WEG - 8	Chavanwadi	GPP-44	N17^0 14' 45.7"	E73^0 54' 45.3"
9	WEG - 9	Ambewad Khurd	GPP-45	N17^0 14' 59.6"	E73^0 54' 51.4"
10	WEG - 10	Ambewad Khurd	GPP-46	N17^0 15' 09.8"	E73^0 54' 57.5"
11	WEG - 11	Ambewad Khurd	GPP-47	N17^0 15' 18.3"	E73^0 55' 02.8"
12	WEG - 12	Ambewad Khurd	GPP-48	N17^0 15' 26.9"	E73^0 55' 06.3"
13	WEG - 13	Ambewad Khurd	GPP-49	N17^0 15' 37.6"	E73^0 55' 10.8"
14	WEG - 14	Ambewad Khurd	GPP-53	N17^0 15' 17.0"	E73^0 55' 15.2"
15	WEG - 15	Dhebewadi	GPP-60	N17^0 15' 22.3"	E73^0 55' 34.1"
16	WEG - 16	Ambewad Khurd	GPP-55	N17^0 15' 09.6"	E73^0 55' 18.5"
17	WEG - 17	Ambewad Khurd	GPP-56	N17^0 14' 16.7"	E73^0 55' 50.4"
18	WEG - 18	Ambewadi Khurd	GPP-58	N17^0 14' 49.3"	E73^0 56' 02.4"
19	WEG - 19	Ambewad Khurd	GPP-59	N17^0 14' 35.5"	E73^0 55' 56.9"
20	WEG - 20	Maskarwadi	GPP-61	N17^0 15' 05.8"	E73^0 56' 19.3"
21	WEG - 21	Galmewadi	GPP-62	N17^0 14' 30.6"	E73^0 52' 37.8"
22	WEG - 22	Galmewadi	GPP-63	N17^0 14' 17.8"	E73^0 53' 19.4"
23	WEG - 23	Galmewadi	GPP-65	N17^0 14' 06.1"	E73^0 54' 00.2"
24	WEG - 24	Galmewadi	GPP-66	N17^0 14' 14.8"	E73^0 54' 17.1"

Sl. No.	WEG No.	Village	Loc. No.	Latitude	Longitude
25	WEG - 25	Ambewad Khurd	GPP-89	N17^0 14' 55.3"	E73^0 51' 57.0"
26	WEG - 26	Ambewad Khurd	GPP-90	N17^0 15' 05.9"	E73^0 51' 57.6"
27	WEG - 27	Ambewad Khurd	GPP-91	N17^0 15' 13.2"	E73^0 52' 06.0"
28	WEG - 28	Borgewadi	GPP-94	N17^0 15' 40.2"	E73^0 52' 42.4"
29	WEG - 29	Chalkewadi	GPP-95	N17^0 15' 55.1"	E73^0 40' 25.7"
30	WEG - 30	Pawarwadi	GPP -57	N17^0 14' 22.5"	E73^0 55' 48.3"

A.4.2. Category(ies) of project activity:

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Scope Number - 1,
Sectoral Scope – Energy Industries (renewable/non-renewable sources)

A.4.3. Technology to be employed by the project activity:

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RINL has sourced the WEGs from Suzlon Energy Ltd., one of the leading manufacturers of the WEGs in the world. Suzlon Energy Ltd. developed Model S.82/1500 kW specific to the low wind conditions (GL/ class - III sites) with their R&D capability in Germany and Netherlands. Type certification for the Model S.82 was received from Germanischer Lloyd, Germany and Center for Wind Energy Technology (C-WET) in India. Technology of S.82/1500 kW is also approved by Ministry of New and Renewable Energy (MNRE)

Technology of S.82/1500 kW was introduced in the Indian market, in the year 2006 and is currently manufactured in India with the ISO certification process for the design, development, and manufacture of the WEGs. Salient features of S.82/1500 kW are as follows. The technical specifications of this turbine are given in the Appendix 1 of the PDD.

The salient Features of the 1.5 MW WEG are as Follows: -

1. Higher Efficiency - Designed to achieve increased efficiency and co-efficient of power (Cp)
2. Minimum Stress and Load - Well-balanced weight distribution ensures lower static & dynamic loads
3. Shock Load-free Operation
4. Intelligent Control – Sophisticated and advanced technologies applied by extensive operational experience maximizes yield
5. Peak Power Factor - High-speed asynchronous generator with a multi-stage intelligent switching compensation system delivers power factor up to 0.99
6. Climatic Shield - Hermetically sheltered, advanced over-voltage and lightning protection system
7. Unique Micro-Pitching Control - Unmatched fine pitching with 0.1° resolution to extract every possible unit of power
8. Grid-friendly - Grid friendly design generates harmonics-free pure sinusoidal power
9. ISO-certified vendors confirm high quality components and the manufacturing as well as installation procedures are ISO 9001:2000 certified.

10. ISO 9001:2000 certification for Installation, Commissioning, Operation and Maintenance

Considering the largest size from available size of the turbines developed considering Indian climate and logistics requirement, the turbine will occupy lesser / optimised land area than equivalent project capacity of the lower range of turbines, and also the turbine doesn't consumes any fossil fuels and having zero emission technology, which states that the technology employed is environmentally safe and sound.

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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The estimated total emission reductions be achieved by the project activity is **809370 tonnes of CO2** equivalent for the crediting period of **10** years.

. Years	Annual estimation of emission reductions in tonnes of CO2 e
2008-09	80937
2010-11	80937
2011-12	80937
2012-13	80937
2013-14	80937
2014-15	80937
2015-16	80937
2016-17	80937
2017-18	80937
2018-19	80937
2019-20	80937
Total estimated reductions (tonnes of CO2e)	809370
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	**80937**

A.4.5. Public funding of the project activity:

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No public funding from Parties included in Annex I is involved in the project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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Title: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources (ACM0002)" Version: 06

Scope no: 1

Sectoral Scope Energy Industries: (Renewable/non-renewable)

Date: 19 May 2006

Referred:
The methodology ACM0002 refers to the latest approved versions of the following tools:

• Tool for the demonstration and assessment of additionality, Version 5.

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

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The methodology is designed to be applicable to grid-connected wind power projects and determines the baseline for grid electricity generation at the combined margin. The Project is a wind energy project that is connected to a predominantly thermal based grid, and is likely to affect the operating margin, and in the long term, the build margin. This is in accordance with what has been laid down in the CDM Modalities and Procedures.

Criterion	Conditions	Applicability
Criterion 1	Applies to electricity capacity additions from: 1. Run-of-river hydro power plants; 2. hydro power projects with existing reservoirs where the volume of the reservoir is not increased 3. New hydro electric power projects with reservoirs having power densities (installed power generation capacity divided by the surface area at full reservoir level) greater than 4 W/m^2 **4. Wind sources** 5. Geothermal sources 6. Solar sources 7. Wave and tidal sources	Project activity involves generation of electricity from wind based electricity generation project activity of 45 MW capacity located in the villages of Ambavade Khurd, Chavanwadi, Chalkewadi, Borgewadi, Pawarwadi, Galmewadi, Dhebewadi and Maskarwadi, of Satara District, Maharashtra State, India. The project activity will supply electricity to the state private utility, REL which supplies power to suburbs of Mumbai connected to the western regional grid

Criterion	Conditions	Applicability
Criterion 2	This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site	The project does not involve fuel-switching from fossil fuel use to renewable energy at the site of the project activity. The project activity is totally new project activity and will be established as an effort of project proponent to promote sustainable development.
Criterion 3	The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available	Project activity will be located in Maharashtra and as per the Indian electricity system Maharashtra falls in the western regional grid. The "Western Grid" electricity system and boundary is well defined. All the details pertaining to Western regional grid is publicly available[2].
Criteria 4	Applies to grid connected electricity generation from landfill gas capture to the extent that it is combined with the approved "Consolidated baseline methodology for landfill gas project activities (ACM0001)	There is no relevance between the project and Clause 4 of the applicability criteria.

B.3. Description of the sources and gases included in the project boundary

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According to the applicable methodology, spatial extent of this project activity includes the project site and all the power plants connected physically to the electricity system that the CDM power project is connected to. The project activity is connected to the network of Maharashtra State Transmission Company Ltd. (MSETCL), which is in-turn part of the western regional grid. Thus the project boundary includes all the power plants physically connected to the western regional grid.

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Following table indicates the sources and gases included the project boundary.

	Source	Gas	Included	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power that is displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project Activity	Grid connected wind energy generation	CO_2	No	Project activity involves conversion of wind energy to electricity energy, Hence no emissions considered on net basis.
		CH_4	No	Not applicable

[2] http://www.wrldc.com/

	Source	Gas	Included	Justification/Explanation
		N_2O	No	Not applicable

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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Identification of Baseline scenario

The Indian power system is divided into five independent regional grids, i.e., Northern, Eastern, Western, Southern, and North-Eastern regional grids[3]. Project activity is located and connected to the western regional grid and the electricity generated by the project activity is utilized in Maharashtra, which is located in the western region. Also as per the definition of ACM 0002, there are no significant transmission constraints for the power generation in the western regional grid. Hence western regional grid is identified as the appropriate project electricity system.

Majority of the electricity generated in the western regional grid are based on the thermal fuel sources and following table following indicates the generation capacity installed and electricity generation[4].

Sl. No	Fuel	Installed Capacity (In MW)	Electricity Generated (In GWh)
1	Coal	20667.50	123913.76
2	Lignite	715.00	3037.54
3	Gas	4428.00	25949.30
4	Liquid Fuels	2712.00	6780.06
5	Nuclear	1840.00	7740.00
6	Hydro	6648.80	18072.02
	Total	**37011.30**	**185492.68**

Capacity addition carried-out in the 10th plan (between 2002 and 2007) is in favor of the thermal sources and following table indicates the capacity plans, addition in the western regional grid.

Sl. No	Fuel Type	Total Capacity Planned (In MW)	Total Capacity Addition (In MW)
1	Thermal	5603	2720
2	Nuclear	1080	1080
3	Hydro	3752	2451
	Total	**11435.62**	**6251**

Under such scenarios, baseline will remain to be skewed towards utilization of thermal fuel sources, specifically the coal based electricity generation as the National Electricity Policy - 2005, Integrated

[3] http://cea.nic.in/planning/c%20and%20e/user_guide_ver3.pdf

[4] Source: Baseline Carbon Dioxide Emission Database Version 3.0, CEA

Energy Policy - 2006 and Report of The Working Group on Power for the Eleventh Plan (2007-12) - 2007 encourage efficient utilization of coal for electricity generation.

Baseline electricity figures:

Net electricity generation from the project activity is estimated as 90 GWh per annum. The basis of arriving from theoretical energy generation to gross generation to net generation by applying discount factors is presented in the following table.

TECHNICAL	Value	Unit
WEG Capacity	1500	KW
No of WEGs	30	Nos
Project Size	45	MW
Theoretical Energy Generation per WEG	3.874285	GWh per annum (As per WEG supplier's estimation based on CWET Wind Data)
Air Density correction factor	88%	
Array Efficiency	95%	
Machine Availability	95%	
Grid Availability	100%	
Electrical losses	98%	
Estimated net Generation per WEG	3.006	GWh per annum
Estimated Gross Generation for the Project	90	GWh per annum
Plant Load Factor	22.88%	As per CWET wind data and WEG power curve

Determination of Baseline emission factor:

The baseline emission factor (EFy) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors according to the following three step. Calculations for this combined margin must be based on data from an official source (where available) and made publicly available.

ACM 0002 describes 3-step approach to apply the methodology for calculating the baseline emission factor (EF_y). Following steps are identified for the calculation of Baseline emission factor.

STEP - 1. Calculate the Operating Margin Emission Factor(s) ($EF_{OM,y}$)

In the western region, power generation is dominated by fossil fuel sources and the power generation by low cost/must run resources constitute less than 50% of total grid generation in the average of the five most recent years. Hence Simple OM method is used for $EF_{OM,y}$ calculation.

The Simple OM emission factor ($EF_{OM, y)}$ is calculated as the generation-weighted average emissions per electricity unit (tCO2 / MWh) of all generating sources serving the system, excluding zero- or low-operating cost power plants, using the following equation:

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y} . COEF_{i,j}}{\sum_{j} GEN_{j,y}}$$

Where:

$F_{i,j,y}$ - Amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in Year (s) y, *and* j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid.

$COEF_{i,y}$ is the CO2 emission coefficient of fuel i (tCO2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s) y

$COEF_{i,y}$ is obtained as $COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i$

where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel i,

$OXID_i$ is the oxidation factor of the fuel,

$EF_{CO2,i}$ is the CO2 emission factor per unit of energy of the fuel i.

$GEN_{j,y}$ - is the electricity (MWh) delivered to the grid by source j.

$EF_{OM,y}$ is calculated, as indicated in the following table, using full generation weighted average, ex-ante, for the most recent 3 years as the data is available from the official sources[5] and is publicly available.

Year	$EF_{OM,y}$ (tCO2 / MWh)
2004-05	1.01
2005-06	1.00
2006-07	0.99
Average EF_{OM}	**1.00**

STEP - 2. Calculate the Build Margin Emission Factor ($EF_{BM,y}$)

$EF_{BM,y}$ is computed as the generation weighted average emission factor of as the generation-weighted average
emission factor (tCO2/MWh) of a sample of power plants m using the following equation.

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_{m} GEN_{m,y}}$$

[5] Source: Central Electricity Authority: CO2 Baseline Database. Version:3,Dated 15/12/2007
http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Where the sample group m consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system comprising of 20% of the system generation (in MWh terms) and those have been built most recently.

In accordance with ACM 0002, $EF_{BM,y}$ is calculated as the average emission intensity of the 20% of the most recent capacity additions in the gird based on the net generation. Computed **$EF_{BM,y}$** is **0.59 tCO_2 / MWh**[6].

STEP - 3. Calculate the Baseline Emission Factor (EF)

The baseline emission factor *EFy* is calculated as combination of the Operating Margin emission factor (*EFOM*) and the Build Margin emission factor (*EFBM*):

$EFy = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y}$

EF_{OMy} - emission factor of Operating Margin
EF_{BMy} - emission factor of Build Margin
W_{OM} - weight factor of Operating Margin
W_{BM} - weight factor of Build Margin

For wind projects, ACM0002 allows the usage of the default weights are as follows: wOM = 0.75 and wBM = 0.25. Using the above values the combined margin emission factor is calculated using the CO2 Baseline Database, Version:3, published by the CEA, dated December 15, 2007.

$EF_{OM,y}$ - 1.0 tCO_2/MWh and w_{OM} - 0.75
$EF_{BM,y}$ - 0.59 tCO2/MWh and w_{BM} - 0.25
EFy = 0.75*1.0+ 0.25*0.71

Baseline emission factor in year y will be (EF,y) = **0.8975** tCO2/MWh

Year	2004-05	2005-06	2006-07	Average
Operating Margin Emission Factor (tCO2 / MWh)	1.01	1.00	0.99	1.0
Build Margin Emission Factor (tCO2 / MWh)				0.59
Combined Margin Emission Factor (tCO2 / MWh)				0.75*1.0+ 0.25*0.59= **0.8975**

[6] Source: Central Electricity Authority: CO2 Baseline Database. Version:3,Dated 15/12/2007
http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): >>

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

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

Sl. No	Alternative	Justification
1	Alternative 1 - The project activity not undertaken as a CDM project activity.	Alternative 1 is realistic and credible and is available for project participant. Under Alternative - 1, Project participant would go ahead with the implementation of project activity, generating renewable electricity and exporting the same under a power purchase agreement, thereby displacing equivalent units of power generated by fossil fuel based plants in the grid. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline scenario. However the barriers discussed under Steps - 2 and 3 would restrict the implementation of the alternative. Hence Project activity is conceived as a CDM project by the Project participant.
2	Alternative 2 - Continuation of the existing scenario	No project activity and equivalent amount of energy would have been produced by the regional grid electricity system through its currently running power plants and by new capacity addition to the grid i.e. Continuation of current situation.

Sub-step 1(b). Enforcement of applicable laws and regulations:

The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.).

The Indian Electricity Act 2003 and the National Electricity Plan neither restrict the usage of fuels nor the technology for power generation. Also the implementation of project activity is not mandatory or a legal requirement on the Project participant. Hence the two alternatives mentioned above are in compliance with all applicable legal and regulatory requirements

2. (a) Additionality check: Investment Analysis

(b) Demonstration of additionality:

Sub-step 2a – Determine appropriate analysis method :
Project activity exports electricity to the western regional grid thus has economic benefits other than the CDM related income, i.e., revenues received from the sale of electricity generated. Therefore, Option I. application of simple cost analysis is not an appropriate method.

Between the other two methods – Option II: Investment comparison analysis and Option III: Benchmark analysis, Project participant has chosen Option III: Benchmark analysis.

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

The Tool for Demonstration and Assessment of Additionality, Ver 05 requires the PP to identify a financial indicator, such as IRR, most suitable for the project type and decision context. The Guidance on the Assessment of Investment analysis permits the PP to use either Equity IRR or Project IRR. PP has chosen Equity IRR to demonstrate the additionality.

The equity IRR is compared with a benchmark. The Additionality Tool Ver 05 states that discount rates and benchmarks shall be derived from one of the five alternatives listed in the Tool. Of them, PP has chosen the commercial lending rate and Government/official approved returns as benchmark since both of them are available publicly and used for making investment decisions. MERC, the State Electricity Regulatory Commission has recommended a return of 16% on Equity[7] while determining the tariff for wind power projects coming up in Maharashtra. The interest rate paid by the project activity for the loan availed by it is 12.75%.Hence; PP has chosen these two rates to demonstrate the additionality.

The PP has chosen equity IRR because it is the most appropriate financial indicator for taking decision. It is one of the most widely used financial indicators by–project developers making significant investment

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

The IRR for the proposed project activity without CDM revenues was computed for a period of 20 years, corresponding to the lifetime of the 45 MW wind farm based on the following assumptions:

Financial Assumptions:

Details relevant for the computation of financial indicator are as follows:

Project Details

Sl. No.	Description	Unit	Value
01	Capacity of the WEG commissioned	KW	1500
02	No of WEGs	Nos	30

[7] http://www.mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf, page 48

03	Project Size	MW	45
04	Basel Plant Load Factor[8]	%	22.88%
05	Estimated Net Generation per WEG	GWh/Annum	3.00
06	Estimated Gross Generation for the Project	GWh/Annum	90

Capital Cost

Sl. No.	Description	Unit	Cost
01	Equipment	In Mn. Rs.	2513.85
02	Common Evacuation	In Mn. Rs.	112.50
03	Land	In Mn. Rs.	51.00
04	Taxes	In Mn. Rs.	20.83
05	MEDA (Processing + Application) Fee	In Mn. Rs.	22.64
06	**Total Capital Costs**	**In Mn. Rs.**	**2720.81**

Operational Costs

Sl. No.	Description	Unit	Cost
01	Insurance	In Mn. Rs.	54.0
03	O&M cost	In Mn. Rs.	420.0
04	Service Tax on O&M cost	In Mn. Rs.	12.24%
05	O&M Free (No of years)	In Mn. Rs.	3.0
06	Annual Escalation in O&M	%	5.0%

Project Funding

Sl. No.	Description	Unit	Value
01	Debt	%	67%
02	Interest rate	%	12.75%
03	Lenders Fee	%	2.0%
04	Equity	%	33%

Revenue Components

Sl No.	Description	Unit	Value
01	Tariff	Rs./ kWh	3.50
02	Estimated Escalation in unit rate	Rs / kWh / annum	0.15
03	Tariff escalation Years	Number	13
04	Price of the CER	Euro	12
05	Exchange Rate	Rs 58	58

Financial Indicator

Sl. No.	Description	Unit	Value

[8] As indicated by the supplier

01	Equity IRR without CDM Revenues	%	8.43
02	Equity IRR with CDM Revenues	%	10.60

Based on above assumptions, the equity IRR of the project activity without CDM benefits works out to 8.43 % (the workings are enclosed) which is lower than

a) ERC recommended ROE of 16%
b) The term lending rate i.e. 12.75%

Sub-step 2d – Sensitivity Analysis

Include a sensitivity analysis that shows whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favor of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially attractive (as per step 2c para 8a) or is unlikely to be financially attractive (as per step 2c para 8b).

In order to demonstrate the robustness of the conclusion arrived at above, viz., that the project is additional, the PP had subjected three critical assumptions of the project activity to reasonable variations, i.e. by 10%. The Guidance to Investment Analysis requires the PP to vary critical assumptions (which account for 20% of the cost or revenue) by 10% to establish the robustness of the conclusion. Accordingly, the PP has identified three critical assumptions, viz.,

a) PLF
b) Project Cost and
c) O&M cost

While PLF had been subjected to a 10% increase, project cost and O&M cost have been subjected to a 10% decrease to ascertain the validity of the conclusions drawn. The results of the sensitivity analysis are as follows:

Details	IRR	Benchmark
Benchmark - Interest rate		12.75%
- MERC ROE		16.00%
Normal	8.43%	
Increase in PLF by 10%	10.47%	
Decrease in Project cost by 10%	10.37%	
Decrease in O&M cost by 10%	8.69%	

It could be seen from the above that project will remain additional irrespective of whether the PLF goes up by 10%, project cost comes down by 10% or O&M cost comes down by 10%. The tariff has not been subjected to sensitivity as the PP has already entered into an agreement with the Utility and it is firm. Moreover, the PLF increase, in a way, takes care of tariff increase also. Having said that, it needs to be mentioned that increase in PLF by 10% is a very difficult proposition as MERC after study of the wind condition has assumed a PLF of 20% only for that

area. The PP has assumed a PLF of 22.8% as against the recommended PLF of 20%. Moreover, the data collected by MEDA also reveals that the PLF has been around 19.85%[9].

It is evident from this sensitivity analysis that the project is not a business-as-usual scenario and financially unattractive. It cannot subsist without CDM benefits.

Step 3: Barrier Analysis

Herein the project proponent is required to determine whether the proposed project activity faces barriers that:

(a) Prevent the implementation of this type of proposed project activity; and
(b) Do not prevent the implementation of at least one of the alternatives through the following sub-steps:

Sub-step 3a: Identify barriers that would prevent the implementation of the type of the proposed project activity

Establish that there are realistic and credible barriers that would prevent the implementation of the proposed project activity from being carried out if the project activity was not registered as a CDM activity. Such realistic and credible barriers may include, among others:

Investment Barriers:

The returns on the equity investment of the project is lower compared to the benchmark required rate of returns identified by the State Government hence benchmark analysis with return on equity as the financial indicator has been chosen for the Investment barrier analysis.

Plant Load Factor of the project activity is dynamic and largely unpredictable as it is dependent on the wind patterns caused by the South-west and the North-east monsoons. Though adequate care is taken to select the site for the project activity to achieve the higher Plant Load Factor, Plant Load Factor is expected to be below that considered in the tariff order (i.e., 20%) since the average Plant Load Factor observed by the Maharashtra Energy Development Agency is 19.85%. Any variations in the Plant Load Factor as a result of exogenous and unpredictable weather pattern will impose significant investment barriers during the operational stage.

Tariff structure

The tariff structure, for power generation (fossil fired projects and hydro - power projects), of the host party, has two components. i.e., capacity charges and the energy charges. Under the capacity charges, project developers are assured 14% post-tax return on equity on the commissioning of projects, irrespective of generation / off-take from the project being set-up. However the tariff structure approved by the Maharashtra Electricity Regulatory Commission for Group - III projects (i.e., commissioned between April 2003 and March 2007) is a single-part tariff incorporating a capital cost of INR 40 Million/MW, a Plant Load Factor of 20%, Operations & Maintenance costs and other relevant costs.

[9] http://www.mahaurja.com/Download/WindGenerationInfo.xls

Project participant is paid only the tariff initially agreed upon (details mentioned in sub-step 2c). Considering the increase in capital cost and the lesser Plant Load Factor, the project activity will not be able to recover investments unlike fossil fired projects and hydro power projects.

This implies that the project activity, as a result of tariff structure carries a higher investment risk than the utility scale fossil fuels and hydro projects where the investment recovery is decoupled from the level of actual generation achieved.

As the duration of the Power Purchase Agreement is 13 years, project activity is expected to face similar risks as those experienced by Group - II projects (commissioned between December 1999 and March 2003). Group II projects which have completed 8 year Power Purchase Agreement tenure on March 2007 were renegotiated to INR 1.17/kWh[10]. This is much below the investment returns expected by the wind energy investors as the tariff of the wind energy projects is back-ended (i.e., derived after servicing the debt). Considering the declining trends in the power tariff throughout the country, similar events may occur with the project activity which would make project activity unviable.

There are also significant constraints on the availability of transmission and evacuation network. Unavailability of transmission capacity, generation back-down, part-load operations as a result of lower wind characteristics are beyond the control of the project participant and likely to impose severe barriers on the project finance.

There are no other revenues for the project participant other than the revenues from the sale of electricity and CDM revenues considered while implementing the project.

Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

As stated above in sub-step 3 (a), there are several barriers which hinder the implementation of wind power projects, including the proposed project activity. Identified barriers would not prevent Alternative 2 mentioned in Sub-step 1 a.

Step 4. Common practice analysis

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

Provide an analysis of any other activities implemented previously or currently underway those are similar to the proposed project activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities are not to be included in this analysis. Provide quantitative information where relevant.

[10] MERC Order dated 20th November 2007

[12] http://www.mahaurja.com/PG_WE_Overview.html

As the policies are different for the different states so the region under consideration is the state of Maharashtra, the location of the project activity, to ensure comparable environment with respect to regulatory framework. The statistics pertaining to wind power in Maharashtra is as follows:

Assessed wind power potential[12]: 4584 MW

Demonstration wind power projects with support from Ministry of Non Renewable Energy

Sources (MNES) and Maharashtra Energy Development Agency (MEDA): 12.28 MW

Installed wind power capacity (as on 31.03.2007)[14]: 1484.9 MW

Wind power projects under CDM pipeline[15]: 914 MW

It is to be noted that India had signed the Kyoto Protocol in the year 2002 and subsequently there was the introduction of Electricity Act 2003. Based on the above data it is clear that there has been a wind power capacity addition of about 1085.8 MW in the period 2002-2007 of which 914 MW are CDM project activities.

In addition to that, Considering the project scale wind farms are not a common practice in Maharashtra. Following table[16] indicates the project statistics relating to wind power (implemented previously and currently underway), similar to the project activity in Maharashtra.

Sl. No	Project Capacity Description	No. of Projects
01	>0 and <=10 MW	364
02	>10 MW and <=20 MW	6
03	>20 MW and <=30 MW	4
04	>30 MW and <=40 MW	2
05	>40 MW and <=50 MW	1
06	>50 MW	1

Factors indicated above highlight that the wind based energy generation capacity addition similar to project activity is not a common practice in Maharashtra and western region.

Thus based on the above it can be inferred that the project activity is not a common practice and CDM revenues is the major contributor in promoting wind power.

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

If similar activities are widely observed and commonly carried out, it calls into question the claim that the proposed project activity is financially unattractive (as contended in Step 2) or faces barriers (as

[14] http://www.windpowerindia.com/statstate.html
[15] http://cdmpipeline.org/publications/CDMpipeline.xls
[16] http://www.mahaurja.com/PG_WE_Overview.html

contended in Step 3). Therefore, if similar activities are identified above, then it is necessary to demonstrate why the existence of these activities does not contradict the claim that the proposed project activity is financially unattractive or subject to barriers. This can be done by comparing the proposed project activity to the other similar activities, and pointing out and explaining essential distinctions between them that explain why the similar activities enjoyed certain benefits that rendered it financially attractive (e.g., subsidies or other financial flows) or did not face the barriers to which the proposed project activity is subject.

Essential distinctions may include a serious change in circumstances under which the proposed CDM project activity will be implemented when compared to circumstances under which similar projects where carried out. For example, new barriers may have arisen, or promotional policies may have ended, leading to a situation in which the proposed CDM project activity would not be implemented without the incentive provided by the CDM. The change must be fundamental and verifiable.

As discussed above the project activity is not a common practice being followed in the region. Due to the unattractive returns associated with the project activity, it is being carried out only after taking CDM revenues into consideration. Registration of the project activity as a CDM project would lead to additional revenues to overcome the barriers thereby improving the investment returns for the project activity and alleviating investment and regulatory policy risks.

Successful registration also provides an incentive for other investors to make investment in wind power projects and reduce the intensive generation of GHG in the western regional grid. Thus CDM revenue acts as a risk mitigation tool in overcoming barriers and imparting viability to the project.

Demonstration of Prior Consideration of CDM:

With reference to EB 41, Annex 46, as this project activity is started before 2 August 2008, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, is required to demonstrate that the CDM was seriously considered in the decision to implement the project activity.

The demonstration of progress schedule of the project implementation activity and CDM development activity is given in Appendix 2 of this PDD.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The project activity meets the eligibility criteria to use simplified modalities and procedure for small scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7 as explained in the earlier sections.

Since the project is a grid connected renewable energy project, emission reduction quantity depends on the units of electricity exported to the grid (in MWh) and the baseline emission factor of the southern regional grid.

Formula used to calculate the net emission reduction for the project activity is

$ERy = BEy - PEy - Ly$ ..... (1)

Where,
ERy - Net Emission Reduction in tCO2/year
BEy - Baseline emissions in tCO2/year
PEy - Project emissions in tCO2/year
Ly - Emissions due to leakage in tCO2/year

Baseline emissions (BEy)
BEy is calculated by multiplying the net quantity of electricity supplied by this project activity (*EGy*) with the CO_2 baseline emission factor for the electricity displaced due to the project (*EFy,*) as follows:

$BE_y = EGy*EFy$…… (2)

Where:

EF_y= Baseline emission factor in tCO_2/MWh

EGy = Net electricity supplied to the western regional grid in year y

The methodological choices for arriving BEy components i.e. EGy and EFy are demonstrated in section B.4 of the PDD. The EF has been arrived in accordance with ACM0002.

Project Emissions:
The project activity uses wind power to generate electricity and hence the emissions from the project activity are taken as nil.
PEy = 0

Leakage:
Leakage emissions on account of the project activity is considered as zero as neither the wind energy generators are transferred from another activity nor any existing equipment of the project site would be transferred from the project site in accordance with the applied methodology.
Ly = 0

Therefore the above equation no.1 is simplified to

ERy = BEy

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	$\mathbf{EF_{BM,y}}$
Data unit:	tCO_2e/MWh
Description:	Build Margin Emission Factor of Western Regional Electricity Grid
Source of data used:	"CO2 Baseline Database for Indian Power Sector" Version 3.0 published by the

	Central Electricity Authority, Ministry of Power, Government of India[17]
Value applied:	0.59
Justification of the choice of data or description of measurement methods and procedures actually applied :	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002.
Any comment:	Calculated based on ex-ante approach

Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO2e/MWh
Description:	Operating Margin Emission Factor of Western Regional Electricity Grid
Source of data used:	"CO2 Baseline Database for Indian Power Sector" Version 3.0 published by the Central Electricity Authority, Ministry of Power, Government of India[18]
Value applied:	1.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.
Any comment:	Calculated based on ex-ante approach

Data / Parameter:	EF_y
Data unit:	tCO_2 / MWh
Description:	Combined Margin CO2 emission factor for Western regional grid
Source of data to be used:	Calculated from EFOM,y and EF,BM,y using the default weights as specified by ACM0002
Value applied	0.8975 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per ACM0002.
Any comment:	Calculated based on ex-ante approach

B.6.3 Ex-ante calculation of emission reductions:

>>

Formula used to calculate the net emission reduction for the project activity is

ERy = BEy – PEy – Ly

Where,

ERy	- Net Emission Reduction in tCO2 in year y
BEy	- Baseline emissions in tCO2 in year y
PEy	- Project emissions in tCO2 in year y
Ly	- Emissions due to leakage in tCO2 in year y

This project activity is grid connected wind power generation. Hence there is no project emission and leakage from the project activity. There is no GHG emission within the project boundary.

Therefore the above equation is simplified to

ERy = BEy

Baseline emissions (BEy)
BEy is calculated by multiplying the net quantity of electricity supplied by this project activity (*EGy*) with the CO_2 baseline emission factor for the electricity displaced due to the project (*EFy,*) as follows:

BE_y = EGy*EFy……. (2)

Where:

EF_y= Baseline emission factor in tCO_2/MWh = 0.8975 tCO_2/MWh

EGy = Net electricity supplied to the western regional grid in year y = 90 GWh / year

Putting EGy and EFy in formula

BEy **= 90180 MWh/y**[19] *0.8975 tCO_2/MWh
= 80937 tCO2/year

EGy [Net electricity supplied to the western regional grid in year y (GWh/y)] = Rated capacity (MW) x Plant Load Factor (%) x Operational hours per year (hours) / 1000

= 45 MW (Capacity) x 22.88 % (PLF) x 8,760 (hours) / 1,000 GWh
= **90 GWh**

EF_y= Baseline emission factor in tCO_2/MWh = = 0.8975 tCO2e/MWh

[19] Refer – "Generation estimation.xls."

The details of the Operating margin, Built margin and Combined Margin calculations have been summarized as per the CEA calculations in Annex 3 of the PDD.

Emission Reduction (ER) = 80937 tCO2e/year

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of project activity emissions (tones of CO2 e)	Estimation of baseline emissions (tones of CO2e)	Estimation of leakage (tonnes of CO2e)	Estimation of overall emission reductions (tonnes of CO2e)
2008-09	0	80937	0	80937
2010-11	0	80937	0	80937
2011-12	0	80937	0	80937
2012-13	0	80937	0	80937
2013-14	0	80937	0	80937
2014-15	0	80937	0	80937
2015-16	0	80937	0	80937
2016-17	0	80937	0	80937
2017-18	0	80937	0	80937
2018-19	0	80937	0	80937
2019-20	0	80937	0	80937
Total (tonnes of CO_{2e})				**809370**

B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

The following parameters will be monitored during the project activity:

Data / Parameter:	EGy
Data unit:	MWh (Mega-watt hour)
Description:	Net Electricity supplied to the grid by the Project activity in year y
Source of data to be used:	Calculated from EGexport and EGimport (EGexport – EGimport)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	90180
Description of measurement methods	Net electricity supplied to grid will be calculated on the basis of measured values of "export" and "import" of electricity through the energy meter

and procedures to be applied:	installed. Joint meter readings will be taken jointly by representatives of SEB and representative of RINL as per the applicable provisions mentioned in the Power Purchase Agreement. The joint meter readings will be recorded once in a month.
QA/QC procedures to be applied:	The quantity of net electricity supplied will be cross-verified from the invoice raised by RINL. Also refer Section B.7.2 and Annex 4.
Any comment:	The data will be archived for crediting period + 2 years.

Data / Parameter:	EGexport
Data unit:	MWh (Mega-watt hour)
Description:	Electricity exported to the grid by the Project activity in year y
Source of data to be used:	Joint meter readings
Value of data applied for the purpose of calculating expected emission reductions in section B.5	90180
Description of measurement methods and procedures to be applied:	The export of electricity will be measured by the energy meter installed at common metering point. Joint meter readings will be taken jointly by representatives of SEB and representative of RINL as per the applicable provisions mentioned in the Power Purchase Agreement. The joint meter readings will be recorded once in a month.
QA/QC procedures to be applied:	The energy meters will be checked for accuracy as per SEB guidelines on a regular basis and are subject to periodic calibration as per PPA.
Any comment:	The data will be archived for crediting period + 2 years.

Data / Parameter:	EGimport
Data unit:	MWh (Mega-watt hour)
Description:	Electricity imported by the Project activity in year y
Source of data to be used:	Joint meter readings
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	The import of electricity will be measured by the energy meter installed at common metering point. Joint meter readings will be taken jointly by representatives of SEB and representative of RINL as per the applicable provisions mentioned in the Power Purchase Agreement. The joint meter readings will be recorded once in a month.
QA/QC procedures to be applied:	The energy meters will be checked for accuracy as per SEB guidelines on a regular basis and are subject to periodic calibration as per PPA.
Any comment:	The data will be archived for crediting period + 2 years.

B.7.2 Description of the monitoring plan:

>>

Parameters monitored ex-post are electricity export (EGexport) and electricity import (EGimport) from the project activity. The same are used to calculate the net electricity export which is taken as the basis for emission reduction calculations.

The joint meter installed at sub station (grid interconnection point) will be used to measure the electricity export and electricity import on continuous basis. Every month the joint meter readings will be taken by the SEB as per PPA terms. The meters at the sub station will be in custody of State Electricity Board. SEB officials will record the readings from the common joint meter and the same will be used to calculate net electricity exported to the grid. The site staff of RINL are responsible for the collation of the electricity export, electricity import and calculate the net electricity export figures in spreadsheets on monthly basis. The same are forwarded to the Project controller who cross verifies on monthly basis and prepares the emission reduction spreadsheets along with the monitoring report as and when required. The Project Head undertakes the final review and has the overall responsibility for data management.

RINL has entered into Operation & Maintenance Agreement with the M/s Suzlon Wind farm Services Limited (SWSL) for carrying out the necessary operation and maintenance of the project activity during the designed life of the project.

The operation and maintenance contract covers the following services:

1) Routine Maintenance Services

Routine Maintenance involves making available suitable manpower for operation and maintenance of the Equipment and covers periodic preventive maintenance, cleaning and up keep of the Equipment including –

a. Tower Torquing
b. Blade Cleaning
c. Nacelle Torquing and Cleaning
d. Transformer Oil Filtration
e. Control Panel & LT Panel Maintenance
f. Site and Transformer Yard Maintenance

2) Security Services

This service includes watch and ward and Security of the Wind Farm and the Equipment.

3) Management Services

a. Data logging in for power generation, grid availability, machine availability.
b. Preparation and submission of monthly performance report in agreed format.
c. Taking monthly meter reading jointly with RINL, of electricity generated at the wind farm and supplied to SEB grid.

4) Technical Services

a. Visual inspection of the WEG and all parts thereof.
b. Technical assistance including checking of various technical, safety and operational parameters of the Equipment, trouble shooting and relevant technical services.

The SEB carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of RINL representative. The frequency of meter testing is on annual basis.

The Article 11 of the Power Purchase Agreement of the project activity, which clearly identifies the following:

Metering and recording of power generation and consumption data
Testing and Calibration of metering instruments
Recording and approving authority

RINL has formed a dedicated CDM project team which is responsible for the recording and storing the data related to the project activity. The project team is also responsible for collation and preparation of monitoring reports and corresponding emission reduction sheets. All the monitoring data is maintained in the electronic form which is further cross verified by the project head and archived for the project life time.

The Organization and responsibility chart for the CDM project activity is described below.

Sl. No	Designation	Responsibilities
01	Project Head	1. Overall responsibility of the Project including CDM. 2. Review of monitoring reports and emission reduction calculation sheet. 3. Coordinate with DOE during verification process.
02	Project Controller	1. Operation & Maintenance of the wind farm. 2. Review of Project including performance evaluation. 3. Invoicing of the generated electricity. 4. Project Documentation: Preparation of monitoring reports and emission reduction calculation sheet.
03	Site staff	1. Collation of generation and consumption data 2. Preparation of spreadsheets mentioning electricity export, electricity import and net electricity export

Further information with respect to the monitoring is given in **Annex 4**.

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>
Dated : 08/07/2007

Organization:	Reliance Innoventures Limited.
Street/P.O.Box:	Santa Cruz (E), 400 055

Building:	5th floor, Business Development, Reliance Energy Centre
City:	Mumbai
State/Region:	Maharashtra
Postcode/ZIP:	400 055
Country:	India
Telephone:	+91 22 30386767
FAX:	+91 22 30099775
E-Mail:	hetalkumar.shah@relianceada.com
URL:	www.relianceada.com
Represented by:	Hetalkumar Shah
Title:	Additional Manager
Salutation:	Mr.
Last name:	Shah
Middle name:	
First name:	Hetalkumar
Department:	
Mobile:	+91 9324216669
Direct FAX:	+91 22 30099775
Direct tel:	+91 22 30386767
Personal e-mail:	hetalkumar.shah@relianceada.com

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
09/02/2007 (Date of Purchase order issued to Suzlon Energy Ltd)

C.1.2. Expected operational lifetime of the project activity:

>>
20 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
15/10/2008 or date of registration of the project, whichever is later.

C.2.2.2. Length:

>>
10 year

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>
As per the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated January 27, 1994 and related latest notification dated , September 14, 2006 states regarding requirement of Environment Impact Assessment (EIA) studies for a range of infrastructure projects;. 38 categories of activities that the proposed industry or project is required to undertake environmental impact assessment studies. The details of these activities are available at: http://envfor.nic.in/divisions/iass/notif/eia.htm.

The proposed project doesn't fall under the list of activities requiring EIA as it will not involve any negative environmental impacts, as the WEGs installed for generation of power use wind (cleanest possible source of renewable energy). Wind power is one of the cleanest sources of renewable energy, with no associated emissions and waste products. In India, wind power projects do not require an Environmental Impact Assessment**.**

The project has achieved all necessary environmental clearances from the state and central government for the project and is before the execution of the project. There are no transboundary impacts from the project.

The project activity has no significant impact on the environment. However, certain foreseen impacts due to the project activity are discussed below:

During construction
Impact on air
Movement of construction material during construction will have some impact on the air. As the transportation is quite less for the project activity, the impacts will be negligible.

Impact on water
Not much water discharge takes place during construction. However proper sanitary arrangements were provided by project proponents
Impact on Land use
The land on which the project activity is taken place is barren and largely unfertile. Prior to the project activity the most of as small hills where there was not any possibility of cultivation due to rocks and

steep ridges as well as there is no possibility of water irrigation. Project proponents had bought the land for a worthwhile application and obtained necessary approvals for installation of windmills. No dislocation of people is involved in the course of the project activity. In fact the land value appreciated due to the project activity and other wind energy developers and the landowners benefited due to the project activity.

Impact due to noise
Personal protective equipments were provided to workers involved in the construction activity to mitigate the effects of noise pollution, but they have no impact on ambient noise level. Taking into consideration the project life cycle, the magnitude of the impacts during the construction phase is negligible and exists for a temporary period of time till the end of construction phase. Therefore, it would not effect the environment considerably. The impacts on the environment due to construction activities of wind turbines are negligible

Operation and Maintenance Phase
RINL has given O & M contract to Suzlon Wind Farms Ltd. which maintains highest level of safety standards. Systematic and scientific maintenance of all equipments has been undertaken to ensure the best safety standards.

Impact on air
Wind energy plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation.

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

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

Impact due to noise
Noise is generated due to the movement of rotor blades. Noise is very much below the regulatory norms. It has no direct effect on the population, as the area is less populated and noise generated will be attenuated by ambient conditions.
.
Socio-Economic Impacts
There is no inconvenience to the local community due to the transmission lines. The locals have benefited economically through land sales. The project will be providing employment opportunities not only during the construction phase, but also during its operational lifetime. The project activity improves employment rate and livelihood of local populace in the vicinity of the project. Moreover, the project generates eco-friendly, GHG free power which contributes to sustainable development of the region.

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

parameters would show positive impacts due to increased job opportunities at the facility as well as other ancillary opportunities to come up.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

As the project is environment friendly in nature, hence there is no significant impact due this project.

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

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RINL identified local communities, villagers, local NGOs, employees, contractors and operational staff as the most important stakeholders with an interest in the CDM project activity. Accordingly, RINL sent out a notice to representatives of various stakeholder groups, with a brief on the project 15 days in advance informing them of the proposed meeting on 22nd June 2007 at the site of the project activity, and requesting each stakeholder group to send representatives to the said meeting.

The local stakeholder consultation meeting had been called for to discuss the concerns on project activity and inform the stakeholders on the Clean Development Mechanism (CDM) initiatives proposed by RINL. Stakeholder consultation was carried-out at the site of the project activity at 13:00 hours on 22nd June 2007. The agenda of the meeting was circulated two weeks prior to the decided date of local stakeholder meeting. This stakeholder meeting involved:

1. Welcome address to the representatives of Project Activity, Mr. Anurag Sharma.
2. Introduction of project activity by Mr. Sameer Mathur.
3. Presentation on project activity by Mr. Hetal Kumar Shah.
4. Public comments were invited at the consultation meeting with permission of Chair.
5. The stakeholders were provided clarifications on the issues raised as above to their satisfaction.
6. Summation of the concerns expressed by the stakeholder groups.

RINL, the project promoter and SEL, the technology supplier explained the various technology features, operation and function of the WEGs and associated benefits of this project activity. They also explained the stakeholders about the eco-friendly nature of the project.

The Minutes of Meeting has been provided to DOE while validation of the project. The summary of the meeting is given below.

No negative comments were received from the stakeholders who attended the meeting.

E.2. Summary of the comments received:

>>

Summary of the comments received from the various stake holders are listed below.

Category of Stake holder	Relationship with project activity	Comments
Local community villagers	Living nearby project activity	The local community showed their trust considering the overall positive impact on local area development
NGO	Representative of local community	Appreciated the efforts of Reliance Innoventures Ltd, as the villagers received premium value of their land.
Teachers of local school	Representative of the local community, working for the welfare of the society	Teachers have reiterated that now the local community will get better jobs and economic development due to the implementation of the project activity.
Local government officials	Administrative authority of local community,	The officials have shown their interest to fast track and implement the project which is beneficiary to the local community.
Employees	Looking after day to day activity of project activity	Employees are happy working into the project activity which will reduce over all GHG potential in the area and region.

No adverse comments were given by local stakeholders.

E.3. Report on how due account was taken of any comments received:

>>

Since no comments were received, thus no action has been taken on this account.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Reliance Innoventures Limited.
Street/P.O.Box:	Santacruz (E), 400 055
Building:	3rd floor, Business Development, Reliance Energy Centre
City:	Mumbai
Region/Region:	Maharashtra
Postfix/ZIP:	400 055
Country:	India
Telephone:	+91 22 30386767
FAX:	+91 22 30099775
E-Mail:	hetalkumar.shah@relianceada.com
URL:	www.relianceada.com
Represented by:	Hetalkumar Shah
Title:	Additional Manager
Salutation:	Mr.
Last Name:	Shah
Middle Name:	
First Name:	Hetalkumar
Department:	
Mobile:	+91 9324216669
Direct FAX:	+91 22 30099775
Direct tel:	+91 22 30386767
Personal E-Mail:	hetalkumar.shah@relianceada.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is sought

Annex 3

BASELINE INFORMATION

Baseline emission factor calculation:

The baseline emission factor (EFy) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors inline with ACM0002 ver 6. Calculations of the combined margin are based on the data publicly available and published by the Central Electricity Authority, Government of India.

CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE	
VERSION	3.0
DATE	15 December 2007

Simple Operating Margin (tCO2/MWh) (incl. Imports)							
	2000-01	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**
West					**1.01**	**1.00**	**0.99**
Build Margin (tCO2/MWh) (not adjusted for imports)							
	2000-01	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**
West							**0.59**

Combined Margin = 0.75 *average (1.01,1.00,0.99) + 0.25 (0.59)
= 0.8975 tCO2 / MWh

Annex 4

MONITORING INFORMATION

The points given below detail the monitoring plan
The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication are as per the PPA (power purchase agreement) with Reliance Energy Ltd

Metering: The Delivered Energy is metered by the Maharashtra State Electricity Board (MSEB), the off-taker REL and RINL at the high voltage side of the step up transformer installed at the Project Site.

Metering Equipment: Metering equipment is electronic trivector meter of accuracy class **0.2%** required for the Project. The meter is installed and owned by the Project Proponent. Dedicated core of both CT's and PT's of required accuracy is made available by the RINL to REL / SEB.

The metering equipment is maintained in accordance with electricity standards. The meter has the capability of recording hourly and monthly readings. The meter installed is capable of recording and storing half hourly readings of all the electrical parameters for a minimum period of **90 days** with digital output.

Meter Readings: The monthly meter reading is taken jointly by the Maharashtra State Electricity Board and RINL on the **first week** of the following month. At the conclusion of each meter reading an appointed representative of the State Electricity Board (SEB), the REL and the RINL sign a document indicating the number of Kilowatt-hours indicated by the meter.

Inspection of Energy Meters: The main meters (export and import) and all associated instruments (CTPT) installed at the Project shall be of 0.2% accuracy class. Each meter is jointly inspected and sealed on behalf of the Maharashtra State Electricity Board (MSEB) and RINL / SWSL and is interfered with by either Party except in the presence of the other Party or its accredited representatives.

Meter Test Checking: The meter is tested for accuracy once in every two years with reference to a portable standard meter which is of an accuracy class of 0.2%. The portable standard meter is owned by the MSEB at its own cost and tested and certified from an accepted laboratory standard meter in accordance with electricity standards. The meters are deemed to be working satisfactorily if the errors are within specifications i.e. $\pm$ 0.2 The consumption registered by the meter will hold good for the purpose of billing as long as the error in the main meter is within the permissible limits.

If during the tests, the meter is found to be beyond the permissible limits of error, the meter shall be immediately calibrated and the correction applied to the reading registered by the meter to arrive the correct reading of energy supplied for billing purposes for the period from the last month's meter reading up to the current test. Billing for the period thereafter till the next monthly reading shall be as per the calibrated meter.

Appendix 1

Technical specifications of S82/1500 kW turbine

Description	**Specification**
Tower/Rotor Height	78.5m
Rotor Diameter	82 m
Installed electrical output	1500 kW
Cut-in wind speed	4 m/s
Rated wind speed	14 m/s
Cut-out wind speed	20 m/s
Rotor swept area	5281 m^2
Rotational speed	15.6 – 18.4 rpm
Rotor material	GRP
Regulation	Pitch
Generator	Asynchronous generator
Operating voltage	690 V
Frequency	50 Hz
Cooling system	Air-cooled
Gear Box	3 stage gear box, 1 planetary and 2 helical
Gear ratio	1:95.09
Nominal load	1750 kW
Type of cooling	Oil cooling system
Yaw Drive System	4 active electrical yaw motors
Yaw bearing	Polyamide slide bearing
Aerodynamic brake	3 times independent pitch regulation.
Mechanical brake	Spring powered disc brake, hydraulically released fail safe.
Control unit	Microprocessor controlled, indicating actual Operating conditions, UPS back up system
Design Standards	GL/IEC

Appendix 2

Demonstration of Prior Consideration of CDM

Sr. No.	Areas / parameters	Project progress (Name of the activity)	Evidence / Reference	CDM progress (Name of the activity)	Evidence[20] / Reference
1	**Project conceptualization stage**	Communication to various equipment suppliers for inquiry, proposal and cost benefit analysis based on available turbine size and model, site/sites, state policy and norms etc.	Internal communications to various equipment suppliers, nodal agencies, consultants, etc via E-mail, letter, reports etc.	CDM consideration by Management the time of investment decision	Certified true copy of the resolution passed by board of directors of RINL on 26/12/2006**.**
2	**Awareness and team building**	With existing staff well trained and experienced in wind farm projects.	**Team:** (Key Managers) Mr Kaushik Trivedi (Senior Vice President) – more than 27 years of experience in which 8 years is for wind power projects Mr. Sameer Mathur (General Manager) – relevant	The company is having in-house CDM cell and involved into CDM development of in-house projects.	**Team:** (Key Managers) Mr.Hetalkumar Shah – more than 3.5 years of relevant experience. (Proposed approved methodology AM0029 and written various PDDs of the projects in pipeline for the company)

[20] Evidence related to project and CDM activity progress is submitted to DOE during validation.

Sr. No.	Areas / parameters	Project progress (Name of the activity)	Evidence / Reference	CDM progress (Name of the activity)	Evidence[20] / Reference
			experienc more than 6 years Mr Anurag Sharma (Deputy General Manager) – relevant experience more than 14 years Team – 10 Nos. **Awareness:** Team involved is well experienced and expert in the specific requirement		Team – 3 Nos **Awareness:** PP has implemented small scale project i.e. 5.625 MW wind farm project considering CDM benefits. (Reference : UNFCCC project no. 1762)
3	**Project Inquiry**	Short listed equipment supplier "Ms Suzlon Energy Limited"	By formal mail and discussions, including documentation discussed in point no.1 of this table.	Short listed DOE for validation activity "Ms TUV India Pvt. Ltd."	Inquiry (by formal mail) of short listed DOE. Dated: 20/03/2007
4	**Proposal**		Suzlon proposal for project activity Dated 30/10/2006		Proposal of "TUV India Pvt limited" Dated 21/03/07 (Copy is submitted to DOE)
5	**Purchase order (PO)**		Issuance of PO dated 09/02/2007.		
6	**Global Stake holder comments by DOE for CDM**	-	-	Web hosting of PDD by DOE	For the period 19/07/2007 to17/08/2007 (refer : http://cdm.unfccc.int/Projects/Validation /DB/GQ5ZXDSQO9TT89MUG5H069F2ZCADJ2 / view.html)

Sr. No.	Areas / parameters	Project progress (Name of the activity)	Evidence / Reference	CDM progress (Name of the activity)	Evidence[20] / Reference
7	**Application for DNA approval for CDM**	-	-	Documentation sent to DNA	Dated : 27/07/2007 (copy of Email- addressing DNA-India submitted to DOE)
8	**DNA meeting for HCA at DNA office**	-	-	Presentation to Indian DNA as per their prescribed criteria.	Dated 22/10/2007 (refer : Invitation letter of Indian DNA)
9	**Commissioning of wind turbines**	Current Status: Total 27 turbines are commissioned.	Date of commissioning of 1st turbine – 5/12/2007 and date of commissioning of 27th turbine – 20/06/2008. (remaining 3 turbines i.e. 4.5 MW project will be commissioned by 30/09/2008.	-	-
10	**DNA Approval**	-	-	Issuance of Host Country Approval	Dated :15/04/2008

Appendix 3

List of Abbreviations

CEA	Central Electricity Authority
CER	Certified Emission Reduction
CDM	Clean Development Mechanism
CRM	Customer Relationship Manager
EPC	Engineering, Procurement and Construction
GHG	Green House Gas
GWh	Giga Watt Hour
INR; Rs.	Indian Rupee
IRR	Internal Rate of Return
JMR	Joint Meter Reading
MW	Mega Watt
MWh	Mega Watt Hour
MAT	Minimum Alternative Tax
MERC	Maharashtra Electricity Regulatory Commission
MSEB	Maharashtra State Electricity Board
MSETCL	Maharashtra State Electricity Transmission Company Limited
MNES	Ministry of Non-Conventional Energy Sources (changed to MNRE- Ministry of New and

	Renewable Energy)
MEDA	Maharashtra Energy Development Agency
NGO	Non Governmental Organisation
O & M	Operation and Maintenance
PPA	Power Purchase Agreement
PLF	Plant Load Factor
PP	Project Proponent
PDD	Project Design Document
RINL	Relinance Innoventures Limited
REL	Reliance Energy Limited
SEL	Suzlon Energy Limited
SEB	State Electricity Board
UNFCCC	United Nations Framework Convention for Climate Change