CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

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Title: 12 MW Grid connected Wind Power Project, Gujarat State, India.
Version: 01
Date: 12/04/2008.

A.2. Description of the small-scale project activity:

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The project activity is the installation and commissioning of 12 MW of Wind Turbine Generators (WTGs) in Kutch District, Gujarat State in Western Region of India and supply of the same to Gujarat Urja Vidyut Nigam Limited (GUVNL) grid. This project is promoted by Ansal Properties and Infrastructure Limited (Ansal API) who has over 40 years experience in the real estate industry and infrastructure development.

Purpose of the Project Activity:
The objective for the project under consideration is generation of electricity from renewable wind energy, resulting in addition of capacity to the grid and displacing an equivalent amount of fossil fuel based electricity generation. To harness wind energy, Ansal API have installed 8 nos. of 1.5 MW each (aggregate 12 MW) WTGs (herein referred as 12 MW wind farm) of Suzlon make in Lathedi (1.5 MWx6) and Suthri villages (1.5 MW x 2) in Abdasa Taluk of Kutch District in Gujarat. The turbines are of three-blade horizontal-axis type with pitch regulation facility for optimizing adjustment of the blade angles in relation to the prevailing wind conditions and expected to generate 24.178GWh power per annum. Power is generated at 690 Volt (V) and stepped-up to 0.66 /33 Kilo voltage by generator transformer to match Suthri sub station and further stepped up to 33 / 220 kV for transmission to Gujarat Electricity Transmission Corporation (GETCO) sub station at Nani Khakhar, 80 km from project site in District Kutch of Gujarat. The WTGs included in the project activity have been commissioned during September 2007 and since then have been commercially operating.

Project Activity in reducing GHG Emissions:
The project activity generates electricity using wind potential and converts it into kinetic energy using Wind turbines, which drives the alternators to generate energy. The generated electricity is exported to the regional grid system, which is Western Region grid. The wind power produced, being GHG neutral will not only displace thermal power in the Western Region Grid but also will reduce the associated emissions with thermal power generation.

The annual greenhouse gas (GHG) emission reduction through this 12 MW wind farm project is estimated to be21,784 tonnes of CO_2 equivalent.

Contribution of project activity to sustainable development

Ministry of Environment and Forests (MoEF), Government of India, has stipulated social well being, economic well being, environmental well being and technological well being for sustainable development in the interim approval guidelines for CDM projects[1]. The project activity contributes to the above indicators in the following manner;

Social well-being:

- The project activity has opened up employment opportunities for the local people not only during the erection and commissioning of the WT Gs but also for the operation and maintenance of the WTGs which has definitely improved the standard of living of the local people.
- The project activity would help to a great extent in the improvement of the electricity facilities in the neighboring villages. More because the power generated is supplied to a distribution grid it has been possible for the local community to get maximum benefits from the project activity.

Economic well-being:

- Settings up of wind farms require large area which would appreciate the land values which would otherwise command extremely low prices more because most of these lands are unproductive.
- The project also contributes to the economic well-being of the nation's economy by reducing import of coal and other fossil fuel for electricity generation.
- The project contributes to the economic sustainability around the plant site, which is promotion of decentralization of economic power, leading to diversification of the national energy supply, which is dominated by conventional fuel based generating units.
- The generated electricity is fed into the Western Regional Grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers and 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.

Environmental well-being:

- Wind power generation is a zero emission activity and there is no addition of emissions into the atmosphere. Moreover, the project uses a renewable energy source which is replenished naturally and does not get depleted by use.
- The Project will assist in a small way to narrow the large demand and supply gap in the State. It will reduce greenhouse gas emissions as well as emissions of local pollutants from power generation, by using a cleaner energy source than what typically would have been used.
- Use of renewable energy source (wind energy) also helps in conservation of natural resources (like coal), thereby contributing to energy security of the country.
- Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.

Technological well-being:

- Wind power technology presently accounts for a mere 5.35%[2] of installed capacity in the country. The successful operation of the project activity would thus encourage other entrepreneurs to install similar projects in India.

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[1] http://envfor.nic.in/divisions/ccd/cdm_iac.html

[2] www.mnes.nic.in/power-menu.htm

- The technology used in the power plant is well proven and safe. Increased interest in Wind energy projects will further push Research & Development efforts by technology providers to develop more efficient and better machinery in future.
- The development of the project also provides important knowledge and experience for other project developers striving to participate in the competitive national and regional market.

The project would generate about 24.178 GWh of power and contribute to the reduction of about 21,784 tonnes of Carbon Dioxide emission equivalent annually.

The above benefits due to the project activity ensure that the project would contribute to the sustainable development of the region.

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
India (Host)	**Private Entity:** Ansal Properties & Infrastructure Limited	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

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A.4.1.1. Host Party(ies):

>>
India

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

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State: Gujarat

A.4.1.3. City/Town/Community etc:

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Location of 8 nos. of 1.5 MW WTGs are as follows

Table A1: Location of WTGs in 12 MW wind farm

S.N.	Capacity	Survey No.	WTG Location No as per micrositing plan	Village
1	1.5 MW	491	M-274	Lathetdi
2	1.5 MW	488	M-278	Lathetdi

3	1.5 MW	440	M-281	Lathetdi
4	1.5 MW	486	M-283	Lathetdi
5	1.5 MW	485	M-284	Lathetdi
6	1.5 MW	469	M-285	Lathetdi
7	1.5 MW	494	M-235	Suthri
8	1.5 MW	528	M-248	Suthri

Taluka: Abdasa
District: Kutchh

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project.t activity :

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The 12 MW wind farm project activity is located in Kutchh district of Gujarat. Nearest Railhead and Airport is at Bhuj, which is at a distance of 90 km from project site.
Physical location of the project activity is shown in the maps below:

Figure 1: Location of Gujarat State in India Map

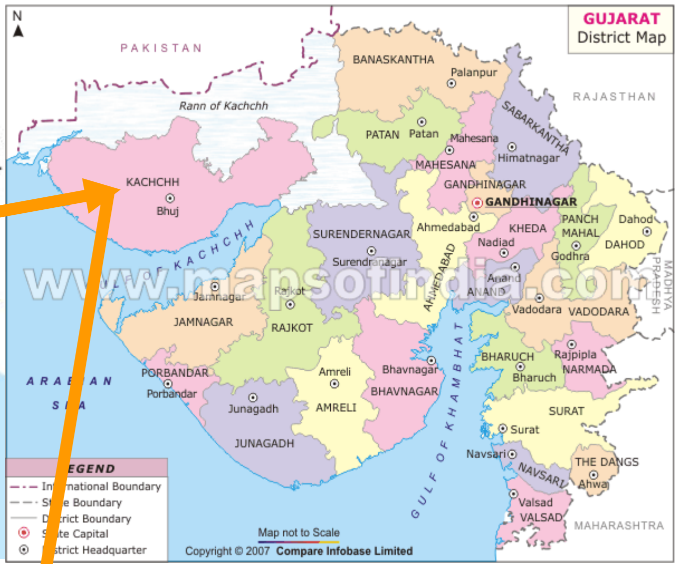

Figure 2: Location of Kachchh District in Gujarat District Map

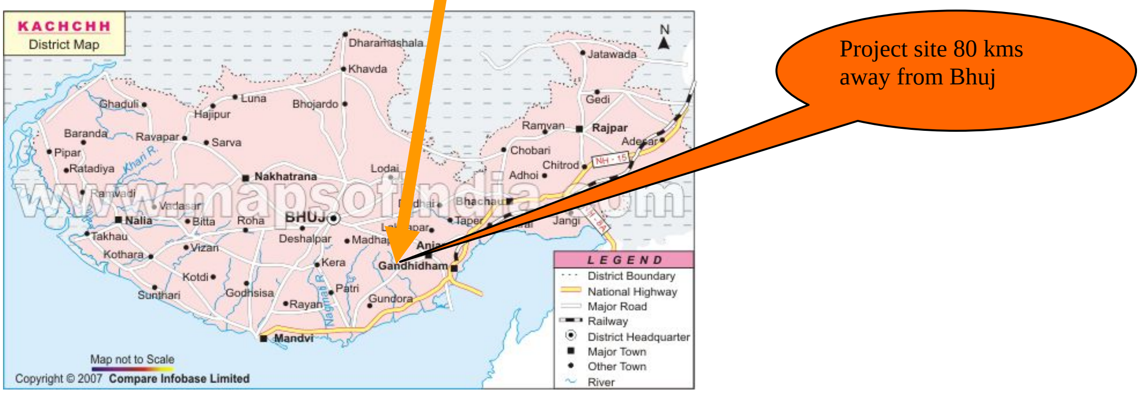

Figure 3: Location of Project Site in Kachchh District Map

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

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Type & Category

According to the Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the proposed project activity fall under the following type and category:

Project Type: Type I – Renewable Energy Projects
Category I D: Renewable Electricity Generation for a grid
Reference: AMS.I.D, version 13, EB 36

Application of environmentally sound and safe technology

The technology employed for the project activity is the current best practice in wind power sector in India. The wind mills were supplied by Suzlon Energy Ltd, an offshoot of Suzlon group, and considered to be one of the leading manufacturers of site specific Wind turbine generators with strong R&D back up having R&D Centres in Germany, Netherlands & Asia[3]. They supplied their latest model S 82, state-of-art 1.50 MW Wind Turbine Generators (WTGs), which is one of the latest available technologies in the country.[4] Thus, this project involves electricity generation using the best available technology through sustainable means without causing any negative impacts on the environment. Hence, the technology applied for the project activity is environmentally safe and sound.

The Project activity utilises the velocity of the wind in the atmosphere for power generation by using of WTGs. The project activity uses the Horizontal Axis Wind Turbine (HAWT) having three rotor blades. The HAWT consisting of a tower and nacelle that is mounted on the tower and the turbine blades are kept in to the direction flow of wind by the yaw system. The rotor is rotated by the wind velocity. The kinetic energy of wind is converted into mechanical energy and then converted into electrical energy by using of electric generators. The project produces less noise/ turbulence. Power is transmitted to the generator through three-stage gearbox and main shaft. WTG are monitored and controlled by a microprocessor based control unit.

The project activity comprises of 8 WTGs of 1.5 MW each. All the WTGs generate electricity at 690 V level and in order to connect the wind turbine to the utility, the voltage will be stepped up to 33kV. It is anticipated that plant can operate at a plant load factor of 23 [5]%. The average annual estimate of power export to the grid system would be around 24.178 GWh.

Technical details of the project activity is summarized in the below Table A.2

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[3] http://www.suzlon.com/R&D_Product.html?cp=2_2

[4] http://www.suzlon.com/WindTurbines.html?cp=2_3. Turbine supplier document will be produced to DOE

[5] As per order on tariff by Gujarat Electricity Regulatory Commission, http://www.geda.org.in/pdf/wind_final_order.pdf

Table A.2: *Brief Technical details of the project design*

Parameter	Specifications
Operational Parameters	
Cut-in wind speed	4 m/sec
Cut-out wind speed	20 m/sec
Re-start point after high wind speed	17 m/sec
Hub height	78.5 m (Including 1 m foundation height)
Rotor	
Number of blades	3
Material	Fibre glass/epoxy
Rotor cone angle	4.3^o
Rotor diameter	82 m
Rotor Speed (at rated power)	16.30 rpm
Swept area	5.281 m^2
Gear Box	
Type of Gear Box	1 planetary stage/2 helical stages
Gear ratio	1:95.09
Gear house material	Cast
Pitch System	
Pitch type	Electrical
Drive type	One electric motor with gearbox & electrical brake/blade
Hub	
Hub type	Cast Spherical hub
Corrosion protection	Corrosion proof painting
Yaw System	
Yaw bearing type	Slide bearing with gear ring & automatic greasing system
Yaw motor & gear type	Active electric yaw drives with motor brake, gearbox and pinion
Number of Units	4
Turbine	
Type of wind turbine	Horizontal axis wind turbine, with flexible slip control wheel Turbine
Rated Power	1.5 MW
No of WTGs	8
Generator	
Generator type	Single speed induction generator with slip rings
Rated Voltage	690 V AC(phase to phase) Stepped up to 0.69/33 kV

Frequency	50 Hz
Synchronous speed	1,500 rpm
Power Factor	0.9 (lag)
Power Evacuation	
Suthri sub station voltage	0.69/33 kV
Transmission Voltage	33/220 kV
GETCO Substation	220 kV Nani Khakhar
Substation distance from site	85 kms
Electricity generation capacity	
Gross Energy	24.178 GWh
CUF	23%

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

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The expected emission reductions are calculated based on the net electricity sales and combined margin emission factor of tCO_2/MWh for the Western Region grid[6]. The resulting emission reductions are 21,784 tCO_2/annum, which is tCO_2 Emission Reductions (ERs) during the chosen crediting period of 10 years. Annual estimates of emission reductions by the project activity during the crediting period are furnished below

Table A.3: ***Annual estimation of Emission Reductions (ERs)***

Years	**Estimation of annual emission reductions in tonnes of CO_2 e**
2008-09	21,784
2009-10	21,784
2010-11	21,784
2011-12	21,784
2012-13	21,784
2013-14	21,784
2014-15	21,784
2015-16	21,784
2016-17	21,784
2017-18	21,784
Total estimated reductions (tCO_2 e)	**217,840**
Total number of crediting years	**10 (fixed crediting period)**
Annual average of the estimated reductions over the crediting period (tCO_2 e)	21,784

A.4.4. Public funding of the small-scale project activity:

[6] For more details, please refer to section B.6. of this document

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

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

As per debundling guidelines specified in Appendix C to the 'Simplified Modalities and Procedures for Small Scale CDM project activities[7]', a proposed small scale project activity shall be deemed to be a debundled component of a large scale project activity if there is a registered small scale project activity or an application to register another small scale project activity under the CDM.

- In the same project category and technology / measure;
- With the same project participants;
- Within the previous 2 years; and
- Whose boundary is within 1 km of the project boundary of the proposed small scale activity at the closest point.

The project activity is thus not a debundled component of a larger project activity, since there is no registered or no request for registration of CDM project activity in the same project category and technology/measure by the same project participants within 1km of the present activity in last two years.

SECTION B. Application of a baseline and monitoring methodology

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

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Project Type: Type I – Renewable Energy Projects
Category I D: Renewable Electricity Generation for a grid
Reference: AMS.I.D, Version 13, EB 36 (14th December, 2007)

AMS I-D draws into following tool to determine baseline for electricity system

"Tool to calculate emission factor for an electricity system,
Reference: Version 01/EB – 35 Annex 12**"**

B.2 Justification of the choice of the project category:

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The installed capacity of the project activity is 12 MW (<15 MW) of power using the wind potential and thus qualifies for Type I project category. Also, as per Appendix B of "Indicative Simplified Monitoring & Baseline Methodologies", renewable energy generating units 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 come under category I.D. The project activity involves generation of power by harnessing wind potential which is a form of renewable energy and then exporting the generated power to

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[7] http://cdm.unfccc.int/EB/007/eb7ra07.pdf

the Western Region grid (which is dominated by fossil fuels). The power generated by the project activity helps in displacing electricity (that would have been supplied by fossil fuels) from the grid. Thus, this project activity qualifies for the applicability condition of the baseline methodology of AMS I.D.

Demonstration that the project activity will remain with in the limits of small-scale project activity through out the crediting period

Wind and power studies are carried out by M/s Suzlon Energy for the project site under observation for about 1-3 years before installation.[8] To confirm that the project remains within small scale limit (<15 MW) parameters such as installed capacity of turbine, swept area, density of wind, wind speed are considered. Based on the cut in and cut out wind speed available in the region, the optimum capacity of power plant is decided and 8 nos. of 1.5 MW wind turbines have been installed to account for aggregate capacity of 12 MW. Keeping the above considerations in view, and also the maximum electricity generating capacity is limited by the design of the plant and machinery and the license issued by the state authorities, there is no possibility of exceeding the limits of small-scale CDM project activities during the crediting period and the project activity will remain as a small scale project activity throughout the crediting period.

B.3. Description of the project boundary:

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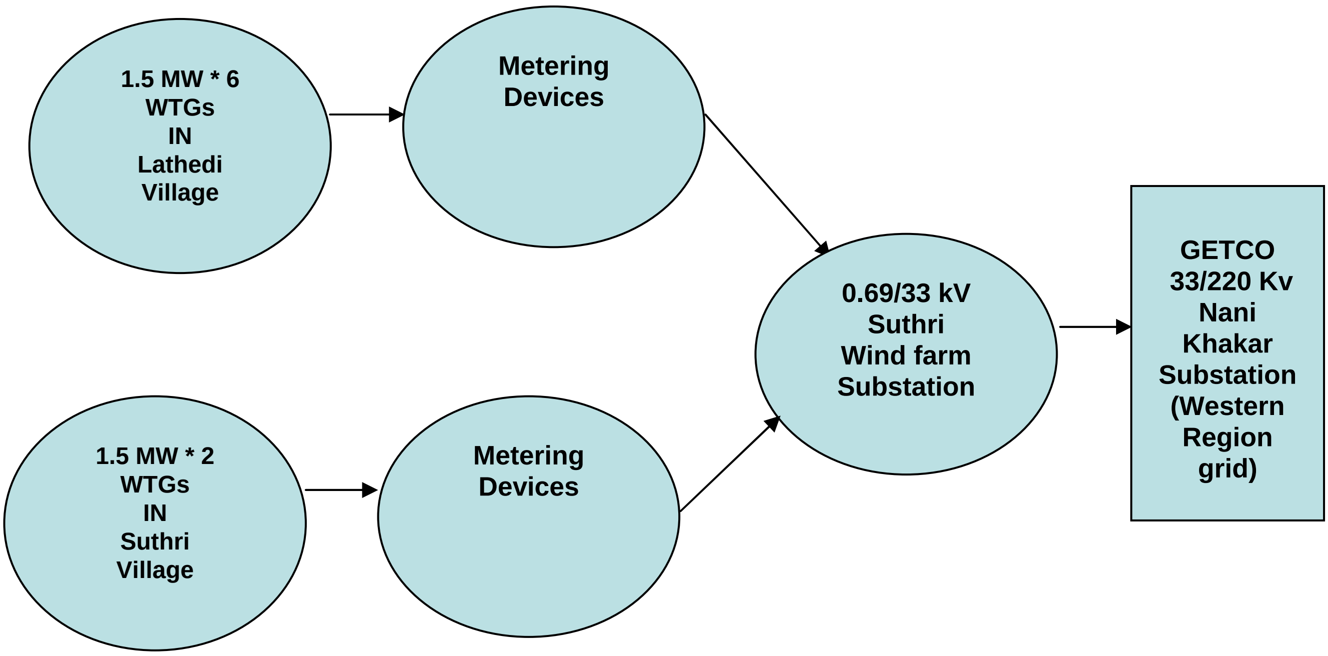
In accordance with AMS I.D, the project boundary encompasses the physical, geographical site of the renewable generation source. For the project activity this includes the wind turbine installations, pooling, and evacuation system till the GETCO sub-station.



[8] 12 MW Wind farm project, DPR, Page 38.

In addition, the project boundary also includes the connected electricity system, i.e. Western Region Grid of India, for the purpose of determining the baseline emission factor for displaced grid electricity. The Western Region grid covers the following states: Gujarat, Madhya Pradesh, Chhattisgarh, Maharashtra, Goa, Daman & Diu, Dadar & Nagar Haveli.

B.4. Description of baseline and its development:

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As per the clause 9 of approved methodology AMS. I.D, Version 13, EB 36 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) Combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in “Tool to calculate the emission factor for an electricity system” (EB 35, Annex 12, Version 01)

OR

b) The Weighted average emissions (in kg CO_2e/kWh) of the current generation mix.

The project proponent has opted for approach ‘a’ i.e. combined margin emission factor and desired to keep the emission factor constant throughout the crediting period for the sake of adopting more simple approach for calculation of emission reductions.

The key parameters used to determine the baseline emissions are furnished below:

Table B1: Key parameters for baseline emissions

Key Parameter	Value	Data Source	Website
EF	Baseline emission factor for the Western Region grid	CEA published baseline emission factor for Western Region grid of India	CEA Website [9]
EGy	Net power export to the grid per annum	From Plant and GUVNL Records.	------

The Emission factor for Western Region is taken from CEA published Grid Emission Factors for Indian grid systems, which are made publicly available on CEA website. The Emission factors have been calculated according to the guidelines of CDM UNFCCC website.

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 small-scale CDM project activity:

Power generation in the Western Region grid is dominated by fossil fuel based power plants. Coal based power plants contribute 56.87% of power generation in Western Region Grid, while diesel and gas account for 15.2%, hydro power and nuclear contributes 16.53% and 4.22 % respectively. Wind power

[9] http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

and other non-conventional energy contribute 7.18% of the total annual generation in the Western Region grid[10]. The domination of power generation by fossil fuel based power plants signify that in the absence of the proposed project activity, equivalent power would have been generated using fossil fuel and no emission reduction would have taken place. Government of India plans to generate at least 10% of the total power generation through renewable sources of power by 2010 and provides a number of benefits to these projects through its ministries/ departments, still its long way to go as the projects face barriers and are not business-as-usual projects.

Despite facing barriers like high investment cost, financially unattractive power generation cost and other barriers discussed in detail in the following paragraphs, the project proponent has decided to contribute its mite to environmental protection by undertaking to set up this project, as power generated using wind energy results in zero emission of greenhouse gases

UNFCCC simplified modalities seek to establish additionality of the project activity as per Attachment A to Appendix B, which listed various barriers, out of which, at least one barrier shall be identified, due to which the project would not have occurred any way. Project participants identified the following barriers for the project activity.

Project participants have undertaken the following analysis in support of additionality.

Investment Barrier

Though the project faces a number of barriers, the most important among them is the investment barrier. The investment barrier faced by the project consists of barrier due to high capital expenditure and consequent impact on return.

High capital expenditure:
The project activity involves an investment of Rs.7240 lakhs for 12 MW capacity. A committee was constituted by the Central Electricity Authority in 2003 to study the capital cost and cost of generation of power from various sources of fuel. The Report of the Expert Committee on Fuels for Power Generation was submitted in February 2004. The Committee has done a detailed study on the capital cost of power plants using different types of fuels and has come out with conclusions, which prove that the capital cost of setting up wind power project is the most expensive of all. The capital cost as estimated by the Committee, the plausible CUF and the effective capital cost of power plants using various types of fuels are given in the table[11] below (B.2 & B.3):

Table B.2 Capital Cost of Power Plants

Source of power generation	Capital cost/MW (Rs. In million)	CUF	Effective Capital cost/MW (Rs. in million)
Wind	54.4	25.63%	212.25
Coal	40.0	90.00%	44.44

[10] www.cea.nic.in – power scenario at a glance

[11] Report of the Expert Committee on Fuels for Power Generation (February 2004)

Natural Gas	27.0	90.00%	30.00
Lignite	42.0	90.00%	46.67

As could be seen from the above, capital cost of Natural Gas based power plants are cheapest followed by Diesel, Lignite and coal. This is mainly because, while the Natural Gas, Diesel and coal based power plants can achieve a CUF of 90 to 95%, WEGs, which are dependent upon the vagaries of wind, can never achieve a CUF of more than 26% even in the best of times and best of places.. Consequently, the cost of generation of power is also lowest in the case of power plants using various fuels as compared to wind based power generation. The cost of generation of power (Rs/kWh) with various fuels as per Expert Committee is given below:

Table B.3- Cost of Power Generation (Rs/kWh)

Sources of Power generation	20% CUF	80% CUF	90% CUF	100% CUF
Wind	3.69	-	-	-
Domestic Coal*	-	1.34	1.23	1.07
Natural Gas*	-	1.44	1.37	1.30
Lignite*	-	1.83	1.71	1.62

*For power plants located at pit head/near the port, conditions similar to WEGs
Source: Report of the Expert Committee on Fuels for Power Generation (February 2004)

Thus, above table shows the wind power generation is not a financially attractive proposition.

Investment analysis: To prove the financial unattractiveness (without CDM benefits) of the wind power project, the PP had undertaken a detailed Investment analysis of the project prior to project implementation.

Table B. 4 : Parameters for Investment Analysis

Parameter	Value	Remarks
WTG Capacity	1.5 MW	Capacity of WTGs installed in the project activity
No of WTGs	8	
Project cost	Rs.7240 lakhs	Total for all wind turbines
Debt/Equity ratio	Debt: 70% (Rs. 5000 lakhs) Equity: 30% Rs. 2240 lakhs)	Sourced from loan sanction letter
Interest rate on Loan	11.75% per annum	IDBI loan sanction letter
Up-front fee for bank loan	0.15% of financial assistance	

Loan Repayment Schedule	Moratorium : 8 months 9th month to 10th year 100% loan repayment in equated installments	32 Quarterly installment commencing from April 1 2008.
Insurance/year	Rs.5.32 lakhs per annum	Insurance is @ 0.24% per annum
Capacity Utilization Factor	23%	This CUF is as per the guidelines from Gujarat Electricity Regulatory Commission[12]
Power generation	24.178GWh[13] per annum	At 23% CUF
Tariff for sold power	Rs. 3.37/ kWh	As per the tariff order of Gujarat Electricity Regulatory Commission. Fixed for 20 years of PPA.
O&M of WTG	Free first year and Rs. 15.25 lakhs/annum for each 1.5MW WTG annual escalation of 5%	As per contract with wind turbine supplier
Depreciation rate	4.5%	As per the tariff order of Gujarat Electricity Regulatory Commission for wind mills
Tax rates	33.66%	As per Income Tax Act in India 2007-2008
Minimum Alternative Tax	11.22%	As per Income Tax Act in India 2007-2008

CUF is taken from GEDA data 23%[14]. The project IRR was found to be 10.71% at 23 % CUF (Table B 5 highlighted green). Sensitivity analysis is carried out by considering hypothetical situation when CUF of project activity is increased above and below by 10 %. Also to depict the actual project situation, IRR of project activity also worked out for CUF 19.55 %(Table B 5 highlighted yellow) which is found to be 8.03%. During project conceptualization stage, CUF was assumed to be 29.7% as per wind power studies conducted by Suzlon . In actual practice, Ansal API's 12 MW wind farm project activity does not attain even 19.5% CUF which is evident from the Table B.7. Further, as per loan agreement and loan sanction letter from IDBI, repayment of term loan schedule commences from April 1, 2008. Due to low CUF, 12 MW wind farm project has not resulted in revenue generation for first term loan repayment and project proponent had to mobilize the fund from internal sources.

It is against the above background that CDM benefits assume importance. With CDM benefits, the project IRR goes up to 13.52% and the average ROE goes up to 17.34%. Soft copy of financial analysis is furnished separately for verification.

[12] As per order on tariff by Gujarat Electricity Regulatory Commission, http://www.geda.org.in/pdf/wind_final_order.pdf

[13] 1 Gwh = 10^6 KWh

[14] www.geda.org.in/pdf/wind_final_order.pdf

Table B 5: Sensitivity analysis of 12 MW wind farm project at different CUF

			CUF from GEDA	GEDA	23%						
% change in PLF	-15%	-12.50%	-10%	-7.50%	-5%	-2.50%	0%	2.50%	5%	7.50%	10%
PLF	19.55%	20.13%	20.70%	21.28%	21.85%	22.43%	23.00%	23.58%	24.15%	24.73%	25.30%
Project IRR	8.03	8.5	8.94%	9.38%	9.80%	10.24%	10.71%	11.16%	11.62%	12.08%	12.52%
IRR on Equity	5.28	6.09	6.88%	7.69%	8.50%	9.37%	10.36%	11.33%	12.35%	13.40%	14.45%

Technical Barrier

1. Wind readings that are recorded, either using hand held anemometer or loggers installed with wind mast are instantaneous readings. These are normally ten minutes interval readings. Based on these readings, average wind speeds and directions are arrived and generation is projected in DPR. But in reality, wind speed changes at every moment and direction is not same as average.

2. Another assumption in annual generation is that power grid would be available for 95% of time. This is a factor on which IPP has no control. Reduction of grid availability would in turn reduce the generation.

3. Location of wind mast and its readings are to be correlated with individual WTGs for available wind parameters in each location. Minor site variation in actual location would change wind parameters. Both are not factored in the estimate of generation potential.

4. Power generation from WTGs is dependent upon the climatic conditions. Since the wind conditions do not follow any set pattern power generation cannot be predicted with certainty. Therefore, the power from WTGs is considered for meeting the base load only. In other words, wind power is considered, almost as a stand-by for conventional power sources and not as a regular source. This inherent inadequacy of WTGs results in creating evacuation problem for the wind power generators.

5. As shown in table B.6, Capacity Utilization Factor (CUF) for wind power in Gujarat State is low when compared to other States. Possible generation per MW in Gujarat State is in the range of 12-14 lakh units. Also as shown in table B7, CUF achieved for the present project activity is less than estimated.

Table B.6. Possible Generation per MW of Wind Installation in different States[15]

POSSIBLE GENERATION PER MW (in lakhs units[16])	
Tamil Nadu	16 - 20
Maharashtra	14 - 16
Karnataka	14 - 20
Gujarat	12 - 14
Andhra Pradesh	12 - 16
Madhya Pradesh	12 - 14

During conceptualization stage, project proponent anticipated that project would work at 29.7% CUF, but in actual practice the project activity does not attain even 20% CUF. Below table depicts the idea about % CUF achieved of each 1.5 MW WTG from September 2007 to May 2008.

Table B 7: Actual CUF achieved

1.5 MW WTG No.	% CUF Achieved
M 235	18.82
M248	17.24
M274	16.97
M278	17.79
M281	14.64
M 283	17.58
M284	16.26
M285	15.60
Aggregate (12 MW)	19.27

Other Barriers

Some of the other barriers faced by the project activity include the following:

1. The wind sector is dominated by limited manufacturers who extend turnkey solutions for establishing wind energy projects. On the power curves, the dependence is on the data furnished by the manufacturers of wind mills than by any independent agency. Sizing of individual units based on

[15] http://www.indianwindpower.com/potential.html

[16] 1 million unit = 1 Gwh.

monitoring of wind for a limited period is fraught with the uncertainty of wind availability in subsequent years.

2. In the conventional power sector, the fossil fuel resources are limited but the technology for harnessing them is well stabilized. In contrast, wind energy source is unlimited but the technology for harnessing is still in the development stage. Thus, non-availability of cost-effective and commercially viable technology for harnessing wind energy is some of the barriers for the project. Lack of standardization in system components resulting in the wide range of design features and technical standards and absence of long-term policy instruments have resulted in manufacturing, servicing and maintenance difficulties of wind turbines. Lack of specialized independent agencies to take up project design for wind energy project, monitoring wind velocity, trouble shooting, repairs and maintenance, etc. have necessitated the dependence on the wind turbine manufacturers, who may not offer economical prices for the services.

3. This is the first time that the PP (Project proponent) is venturing into power generation, leave alone wind power generation. PP, therefore, does not have any experience in operating such projects. Though wind farms are usually developed and maintained by developers on contract basis, lack of basic knowledge becomes a constraint.

4. Long transmission line from Suthri substation to GETCO substation at Nani Khakhar (80 Kms) which would result in transmission losses.

Common Practice Analysis

In the Indian power sector, the common practice is investing in only medium or large scale fossil fuel fired power projects. Generation of power through a small wind project is not a common practice. This can be seen from the published statistics in respect of installations of wind projects in India and in the Western Region vis-à-vis the total installed capacity (of power generation).

Table B.8: Installed Capacity as on 30th April 2008 [17]

(In MW)

Sector	All India	Western Region
Hydro	35908.8	7198.5
Thermal	92157	31386
Nuclear	4120	1840
RES	11125.2	3130.9
Of which wind	7666.83	2591.4
Total	**143311**	**43555.3**
Wind power as percent of total	**5.35**	**5.94**

[17] Page No: 170 & 171, Annual Report, 2005-06, Ministry of Power, Govt. of India - http://www.powermin.nic.in/reports/pdf/ar05_06.pdf

The total installed capacity of power projects in India as on 30th April 2008 was 143311 MW. Of the total, power generated through wind accounted for a meagre 7666.83 MW or about 5.35% of the total power generation in the country, which is very negligible. A region-wise analysis reveals that the wind projects accounted for less than one tenth of the total installed capacity of power plants. These figures represent only the installed capacity and the capacity utilization of wind power projects on an average will be less than about 20%, which makes wind power contribution to actual power generation negligible.

Earthquakes:

The project area lies in a complicated geology with number of thrusts and faults. Most of the district of Kachchh lies in Zone V (Source. http://asc-india.org/seismi/seis-gujarat.htm#7)

It is seen from the seismic zoning map of India that the project area lies within seismic zone V, which indicates the high seismic intensity of the region in India. The project area lies in the zone where earthquakes of intensity greater than 9 cm scale are expected. There were major earthquakes in the project area in the past. It is evident from the table B.9 there were significant earthquakes taken place in Bhuj (Project site is 80 Kms away from Bhuj).

One such horror earthquake occurred on 26th January 2001, with high magnitude of 7.7 Mw, resulting in close to 13,823 deaths and extensive damage to property in Gujarat.. Thus the probability of reoccurrence of earthquake in the project region is quite high which may cause serious devastation in project area. The following maps show that the project lies in a highly hazardous seismic zone.

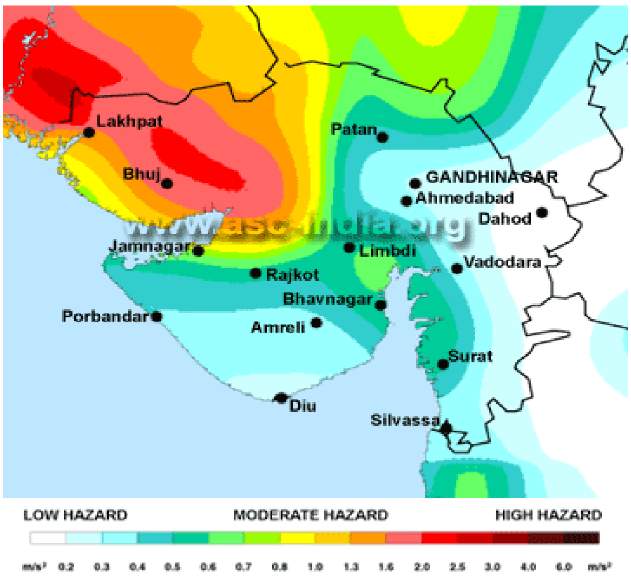

Fig B1: Seismic hazard map of Gujarat[18]

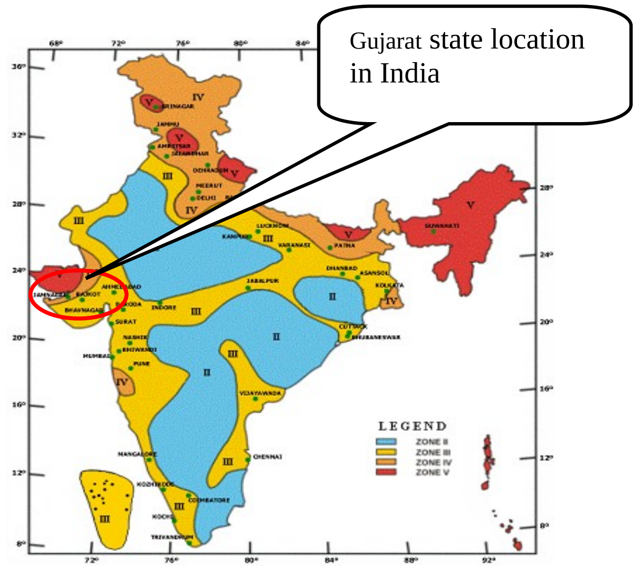

Fig B2: Seismic map of India

[18] http://asc-india.org/maps/hazard/haz-gujarat.htm

Table B 9 : Significant Earth Quakes in Gujarat State

S.N.	Date	Origin Time	Epicentre Latitude	Epicentre Longitude	Magnitude
1	29 August 1636	Surat area, Gujarat	-	-	Maximum Observed Intensity (III)
2	February-1705	Bhavanagar-Gogha area, Gujarat			Maximum Observed Intensity (XI)
3	16 June 1819	Rann of Kachchh, Gujarat	23.60 N	69.60 E	Maximum Observed Intensity (XI)
4	20 July 1828	Bhuj-Anjar area, Gujarat	23.2 N	69.9 E	Maximum Observed Intensity (IV)
5	26 April 1864	Dewan-Khambat area, Gujarat	24.4 N	72.2 E	Maximum Observed Intensity (VII)
6	14 April 1872	Bhavnagar area, Gujarat	21.767 N	72.233 E	Maximum Observed Intensity (VI)
7	14 January 1903	Kunria area, Gujarat	24.0 N	70.0 E	Ms 6.0
8	15 August 1906	North of Bakshasar, Rajasthan –Felt widely along the Indo-pakistan border, Sindh and Gujarat	27.5 N	70.25E	6.2 Mw
9	12 July 1907	Tharpakar, Pakistan-Felt in Sindh, Ahmedabad (Gujarat)	25.0 N	70.0 E	Maximum Observed Intensity (VI)
10	21 April 1919	Hebatput-Bhavnagar area, Gujarat	22.00 N	72.00E	Maximum Observed Intensity (VIII)
11	20 July 1935	Gulf of Khambat, Gujarat	21.00 N	72.400E	Maximum Observed Intensity (VII)
12	June 1938	Jhinjuwada – Vadgam area, Gujarat	23.3 N	71.1E	Maximum Observed Intensity (VI)
13	14 July 1938	Dhandhulka-Limbdii area,	22.40 N	71.80E	Maximum Observed

		Gujarat			Intensity (VI)
14	19 July 1938	Dhandhulka-Limbdii area, Gujarat	22.40 N	71.80E	Maximum Observed Intensity (VI)
15	23 July 1938	Dhandhulka-Limbdii area, Gujarat	22.40 N	71.80E	Maximum Observed Intensity (VII)
16	1940	Umia-Luna area, Gujarat(East of Lakhpat and to the west of Bhuj)	23.70	69.10 E	Ms 5.8
17	31 October 1940	Dhrol-Jamnagar area, Gujarat	22.5 N	70.4 E	Maximum Observed Intensity (VI). This earthquake might be the same as the previous event reported in Kachchh for which no date or origin times are available.
18	27 November 1945	Off the Makran coast, Pakistan	24.5 N	63.0 E	Mw 8.0 (Tsunamis with heights in excess of 6 metres were also observed in Kachchh.
19	14 June 1950	Tharad-Jhajham area, Gujarat	24.00 N	71.2 E	Maximum Observed Intensity (V)
20	21 July 1956	Bhadreshwar-Anjar area, Gujarat OT: 15:32:25 UTC	23.00 N	70.00 E	Maximum Observed Intensity (IX)
21	01 September 1962	Khed Brahma – Vadali area, Gujarat	23.00 N	73.00 E	Ms 5.0
22	23 March 1970	Ankleshwar-Bhharuch area, Gujarat OT: 1.53:01 UTC	21.600 N	72.960 E	Maximum Observed Intensity (VII)
23	26 March 1975	Arabian Sea OT: 16:19:19	19.754 N	68.398 E	Mb 5.2
24	24 August 1993	Arabian Sea OT: 17:47:30	20.700 N	71.44 E	Mb 4.9

25	12 September 2000	Bhavnagar area, Gujarat OT=00:53:27 UTC	21.680 N	72.123 E	ML 3.8
26	26 January 2001	Bhachau-Chobari (Bhuj) area, Gujarat OT=3:16:40	23.442 N	70.130 E	Mw 7.7
27	28 January 2001	Suvi-Rapar area, Gujarat OT:1:02:10 UTC	23.532 N	70.598 E	Mw 5.8
28	08 February 2001	Suvi-Chobari area, Gujarat OT: 16:54:42	23.693 N	70.4 E	ML 5.1
29	05 August 2003	Suvi area, Gujarat OT: 11:08:03	23.640 N	70.230 E	Mw 5.0
30	07 March 2006	Mouna area, Gujarat OT:10:20:46 UTC	23.768 N	70.853 E	Mw 5.5
31	06 April 2006	Vondh area, Gujarat OT: 17:59:17	23.308 N	70.444 E	Mw 5.5
32	08 April 2007	Gandhidham area, Gujarat OT= 16:20:13 UTC	23.083 N	70.187 E	Mb 4.2
33	09 March 2008	Dudhai-Bhachau area, Gujarat OT: 11:10:41 UTC	23. 4 N	70.142 E	Mb 4.4

Mw[19]= Moment Magnitude
UTC[20] – Coordinated Universal time (+5.5 hours IST)
Mb[21]= Body Wave Magnitude

Early consideration of CDM

Ansal API decided to diversify into renewable energy sources like wind. This small capacity may enable the company to understand the various issues involved in setting up wind farms such as technical

[19] The moment magnitude is a new measure for the size of an earthquake. It is gradually replacing the Richter scale because it is physically better substantiated. Minor differences may occur between the two scales (0.1 units in this case). (http://sine.ni.com/cs/app/doc/p/id/cs-10201)

[20] Nearly all international time is kept using Coordinated Universal Time (UTC) and a twenty four hour clock. UTC is also known as GMT, or Greenwich Mean Time. (http://www.iris.edu/seismon/html/utc.html)

UTC to different time zone conversion please refer http://www.souledout.org/nightsky/time/ut.html

[21] Body-wave (mb): Magnitude values are computed based on the seismic-wave period greater than or equal to 0.1 and less than or equal to 3.0, and distance is greater than or equal to 5 degrees.

difficulties, operation and maintenance problems, land related issues, plant load factor etc.

The Board of Directors of Ansal API during conceptualisation stage decided to consider income from Carbon Credits while making the investment in a wind project, which could enable it to overcome the barriers and financial hardships, it is likely to face. Documentary evidence would be made available for verification by the DOE.
In view of this, the present 12 MW Wind farm project is not a business-as-usual project but additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The project activity uses renewable energy source to generate electricity and exports the generated electricity to the grid system, which constitutes of both fossil fuels and non fossil fuels sources of electricity generation. Emission reductions due to the project activity are considered to be equivalent to the baseline emissions, since the wind power project would not lead to any project emission and leakage emissions. Emission reductions are related to the electricity exported by the project and the emission co-efficient of the grid system.

Baseline

The baseline emissions are calculated based on the net energy provided to the grid (in GWh/year), and an emission factor for the displaced grid electricity (in tCO2 /GWh). The baseline scenario is electricity delivered to the grid by the project that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.

$$BE_y = EG_y * EF_y$$

where,

EG_y = the net electricity exported to the grid system during the year *y*

EF_y = the emission factor of the grid to which the project exports electricity

Central Electricity Authority (CEA) (which is an official source of Ministry of Power, Government of India) have worked out baseline emission factor for various grids in India and made them publicly available i.e. "**CO_2 Baseline Database**" at

http://www.cea.nic.in/planning/c%20and%20e/Govertment%20of%20India%20website.htm

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

Western Region grid consists of independent state level electricity systems including public sector undertakings that exchange significant power within the region depending on the demand. The overall power flows are managed by the Western Regional Load Despatch Centre. Other regions viz. Southern, Northern, Eastern and North Eastern are connected with the Western Region grid. The power inflows from and outflows to these regions would constitute imports and exports. The Western Region has considerable amount of imports in to the grid. The baseline Emission factor (including Imports) of Western Region published by CEA is considered for calculation of Emission reductions due to displacement of electricity in accordance "Tool to calculate the emission factor for an electricity system" (EB 35, Annex 12, Version 01)

According to the above mentioned tool, grid emission factor is calculated as Combined Margin (CM), comprising the Operating Margin (OM) emission factor and the Build Margin (BM) emission factor. The following procedure was adopted for estimating the grid electricity emission factor:

Step 1 – Calculation of the Operating Margin
Step 2 – Calculation of the Build Margin

Step 3 – Calculation of the grid emission factor (Combined Margin)

Step 1 – Calculation of the Operating Margin

Tool to calculate emission factor for an electricity system (Version 01) EB 35, Annex 12 recommends the use of dispatch data analysis as the first methodological choice. However, in India availability of accurate data on grid system dispatch order for each power plant in the system and the amount of power dispatched from all plants in the system during each hour is practically not possible. Also, still the merit order dispatch system has not become applicable and is not likely to be so during the crediting period. In view of this it is proposed to apply other choices as suggested in the above mentioned tool.. Since the power supplied by low cost must run power plants[22] to the Western Region grid during 2005-06 is clearly below 50%, it was decided to apply the **Simple OM method.**

In the Simple OM method, the emission factor is calculated as generation- weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. The data vintage option selected is the *ex-ante* approach, where a 3 year average OM is calculated. The most recent three year CEA data published on the emission factor of Western Region is considered. The CEA baseline emission factor is derived using the following formulae to calculate simple OM.

$$EF_{grid\,OM,simple,y} = \frac{\sum FC_{i,m,y} \times NCV_{i,y} \times EF_{CO_2 i,y}}{\sum EG_{m,y}} \quad (1)$$

Where:

$EFg_{OM,simple,y}$ is Simple Operating Margin CO_2 emission factor in year y (tCO_2/MWh)

$FC_{i,m,y}$ is the Amount of fossil fuel type *i* consumed by plant/unit m in year y (mass or volume unit)

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

$EG_{m,,y}$ is the Net electricity generated and delivered to the grid by power plant/unit *m* in year *y* (MWh)

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

i is All fossil fuel types combusted in power plant/unit m in year y

y Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

$GEN_{j,y}$ is the generation from power plant *j* in the year in MWh

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

Where:

[22] Defined as Hydro, geothermal, wind, low cost biomass, nuclear and solar generation plants in the Tool to calculate emission factor for an electricity system (Version 01) EB 35, Annex 12. (ref foot note 3 page 4).

$EF_{grid\ OM,simple,y}$ is Simple operating margin CO_2 emission factor in t he year *y*, (tCO_2/MWh)
$EG_{m,,y}$ is Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$FE_{EL,m,y}$ is CO_2 emission factor of power unit m in the year *y*, (tCO_2/MWh)
m is All power units serving the grid in year *y* except low-cost/must-run power units
y is Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

Table B 10 : Operating Margin[23]

Most recent three years	**2004/05**	**2005/06**	**2006/07**
Operating Margin* (OM) in t CO_2 / MWh	1.013	1.004	0.994
Average of 3 years	**1.003 tCO_2/Mwh**		

* including imports

Source: CDM Carbon Dioxide Baseline Data base, Version 3, December 2007 (www.cea.nic.in)

Step 2 – Calculation of the Build Margin

Tool to calculate emission factor for an electricity system (Version 01) EB 35, Annex 12 , offers two options for determination of build margin emission factor: *ex ante* and *ex post* determination of the Build Margin (BM). Option 1 is selected wherein the build margin emission factor is calculated *ex- ante* based on most recent information available on plants already built for sample group *m* in Western Region. This simplifies the monitoring procedures, but also offers a conservative approach of BM calculation. The sample group *m* shall be the one having higher power generation between (a) five power plants that have been built most recently and (b) the capacity additions in the electricity system that comprises 20% of the system generation built most recently. It is found that the option (b) has higher generation compared to option (a). Hence option (b) is selected.

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

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

Build Margin emission factor is determined as below:

[23] CEA published CO2 data base, http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Build Margin (BM)	**0.594**	tCO_2 / MWh

Step 3 – Calculation of the baseline emission factor (Combined Margin)

The baseline emission factor for wind power projects in year *y* is calculated as the sum of 75% weightage of OM and 25% weightage of BM emission factor. As noted above, the resulting Combined Margin is fixed ex ante for the duration of the crediting period:

$$EF_{grid,CM,y} = w_{OM} \bullet EF_{grid,OM,y} + w_{BM} \bullet EF_{grid,BM,y} \quad (4)$$

$\mathbf{EF_{grid,CM,y}}$ = (0.75*1.003) + (0.25*594)
= 0.901 tCO_2/Mwh

Where;
$EF_{grid\ BM,\ ,y}$ is Build margin CO_2 emission factor in t he year *y*, (tCO_2/MWh)
$EF_{grid\ OM,\ ,y}$ is Operating margin CO_2 emission factor in t he year *y*, (tCO_2/MWh)
W_{OM} is Weighting of operating margin emissions factor (75%)
W_{BM} is Weighting of build margin emissions factor (25%)

Combined Margin (CM) Simple average of OM and BM	**0.901**	tCO_2 / MWh

Project emissions

No project emissions are applicable to the present small scale wind power project, since the electricity generation is based on wind resources, which does not involve combustion of fossil fuels or generation of emissions from fossil fuels. Hence, the baseline emissions will be equivalent to the emission reductions in the project activity.

Leakage:

No leakage emissions are considered for the project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity.

Emission Reductions:
Since the project emissions as well as the leakage are zero, the emission reductions are equal to the baseline emissions. These are calculated based on the monitored net amount of electricity supplied to the grid, and the baseline emission factor.

$$ER_y = BE_y - PE_y - L_y \quad (5)$$

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

(Copy this table for each data and parameter)

Data / Parameter:	**EF_y**
Data unit:	t CO_2/MWh
Description:	Combined margin emission factor of Northern Grid
Source of data used:	Central Electricity Authority (CEA), Gov. of India: "CO_2 Baseline Database", Version 3.0, December 2007. Available at www.cea.nic.in.
Value applied:	0.901
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factors in the CO_2 database of CEA are compiled specifically for application by grid-connected CDM projects. The emission factors are consistent with Tool to calculate emission factor for an electricity system (Version 01) EB 35, Annex 12 and AMS I.D Version 13,EB 36
Any comment:	The value applied is the sum of 75% weightage of the three years Operating Margin (OM, adjusted for imports) arithmetic average and the recent 25% Build Margin (BM), data value where: ▪ OM = 1.003 t CO_2/MWh. This is the generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission (according to Tool to calculate emission factor for an electricity system (Version 01) EB 35, Annex 12), being: ▪ Years OM EF FY 2004-05 1.013 t CO_2/MWh FY 2005-06 1.004t CO_2/MWh FY 2006-07 0.994 t CO_2/MWh ▪ BM = 0.594 t CO_2/MWh. This is the build margin for the latest year for which data is available at the time of PDD submission, being 2006-07

B.6.3 Ex-ante calculation of emission reductions:

>>

As per AMS I.D, the baseline emissions are calculated as the net electricity generated by the project activity (Gwh/year), multiplied with the baseline emission factor for the project grid (tCO_2/Gwh).

Baseline emissions

Baseline emissions calculated as explained in section B.6.1 above are summarised as below.

BE_y = 24.178 GWh/annum X 901 tCO_2/GWh

BE_y = 21,784 tCO_2/annum

Project emissions

No project emissions are applicable.

Leakage

No leakage emissions are applicable.

Emission reductions

ER_y = BE_y - PE_y - L_y

ER_y = 21,784 - 0 - 0

ER_y = 21,784 tCO_2/annum ($ER_y = BE_y$)

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

>>

Year	**Estimation of project activity emissions (t CO_2 e)**	**Estimation of baseline emissions (t CO_2 e)**	**Estimation of leakage (t CO_2 e)**	**Estimation of overall emission reductions (tCO_2 e)**
2008-09	0	21,784	0	21,784
2009-10	0	21,784	0	21,784
2010-11	0	21,784	0	21,784
2011-12	0	21,784	0	21,784
2012-13	0	21,784	0	21,784
2013-14	0	21,784	0	21,784
2014-15	0	21,784	0	21,784
2015-16	0	21,784	0	21,784
2016-17	0	21,784	0	21,784
2017-18	0	21,784	0	21,784
Total (tonnes of CO_2 e)	**0**	**217,840**	**0**	**217,840**

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)	
Data / Parameter:	**EG_y**
Data unit:	GWh
Description:	Net power exported to grid (Net saleable energy)
Source of data to be used:	On site measurement
Value of data	24.178(this is estimated value however actual value is considered for emission reduction purpose.)
Description of	For measuring the energy delivered by the project activity, energy meters have

measurement methods and procedures to be applied:	been installed by Ansal API at WTGs and one set of main meter (part of interconnection facilities) and check meter is provided by GETCO (Gujarat Energy Transmission Corporation Limited) at the interconnection point i.e. Suthri sub-station. Monthly joint meter readings of the main meter and check meter at the interconnection point will be taken by the designated officials of the company and GETCO on the synchronisation date of each unit as well as at on the first day of every month.
QA/QC procedures to be applied:	The main meter and check meter will be tested for accuracy at regular intervals before synchronization of the unit and every six months thereafter. The test for the main meter and the check meter will be done with reference to a portable Sub Standard meter, which will be of accuracy class compatible with the class of meter under test and as per the Prudent Utility Practices.
Any comment:	Data will be archived electronically and on paper regularly throughout the crediting period. Also, data will be archived for a minimum of 2 years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

B.7.2 Description of the monitoring plan:

>>

The monitoring plan is developed in accordance with the modalities and procedures for small-scale CDM project activities and is proposed for grid-connected 12 MW wind farm project implemented in Gujarat in India. The monitoring plan, which will be implemented by the project proponent describes about the monitoring organisation, parameters to be monitored, monitoring practices, Quality Assurance (QA), Quality Control (QC) procedures, data storage and archiving.

Project Management

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the Board of Directors. The Board may delegate the same to a competent person identified for the purpose. The identified person will be the in charge of GHG monitoring activities and necessary reports will be submitted to the management or it's Committee for review.

Monitoring Requirements

The monitoring plan includes monitoring of energy parameters such as net energy export to the GUVNL grid system. Emission reductions resulted from the project activity will be calculated based on the net energy export to the grid system in accordance with the calculations illustrated in Section B.6.3 of the PDD. Emission reductions generated by the project shall be monitored at regular intervals. The crediting period chosen for the project activity is 10 years.

Monitoring equipment comprises of energy meters, which will monitor the energy fed by the plant to GUVNL grid system by the project. Ansal API have installed energy meters at each WTGs and GETCO has provided one set of main meter and check meter at Suthri substation Project proponent will calibrate the meters at WTGs according to the procedures laid down by PPA once in six months. Project proponent will appoint a Designated Operational Entity (DOE) for verification of emission reductions resulted by the project activity at regular intervals.

Methodology adopted for determining baseline emission factor is the Combined Margin (including imports) of the generating mix in the Western Region grid system, which will represent the intensity of carbon emissions of the grid system. The baseline emission factor is fixed ex-ante for all the years of the crediting period using the official data published by the Central Electricity Authority for the Western Region grid for the year 2006-07 and therefore is not included in the monitoring procedures.

QA & QC Procedures

The project shall employ latest state of art microprocessor based high accuracy monitoring and control equipment that will measure, record, report, monitor and control of various key parameters of the project. These monitoring and controls will be the part of the Control Systems of 12 MW wind farm. Necessary standby meters or check meters as required would be installed, to operate in standby mode or when the main meters are not working. All meters will be calibrated and sealed as per industry practices at regular intervals. Records of calibration certificates will be maintained for verification. Hence, high quality is ensured with the above parameters. Sales records will be used and kept for checking the consistency of the recorded data.

Data Recording and Storage

For measuring the delivery/import of energy by the project at the interconnection point, one set of Main meter and Check Meter shall be provided by GETCO at the interconnection point. Representatives of both the project proponent and GETCO will sign the document which will contain all details such as the equipment data, calibration status, previous reading, current reading, net billable units, date and time of recording etc. This document will be used as a basic document for monitoring and verification of the net energy exported to the grid. GUVNL will pay to project proponents based on this document.

The above document will be kept at safe storage for verification of emission reductions generated from the project activity. Supporting documents such as receipts of payments released by GUVNL will also be kept in safe storage for later verification by an independent third party. The period of storage will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

Kindly refer Annex 4 for details regarding monitoring plan.

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

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Date of completion of the application of the baseline and monitoring methodology:

Mr. Tikam Das Teckchandani,
Sr. Vice President (Engineering)
Ansal Properties & Infrastructure Limited,
Ansal Bhawan, 16, Kasturba Gandhi Marg,
New Delhi – 110 001
Telephone: 011-23353550,66302269
Fax: 011-23322009.

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:

>>
13/07/2007 (Sourced from Intent for occupation of land on lease basis for 12 MW Wind farm)

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:

>>
NA

C.2.1.2. Length of the first crediting period:

>>
NA

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
1/09/2008 or Date of registration of project activity whichever is later

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

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D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

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The Ministry of Environment & Forest (MoEF), Government of India, vide Notification No. SO. 1533 dated 14th September, 2006[24] requires EIA clearance of the Project activities listed in Schedule. Wind power project activity is not listed in the schedule.

[24] http://envfor.nic.in/legis/eia/so1533.doc

12 MW Wind farm project activity utilizes renewable energy source wind, and it does not likely to cause any negative impact on environment. Therefore the present project activity does not require EIA.

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:

>>

No significant environmental impacts considered due to implementation of project activity by the host party, hence, no references or procedures specified here.

SECTION E. Stakeholders' comments

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

>>

No specific public consultation / participation requirements are specified in Indian statutes for setting up of small-scale industries. However, there are certain procedural requirements, which every project investor needs to follow before implementing any project.

Before implementing any project, project investors / developers need to identify the stakeholders, prepare necessary documents, approach the identified stakeholders directly and obtain required clearances / approvals. The stakeholders after review of documents and investment profile, will accord approvals / licences or send comments in writing to project investors for further clarifications / corrections. In case they are not satisfied with the project design or they feel that the project impacts any of the local environment / social / economical environments, they will not issue clearances / approvals and stop the implementation of the project.

Stakeholder Name	Function of Stakeholder	Description of Involvement
Gujarat Energy Development Agency (GEDA)	A state nodal agency and policy implementation body in respect of renewable energy projects in Gujarat. GEDA reviews the project documentation and accords clearance for utilizing renewable energy sources in the state.	Issues clearance for setting up the project in Gujarat utilizing wind potential available at the site
Gujarat Urja Vikas Nigam Limited (GUVNL)	The state owned electricity utility company that manages the electricity generation and distribution in Gujarat State. Any electricity generation project proposed in Gujarat shall approach GUVNL for power evacuation arrangements. Both GUVNL and the project proponent shall sign a Power Purchase Agreement, before implementing the project.	Accords techno-economic clearance to the project, purchases power from the project by executing Power Purchase Agreement to determine the tariff and other terms.
Local Village	Elected statutory body of the local populace	Project case will be explained to

Panchayat		local populace and village representative to make them aware of project activity and its outcome. Local Village Panchayat also gives their opinion on project

All stakeholders were intimated about the meeting through invitation letters sent to the Lathedi and Suthri Gram Panchayat and also concerned officials of GUVNL. Following this, a meeting was conducted to make the local community aware of the project activity. Suzlon Representative welcomed all the stakeholders. He explained the stakeholders that the Ansal API was undertaking a wind power project of 12 MW capacity at Lathedi and Suthri Village, and would provide pollution free energy. The meeting discussed about the project, impact on the local community and the environment. The villagers were also informed that they could avail employment opportunities during its operation and maintenance. The local community was in appreciation of the efforts taken by M/s Ansal API and was in full support of the Project.

Govt. Approvals

1) Permission to set up 12 MW wind farm power project from GUVNL vide
Letter No: GEDA/PWF/SGWPL-AP & IL/Abdasa/2007-08/2763 & 2800 Dt.20/9/2007 & 24/9/2007.

2) Commissioning Certificate issued by GEDA for 12 MW (1.5 MWx6) & (1.5 MW x2)Wind farm :
Ref No: GEDA/PWF/SGWPL-AP & IL/Abdasa/2007-08/3358 Dated 19/10/2007 for 3 MW (1.5 MWx2)
Ref No: GEDA/PWF/SGWPL-AP&IL/Abdasa/2007-08/3393 Dated 19/10/2007 for 9 MW (1.5 MWx6)

3. Executed Power Purchase Agreement with Gujarat Urja Vikas Nigam Limited (GUVNL) on 4/12/2007 for 12 MW wind farm power project.

4.NOC from Gram panchayat duly signed by representatives participated in Stake holder Consultation-Attached

E.2. Summary of the comments received:

>>
No comments are received on the project.

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

>>
No comments are received hence no specific action required.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Ansal Properties & Infrastructure Limited
Street/P.O.Box:	Kasturba Gandhi Marg
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FAX:	011-23322009
E-Mail:	
URL:	www.ansalapi.com
Represented by:	
Title:	Sr. Vice President (Engineering)
Salutation:	Mr.
Last Name:	Teckchandani
Middle Name:	Das
First Name:	Tikam
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from the parties included in Annex -I is involved in the project activity

Annex 3

BASELINE INFORMATION

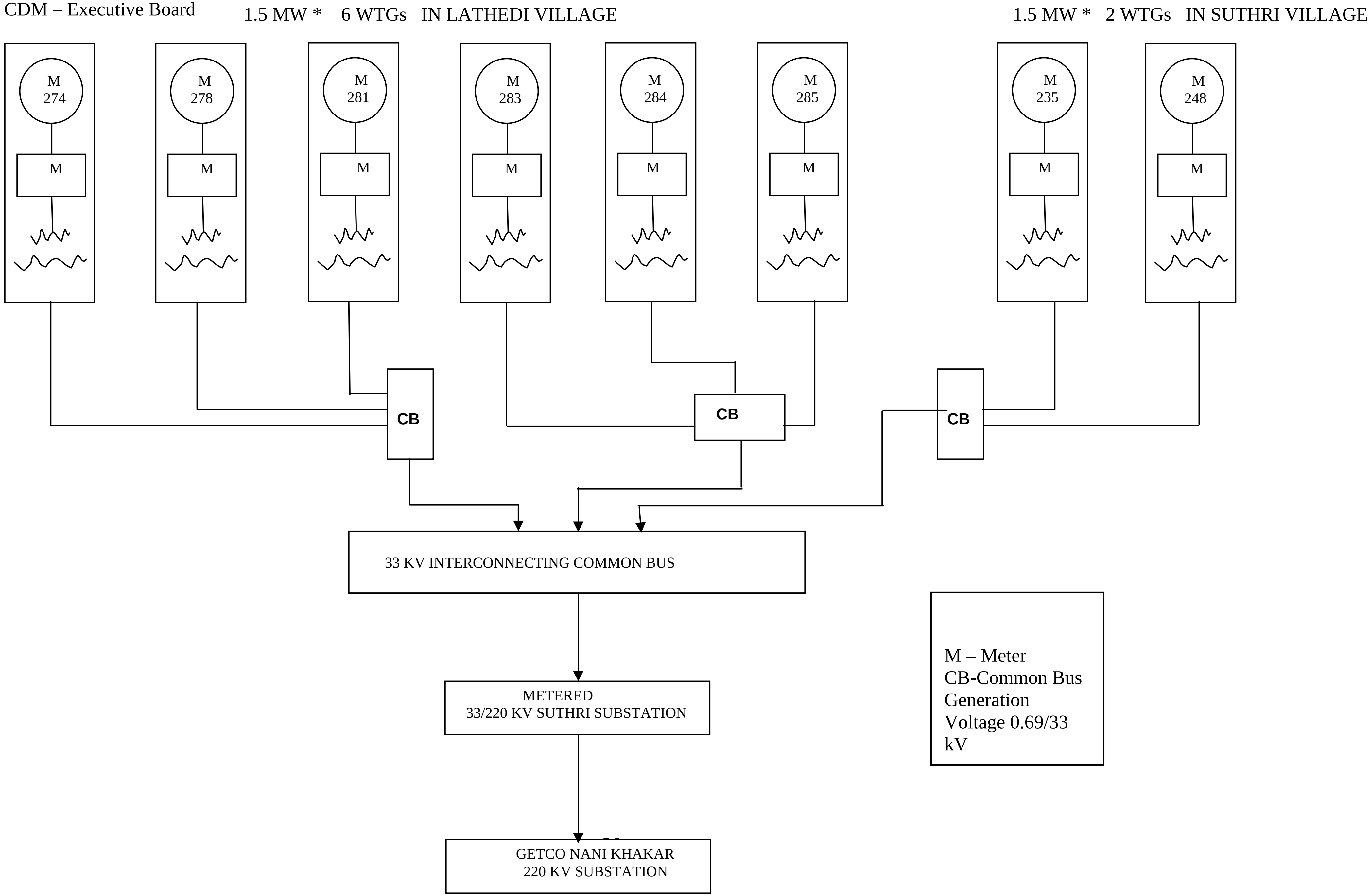
This project uses grid emission factor calculations officially published by the Central Electricity Authority (CEA) of India, following the approaches and rules defined in Tool to calculate emission factor for an electricity system (Version 01) EB 35, Annex 12 . For details and further information on data please see CEA CO_2 data base from the following web link: http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

➔ "CDM Carbon Dioxide Baseline Database, Version 3 (15 December 2007)"

Annex 4

MONITORING INFORMATION

Each 1.5 MW WTG is metered and monitored separately and also at interconnection point at Lathedi and Suthri villages. Power exported from 12 MW wind farm to GUVNL substation is monitored at Suthri sub-station and transmitted to GETCO 33/220 kV substation at Nani Khakar which is 80 kms away from project site. Figure below presents the schematic diagram of metering of WTGs.


1.5 MW * 6 WTGs IN LATHEDI VILLAGE
1.5 MW * 2 WTGs IN SUTHRI VILLAGE
M 274
M 278
M 281
M 283
M 284
M 285
M 235
M 248
M
CB
33 KV INTERCONNECTING COMMON BUS
METERED
33/220 KV SUTHRI SUBSTATION
GETCO NANI KHAKAR
220 KV SUBSTATION
M – Meter
CB-Common Bus
Generation Voltage 0.69/33 kV