



Voluntary Carbon Standard
Project Description Template
19 November 2007

[Date of VCS PD: 02/04/2009]

6.2 MW Bundled Wind Power Project in India

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1 Description of Project:

1.1 Project title

6.2 MW Bundled Wind Power Project in India

Date: April 02, 2009

Version: 3

1.2 Type/Category of the project

The project activity generates electricity from wind, which is a renewable source of energy. The generated electricity will be supplied to the grid and then distributed to end user. The project hence can be considered under “Grid-connected electricity generation from renewable sources”. The project activity has a total capacity less than 15 MW (limit for small scale project).

According to UNFCCC definitions for small-scale CDM projects, the project type and category is defined as follows:

Type I: Renewable energy projects
 Category: I.D: Grid connected renewable electricity generation
 Version 13, EB-36

As per Voluntary Carbon Standard the project activity falls under Renewable energy [wind, PV, solar thermal, biomass, liquid biofuels, and geothermal, run-of river hydro]

The project is a grouped project of 5 project promoters with capacity of WTGs ranging from 0.6 to 1.25 MW. The complete windfarm list is provided in section 1.4.

1.3 Estimated amount of emission reductions over the crediting period including project size:

Year	Annual estimation of emission reductions in tonnes of CO ₂ e
2006	2269
2007	4886
2008	10663
2009	10663
2010	10663
2011	10663
2012	10663
2013	10663
2014	10663
2015	10663
Total estimated reductions (tonnes of CO₂ e)	92460
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO₂ e)	9246

As per the VCS_2007.1 Program Guidelines Page no. 07, Point No. 09 project are divided into three groups:

- *Micro project: Less than 5,000 tonnes CO₂ equivalent emissions reductions per year.*
- *Projects : 5,000– 1,000,000 tCO₂ -e per year; and*
- *Mega Project: More than 1,000,000 tonnes CO₂ equivalent emissions reductions per year*

Project activity has around 9246 (average) tonnes CO₂ equivalent estimated emissions reductions per year so its comes under group i.e. "Projects".

1.4 A brief description of the project:

Renewable sources of energy have a vital significance in the context of growing concern regarding sustainable energy supplies and protection of the environment from adverse effects of fossil fuel utilization. The wind-generated energy is supplied to the western region grids. The power produced; being GHG neutral will not only displace equivalent amount of power generated that would have been generated from fossil fuel dominated western grid of India.

The capacity of the project and other details has been furnished in the table below. This is a VCS grouped project activity bringing together various small-scale project activities. The grouped project activity consists of the following sub-group:

Table 1: Details of Wind Turbine Generator (WTG) Sponsors

Ref. No.	Name of the Participants	No. of WT G	Capacity /WTG (MW)	Installed Capacity (MW)	WTG Supplier	WTG Location District / State
1	Rathi Transpower Pvt. Ltd. (RTPL)	1	0.6	0.6	Suzlon	Kutch, Gujarat
2	Batliboi Ltd. (BIL)	1	1.25	1.25	Suzlon	Jamnagar, Gujarat
3	Shri Saibaba Sansthan Trust (SSST)	1	1.25	1.25	Suzlon	Ahmednagar, Maharashtra
		1	1.25	1.25	Suzlon	Ahmednagar, Maharashtra
4	Ranka Jewellers Pvt. Ltd. (RJPL)	1	0.6	0.6	Suzlon	Kutch, Gujarat
5	Cera Sanitaryware Limited. (CSL)	1	1.25	1.25	Suzlon	Kutch, Gujarat
	Total	6		6.2		

Purpose of the project activity

The main purpose of the project activity is :

- To generate electrical energy through sustainable means using wind power resources.
- To utilize the generated output for selling it to the state electricity utilities.
- To contribute to climate change mitigation efforts.

Apart from generation of renewable electricity, the project has also been conceived for the following:

- To enhance the propagation of commercialisation of wind turbines in the region.
- To contribute to the sustainable development of the region, socially, environmentally and economically.
- To reduce the prevalent regulatory risks for this project through revenues from emission trade.

The project fulfills criteria of above requirements

Contribution of project activity to sustainable development

Government of India has stipulated following indicators for sustainable development in the interim approval guidelines¹ for VER projects.

1. Social well-being
2. Economic well-being
3. Environmental well-being
4. Technological well-being

1. Social well being:

- The project would lead to the development of the region.
- During civil work, the project is expected to generate considerable employment opportunities for the local population.
- Other than these, there are various kinds of mechanical work, which would generate employment opportunity on regular and permanent basis.

2. Economic well being:

- The project activity generates employment in the local area.
- The project activity leads to good investment to a developing regions which otherwise would not have happened in the absence of project activity.
- The generated electricity is fed into the regional grids through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.
- The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.
- The project contributes to the economic sustainability around the plant sites, which is promotion of decentralization of economic power.

3. Environmental well being:

¹ Ministry of Environment and Forest web site: http://envfor.nic.in:80/divisions/ccd/cdm_iac.html

- The project utilizes wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions.
- As wind power projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power.
- Being a renewable resource, using wind energy to generate electricity contributes to resource conservation.
- Thus, the project causes no negative impact on the surrounding environment contributing to environmental well being.

4. Technological well being:

- There is continuous research and development on the geometry of the wind blades, height of towers, diameters of towers, etc., which augurs well for the technological well being in the development of wind energy to produce clean electricity.
- Advancement in wind power production encourages research on improved performance of turbines at low to medium wind speeds and improved capacity utilisation, cost reduction and high reliability, and increased life of turbines.

In view of the above, the project participants consider that the project activity profoundly contributes to the sustainable development.

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

Ref. No	Project Participant	Capacity (MW)	Commissioning Year	Survey No.	Machine Number	Village	District	State
1	RTPL	0.6	2007	47/1	0670	Moti Sindholi	Kutch	Gujarat
2	BIL	1.25	2005	374/p	W-3	Lamba	Jamnagar	Gujarat
3	SSST	1.25	2007	BP-2		Bhoire	Ahmednagar	Maharashtra
		1.25	2007	BP-3		Bhoire	Ahmednagar	Maharashtra
4	RJPL	0.6	2008	R.S. No. 45	M-591	Moti Sindholi	Kutch	Gujarat
5	CSL	1.25	2007	107	M-19	Kadoli	Kutch	Gujarat
		6.2						

Table 2 : Geographical Location of Each District Where WTGs are Installed

District	Latitude	Longitude	Color code
Jamnagar (Gujarat)	22 ⁰ 28' 0 N ²	70 ⁰ 4' 0 E	
Kutch (Gujarat)	24.00 ⁰ N ³	70.00 ⁰ E	

² <http://www.fallingrain.com/world/IN/9/Jamnagar.html>

³ http://www.mapsofworld.com/lat_long/india-lat-long.html

District	Latitude	Longitude	Color code
Ahmednagar(Maharashtra)	19° 4' 60N ⁴	74° 43' 60E	

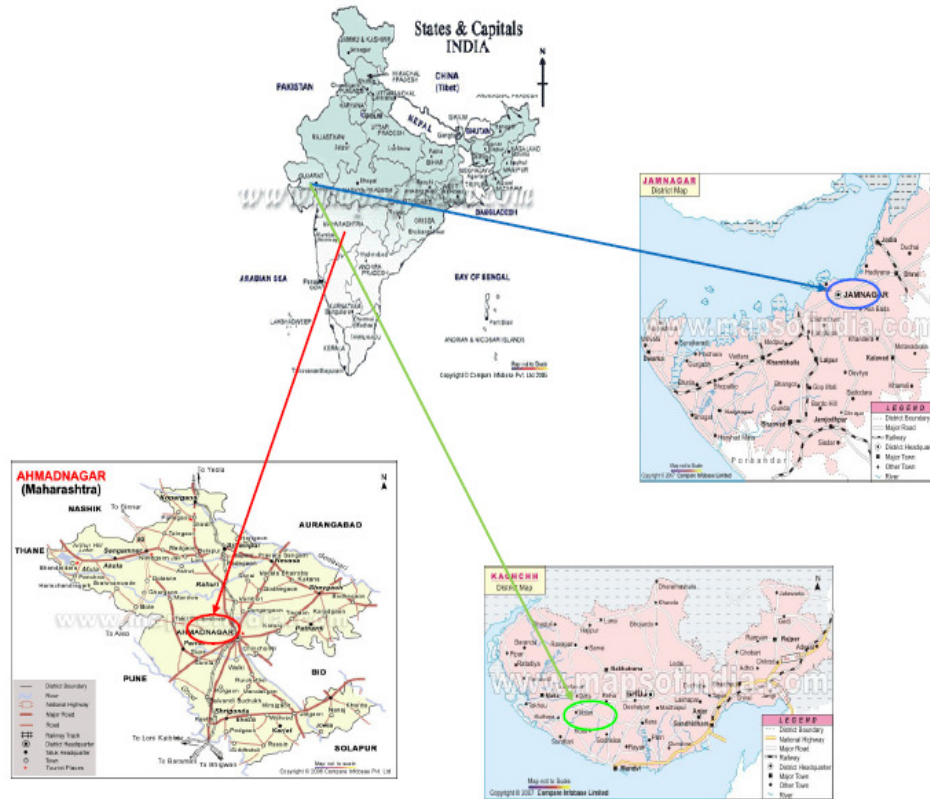


Figure 1, Location of Wind Turbines

1.6 Duration of the project activity/crediting period:

As per VCS 2007.1 page 07, point 12 “Project start date” Date on which the project began reducing or removing GHG emissions. Hence, 26/09/2005 will be the start date as it is the earliest commissioning date of WTG in the bundle (Batliboi Ltd. based on commissioning certificate). For commissioning year of all wind turbines please refer section 1.5

Crediting period start date: 28/03/2006 As per VCS 2007.1 standard Para 5.2.1 (Page no. 12) “The earliest Project Crediting Period Start Date under the VCS 2007.1 shall be 28 March 2006 for non-AFOLU projects”

VCS project crediting period: ten years which may be renewed at the most one times

1.7 Conditions prior to project initiation:

⁴ <http://www.fallingrain.com/world/IN/16/Ahmadnagar.html>

In prior/absence of project activity equal amount of electricity would have been generated from fossil fuel dominant power plants in western electricity grid of India & therefore the western electricity grid has been taken as baseline for GHG emission reduction estimation.

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The project utilizes wind energy for generating electricity which otherwise would have been generated through power plants connected to the WESTERN grid

1.9 Project technologies, products, services and the expected level of activity:

Main characteristics of the WTGs used in project are:

Salient Features of 0.6 MW (S 52, Suzlon make) WEG

Sr. No.	Particulars	Specifications
1.	Rotor diameter	52 m
2.	Hub height	75 m
3.	Installed electrical output	600 kW
4.	Cut-in wind speed	3.5 m/s
5.	Rated wind speed	12 m/s
6.	Cut-off wind speed	25 m/s
7.	Rotor swept area	2124 m ²
8.	Rotational speed	24 rpm
9.	Rotor material	GRP
10.	Regulation	Pitch
11.	Generator	Asynchronous Generator, 4 pole
12.	Rated output	600 kW
13.	Rotational speed	1500 rpm
14.	Operating voltage	690 V
15.	Frequency	50 Hz
16.	Enclosure class	IP 56
17.	Insulation class	H
18.	Cooling system	Air cooled
19.	Gear box	3-stage gearbox, 1 planetary & 2 helical
20.	Manufacturer	Winergy
21.	Gear ratio	1:63.633
22.	Nominal load	660 kW
23.	Type of cooling	Oil cooling system, Forced lubrication
24.	Yaw drive system	2 active electrical yaw motors
25.	Yaw bearing	Polyamide slide bearing
26.	Safety system	
26.1	Aerodynamic brake	3 independent system with blade pitching
26.2	Mechanical brake	Spring applied hydraulically released disc brake
27.	Control unit	Actual operating conditions, UPS back-up system
28.	Tower	Tubular
29.	Design standards	GL special class

Salient Features of 1.25 MW S-70 (66, Suzlon make) WEG

Sr. No.	Particulars	Specifications
1.	Rotor diameter	66 m
2.	Hub height	74 m
3.	Installed electrical output	1250 kW
4.	Cut-in wind speed	3 m/s
5.	Rated wind speed	14 m/s
6.	Cut-out wind speed	22 m/s
7.	Rotor swept area	3421 m ²
8.	Rotational speed	1006 / 1506 rpm (50 Hz), 1208 / 1810 rpm (60 Hz)
9.	Rotor material	GRP
10.	Regulation	Pitch
11.	Generator	Asynchronous Generator, 4/6 pole
12.	Rated output	250/1250 kW
13.	Rotational speed	1010/1515 rpm
14.	Operating voltage	690 V
15.	Frequency	50 / 60Hz
16.	Protection	IP 56
17.	Insulation class	H
18.	Cooling system	Air cooled
19.	Gear box	3-stage gearbox, 1 planetary & 2 helical.
20.	Manufacturer	Winergy
21.	Gear ratio	74.917:1
22.	Nominal load	1390 kW
23.	Type of cooling	Oil cooling system
24.	Yaw drive system	4 active electrical yaw motors
25.	Yaw bearing	Polyamide slide bearing
26.	Safety system	
26.1	Aerodynamic brake	3 times independent pitch regulation
26.2	Mechanical brake	Spring power disc brake, hydraulically released, fail safe. Microprocessor controlled, indicating.
27.	Control unit	Actual operating conditions, UPS back-up system
28.	Tower	Tubular
29.	Design standards	GL/IEC

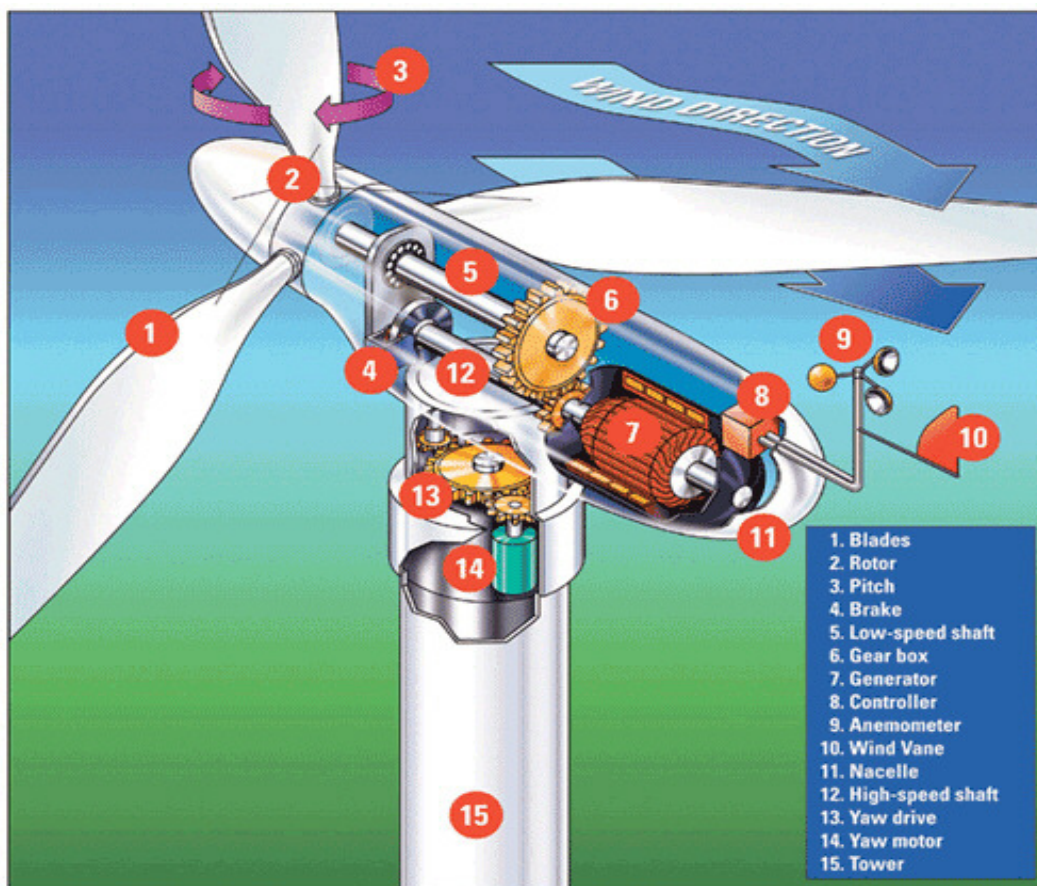


Figure 2. Wind Turbine Schematic

1.10 Compliance with relevant local laws and regulations related to the project:

Project meets all local laws and regulation of India.

Following are the important compliances required and met by the PPs–

1. Maharashtra Energy Development Authority (MEDA) & Gujarat Energy Development Authority (GEDA) infrastructure clearance
2. Land lease deed
3. Power Evacuation Clearances from MEDA and GEDA
4. Power Purchase Agreement (PPA) with MSEDCL and GETCO
5. Letter from the State Electrical Inspectorate according operating permission for the facility
6. O & M contract
7. Commissioning Certificates issued by MSEDCL and GETCO

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

Technologically, the WTGs are designed according to the Germanischer Lloyd (GL) design standards and procured from Indian company M/S. Suzlon Energy Ltd. The technology is a clean and safe technology since there are no GHG emissions associated with the electricity generation.

All wind farms included in this group are already operating normally. There are no clear identified risks that could affect the removal enhancements of the project.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

The PP had taken up the project to utilize available renewable resource of wind energy to generate electricity. It will lead to reduced generation of electricity at the grid end which is fossil fuel dominated and hence reduce associated emission reduction. The project is primarily taken up as GHG abatement project. The project does not consume any fossil fuels which can lead to GHG emissions.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

A letter from project proponents have been submitted showing that Project has not created another form of environmental credit.

1.14 Project rejected under other GHG programs (if applicable):

Not Applicable

1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:

Name of the 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)	Rathi Transpower Pvt. Ltd.	No
	Batliboi Ltd.	
	Shri Saibaba Sansthan Trust	
	Ranka Jewellers Pvt. Ltd.	
	Cera Sanitaryware Limited.	
Switzerland	South Pole Carbon Asset Management Ltd. (as carbon credit buyer)	No

Role: Facility owner, Operation & Maintenance of Project Activity & Recording and Monitoring Project Data. Please refer to Annexe B for contact information.

Project Consultant (Technical):	MITCON Consultancy Services Ltd.
	Energy & Carbon Services
	Kubera Chamber, Shivajinagar
	Pune - 411 005
	India
Contact Person:	Mr. Deepak Madhukar Zade (Executive Vice President)
	Tel +91-20-2553 3309, 2553 4322, +91-09822684106
	Fax +91-20-2553 3206
	Email: deepak@mitconconsultancy.org

Role: Technical Consultant:

1. Identification of GHG reduction projects.
2. Calculation of GHG emission Potential
3. Preparation of Project document.
4. Assistance for Validation & verification of project activity.
5. Preparation of Monitoring Report.
6. To pursue GHG emission reduction project on behalf of PP's.

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):

Not applicable

1.17 List of commercially sensitive information (if applicable):

Not applicable

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

As per the VCS 2007.1 program guidelines⁸ methodology applicable to the project activity is “AMS I.D.Version 13 (Valid from 14 Dec 07 onward) Approved methodology for Small Scale Projects” under the sectoral scope “Energy industries (renewable-/ non-renewable sources)” which is most appropriate for this Project and is listed as per the UNFCCC norms.

Project Type: I – Renewable Energy Projects

Project Category: AMS I.D. – Grid connected renewable electricity generation (Version 13, 14th December 2007, EB 36)

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

As defined under Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project activity proposes to apply following project types and categories:

- **Type** : **I – Renewable Energy Projects**
- **Project Category** : **I.D. – Grid connected renewable electricity generation**

(Version13, EB 36)

Requirements with respect to technology/measure under AMS I.D. – Grid connected renewable electricity generation **(Version 13, EB 36)**

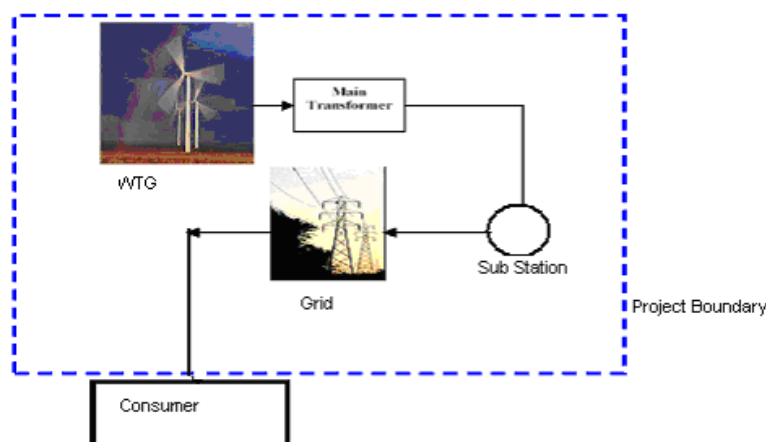
<i>Applicability Criteria</i>	
This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.	The project activity encompasses wind power generation from 6 (6.2 MW capacity) wind electric generators. The electricity thus generated will be evacuated to the western regional grid which is fossil fuel dominated.
If the unit added has both renewable and non-renewable components, the eligibility limit of 15 MW for a small scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW	The project activity is within the small scale limit of 15 MW . However there is neither a non-renewable component nor co-firing in this case.
Combined heat and power systems are not eligible under this category.	Not applicable
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be physically distinct from the existing units	The present activity is a new set up hence not applicable.
Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW	Not applicable.

This category comprises renewable energy, including wind power, which supplies electricity to an electricity distribution system (grid). The proposed project will

generate 11.83 GWh per annum (after commissioning of all the WTGs i.e. 2008-09) of electricity from a renewable source (Wind Energy) as per PLF envisaged from MERC and published data source. This electricity will be supplied to the WESTERN Regional Electricity Grid, where the major part of electricity comes from non-renewable electricity generation. As the proposed project will supply electricity from a renewable source to the regional grid, the application of Type ID is justified.

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

Project boundary specified encompasses the physical, geographical site of the renewable energy generation source. This includes the wind turbine installation, main transformer, sub-stations and the respective grid. The proposed project activity evacuates the power to the WESTERN Grid. Therefore, all the power plants contributing electricity to the WESTERN Grid are taken in the connected (project) electricity system for the purpose of baseline estimation.



Sources of Gases

Baseline	Source	Gas	Status	Justification/Explanation
	Grid electricity generation	CO ₂	Included	Main Emission Source
		CH ₄	Excluded	Excluded for simplification. This is conservative.
		N ₂ O	Excluded	Excluded for simplification. This is conservative.

Project Activity	Source	Gas	Status	Justification/Explanation
	On site fuel combustion due to implementation of project activity	CO ₂	Excluded	Not required for the project.
		CH ₄	Excluded	Not required for the project.
		N ₂ O	Excluded	Not required for the project.

Baseline Scenario

GHG sources for the baseline scenario (in the project boundary) are the emission due to power generation by the fossil fuel dominated WESTERN grid, equivalent to power generated by the project activity.

Project Activity

There is no source of GHG emission (in the project boundary) in the project activity, as the entire project activity is based on renewable source of energy i.e. wind power.

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

The project activity is a wind power project that supplies electricity to WESTERN grid. Since wind is a renewable resource, the GHG emission from the project activity is zero.

The project will have a total installed capacity of 6.2 MW, hence this is a small-scale CDM project and the Simplified M&P for Small-Scale CDM Project Activity, Category I.D. is applicable. This category “comprises renewable energy sources, such as photovoltaic, hydro, tidal/wave, wind, geothermal and biomass, that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or non-renewable biomass fired generating unit”.

Baseline methodology for projects under Type I.D has been detailed in paragraphs 7-11 (Type I.D Version -13) of the above-mentioned document. Paragraph 9 (Type I.D) applies to this project activity, which states that:

“For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO₂e/kWh) calculated in a transparent and conservative manner as:

- (a) *A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the ‘Tool to calculate the emission factor for an electricity system’.*

OR

- (b) *The weighted average emissions (in kg CO₂e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used. Calculations must be based on data from an official source (where available) and made publicly available.”*

The project proponent has chosen the option (a) i.e. a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) for the purpose of calculation of baseline. Actual CO₂ emission factor are used for the purpose. Value has been used from the latest version of **Baseline Carbon Dioxide Emissions from Power Sector** provided by the Central Electricity Authority, Govt. of India (version-3).

Following information is used for baseline determination:

Sr. No.	Key information/data used for baseline determination	Source of data/information
1	Grid emission factor (Northern and Western Region)	CO ₂ Baseline Database for the Indian Power Sector, User Guide (Version 3,) http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
2	Electricity supplied to the grid by the project. Net Electricity export by the project annually (obtained from credit report by project promoter on monthly basis).	<u>MONTHLY JMR & INVOICES OF STATE ELECTRICITY BOARD FOR ELECTRICITY EXPORTED TO THE REGIONAL GRID.</u>

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

In addition to using a VCS Program approved methodology; the project proponent shall demonstrate that the project is additional using one of the following tests:

Test 1 - The project test:

Step 1: Regulatory Surplus

- Local or National Legislation does not require the production of the underlying service or product with the chosen technology.
- There is no legal requirement on the choice of a particular technology for power generation.
- Similarly, at the time of investment there was no legal restriction according to Indian Electricity Act of 1948 on fuel choice for power generation.
- The applicable Environmental Regulations do not restrict the use of wind energy for power generation.
- The Indian Electricity Act of 2003 does not restrict or empower any authority to restrict the fuel choice for power generation.

There is no mandatory law or regulation which enforced project promoters to adopt the wind electricity generation. Project Proponent has been issued with all required regulatory clearances before commissioning.

Step 2: Implementation Barriers

The project shall face one (or more) distinct barrier(s) compared with barriers faced by alternative projects.

- Investment Barrier
- Technological Barriers
- Institutional barriers

Project proponent selected Investment Barrier

Investment Barrier

Benchmark analysis has been chosen to demonstrate the additionality of the projects in the bundle. Since the financial indicator, Project IRR, has been chosen to demonstrate the additionality, as per the Guidance on Investment Analysis WACC is one of the appropriate benchmarks. Accordingly, benchmark has been computed for all the projects in the bundle separately, the computation of which are enclosed. In computing the WACC the rate of interest at which the loan has been contracted by the individual projects has been taken into consideration adjusted to tax rate. Expected return on equity has been computed using the CAPM. After computing the WACC, lowest WACC has been taken as the benchmark on a conservative basis. Based on the above methodology, the benchmark works out to 13.17% Projects in the bundle should earn a return (Project IRR) atleast equal to or more than the benchmark of 13.17% to merit investment.

The assumptions made in making projections and hence IRR are given in the enclosed worksheet. Based on the above assumptions, the project IRR of various projects in the bundle works out as follows:

	BIL	CSL	RTPL	RJPL	SSST
WITHOUT CDM	9.65%	5.26%	7.74%	6.28%	7.78%

It could be seen from the data given above, the project IRR is lower than benchmark in all cases. Therefore, the projects in the bundle are additional and cannot become financially attractive without CDM benefits. The robustness of the conclusion has been checked by subjecting critical parameters – Generation and Project cost - to reasonable variations (+/- 10%) as required by the Guidance on Investment analysis. The results of the sensitivity analysis are given in the following table:

<i>Sensitivity Analysis for BIL</i>					
<i>Generation</i>					
<i>Variation</i>	<i>10%</i>	<i>5%</i>	<i>0</i>	<i>-5%</i>	<i>-10%</i>
<i>Project IRR</i>	11.35%	10.51%	9.65%	8.75%	7.82%
<i>Project Cost</i>					
<i>Variation</i>	<i>10%</i>	<i>5%</i>	<i>0</i>	<i>-5%</i>	<i>-10%</i>
<i>Project IRR</i>	7.81%	8.69%	9.65%	10.71%	11.90%

<i>Sensitivity Analysis for CSL</i>					
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<i>Generation</i>					
Variation	10%	5%	0	-5%	-10%
Project IRR	7.08%	6.20%	5.26%	4.28%	3.24%
Project Cost					
Variation	10%	5%	0	-5%	-10%
Project IRR	3.64%	4.42%	5.26%	6.20%	7.24%

<i>Sensitivity Analysis for RTPL</i>					
<i>Generation</i>					
Variation	10%	5%	0	-5%	-10%
Project IRR	9.37%	8.57%	7.74%	6.87%	5.98%
Project Cost					
Variation	10%	5%	0	-5%	-10%
Project IRR	5.98%	6.81%	7.74%	8.76%	9.90%

<i>Sensitivity Analysis for RJPL</i>					
<i>Generation</i>					
Variation	10%	5%	0	-5%	-10%
Project IRR	7.86%	7.08%	6.28%	5.45%	4.58%
Project Cost					
Variation	10%	5%	0	-5%	-10%
Project IRR	4.66%	5.43%	6.28%	7.22%	8.26%

<i>Sensitivity Analysis for SSST</i>					
<i>Generation</i>					
Variation	10%	5%	0	-5%	-10%
Project IRR	9.25%	8.52%	7.78%	7.01%	6.22%
Project Cost					
Variation	10%	5%	0	-5%	-10%
Project IRR	6.52%	7.12%	7.78%	8.48%	9.25%

From the foregoing, it is evident that the proposed project activities are not business-as-usual cases. The VCU benefits will help the project activity to cover up some of the risks.

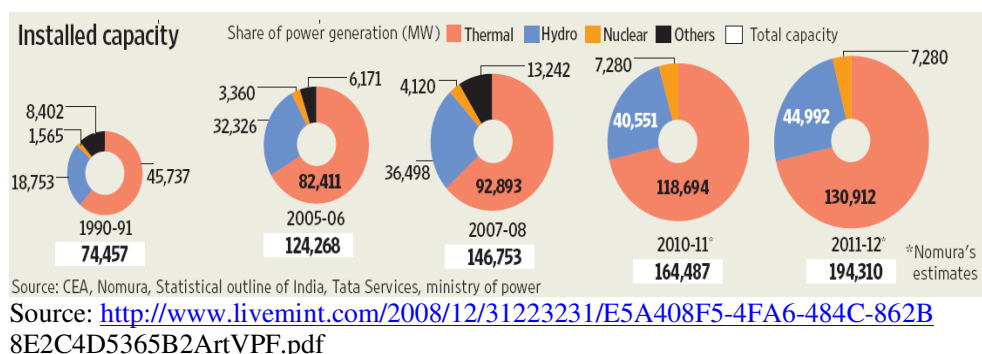
Step 3: Common Practice

* Project type shall not be common practice in sector/region, compared with projects that have received no carbon finance.

- ✱ If it is common practice, the project proponents shall identify barriers faced compared with existing projects.
- ✱ Demonstration that the project is not common practice shall be based on guidance in the GHG Protocol for Project accounting, Chapter 7

As per GHG Protocol for Project Accounting, Common Practice refers to the predominant technologies or practices in a given market. The same guidance has been used here for demonstration of project activity not being common practice.

Coal has been the mainstay of India's energy supply for several years now. Coal consumption increased from 140 Mt in 1984 to over 400 Mt in 2004 with a growth rate of 5.4%⁵.



This dependence on coal, as well as the lack of infrastructure to support alternative forms of energy, is the historical fall-out of shortsighted energy vision based upon the following:

- Availability and affordability of mature coal technology to meet energy needs during India's nation-building phase post-Independence
- India's ostensible abundance of coal as a natural resource
- The flawed yet long-standing belief that India has vast indigenous coal reserves
- Nationalization of India's coal sector between 1971 and 1973 that created a virtual monopoly, dominated by Coal India Limited (CIL) – a public sector behemoth with over 458,000 employees and significant political sway⁶.

Moreover the share of generation from wind power projects in Gujarat stands at 0.65% (251.5 GWh⁷) of the total generation in state. Extending the argument further, of the of total 38269.84⁸ GWh of electricity generated in Gujarat in the year 2005, the share of conventional sources in state as more than 99 %.

Furthermore the share of generation from wind power projects in 2006 at Maharashtra and Gujarat stands at 0.73 % (495.36 GWh⁹) and 0.79% (350.0 GWh¹⁰) respectively of the total

⁵ Integrated Energy Policy; Government of India (Planning Commission)
http://planningcommission.nic.in/reports/genrep/rep_intengy.pdf

⁶ This has been addressed with a recent government decision to allow private sector bidding of coal reserve blocks.

⁷ http://cea.nic.in/power_sec_reports/general_review/0304/chap-3.pdf, table no. 3.4

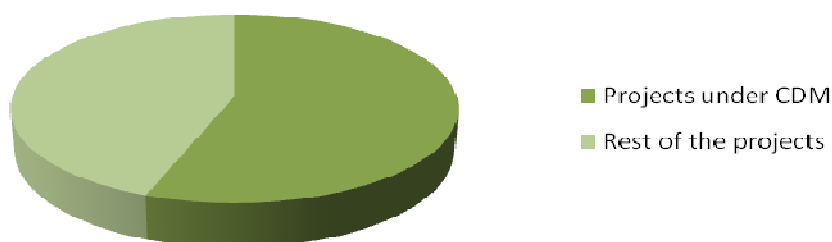
⁸ http://cea.nic.in/power_sec_reports/general_review/0304/chap-3.pdf, table no. 3.4

⁹ http://cea.nic.in/power_sec_reports/general_review/0405/ch3.pdf, table no. 3.4

generation in state. Extending the argument further, of the 67078.27¹¹ GWh of total electricity generated in Maharashtra and 44230.80¹² GWh of electricity generated in Gujarat in the year 2006, the share of conventional sources in both states as more than 98 %.

Maharashtra

When we analyze the extent to which wind energy projects have diffused in the electricity sector in Maharashtra, in 2004–05, wind electricity generation was 495.36 GWh¹³ and the total electricity availability at bus-bar in the state of Maharashtra was 82075.33 GWh¹⁴. This works out to 0.6%, showing that wind energy power generation is insignificant as compared to other power project generation sources. Installed capacity of wind energy generation sources stood at 411.20 MW as of 31 March 2005. Of the current installed wind power capacity of 1646 MW¹⁵ in Maharashtra, 916 MW¹⁶ is under various stages of CDM. The percentage of projects applying for CDM thus stands at 56%.



Gujarat

Gujarat does not demonstrate a trend very different from that of Maharashtra. In 2004-05, wind contributed only 0.6% of total generation¹⁷. The figure has improved marginally in 2006-07, but the improvement is not very encouraging. The current installed capacity stands at 875 MW¹⁸ and out of this 497 MW¹⁹ is in the process of availing CDM funds. The percentage again works out to be 57%.

¹⁰ http://cea.nic.in/power_sec_reports/general_review/0405/ch3.pdf , table no. 3.4

¹¹ http://cea.nic.in/power_sec_reports/general_review/0405/ch3.pdf , table no. 3.4

¹² http://cea.nic.in/power_sec_reports/general_review/0405/ch3.pdf , table no. 3.4

¹³ Table 3.4; http://www.cea.nic.in/power_sec_reports/general_review/0405/ch3.pdf

¹⁴ Table no 5.3; http://www.cea.nic.in/power_sec_reports/general_review/0405/ch5.pdf

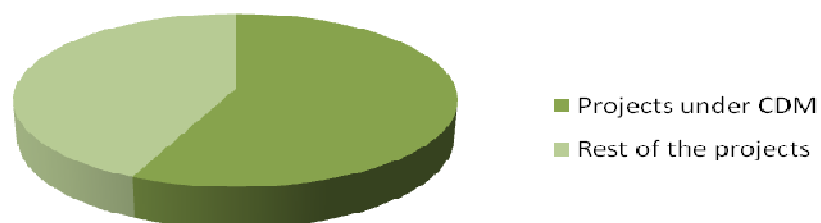
¹⁵ MNES Annual Report 2007-08, http://mnes.nic.in/annualreport/2007_2008_English/Chapter%205/chapter%205_1.htm

¹⁶ <http://cdmpipeline.org/publications/CDMpipeline.xls>

¹⁷ Table 3.4 and 5.3 of CEA General Review, 2006

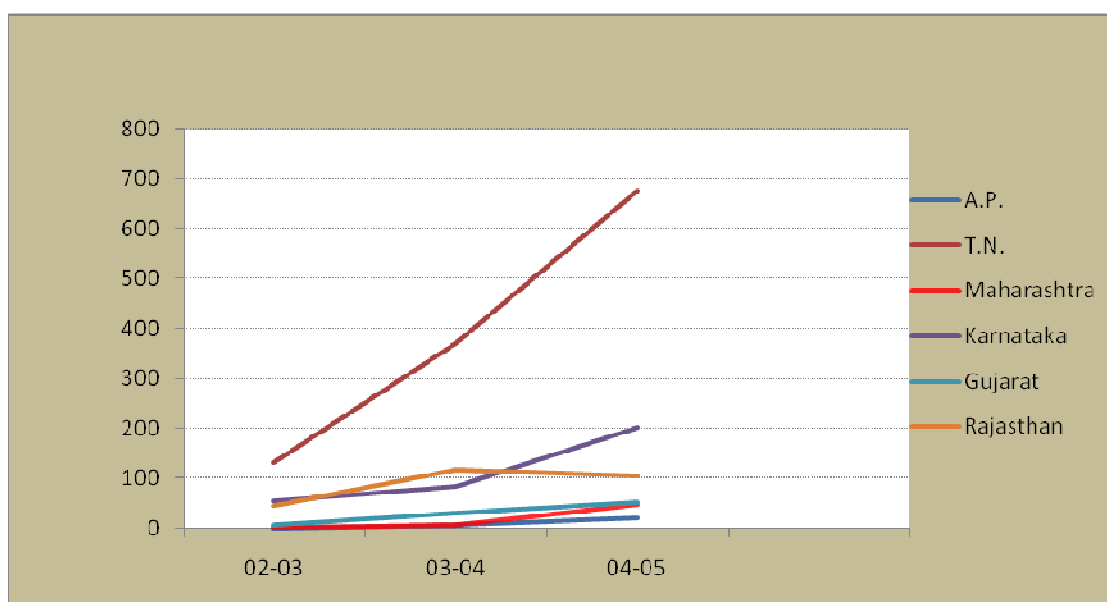
¹⁸ MNES Annual Report 2007-08

¹⁹ <http://cdmpipeline.org/publications/CDMpipeline.xls>



The paragraphs above explicate that the power sector in India still feels more comfortable with investments in large and medium sized thermal and hydro power projects rather than the infirm renewable energy projects.

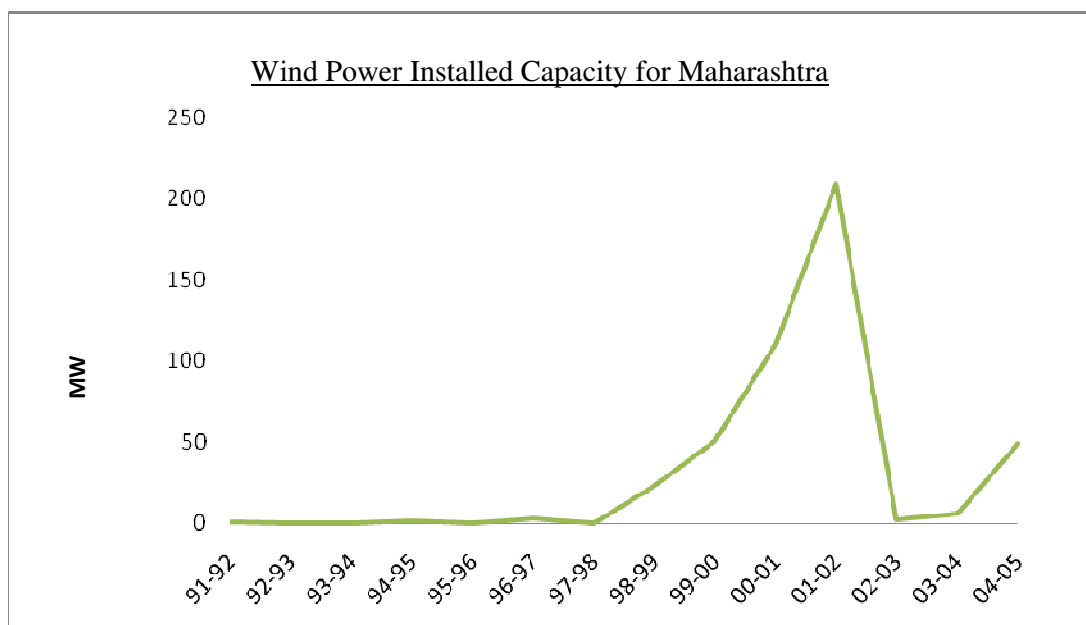
All India installed capacity of wind power projects



Wind Power Installed Capacity²⁰ (MW): 1991/92 to 2004/05

²⁰ Table 1.99; TERI Energy Data Directory and Yearbook 2005/06

If addition of installed capacity²¹ is observed for Maharashtra, the following trend comes to light-



There was a sudden drop in installations in the year 2002-03 which also continued in 2003-04 as a result of Maharashtra government withdrawing Sales Tax incentive vide GR dated 01/01/200022.

Gujarat

Table 6.1 WIND POWER POTENTIAL		
State	Gross Potential (MW)	Technical Potential (MW)
	(a)	(b)
Andhra Pradesh	8275	1750
Gujarat	9675	1780
Karnataka	6620	1120
Kerala	875	605
Madhya Pradesh	5500	825
Maharashtra	3650	3020
Orissa	1700	680
Rajasthan	5400	895
Tamil Nadu	3050	1750
West Bengal	450	450
Total	45195	12875

²¹ Table 1.99; TERI Energy Data Directory and Yearbook 2005/06

²² www.assochem.org/events/recent/event_58/Dr_Sudhir_Kumar_MEDA.ppt

Wind power potential²³

State	Demonstration Projects (MW)	Private Sector Projects (MW)	Total Capacity (MW)
Andhra Pradesh	7.4	118.7	126.1
Gujarat	15.3	272.5	287.8
Karnataka	7.1	479.9	487.0
Kerala	2.0	0.0	2.0
Madhya Pradesh	0.6	34.5	35.1
Maharashtra	8.4	646.2	654.6
Rajasthan	6.4	306.2	312.6
Tamil Nadu	19.4	2507.3	2526.7
West Bengal	1.1	0.0	1.1
Others	0.5	1.1	1.6
Total	68.2	4366.3	4434.5

State-wise Wind Power Installed Capacity²⁴ (as on 31.12.2005)

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Actual generation²⁵

²³ http://mnes.nic.in/annualreport/2004-2005_English/ch6_pg1.htm

²⁴ http://mnes.nic.in/annualreport/2005_2006_English/CH8/2.html

²⁵ <http://www.geda.org.in/pdf/wind/Windfarms-PowerGeneration.pdf>

WIND FARM GENERATION REPORT OF GUJARAT FOR THE YEAR 2005-06 & 2006-07

Sr. No.	Location of Wind Farm, Village, District	Installed Capacity as on 31.03.07	Annual electricity generation during the year 2005-06 in MW hrs.	Annual electricity generation during the year 2006-07 in MW hrs.	Cumulative generation till December - 2006 in MW hrs.
1	Lamba, Jamnagar	36.30	42696.75	45556.31	319280.90
2	Gandhvi, Jamnagar	17.20	8272.83	22797.25	25974.91
3	Navadra, Jamnagar	35.88	54410.91	54396.78	284875.21
4	Bhogat, Jamnagar	24.85	36917.66	37329.00	234945.47
5	Okhamadhi, Jamnagar	2.00	2175.44	2264.48	25688.92
6	Patelka, Jamnagar	13.73	20782.88	20514.23	122560.39
7	Dhank, Rajkot	32.94	27793.46	25719.12	344089.22
8	Mervadar, Rajkot	21.26	12959.28	12458.78	166379.62
9	Ukahrala, Bhavnagar	13.20	25655.46	29774.21	82771.68
10	Okha, Jamnagar	0.28	159.73	67.13	6204.15
11	Bamnasa/Kuranga/Satapar/Jodhpar/Okhamadhi, Jamnagar	89.60	30700.52	93366.20	104367.07
12	Sadodar, Jamnagar	92.00		3447.69	
13	Shikarpur, Kutch	26.30	17505.10	30660.58	
14	Changdai, Kutch	25.00	4071.96	41172.11	39033.91
15	Vanku, Kutch	41.45	73.47	33507.46	23108.48
16	Suththri, Kutch	97.80		1751.73	
17	Tuna, Kutch	0.70	230.20	131.61	
		570.47	284405.61	454914.67	1779279.90

	Gross Generation (MWh)	Generation from wind farms (MWh)	% of total generation
2005-06	4568580626	284405.61	0.62%
2006-07	4551736627	454914.67	0.99%

Thus the entire sector is dominated by the conventional, thermal and up to a small extent, large hydro electric projects. The non conventional energy sources which are already struggling owing to higher costs involved, need good financial back up to enter this prejudiced market. As rightly pointed out by Mr V. Subramanian, Secretary, Ministry of New and Renewable Energy, at the Cleantech Forum, that “renewable energy does not even get a third of support available to conventional” sources.

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

As defined under Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project activity proposes to apply following project types and categories:

²⁶ <http://www.wrpc.nic.in/annualreport0506/annex11.pdf>

²⁷ <http://www.wrpc.nic.in/AnnualReport0607/Annex11.pdf>

- **Type** : **I – Renewable Energy Projects**
- **Project Category:** : **I.D. – Grid connected renewable electricity generation (Version 13, EB 36)**

Requirements with respect to technology/measure under AMS I.D. – Grid connected renewable electricity generation (**Version 13, EB 36**)

The project activity is a small scale activity as the aggregate capacity is 6.2 MW which is less than 15 MW - ceiling capacity for the project to be considered under small scale activity as per the simplified modalities and procedures of the UNFCCC. This category comprises renewable energy, including wind power, which supplies electricity to an electricity distribution system (grid). Project activity utilizes wind for power generation and exports the generated electricity to the grid hence, application of Type I.D is justified.

As per AMS.ID para.13 (monitoring)

Monitoring shall consist of metering the electricity generated by the renewable technology.

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

- *Purpose of monitoring*

To verify the emission reductions, based on actual data. The monitoring is also as per the requirement of PPA and hence inline with the requirements of MSEDCL and GETCO which leads to accurate monitoring of the generated electricity. Net generation is measured by JMR. Gross electricity will also be monitor by monthly gross generation data from controller.

- *Types of data and information to be reported, including units of measurement*

Net electricity supplied to the grid by the project in MWh from the JMR issued by the respective state electricity board by applying apportioning method explained in section 3.4.

- *Origin of the data*

Credit Report (JMR)

- *Monitoring, including estimation, modelling, measurement or calculation approaches*

Calculation for monitoring will be made on actual electricity supplied to the grid (JMR). Gross electricity will be monitor through meter installed at controller.

- *Monitoring times and periods, considering the needs of intended users;*

Monitoring will be done as below:

Frequency: hourly measured

Recording: Monthly from joint meter

Archiving Policy: Paper & Electronic

Data reporting will be calendar year wise for entire crediting period.

- *Monitoring roles and responsibilities*

Project proponent and wind turbine supplier together will be involved for collecting the monitoring information. SEBs will be responsible for the apportioning of the electricity.

- *Managing data quality*

All the data will be stored in the electronic/paper format. The data will be handled by the Central Monitoring Station (CMS) of the wind power project developer. All the WTGs are connected with the CMS through a wireless Radio Frequency (RF) network or SCADA. The generation data of individual machine can be monitored as a real-time entity at CMS.

The monthly JMR & monthly invoices will be kept in the paper format by the PPs.

Main meter will be regularly calibrated as per the SEB norms (Published in the gadget of India, extraordinary, part-III, section-IV, notification no. 502/70/cea/dp & d, dated 17th March 2006). The calibration frequency will be Annual or as per the UNFCCC guidelines (at least once in three year, paragraph 12.c, EB- 41 Annex- 20)

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Data / Parameter:	EG_v
Data unit:	MWh
Description:	Electricity supplied to the grid by the project. Net Electricity export by the project annually (obtained from joint meter reading by Regional electricity board and project promoter on monthly basis). Note: Net Electricity Export to grid = Electricity export to grid – Electricity import from grid – Electricity Losses, if any (Transmission and Distribution losses)
Source of data to be used:	Credit Report (Joint meter reading) by SEB and promoter
Value of data	--
Description of measurement methods and procedures to be applied:	<u>Monitoring:</u> trivector meter will be used for monitoring <u>Data Type:</u> measured <u>Frequency:</u> hourly measured <u>Recording:</u> Monthly from joint meter <u>Archiving Policy:</u> Paper & Electronic <u>Responsibility:</u> Project Head would be responsible for regular calibration of the meter. <u>Calibration Frequency:</u> Once a year.
QA/QC procedures to be applied:	The project revenue is based on the net units displaced as measured by main metering system installed at the interconnection point (substation point). The meters used are calibrated periodically by state electricity utility. The Joint meter readings will be derived as per the joint procedures by O & M contractor and SEB. The O&M

	contractor will carry out the apportioning of the electricity generation on the basis of data collected from the WTGs. The SEB accordingly apportions the main/check meter readings to the project developer. Cross verification of JMR will be done by <u>invoices of respective State Electricity Board for electricity exported to the grid.</u>
Any comment:	This data will be archived up-to two years after the completion of crediting period or last issuance whichever is later.
Data / Parameter:	EG_{gross}
Data unit:	MWh
Description:	Gross electricity generated by WTG
Source of data to be used:	Monthly Performance Report
Value of data	--
Description of measurement methods and procedures to be applied:	<u>Data Type:</u> measured <u>Frequency:</u> hourly measured <u>Recording:</u> Monthly <u>Archiving Policy:</u> Electronic <u>Calibration Frequency:</u> Internal calibrated
QA/QC procedures to be applied:	A internal calibrated meter is installed at WTG controller will measure the gross generation.
Any comment:	This data will be archived up-to two years after the completion of crediting period or last issuance whichever is later.

3.4 Description of the monitoring plan

The project participant signed an operation and maintenance agreement with the suppliers of the wind turbines. The agreements are initially for a fixed period. The performance of the turbines, safety in operation and scheduled /breakdown maintenances is responsibility of supplier of the wind turbines and are organized and monitored by them. So the authority and responsibility of project management lies with the O & M contractor.

The project activity involves generation of electricity from wind, the employed WTG can only convert wind energy into electrical energy and cannot use any other input fuel for electricity generation. Thus no special ways and means are required to monitor leakage from the project activity.

The proposed project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state power utility.

- The primary recording of the electricity fed to the state utility grid will be carried out jointly at the incoming feeder of the state power utility. Machines for sale to utility will be connected to the feeder.
- The joint measurement will be carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading. On the basis of joint meter reading, invoice has been raised by project proponent. Invoice copy is considered as sale of net electricity to grid and same values are incorporated in emission reduction calculation sheet (excel calculation tool) for calculating the emission reduction and subsequently in monitoring report.
- The monitoring of electricity generation by each WTG will be carried out, at the individual WTGs. Each WTG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through a wireless Radio Frequency (RF) network (SCADA). The generation data of individual turbine can be monitored as a real-time entity at CMS.
The O & M management structure is as follows:

Routine Maintenance Services:

Routine Maintenance Labour Work involves making available suitable manpower for operation and maintenance of the equipment and covers periodic preventive maintenance, cleaning and upkeep 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

Security Services: This service includes watch & ward and security of the wind farm and the equipment.

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 utility, of power generated at wind farm and supplied to grid from the meter/s maintained by utility for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

Technical Services:

- a) Visual inspection of the WTG 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.
- c) Annual and monthly training schedules are organized by the manufacturers and suppliers of the wind turbines.

The responsibilities of VER project team is presented below (applicable for all projects)-

Designation	Responsibilities
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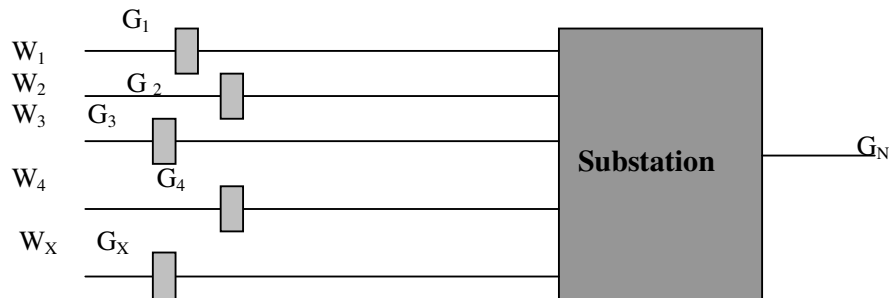
Project Head	- Overall performance monitoring - Project Execution
Project Executer and Controller	- Operation - Verification of data - Site visit to check authenticity of data and take corrective action wherever necessary - Storage of Data
Site Main Controller	- Operation, Monitoring and Verification of data - Data recording - Storage of data
Operation and Maintenance Contractor	- Operation and Maintenance - Data recording - Storage of Data

Emergency preparedness procedures:

- During the operations and maintenance, the health safety kits and first-aid-box with necessary medicines are readily available for 24 hours.
- Fire extinguishers are provided in all areas and refilled before their expiry dates. Safety training programs are arranged by Site Manager once in six months to various persons including securities from state government fire service department persons.
- Apportioning of electricity:**

The apportioning of the electricity at sub station is done as per the following method at the wind farm.

Suppose X numbers of wind turbines are connected to a substation through a particular feeder. The generation reading is collectively displayed by the substation meter. The net generation of each of the wind turbine is then calculated in the following manner:



G_N = Total net generation by X number of wind turbines in the wind farm connected through a particular feeder which is recorded by main meter/check meter at the substation.

G_G = Total generation by X number of wind turbines

$$\text{i.e. } (G_1 + G_2 + G_3 + \dots + G_X) = G_G$$

$G_G > G_N$ as some transmission loss takes place on the way to the substation.

$$\text{Thus, } G_G - G_N = G_L$$

This total transmission loss (G_L) is distributed amongst the X wind turbines in proportion to their generation.

$$G_1 / G_G = Y_1$$

Similarly $G_2 / G_G = Y_2$ and so on...

Transmission losses for particular wind turbine are calculated as:

Transmission losses for the 1st wind turbine:

$$[Y_1 / (Y_1 + Y_2 + Y_3 + \dots + Y_X)] * G_L = L_1$$

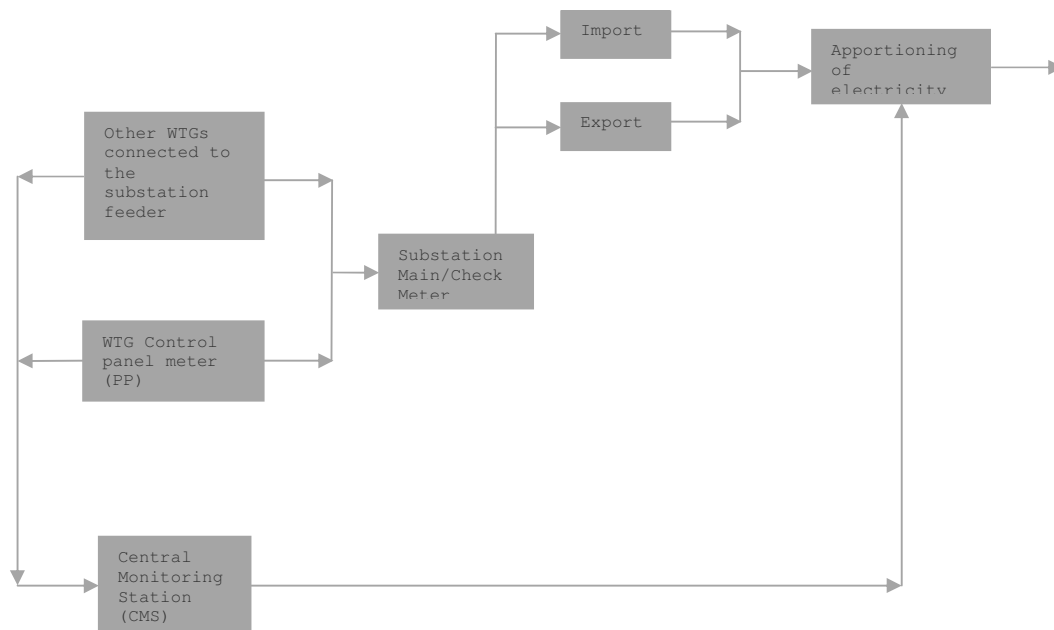
Therefore, net generation from wind turbine W_1 is calculated as $G_1 - L_1 = G_{N1}$

Transmission losses for the 2nd wind turbine:

$$[Y_2 / (Y_1 + Y_2 + Y_3 + \dots + Y_X)] * G_L = L_2$$

Therefore, net generation from wind turbine W_2 is calculated as $G_2 - L_2 = G_{N2}$ and so on...

Schematic metering diagram:



4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

The project activity involves a total installed capacity of 6.2 MW. The project is producing electricity and supplying it to WESTERN Grid. The project activity is

classified as a small scale project activity as the installed capacity is below 15 MW limit. Small scale baseline methodology AMS-I.D. (Version- 13, EB- 36) is applicable to the project activity. Baseline methodology for project category I.D has been detailed in paragraphs 7-11 of the approved small scale methodology AMS-I.D. (Version- 13, EB- 36) Paragraph-9 of the approved methodology applies to this project activity, which states that:

....the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO₂e/kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the ‘Tool to calculate the emission factor for an electricity system’.

OR

(b) The weighted average emissions (in kg CO₂e/kWh) of the current generation mix.’

The project Promoters have chosen combine margin (CM) approach for determination of the baseline emission of the proposed project activity.

Following information is used for baseline development:

Electricity supplied (kWh) to the WESTERN Grid taken from monthly invoices raised by the PPs to State Electricity Board on the basis of the monthly Joint Meter Reading Reports issued by Electricity Board to PPs.

Grid emission factor (tCO₂/MWh) from CEA Database, version 3.0 published by Central Electricity Authority (CEA), Government of India.

The combine margin grid emission factor can be calculated by using step 6 equation 13 of “Tool to calculate the emission factor for an electricity system” Annex- 12, Version- 01.1, EB- 35) as below:

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

Where:

$EF_{\text{grid,BM,y}}$	= Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EF_{\text{grid,OM,y}}$	= Operating margin CO ₂ emission factor in year y (tCO ₂ /MWh)
W_{OM}	= Weighting of operating margin emissions factor (%)
W_{BM}	= Weighting of build margin emissions factor (%)

The following default values should be used for WOM and WBM:

Wind and solar power generation project activities: WOM = 0.75 and WBM = 0.25 (owing to their intermittent and non-dispatch-able nature) for the first crediting period and for subsequent crediting periods.

4.2 Quantifying GHG emissions and/or removals for the project:

The calculation of baseline emissions involves two parameters—

- A. Grid emission factor (EF_{grid}, y, tCO₂/MWh)
- B. Net electricity supplied to the grid (EG_y, MWh)

It is given by the following formula:

$$\text{Baseline emissions (tCO}_2\text{)} = \text{Grid emission coefficient (EF}_{\text{grid}}, y, \text{ tCO}_2\text{/MWh)} \times \text{Net electricity supplied (EG}_y\text{, MWh)}$$

A. Calculation of Grid emission factor (EF_{grid}, y, tCO₂/MWh)

The project promoters have chosen option (a) — A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) —to calculate the grid emission coefficient from ‘Tool to calculate the emission factor for an electricity system’ (Annex- 12, Version-01.1, EB- 35)

The combine margin grid emission factor can be calculated by using step 6 equation 13 as below:

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

Where:

- EF_{grid,BM,y} = Build margin CO₂ emission factor in year y (tCO₂/MWh)
- EF_{grid,OM,y} = Operating margin CO₂ emission factor in year y (tCO₂/MWh)
- W_{OM} = Weighting of operating margin emissions factor (%)
- W_{BM} = Weighting of build margin emissions factor (%)

Step 1: Calculation of OM (EF OM, y)

For calculation of operating margin four options are available:

1. Simple operating margin;
2. Simple adjusted operating margin;
3. Dispatch data analysis operating margin;
4. Average operating margin

CO₂ Baseline Database (Version- 3.0), published by Central Electricity Authority (CEA), Government of India has been referred for the values of OM. According to methodology ACM0002, (Version- 08, EB- 44) dispatch data analysis should be the first choice but for projects in India dispatch data analysis cannot be used because of unavailability of data. Also necessary data for the calculation of Simple adjusted operating margin is not available. And the average emission rate method can only be used where low-cost/must run resources constitute more than 50% of total grid generation. Hence, Simple operating margin has been used. Also the low-cost/must run resources constitute less than 50% (as per CEA database only 18.5% of the total grid generation of WESTERN Grid in average of the three most recent years.

Calculation of Operating Margin emission factor for the region based on simple OM

The values of OM have been taken from CEA Database version-3 which is calculated by approved methodology ACM0002. The calculation of OM has been done ex ante based on the most recent 3 years data available at the time of VCS PD submission.

Simple Operating Margin (tCO2/MWh) (incl. Imports)			
	2004-05	2005-06	2006-07
WESTERN	1.01	1.00	0.99
South	1.00	1.01	1.00
Average of 3 years (WESTERN)	1.0		
Table reference- CEA Baseline Database, Version 3.0			

Step 2: Calculation of Build Margin factor (EF BM, y) for the region (ex ante)

The values of BM have been taken from CEA Database which is calculated by approved methodology ACM0002. The calculation of BM has been done ex ante.

Build Margin (tCO ₂ /MWh) (not adjusted for imports)			
	2004-05	2005-06	2006-07
WESTERN	0.77	0.63	0.59
South	0.70	0.71	0.71
Table reference- CEA Baseline Database, Version 3.0			

Step 3: Grid emission coefficient (EF grid,y)

The grid emission factor is calculated as the weighted average of the operating margin emission factor (EFOM, simple, y) and the build margin emission factor (EFBM, y), where the weights WOM and WBM for wind projects, by default, are WOM = 0.75 & WBM = 0.25).

WESTERN Grid:

$$\begin{aligned}
 \text{EF grid,y} &= 0.75 \times \text{EF OM,y} + 0.25 \times \text{EF BM,y} \\
 &= 0.75 \times 1.0 + 0.25 \times 0.59 \\
 &= 0.901 \text{ tCO}_2/\text{MWh}
 \end{aligned}$$

4.3 Quantifying GHG emissions and/or removals for the project:

Project emissions (PEy):

The project emissions for proposed project activity are taken as zero ton of CO₂.

Leakage emissions (LEy):

According to paragraph 12 of AMS-I.D. (Version-13, EB-36) 'If the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.'

The leakages are taken as zero tonnes of CO₂, as there is no transfer of energy generating equipments from another activity nor the existing equipments are transferred to another activity.

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

The total emission reductions by the project activity may be calculated as:

Emission reductions (ER_y)

The emission reductions (ER_y) are calculated as per equation 11 of 'Tool to calculate the emission factor for an electricity system' (Annex- 12, Version-01.1, EB- 35).

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y	= Emission reductions in year y (t CO ₂ e/yr)
BE_y	= Baseline emissions in year y (t CO ₂ e/yr)
PE_y	= Project emissions in year y (t CO ₂ /yr)
LE_y	= Leakage emissions in year y (t CO ₂ /yr)

As for wind power project activity the leakages & project emissions are considered as zero, the emission reductions of the proposed project activity are equal to the baseline emissions.

Thus the proposed wind power project activity will achieve estimated emission reductions (ER_y) of 10663 tCO₂ per annum. The ER has been calculated on the basis of PLF for Maharashtra and published data source is used for Gujarat state.

Summary of the ex-ante estimation of emission reductions:

Year	Estimation of Project Activity Emission Reduction (tCO ₂ e /yr.)	Total Baseline Emissions (tCO ₂ e /yr.)	Estimation of Leakage (tCO ₂ e /yr.)	Estimation of Emission Reduction (tCO ₂ e /yr.)
2006	0	2269	0	2269
2007	0	4886	0	4886
2008	0	10663	0	10663
2009	0	10663	0	10663
2010	0	10663	0	10663
2011	0	10663	0	10663
2012	0	10663	0	10663
2013	0	10663	0	10663
2014	0	10663	0	10663
2015	0	10663	0	10663
Total	0	92460	0	92460

5 Environmental Impact:

As per the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated January 27, 1994 and further modified on 14th September, 2006, regarding requirement of Environment Impact Assessment (EIA) studies for a range of infrastructure projects, 38 categories of the proposed industry or project is required to undertake EIA 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 WTGs installation 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 EIA.

6 Stakeholders Comments:

The promoters organized formal & informal stakeholder consultation with the objective to inform the local interested stakeholders which include villagers, technology suppliers, and farmers on the environmental and social impacts of the project activity and discuss their concerns related to the development and operation of the activity. Stakeholders were invited through publicly announcement at a local newspaper and in person. Details of stakeholders meeting are -

Sr. No.	Name of the Sponsor	Mode of Consultation (formal / informal)	Date
1	Rathi Transpwer Pvt. Ltd.	Formal	03/04/2008
2	Batliboi Ltd.	Formal	18/03/2008
3	Shri SaiBaba Sansthan Trust	Formal	09/04/2008
4	Cera Sanitaryware Ltd.	Formal	03/04/2008
5	Ranka Jewellers Pvt. Ltd.	Formal	02/03/2009

Once the project and process was informed, including the local job creation and benefits, the local stakeholders had no objections or negative comments relating to the project.

7 Schedule:

Project start date:

26/09/2005 (the earliest date of start in the bundle –Batliboi Ltd. based on Commissioning

Crediting period start date:

28/03/2006 As per VCS 2007.1 standard Para 5.2.1 (Page no. 12) “The earliest Project Crediting Period Start Date under the VCS 2007.1 shall be 28 March 2006 for non-AFOLU projects”

Operational lifetime of the project activity:

20 Years

VCS project crediting period:

Ten years. This may be renewed at most one times

8 Ownership:

8.1 Proof of Title:

For proof of title commissioning certificate and state electricity board clearances as well purchase order are there as strong evidence.

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

- Not applicable

ANNEXE – A

DECLARATION LETTERS

Letters, separately submitted to DoE

ANNEXE – B**CONTACT INFORMATION**

MITCON will act as a focal point for all communication with the project participants given below.

Organization:	South Pole Carbon Asset Management Ltd.
Street/P.O.Box:	Technoparkstr. 1
Building:	/
City:	Zurich
State/Region:	Zurich
Postfix/ZIP:	8005
Country:	Switzerland
Telephone:	+41 44 633 78 70□
FAX:	+41 44 633 14 23
E-Mail:	info@southpolecarbon.com
URL:	www.southpolecarbon.com
Represented by:	Patrick Bürgi
Title:	/
Salutation:	Mr.
Last Name:	Bürgi
Middle Name:	/
First Name:	Patrick
Department:	/
Mobile:	/
Direct FAX:	+41 44 633 14 23
Direct tel:	+41 44 633 78 70
Personal E-Mail:	p.burgi@southpolecarbon.com

Organization:	Rathi Transpower Pvt. Ltd.
Street/P.O.Box:	7, Deccan College Road
Building:	Rathi Chambers
City:	Pune
State/Region:	Maharashtra
Postfix/ZIP:	411006
Country:	India
Telephone:	+91 020-30517231
FAX:	+91 020-30517212
E-Mail:	
URL:	--
Represented by:	
Title:	Senior Manager
Salutation:	Mr.

Last Name:	Gandhi
Middle Name:	S
First Name:	S
Department:	Accounts
Mobile:	Not Available
Direct FAX:	Not Available
Direct Tel:	Not Available
Personal E-Mail:	ssgandhi@rathigroup.com

Organization:	Batliboi Ltd.
Street/P.O.Box:	104, Bombay Samachar Marg, Fort
Building:	Bharat House, 5 th Floor
City:	Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400001
Country:	India
Telephone:	+91 022-66378200
FAX:	+91 022-22679280
E-Mail:	--
URL:	--
Represented by:	
Title:	General Manager (Taxation)
Salutation:	Mr.
Last Name:	Shah
Middle Name:	K
First Name:	K
Department:	--
Mobile:	Not Available
Direct FAX:	Not Available
Direct Tel:	Not Available
Personal E-Mail:	kk.shah@batliboi.com

Organization:	Shri Saibaba Sansthan Trust
Street/P.O.Box:	Rahata, Shirdi
Building:	--
City:	Ahmadnagar
State/Region:	Maharashtra
Postfix/ZIP:	
Country:	India
Telephone:	
FAX:	02423 - 258770
E-Mail:	--
URL:	--
Represented by:	--

Title:	HOD
Salutation:	Mr.
Last Name:	Rohmare
Middle Name:	
First Name:	Vijay
Department:	Electrical
Mobile:	Not Available
Direct FAX:	Not Available
Direct Tel:	Not Available
Personal E-Mail:	vijayrohmare@ rediffmail.com

Organization:	Ranka Jewellers Pvt. Ltd.
Street/P.O.Box:	575, Laxmi Road
Building:	--
City:	Pune
State/Region:	Maharashtra
Postfix/ZIP:	411030
Country:	India
Telephone:	+91 020-24459830
FAX:	+91 020-24453890
E-Mail:	--
URL:	--
Represented by:	
Title:	Chairman
Salutation:	Mr.
Last Name:	Ranka
Middle Name:	-
First Name:	Shailesh
Department:	--
Mobile:	09822611911
Direct FAX:	Not Available
Direct Tel:	Not Available
Personal E-Mail:	Not Available

Organization:	Cera Sanitaryware Limited
Street/P.O.Box:	9, GIDC Industrial Estate
Building:	--
City:	Kadi, Mehsana
State/Region:	Gujarat
Postfix/ZIP:	382715
Country:	India
Telephone:	+912764-242329
FAX:	+91 2764-242465
E-Mail:	--
URL:	--
Represented by:	

Title:	Senior Manager (R&D)
Salutation:	Mr.
Last Name:	Bahety
Middle Name:	L
First Name:	M
Department:	--
Mobile:	Not Available
Direct FAX:	Not Available
Direct Tel:	Not Available
Personal E-Mail:	mbahety@ cera-india.com

ANNEXE – C

ESTIMATED VER GENERATION YEAR WISE

Baseline Emmission of RTPL				0.901 tCO2/MWh	
Emission Reductions					
Year	Units MWh)	Baseline Emission	Project Emmission	Leakage	Emission Reduction tCO2
2006	0	0	0	0	0
2007	395	356	0	0	356
2008	1209	1089	0	0	1089
2009	1209	1089	0	0	1089
2010	1209	1089	0	0	1089
2011	1209	1089	0	0	1089
2012	1209	1089	0	0	1089
2013	1209	1089	0	0	1089
2014	1209	1089	0	0	1089
2015	1209	1089	0	0	1089
Total	10066	9070	0.00	0	9070
Annual Average	1007	907	0	0	907

Baseline Emmission of CSL				0.901 tCO2/MWh	
		Emission Reductions			
Year	Units MWh)	Baseline Emission	Project Emmission	Leakage	Emission Reduction tCO2
2006	0	0	0	0	0
2007	1049	945	0	0	945
2008	2519	2269	0	0	2269
2009	2519	2269	0	0	2269
2010	2519	2269	0	0	2269
2011	2519	2269	0	0	2269
2012	2519	2269	0	0	2269
2013	2519	2269	0	0	2269
2014	2519	2269	0	0	2269
2015	2519	2269	0	0	2269
Total	21197	19099	0.00	0	19099
Annual Average	2120	1910	0	0	1910

ANNEXE – C (contd.)
ESTIMATED VER GENERATION YEAR WISE

Baseline Emmision of BIL				0.901 tCO2/MWh	
		Emission Reductions			
Year	Units MWh)	Baseline Emission	Project Emmision	Leakage	Emission Reduction tCO2
2006	2519	2269	0	0	2269
2007	2519	2269	0	0	2269
2008	2519	2269	0	0	2269
2009	2519	2269	0	0	2269
2010	2519	2269	0	0	2269
2011	2519	2269	0	0	2269
2012	2519	2269	0	0	2269
2013	2519	2269	0	0	2269
2014	2519	2269	0	0	2269
2015	2519	2269	0	0	2269
Total	25185	22692	0.00	0	22692
Annual Average	2519	2269	0	0	2269

Baseline Emmision of RJPL				0.901 tCO2/MWh	
		Emission Reductions			
Year	Units MWh)	Baseline Emission tCO2	Project Emmision tCO2	Leakage tCO2	Emission Reduction tCO2
2006	0	0	0	0	0
2007	0	0	0	0	0
2008	1209	1089	0	0	1089
2009	1209	1089	0	0	1089
2010	1209	1089	0	0	1089
2011	1209	1089	0	0	1089
2012	1209	1089	0	0	1089
2013	1209	1089	0	0	1089
2014	1209	1089	0	0	1089
2015	1209	1089	0	0	1089
Total	9671	8714	0	0	8714
Annual Average	967	871	0	0	871

ANNEXE – C (contd.)

Baseline Emmision of SSST			0.901 tCO2/MWh		
		Emission Reductions			
Year	Units MWh)	Baseline Emission tCO2	Project Emmision tCO2	Leakage tCO2	Emission Reduction tCO2
2006	0	0	0	0	0
2007	1460	1315	0	0	1315
2008	4380	3946	0	0	3946
2009	4380	3946	0	0	3946
2010	4380	3946	0	0	3946
2011	4380	3946	0	0	3946
2012	4380	3946	0	0	3946
2013	4380	3946	0	0	3946
2014	4380	3946	0	0	3946
2015	4380	3946	0	0	3946
Total	36500	32887	0.00	0	32887
Annual Average	3650	3289	0	0	3289

