CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

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>.

SECTION A. General description of the small-scale project activity

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

"8.75 MW Wind Power Project in Gujarat"
Version: 1.1
07/12/2006

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

This is a wind energy project of capacity 8.75 MW comprising 7 Wind Turbine Generators (WTG's) of 1.25MW each. The WTG's are located at sites Bhogat, Lamba and Mandvi. The project activity is executed in a phased manner during March 2003 to March 2005. Since project promoter do not have any experience in wind power generation and also finding good wind farm sites in any one year is very difficult, thereby Investments were done in phased manner. Moreover wind power projects entail higher capital cost/MW capacity as compared to other options and also have lower PLF thus leading to much higher cost/unit power generation. Thus arranging finance for 8.75 MW was difficult to arrange at any given point in time. The project conceptualizes wheeling of electricity, produced at wind energy farms, using state grid to the investing company for its internal use.

Rolex Rings Private Limited, referred to as RRPL hereafter, has business interests in the area of auto-component manufacturing. RRPL generates electrical power using wind energy at their wind farms in Gujarat. Power is wheeled to the forging and component manufacturing plant at Rajkot, Gujarat. Gujarat State Electricity Board grid (part of Western Regional (WR) grid in India) network is used for transmission of power to RRPL plant.

As a responsible and conscious business house, the group has chalked out a strategy to contribute towards sustainable development by investing in renewable energy sources. Wind Energy projects are environmentally positive, there is no emission of Green house gases, and are completely automated in operations. The project reduces greenhouse gas (GHG) emission by reducing use of electricity generated in the Western Grid of India, which predominantly uses fossil fuels and has grid emission of ~ 0.843 T of CO_2/MWh of electricity produced. These wind mills are thus effectively saving 0.843 T of CO_2/MWh of electricity generated.

The project qualifies as a Small Scale CDM project activity (Renewable energy project activity with a capacity < 15 MW).

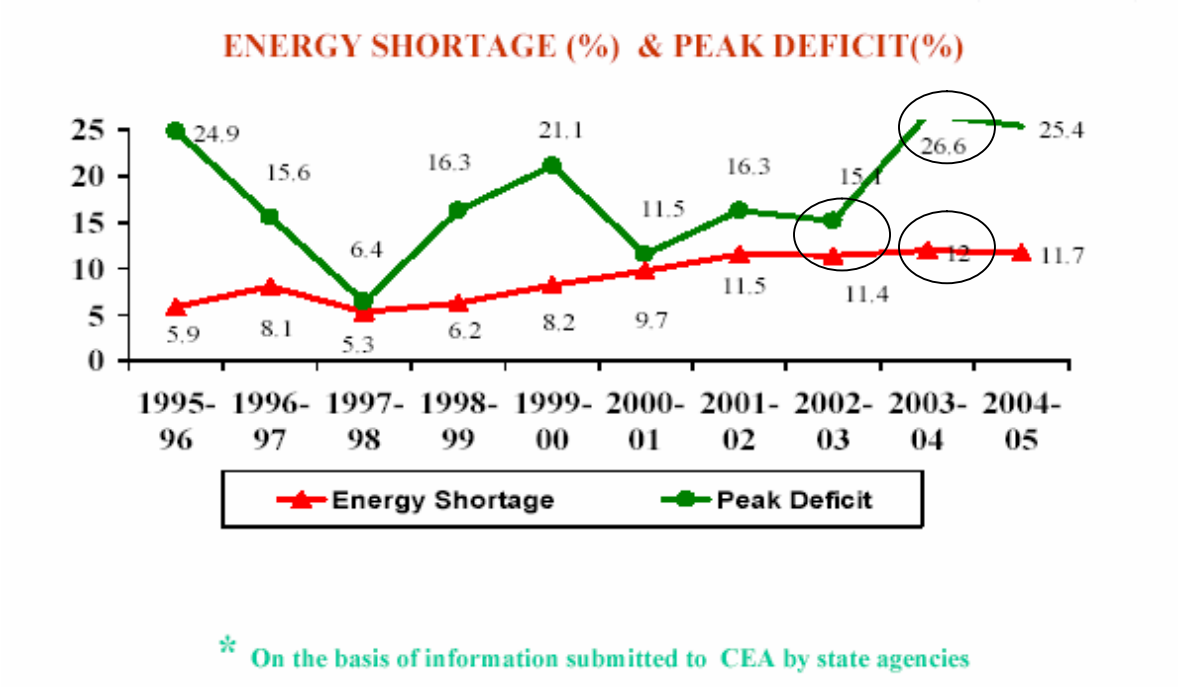
Sustainable Development:
Proposed CDM project activity has following sustainable development aspects:

Social well being:

Gujarat is facing a power shortage of 11~12% (15~26% peak power shortage) [1]as can be seen from graph below. Power generation using wind-energy shall help meet power shortage in the state. It is also

[1] Ministry of Power-India (Indian Electricity Scenario, Western Region)

contributing towards Government of India's plan of meeting 10% of total power demand in the country using renewable energy sources.



Power Sector Profile for Gujarat as on 31.03.2005

Economic well being:
The project implementation has provided a fillip to economic activity in the region. Direct & Indirect Employment has been generated in the plant for the project implementation & management. The success of this project will encourage more business houses to invest in Wind Power projects to attain self reliance in terms of energy requirements. This further helps policy makers to divert the funds, to be originally used for power sector reforms, for improvement of other sectors.

Environmental well being:
The wind energy based electricity generation leads to less fossil-fuel burning in the system and thus less GHG emissions in the atmosphere.

Use of renewable energy source (wind energy) also helps in conservation of natural resources (like coal), thereby contributing to energy security of the country.

Technological well being:
The technology used in the power plant is well proven and safe. Increased interest in Wind energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host	Private and/or public entity(ies) project participants (*) (as	Kindly indicate if the Party involved wishes to be considered

Party)	applicable)	as project participant (Yes/No)
Government of India (Host Party)	Rolex Rings Private Limited (RRPL)	No

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

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

A.4.1.1. Host Party(ies):

India

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

The proposed project sites are located in the State of Gujarat.

A.4.1.3. City/Town/Community etc:

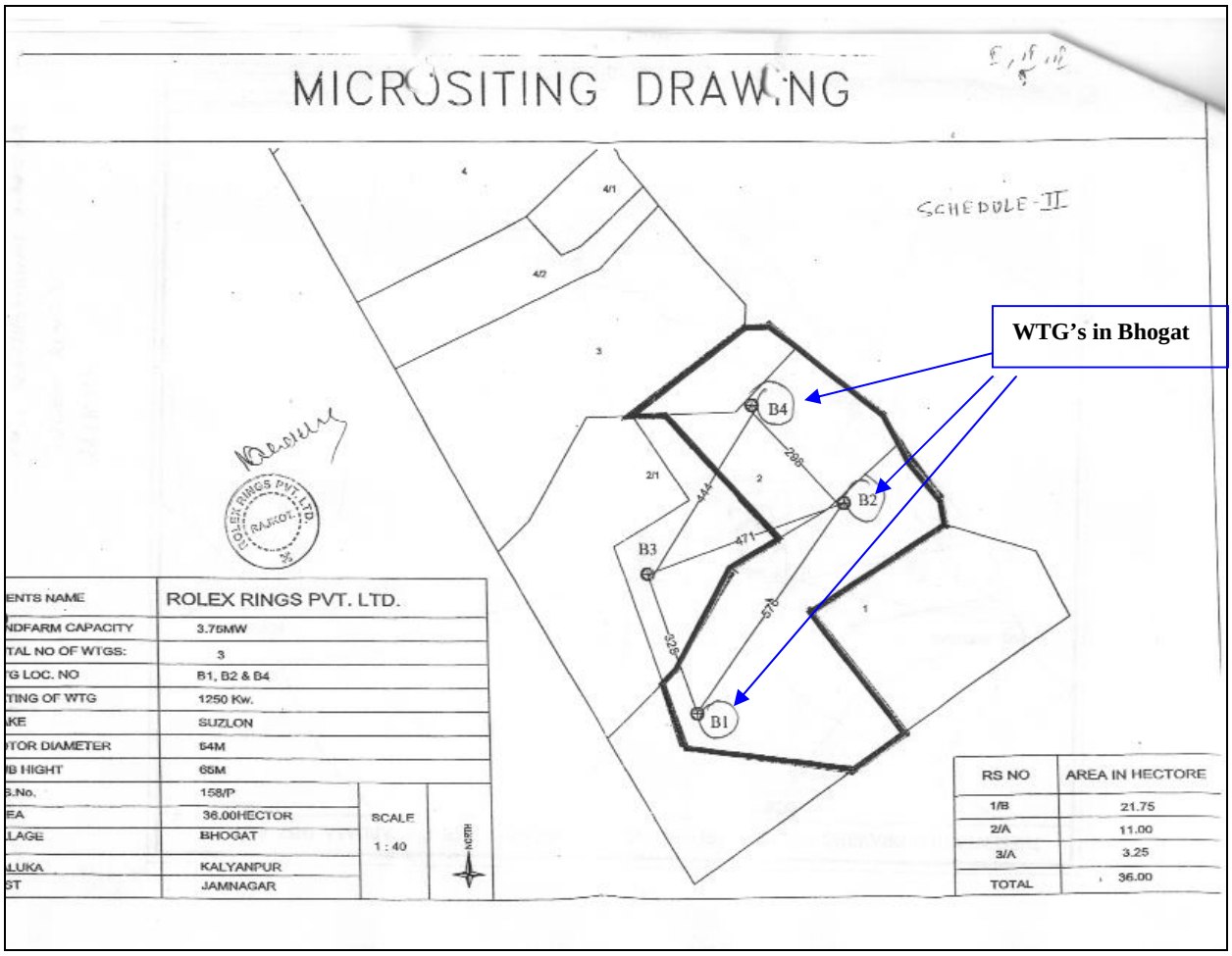
Capacity	Unique Id	Location	Commissioning Date
1.25MW	B1	Bhogat	27-03-03
1.25MW	B2	Bhogat	29-07-03
1.25MW	B4	Bhogat	29-07-03
1.25MW	W06	Lamba	01-06-05
1.25MW	V09	Vanku	29-04-06
1.25MW	V10	Vanku	18-04-06
1.25MW	V18	Vanku	29-04-06

A.4.1.4. Detail of physical location, including information allowing the unique identification of this small-scale project activity(ies):

Site location	District	Latitude/Longitude
Bhogat	Jamnagar	70.07 E 22.27 N
Lamba	Jamnagar	70.07 E 22.27 N
Vanku	Kutch	68.32 E 22.51 N

Micro-site drawings for the same are as below:

BHOGAT Site:

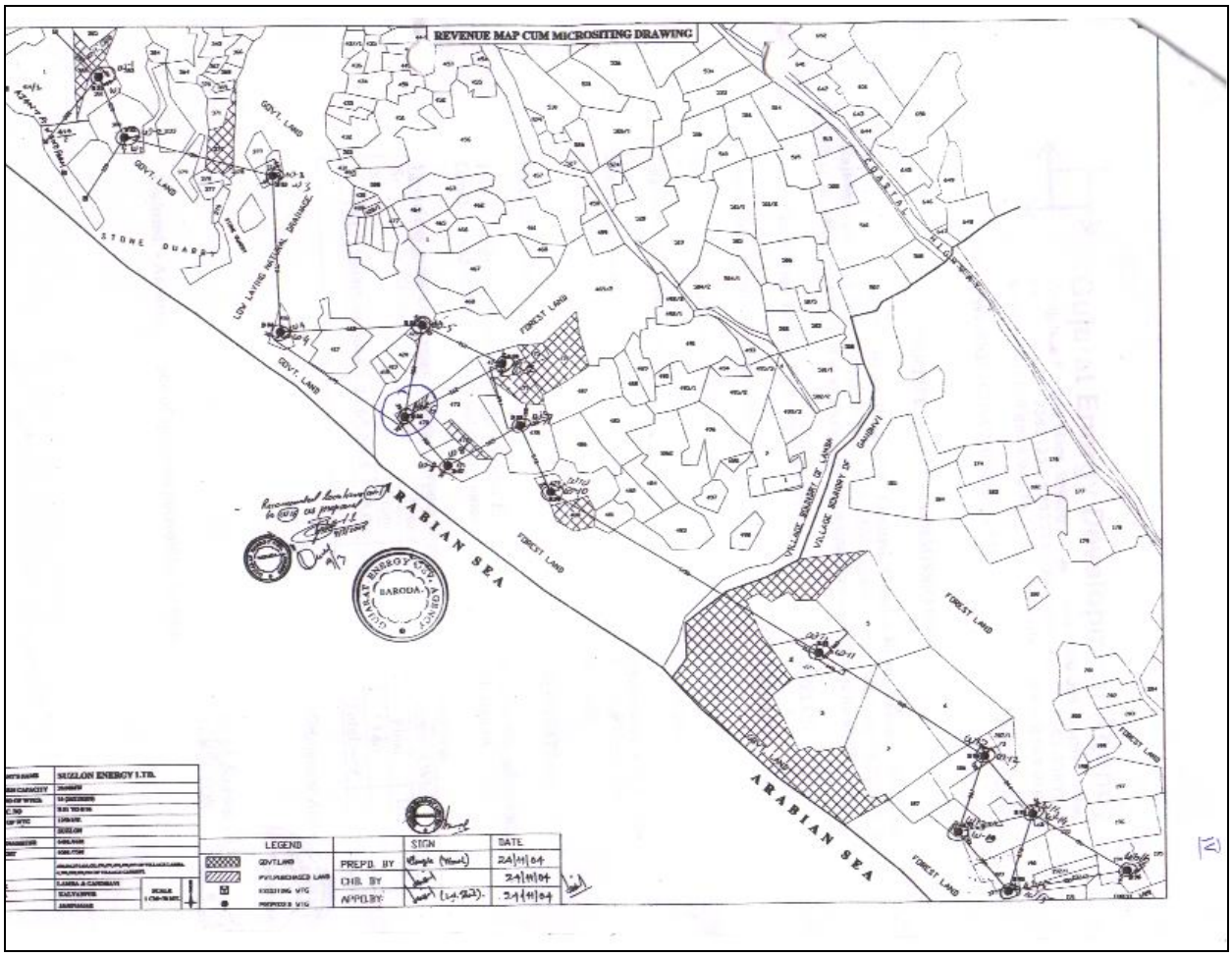


3 WTGs on this site

Nomenclature:

B1, B2, B4.

LAMBA Site:

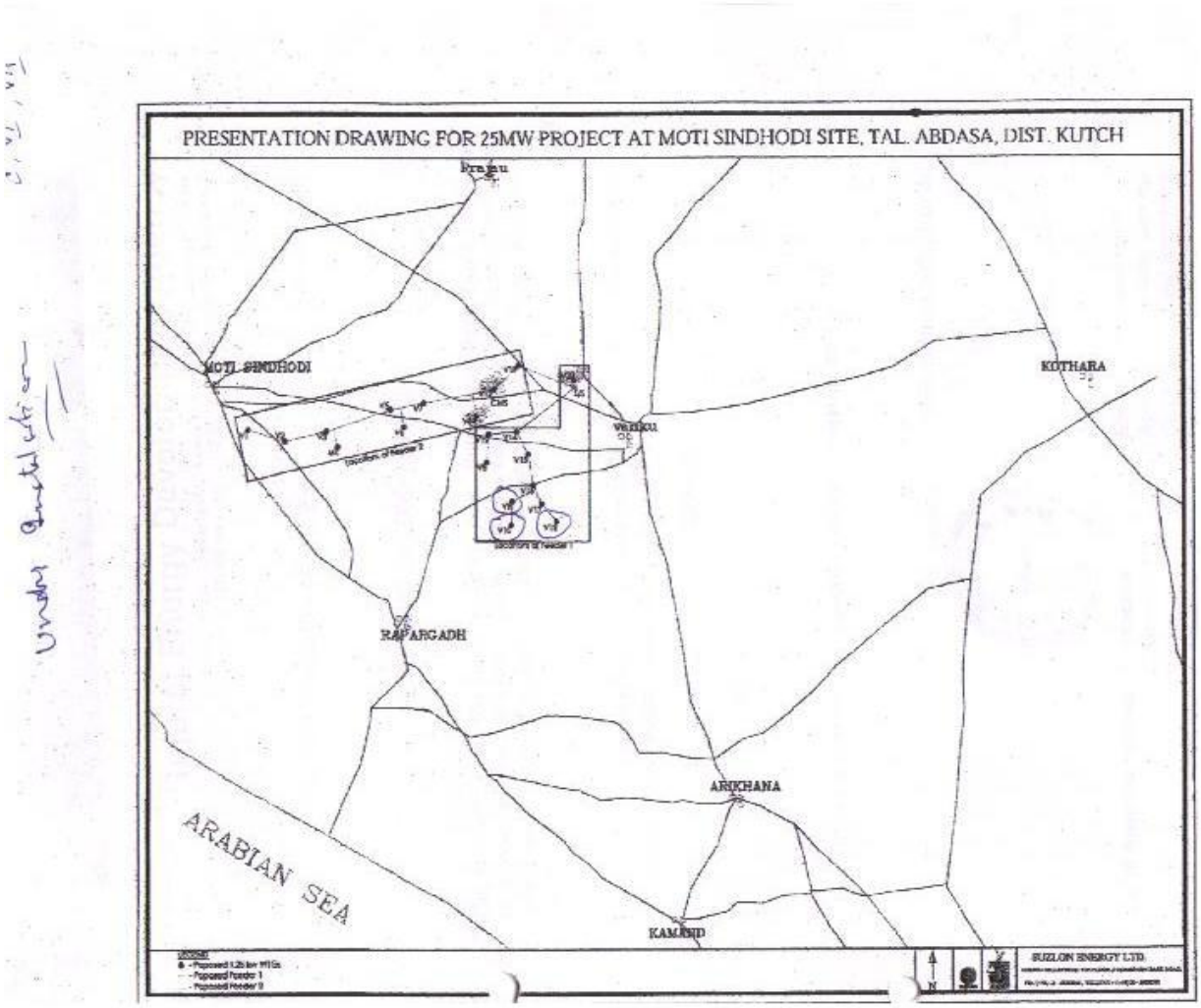


Nomenclature:

Total 1 WTG

B-86 (Suzlon)
W06 (GEDA)

Vanku Site:



3 WTGs on this site:
V09, V10, V18

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

Project Type: I–Renewable Energy Projects

Project Category: I.D. **'Grid connected renewable electricity generation'** version 9/ Scope 1, 28 July 2006

The project is a Renewable Energy project with maximum output capacity of 8.75 MW (<15 MW) this comes under the Appendix B of the simplified modalities & procedures for small-scale CDM-project activities. No transfers of technology from annex-1 countries take place.

A brief description of technology of WTGs is enclosed as Annex-3

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

Power supply to WR grid is primarily dependent on fossil based power plants, which contributes ~ 78% of the total power generation. Other main sources of power are nuclear & hydro power plants. Wind & other renewable energy based projects contribute only a fraction (<2.6%)[2] to the total power generated. In the absence of the proposed project activity the usual course would be to use electricity supplied by grid or consider alternative captive power generation.

Since the project activity uses wind energy for power generation there would be no direct as well as indirect on/off site emissions resulting from project activity. Considering all the impact parameters like grid evacuation, grid availability, wind availability etc. the project activity is expected to generate approximately 2.8 GWh per WTG per year (promised by wind farm developer), the value is taken to be 2.6 GWh after considering line losses and grid availability.

The core business activity of the project promoter is to manufacture auto component to automobile industry. RRPL have forging and component manufacturing unit at Rajkot. The power produced and supplied to state grid at Wind turbine sites is used at Rajkot plant for meeting the power requirements of manufacturing process. The idea behind installing wind mills is to become self reliant in power generation and also to help in creation of cleaner environment to live in through use of renewable energy.

The project proponents have a policy towards environmentally positive technologies, and power generated using wind energy does not emit any greenhouse gases. But wind power investment is not a financially attractive option in itself. However taking into account the economic value of CERs from the project activity, proponents could decide to go ahead with the project. The project will reduce anthropogenic GHG emissions by replacing fossil-fuel based electricity generation i.e. Grid Power.

Total anticipated reductions in tonnes of CO2 equivalent: 153,426 **tCO2e** (for 10 years fixed crediting period)

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

[2] Ministry of Power-India 2005 (Indian Electricity Scenario, Western Region)

Emission Reduction Estimation	
Year	**Annual Estimation of emission reduction in tonnes of CO2e**
Jan 07 - Jan 08*	15342
Jan 08 - Jan 09*	15342
Jan 09 - Jan 10*	15342
Jan 10 - Jan 11*	15342
Jan 11 - Jan 12*	15342
Jan 12 - Jan 13*	15342
Jan 13 - Jan 14*	15342
Jan 14 - Jan 15*	15342
Jan 15 - Jan 16*	15342
Jan 16 - Jan 17*	15342
Total estimated reductions (tonnes of CO2e)	153426[3]
Total number of crediting years	10 years (fixed crediting period)
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	15342

*** 15th Jan to 14th Jan in the following year**

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

No Public Funding for the project activity.

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

There is no registered small-scale CDM project activity or a request for registration for another small-scale project activity:

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

It therefore satisfies all conditions listed in "Appendix C" of the simplified M&P for the small-scale CDM project activities for guidance on how to determine whether the proposed project activity is not a de-bundled component of a larger project activity"

[3] Estimated based on CGM for year 2004-05, actual shall be done on after calculating CGM of year in which generation occurs.

SECTION B. Application of a baseline methodology:

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

Methodology: AMS I.D. '*Grid connected renewable electricity generation'*, Version 09, 28 July 2006/Scope 1

Reference: Appendix B of the simplified modalities & procedures for small-scale CDM-project activities

B.2. Project category applicable to the small-scale project activity:

The Project is generating renewable electricity which is replacing the electricity purchased from fossil fuel dominated grid. Additionally this is a small-scale project (capacity < 15 MW). Hence it qualifies for category I D. The project conceptualizes wheeling of electricity, produced at wind energy farms, using state grid to the investing company for its internal use. A wheeling agreement is duly signed between state agencies and RRPL to facilitate the wheeling of power.

Baseline Scenario

Project Category: *I.D. (Version 9) 28 July, 2006 Grid connected renewable electricity generation*
Reference: Appendix B of the simplified M&P for small scale CDM project activities;

The applicable baseline, as per appendix B of the simplified modalities and procedures for small scale CDM project activities, is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2 eq/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 approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen.

OR

(b) The weighted average emissions (in kg CO2equ/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Option (b) which is an ex-post approach has been used to calculate the emission reductions[4].

Data used: for the years 2004-05, as a sample calculation.

Following information is required for baseline estimation.

[4] Changes were made in accordance to version 9 of AMS I D, which allows only ex-post approach for CGM.

Parameter	Source	Remarks
Gross Power generation from power plants in Western Grid	WREB data for 2004-05	For estimation of Current Generation Mix
Auxiliary Power Consumption in power generation in western Grid	WREB data for 2004-05	For estimation of Current Generation Mix
Design Heat Rate for Coal based power plants	Performance Review of Thermal Power stations 2004-05 ; Central Electricity Authority (CEA) data;	For estimation of fuel consumption in power generation
Design Heat Rate for Gas based power plants	Central Electricity Regulatory Commission (CERC) petition	For estimation of fuel consumption in power generation
NCV - Coal	IPCC default value	For estimation of fuel consumption in power generation
NCV – Gas	IPCC default value	For estimation of fuel consumption in power generation
Emission Factor – Coal	IPCC default value	For estimation of emissions in power generation
Emission Factor – Gas	IPCC default value	For estimation of emissions in power generation

B.3. 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:

Proposed project activity is eligible to use simplified methodologies as

1. It's a small scale project with a generation capacity of 8.75MW (<15 MW, according to Paragraph 6 (c) of decision 17 CP.7)
2. It confirms to project category in "Appendix B of the simplified modalities & procedures for small scale CDM-project activities under TYPE ID – *Grid Connected renewable electricity generation*"
3. It is not a de-bundled component of a larger project activity, as it qualifies guidelines in "Appendix C of the simplified M&P for the small-scale CDM project activities for guidance on how to determine whether the proposed project activity is not a de-bundled component of a larger project activity.

Project Additionality Analysis:

Additionality of the project activity is analysed in the following section as per barriers outlined in attachment A of Appendix B.

Barrier Analysis

A: Investment Barriers

The power situation in India is particularly grim due to reliance on financially weak State Electricity Boards. The situation is particularly acute in Gujarat state. According to a study done by a premier institute[5], captive power generation in 2002 amounted to 20% of total electricity produced in Gujarat, a response to the poor quality supply from GEB. In the year 2003, RRPL decided to go ahead with

[5] Captive Power Plants: Case study of Gujarat, India.

implementation of wind turbine generators to meet power demand in its forged component manufacturing units- a highly energy intensive process.

To have self reliance on electricity, RRPL went ahead with analyzing different alternative captive power options. It could have either continued to use grid supplied electricity at high tariff or set up a captive unit based on coal or diesel. There was also an option going for WTG's considering CDM benefits to achieve financial closure.

Comparison of Levelized Cost of Power Generation using Different Fuel Options:

The project proponent identified the following options as the source of power to meet its electrical energy requirement –

Alt-1: Thermal power plant based on imported coal as fuel.
Alt-2: Captive Power generation from fuel oil, LDO etc.
Alt-3: Energy generation using renewable source of wind power.

Coal based power generation is a preferred option for the project proponent for the reasons –
It is the most economical option for generating electrical power. Technology is available in the country, which are the latest and the most efficient one from these systems. The load factor is a certainty with these power plants and is the highest. Coal based captive power generation is preferred option in state of Gujarat. A list of various projects (captive as well as IPPs) based on coal as fuel has been provided.

Same holds true for the fuel oil based captive power generation on availability and technology. The same is clearly demonstrated by table on page-16 of this document, show casing the penetration of different captive power options in Gujarat state.

Alternatively RRPL could also invest into wind energy and wheel the power to its production unit in Rajkot. Although this wasn't the best possible option to meet power requirements, however after considering CDM benefits, a decision to invest in wind energy was taken. Wind energy is clean energy as there is no GHG emission from it and this makes it an option for the project proponent.

The financial analysis shows that the wind energy requires > 2.1 times the investment required for DG sets and 4 times the investment required for a coal plant for producing same amount of power. The high investment cost is a big deterrent for investors, especially in a capital starved country such as India. Also wind energy costs **~1.96** times the cost of Coal based power (the option with least cost of generation).

SN	Source	Power Generation cost / kWh
Alt-1	**Coal**	**Rs 2.4 / kWh**
Alt-2	**Fuel Oil**	**Rs 3.2 / kWh**
Alt-3	**Wind Energy**	**Rs 4.7 / kWh**

Assumptions for calculating levelized cost of power generation:

	Coal	FO / diesel	Wind	Remarks
PLF	90%	95%	23%	Taken on a higher side for conservative estimate.
Fuel Cost (Rs./T)	2200	11500	0	TERI report
Fuel Requirement kg per KWh	0.6	0.22	0	For coal most efficient CEA norms are used.
Operation and Maintenance Cost (Rs./KWh)	0.08	0.13	0.55	From project details for Wind, others CEA norms of 3%
Pre tax cost of Capital	12.2%	12.2%	12.2%	Weighted average cost of capital

Thus wind energy is not the most attractive option for meeting the power requirements of the Project Participants. The cost analysis of various fuel options is also comparable and in line with the published data by various independent agencies.

Fuel	Generation Cost	Source of Information
Coal	Rs. 2.15-2.52	Report of the expert committee on fuels for Power Generation, CEA Feb 2004[6]
	Rs. 1.78-1.92	Captive Power Plants: Case Study of Gujarat. Working Paper March 2004
FO	Rs. 3.50-3.75	Captive Power Plants: Case Study of Gujarat. Working Paper March 2004
Wind	Rs. ~ 5.8	Comparison of distributed Generation options for India, Study by IITD professor, presentation

[6] Report provided to DOE

		during CIEC seminar. Whither Nuclear Power? A paper published in Economic & Political Weekly 2006

In terms of returns associated, Wind Energy Projects in Gujarat achieve low PLF (in comparison to Tamilnadu, Karnataka)[7] and thereby low financial returns and consequently low IRR values. In this case IRR is compared against WACC calculated using CAPM. Expected return using this model is approximately 12%. IRR in this case comes to be about ~10.6%[8], which is quite low as compared to expected returns. The IRR has been calculated by independent financial consultant (Chartered Accountancy firm) based on data and facts provided by RRPL relating to machinery details, cost, generation of units, tariff and government policies etc. Key assumptions for calculation of IRR:

Capital cost	Rs. 531.8 lac/WTG
Debt to Equity ratio	3:1
Interest Rate	9.50 %
Unit Generation (promised by Suzlon)	26 lac units/annum per WTG
Units guaranteed by manufacturer per annum	26 lac/WTG
Depreciation benefit	80 %
Income tax benefit	10 years
Debt Repayment period	10 years

B: Regulatory Risks:

The state of Gujarat has witnessed a growth in wind turbine installations till the year 1998. The Wind Power sector witnessed nil installation over next four years up to December 2002. The WTGs installed by RRPL were among the first few installed after a slump in investments in the Wind power sector in Gujarat.

Wind Installations in Gujarat over the years:

[7] Units guaranteed by Wind farm developers in these states (provided to DOE)

[8] IRR calculation has been verified by independent Financial Consultant, and provided to DOE. IRR earlier calculated was 10.2%, this time a more conservative approach was used.

Years	Till '92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	01-02	02-03
Installations (MW)	14.5	1.6	10.6	37.7	51.2	31.1	20.1	0.0	0.0	0.0	0.0

As clearly seen the Wind energy installations came to stand still after year 1998 till 2002-03[9]. The slump in investments was attributed to poor state policy as shown below-

Year	Policy	Remarks
Jan1993 - Sep2001	• Tariff rate of Rs.1.75/KWH • Banking for 6 months as compared to other states with banking option of 12 months. • No third party sales option available. (#).	Policy attracted investments till 1998, but there after failed to attract investors due to stagnant policy.
Oct2001 - Jun2002	• Tariff rate of Rs.2.25/KWH • Wheeling charges doubled from 2% to 4%. ($)	The policy failed to attract investments and was changed within 9 months of implementation.
Jun2002-till date	• Tariff of Rs.2.60/KWH • Banking period again reduced to 6 months. (*)	A marginal growth of 6.2 MW in 2002-03 and 28.9 MW in 2003-04 was observed after this policy.

Sources:
(#): Page no. 10 of Report by TERI on Wind power Economics
($): Page no. 17 of Petition no. 27/2000, 57/2001, 58/2001, 74/2002 & 75/2002
(*): Gujarat wind Policy, (Source: GEDA).

This table shows the irregular and non-conducive nature of government policy. The banking period is only six months in comparison to twelve months in states of Maharashtra, Tamilnadu and Karnataka. The tariff in state is among lowest in country. Any change in the near future will have effect on the returns expected by project proponent and thereby added to the apprehensions. Similar policy planning affects have been observed in other states[10].

C: Other Barrier:

Among all energy sources available wind energy is never considered as base-load option. It is mainly due to the fact that wind power is infirm and is dependent on a number of factors which are beyond the control of power producer such as availability of wind, wind velocity and wind direction. The Wind turbines were installed in Gujarat after a gap of four years; this was the first time megawatt class wind

[9] Data only till 31/12/2002. First WTG was installed in March 2003 after a gap of 4 years. Source: MNES.

[10] Wind Power: Experiences and future directions Page-19.

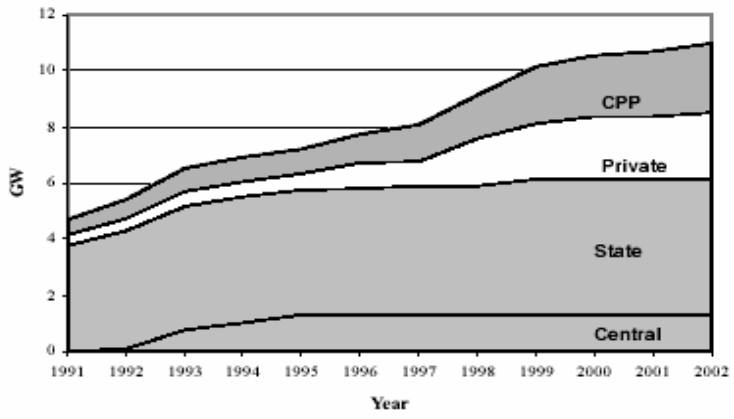
Use of wind energy in India: Lessons learned Page. 25, Published in 2001 at the time of project conceptualization.

mill was installed in state[11]. All the wind mills installed in year 2002-03 in the wind farm sites of area have gone ahead for CDM registration[12]. Since this was first time megawatt class WTG was installed in state the project proponent had apprehended technical issues relating to new technology. The main technological barrier apprehended were non-compliance of local components and foreign parts which in a way weakens the reliability of entire system. Since most of wind farms are located in far flung areas, failures due to lightning and control system damages are often marred by lengthy repair time and off-line periods.

D: Common Practice Analysis

When we observe Power sector growth pattern in Gujarat we notice a substantial progressive growth of captive power plants.

Figure 3: Installed Capacity- Gujarat



Source: Gujarat Electricity Board, 2002
Commissioner of Electricity, Gandhinagar, Gujarat, 2002

As seen, and explained in Investment barriers, RRPL could have opted for Coal, HSD or Gas based captive plant. This is common practice for Captive power Plants in Gujarat as illustrated by table below.

[11] Supporting documents provided to DOE.

[12] PDD for bundled wind project in Gujarat, UNFCCC website

Table3: CPPs Gujarat- Plant Sizes

Fuel	Number		Plant Size (MW)			Unit Size (MW)		
	Plants	Units	Min	Max	Average	Min	Max	Average
Lignite	9	24	2.5	22	11.47	0.86	16.8	4.30
Coal	12	27	1.5	115	18.67	1.25	30	8.30
Fuel Oil (FO)	41	76	0.8	52.6	6.63	0.2	19.2	3.58
Light Diesel Oil	15	33	0.6	6.16	1.71	0.40	2	0.78
High Speed Diesel (HSD)	10	24	0.6	10.92	4.34	0.26	4	1.81
Naptha	14	39	4	240	65.97	2.10	41	23.68
Natural Gas	35	62	0.088	114.5	14.73	0.088	34	8.32
Bagasse	22	44	1.5	8.2	4.21	0.85	3	2.11
Others	5	9	0.85	84	48.18	0.85	50	26.77
Total	**163**	**338**			**14.98**			**7.22**

Source: Gujarat Electricity Board, 2002
Commissioner of Electricity, Gandhinagar, Gujarat, 2002

So far, of 45000 MW of wind potential of India, only 5% potential has been utilized (1870 MW), out of which only 173 MW is installed in Gujarat. Thus investing in wind energy is not a common practice in the state, though many Industrial setups have started WTG's after 2003-04 with CDM based revenue back up.

RRPL decided to go for wind based power generation, which is not a business as usual scenario. This is further strengthened by the fact that wind sector saw new investments after a gap of four years. The project activity is additional to the baseline scenario as it reduces emissions below baseline level and faces above mentioned barriers which prohibit its implementation.

Impact of CDM Registration

Project IRR after CDM benefits would improve to 13.61%. CDM will help bridge the profitability gap for wind energy projects, as well as provide fillip to similar activities in the state by making them viable. This will also encourage more investments in state of Gujarat in the sector of Wind Power, as the sector had seen nil growth in past few years due to barriers as discussed.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

As per the Appendix B of simplified modalities & procedures for small-scale CDM-project activities, the project boundary is "The project boundary encompasses the physical, geographical site of the renewable generation source."

The project boundary is composed of the Wind Energy Generators and the metering equipment for each generator and substation for supplying power to grid.

Leakages
No Leakage.

B.5. Details of the baseline and its development:

Baseline Scenario:

"The baseline is the KWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2equ/KWh) calculated in a transparent and conservative manner"

Establishing Baseline:

As discussed in section B.2, the base line is established using the vintage data to calculate Current Generation Mix.

The actual CERs shall be calculated on basis of actual emission factor based on this approach for the year in which generation occurs.

Year	t CO2/MWH
2004-05	0.843

GEF calculated using the approach of CGM is **0.843 tCO_2 / MWH.**

Baseline Completion Date: 31st July 2006

Baseline Calculated by:
Mr. Manesh Madeka
Managing Director
Rolex Ring Private limited. (Also a project participant)
Gondal Road Village –Kotharia
Rajkot, Gujarat
Ph: +91-9824055374, +91-20-26702777
madekam@rolexrings.com
www.rolexrings.com

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

C.1.1. Starting date of the small-scale project activity:

27/03/2003

C.1.2. Expected operational lifetime of the small-scale project activity:

20 years

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

Fixed Crediting Period

C.2.1. Renewable crediting period:

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

C.2.1.2. Length of the first crediting period:

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

15/01/2007

C.2.2.2. Length:

10 years

SECTION D. Application of a monitoring methodology and plan:

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

This comes under the Appendix B of the simplified modalities & procedures for small-scale CDM-project activities under Category ID – *Grid connected renewable electricity generation*.

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

The project is a renewable energy project generating electricity (Type ID) – the monitoring methodology and baseline are selected here as suggested in the document 'Simplified Modalities and Procedures for Small-Scale CDM project activities'

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

D.3 Data to be monitored:

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1. $GEN_{i,y}$	*Electricity*	*Electricity generated in Wind Energy Generator (i) i.e. delivered to grid*	*kWh*	*(m)*	*Continuous*	*100%*	*Electronic*	*2 yrs after the credit period (12 yrs)*	*Monthly GEDA share of electricity certificate will be used for this variable. The reading from common meter as well individual meters is used by GEDA personnel to calculate share of each WTG on pro-rata basis.*
2. EF_y	*Emission Factor*	*CO_2 emission factor of the grid.*	*t CO_2 / MWh*	*(c)*	*Yearly*	*100%*	*Electronic*	*2 yrs after the credit period (12 yrs)*	*Calculated as emission factor pertaining to current generation mix, i.e. the year in which generation from project activity takes palce.*
3. $GEN_{l,y}$	*Electricity*	*Gross*	*kWh*	*estimated*	*Yearly*	*100%*	*Electronic*	*2 yrs after the*	*Western Region Electricity Board*

		electricity generation from power plant j in year y						*credit period (12 yrs)*	*(WREB) / Central Electricity Authority (CEA) Data*
4. $AUX_{i, y}$	*Electricity*	*Auxiliary Power Consumption in power plant j in year y*	*kWh*	*estimated*	*Yearly*	*100%*	*Electronic*	*2 yrs after the credit period (12 yrs)*	*Western Region Electricity Board (WREB) / Central Electricity Authority (CEA) Data*
5. $NET_{j, y}$	*Electricity*	*Net electricity supplied to grid from power plant j in year y*	*kWh*	*Calculated/ estimated*	*Yearly*	*100%*	*Electronic*	*2 yrs after the credit period (12 yrs)*	*Western Region Electricity Board (WREB) / Central Electricity Authority (CEA) Data*
6. $FF_{k, y}$	*Quantity*	*Quantity of fuel type k used in year y*	*Tonne*	*Calculated*	*Yearly*	*100%*	*Electronic*	*2 yrs after the credit period (12 yrs)*	
7. $COEF_k$	*Coefficient*	*Coefficient of emission for fuel type k*	*tCO_{2e}/ tonne*	*Calculated*	*Yearly*	*100%*	*Electronic*	*2 yrs after the credit period (12 yrs)*	
8. NCV_k	*Calorific value*	*Net calorific value for fuel type k*	*Kcal/ kg*	*Estimated*	*Yearly*	*100%*	*Electronic*	*2 yrs after the credit period (12 yrs)*	*Western Region Electricity Board (WREB) / Central Electricity Authority (CEA) Data*
9. $HRate_{j, y}$	*Kilo Calories*	*Heat Rate of Power plant j*	*kCal / KWh*	*Estimated*	*Yearly*	*100%*	*Electronic*	*2 yrs after the credit period (12 yrs)*	*Central Electricity Authority (CEA) Data*
10. EF_k	*Emission factor coefficient*	*Emissions coefficient of fuel k*	*tC / TJ*	*Estimated*	*Yearly*	*100%*	*Electronic*	*2 yrs after the credit period (12 yrs)*	*IPCC default values*
11. $OXID_k$	*Number*	*Oxidation*	*fraction*	*estimated*	*Yearly*	*100%*	*Electronic*	*2 yrs after the*	*IPCC default values*

		factor for fuel type k						*credit period (12 yrs)*	

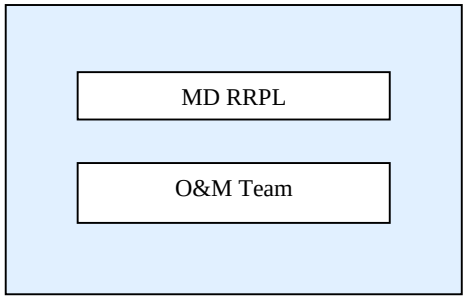
D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

ID Number	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1	*L*	*The data can be very accurately measured. Tower wise electricity generation is measured using WTG meter. Electricity exported to grid is measured using SEB meter installed on uploading station, this reading is taken monthly by joint team of O&M team at wind farm and SEB personnel. The meter at the uploading station will be two way meter and will be in custody of State electricity board.* *GEDA issues monthly certificate for actual power exported by each WTG on the wind farm, This reading is derived using above meters. Reading recorded in this certificate would be used for actual estimations.*
2, 3, 4, 5, 6,7,8,9,10,11	*L*	*Data is taken from WREB and CEA data as published annually on power generation in WR Grid.*

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

RRPL has implemented 8.75 MW Wind energy power generation project. Power generation using renewable energy like wind power is eligible for CDM benefits under Kyoto protocol. Following is a monitoring plan for CDM activity.

Organisational Structure:



Responsibility:

The WTGs are owned by RRPL and the machines are under contract for the turn-key operation and maintenance by the manufacturer itself. The responsibility of WTG maintenance (usual and preventive as well), daily WTG wise power generation data collection & reporting, monthly joint meter reading of common meter with SEB personnel are with manufacturer itself. WTG manufacturer is an ISO certified company and has standard procedures for O&M, training, emergency situations, meter calibration etc.

Data Monitoring:

The methodology requires monitoring of the following:

- Actual Electricity generation from the project activity;

Completeness-
For Electricity generation data: There is tower wise meter which is used to monitor tower wise power generation data. This meter is maintained by O&M team contracted by RRPL. A daily generation report is prepared which is sent to RRPL. Overall plant electricity generation is monitored using GEB meter. GEB takes reading of power generation every month; this data is used for billing purposes. This meter is maintained by GEB.

A daily log is maintained by O&M team about issues related to power generation (tower shutdown, grid failure etc). A monthly MIS is prepared based on this data and is reviewed by RRPL.

Calibration of Meters-
Tower wise meter is of high accuracy level, and is checked for accuracy on a regular basis. GEB meter is maintained by GEB personnel and calibration is done periodically. If there are problems found with performance of the meter, necessary actions are taken by GEB.

Frequency-
Electricity generation data is collected daily by O&M team. GEB meter reading is done every month by GEB.

D.6. Name of person/entity determining the monitoring methodology:

Mr. Manish Madeka
Managing Director
Rolex ring Private Limited. (Also a project participant)
Rolex Rings Private Limited

Gondal Road Village –Kotharia
Rajkot, Gujarat
Ph: +91-9824055374, +91-20-26702777
madekam@rolexrings.com
www.rolexrings.com

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

E.1.1 Selected formulae as provided in appendix B:

E.1.2 Description of formulae when not provided in appendix B:

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

Since, the proposed project activity is a renewable energy project which generates electricity using wind power; no anthropogenic emissions by sources of greenhouse gases within the project boundary are identified. Hence, no formulae are applicable.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

No anthropogenic greenhouse gases by sources outside the project boundary that are significant, measurable and attributable to the project activity are identified. Hence, no leakage is considered from the project activity. In addition, project proponents confirm that the renewable energy technology is not equipment transferred from another activity. Hence, no leakage calculation is required.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

Nil

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

$$BE_y = \Sigma GEN_i \text{ X } EF_y / 1000$$

BE_y - Baseline emissions in year y, tCO_2e
GEN_i – Net power wheeled to the grid from wind mill i, kWh
EF_y - Grid emission factor calculated ex-post for year y, kg CO_2/kWh

$$EF_y = \Sigma(FF_{k,y} \text{ X } COEF_k) \text{ X } 1000 / \Sigma NET_{j,y}$$

$FF_{k,y}$ = Quantity of fuel type k used in power generation in WR grid in year y, tonne
$COEF_k$ = Coefficient of emission for fuel type k, tCO2e/ tonne
$NET_{j,y}$ = Net power generation in power plant j in WR grid in year y, kWh

$$FF_{k,y} = GEN_{j,y} \text{ X } HRate_j / NCV_k / 10\text{^}3$$

$GEN_{j,y}$ = Gross power generation in power plant j in WR grid in year y, kWh
$HRate_{j,}$ = Heat Rate of power plant j in year y, kcal/ kWh
NCVk = Net calorific value of fuel type k, kcal/ kg

$COEF_k = EF_k$ X $OXID_k$ X NCV_k X 4.187 X 44/12 / 10^6

EF_k = Emission Factor for fuel type k, tC/ TJ
$OXID_k$ = Oxidation factor for fuel type k, fraction

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

$ER_y = BE_y$

Where
ER_y - Emission reductions, tCO2e

E.2 Table providing values obtained when applying formulae above:

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Emission Factor (EF)		0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843	0.843
Generating Capacity	MW	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
Electricity Generation wheeled to users	MWH	18200.00	18200.00	18200.00	18200.00	18200.00	18200.00	18200.00	18200.00	18200.00	18200.00
Emission Reduction(ER)	Thousand	15342.60	15342.600	15342.600	15342.6	15342.6	15342.6	15342.6	15342.6	15342.6	15342.6
Total											**153426.0**
Avg											**15342.6**

SECTION F.: Environnemental impacts:

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

"As per Ministry of Environment & Forest (MOEF) India, Environment Impact Notification S.O.60(E) Dated 27/01/1994 and amendment notice EO Dated 04/07/2005, 32 sectors covered under Schedule 1 with project cost of more than Rs 50,000 are required to conduct EIA."

Wind power projects are not covered under Schedule 1 and thus EIA is not required.

SECTION G. Stakeholders' comments:

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

Local stakeholders:

1. Panchayat.
2. Local community
3. GEDA
4. GEB i.e. later changed to GETCO

Procedure Followed:

Information to local community and Panchayat: A letter was sent to Sarpanch of village, at each wind farm site and informed about the project activity and called upon for a meeting by a representative appointed by RRPL. The information to Sarpanch was aimed to inform all the stake holders i.e. people from local community through a proper channel i.e. village panchayat. The panchayat is the medium and forum for every kind of decision and discussion that affects the local community.

Meeting with Panchayat and local community: A meeting was held at respective villages with village Sarpanch and important members of the community. No adverse feedback was obtained from local authorities as well residents. Moreover project proponents were appreciated for the environment friendly project activity.

GEDA: GEDA is the wind farm developer and issues a certificate of commissioning, which can be taken as consent to go ahead with project activity.

GETCO: GETCO (GEB) functioning as State transmission utility is a part of Power purchase agreement between RRPL and Gujarat state. This PPA is taken as certification for approval on part of Stake holder.

G.2. Summary of the comments received:

There are no adverse comments from stakeholders.

Summary of comments received:

- Ø People are well aware of this project activity and power generation source based on wind energy..
- Ø Better form of energy as compared to other sources of power.
- Ø No negative impact on nearby areas and surroundings.
- Ø The project activity will generate employment for nearby people.
- Ø This project will encourage more projects of similar nature.
- Ø Villages enquired about safety concerns related to Wind energy project and the doubts were adequately answered to their satisfaction.
- Ø No negative feedback received on project activity.

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

No specific action was required as no adverse comment received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Rolex Rings Private Limited

Organization:	Rolex Rings Private Limited
Building:	Gondal Road Village –Kotharia
Street/P.O.Box:	
City:	Rajkot
State/Region:	Gujarat
Postcode/ZIP:	
Country:	India
Telephone:	+91-9824055374
FAX:	+91-20-26702777
E-Mail:	madekam@rolexrings.com
URL:	www.rolexrings.com
Represented by:	
Title:	Managing Director
Salutation:	
Last Name:	Madeka
Middle Name:	
First Name:	Manesh
Department:	
Mobile:	+91-9824055374
Direct FAX:	
Direct tel:	+91-9824055374
Personal E-Mail:	madekam@rolexrings.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No Public Funding for this project.

Annex-3

TECHNICAL CONCEPT AND SPECIFICATION OF SUZLON S-64 (1250 kW) WTG

ROTOR		
Diameter	*:*	*64 m*
No. of Rotor Blade	*:*	*3*
Orientation	*:*	*Upwind/Horizontal axis*
Rotational Speed	*:*	*13.9 / 20.7 rpm.*
Rotational Direction	*:*	*Clockwise*
Rotor Blade Material	*:*	*GRP*
Swept area	*:*	*3217 m^2*
Hub Height	*:*	*65 m*
Regulation	*:*	*Pitch regulated*
OPERATIONAL DATA		
Cut in wind speed	*:*	*3 m/s.*
Rated wind speed	*:*	*14 m/s.*
Cut off wind speed	*:*	*25 m/s.*
GEARBOX		
Type	*:*	*Integrated 3 Stage 1 planetary & 2 helical*
Gear ratio	*:*	*1: 74.917*
Manufacturer	*:*	*Flender - Winergy*
Nominal load	*:*	*1390 KW*
Type of cooling	*:*	*Oil cooling system, Forced lubrication*
GENERATOR		
Type	*:*	*Asynchronous 4/6 pole*
Rotation speed	*:*	*1006/1506 RPM*
Rated output	*:*	*250/1250 kW*
Rated voltage	*:*	*690 V*
Frequency	*:*	*50 Hz*
Insulation	*:*	*Class "H"*
Enclosure Class	*:*	*IP 56*
Cooling system	*:*	*Air cooled*
OPERATING BRAKES		
Aerodynamic brake	*:*	*3 Independent systems with blade pitching*
Mechanical brake	*:*	*Spring powered disc brakes, hydraulically released, fail safe.*

YAW DRIVE

Method of operation	:	*4 Active electrical yaw motors*
Bearing type	:	*Polyamide slide bearing*

CONTROL UNIT

Microprocessor control with graphic backlit LCD display indicating operation conditions. Control includes thyristor switchgear watchdog for operation, monitoring, log with real time, local control and servicing interface. Optional remote monitoring & operation. UPS back up system.

Reactive Current Compensation

Compensation	:	*Dynamic & Intelligent, with PF greater than 0.9*

SAFETY SYSTEMS

1. Brake System : *Automatic application by synchronous hydraulic control of the blade pitching in case of:*

- *Vibration or shock loading*
- *Over temperature of the gearbox or generator failure of the thyristors & control in the case of wind speed in excess of 25 m/s.*
- *Variation in the Rated Voltage Range*
- *Variations in the Frequency range*
- *Asymmetric phasing*
- *Line interruption- with automatic reconnection*

2. Brake System : *Spring applied hydraulically released disk brake.*

TOWER

Type	:	*Free standing, Lattice tower, hot dip galvanized*
Height	:	*To suit hub height*
Construction	:	*Bolted*
Erection	:	*With crane*
Design	:	*GL special class*

Annex 4:

Grid Emission factor calculation

unit: GWh

Western Grid Power Generation (2004-05)

Gorss Generation

Source	Thermal	Gas	Hydro	Nuclear	Wind	Diesel	Total
Gujarat	30120.94	13366.83	873.19	0.00	86.50	0.00	44447.46
Madhya Pradesh	13502.55	0.00	3737.85	0.00	11.03	0.00	17251.43
Chattisgarh	7924.98	0.00	382.64	0.00	0.00	0.00	8307.62
Maharashtra	55543.13	5450.19	5583.54	0.00	502.02	0.00	67078.88
Goa	0.00	138.36	0.00	0.00	0.00	0.00	138.36
Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dadra Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central Sector	34870.00	6851.87	0.00	5099.68	0.00	0.00	46821.55
Total Western	**141961.60**	**25807.25**	**10577.22**	**5099.68**	**599.55**	**0.00**	**184045.30**

Auxiliary Consumption

Source	Thermal	Gas	Hydro	Nuclear	Wind	Diesel	Total
Gujarat	2933.63	261.59	7.07	0.00	0.00	0.00	3202.29
Madhya Pradesh	1414.69	0.00	7.31	0.00	0.00	0.00	1422.00
Chattisgarh	782.82	0.00	0.00	0.00	0.00	0.00	782.82
Maharashtra	4452.14	124.89	39.08	0.00	0.00	0.00	4616.11
Goa	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dadra Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central Sector	2364.72	148.30	0.00	603.17	0.00		3116.19
Total Western	**11948.00**	**534.78**	**53.46**	**603.17**	**0.00**	**0.00**	**13139.41**

Net generation

Source	Thermal	Gas	Hydro	Nuclear	Wind	Diesel	Total
Gujarat	27187.31	13105.24	866.12	0.00	86.50	0.00	41245.17
Madhya Pradesh	12087.86	0.00	3730.54	0.00	11.03	0.00	15829.43
Chattisgarh	7142.16	0.00	382.64	0.00	0.00	0.00	7524.80
Maharashtra	51090.99	5325.30	5544.46	0.00	502.02	0.00	62462.77
Goa	0.00	138.36	0.00	0.00	0.00	0.00	138.36
Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dadra Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central Sector	32505.28	6703.57	0.00	4496.51	0.00		43705.36
Total Western generation	**130013.60**	**25272.47**	**10523.76**	**4496.51**	**599.55**	**0.00**	**170905.89**

Western Grid Power Emission Factor-2004/05

Source	*MoU*	*Thermal*	*Gas*	*Diesel*	*Others*	
Gross Generation	GWh	141961.60	25807.25	0.00	16276.45	
Auxiliary Consumption	GWh	11948.00	534.78	0.00	656.63	
Net Generation	GWh	**130013.60**	**25272.47**	**0.00**	**15619.82**	**170906**
Heat Rate	kcal/kWh	2357	2000	1900	0	
Fuel Consumption	Tonnes per annum	87592537	4984019	0		
Total Emissions	tCO2/ annum	**131941948.2**	**12063147**	**0**		**144005095.4**

Emission Factor	tCO2e/ MWh	**0.843**

Annex-5
Glossary

%	Percentage
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reduction
CGM	Current Generation Mix
CO_2	Carbon Di Oxide
DNA	Designated National Authority
DOE	Designated Operational Entity
EIA	Environmental Impact Assessment
GHG	Green House Gases
GWh	Giga Watt Hour
GEB	Gujarat Electricity Board
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
kWh	Kilo Watt Hour
MoEF	Ministry of Environment and Forests
MW	Mega Watt
RRPL	Rolex Rings Private Limited
T & D	Transmission and Distribution
UNFCCC	United Nations Framework Convention on Climate Change
WACC	Weighted average cost of capital
WREB	Western Regional Electricity Board

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