



8.75 MW Wind Power Project in Gujarat
(CDM Project Activity Ref No. 0776)

MONITORING REPORT

Monitoring Period: 26/02/2008 to 28/02/2010 (Inclusive of both days)

Version: 1.0

Date: 08/04/2010

Certified Emission Reductions (CERs): **24001 tCO₂e**

By

Rolex Rings Private Limited
Gondal Road Village Kotharia
District Rajkot
State Gujarat



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1. Introduction

Rolex Rings Private Limited (RRPL) has installed 7 Wind Turbine Generators (WTG's) of 1.25MW capacity each at sites Bhogat, Vanku and Mandvi. The project activity has been executed in a phased manner during March 2003 to March 2005. Electrical power generated by these WTG's is wheeled to the forging and component manufacturing plant of RRPL at Rajkot, Gujarat through NEWNE regional grid (earlier it was Western grid), India.

The project reduces greenhouse gas (GHG) emission by reducing use of electricity generated in the NEWNE grid of India, which predominantly uses fossil fuels for power generation. The Grid emission factor for the monitoring period is 0.93143 tCO₂/MWh. Hence during this period the project activity has effectively reduced 0.93143 tonnes of carbon dioxide equivalent per Mega Watt hour of electricity generated.

The WTG capacity, location and date of commissioning has been listed below:

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	Gandhvi	01-06-05
1.25MW	V09	Vanku	29-04-06
1.25MW	V10	Vanku	18-04-06
1.25MW	V18	Vanku	29-04-06

The purpose of the monitoring report is to calculate and demonstrate the GHG emission reduction quantity achieved by this project for the periodic form 26th February 2008 to 28th February 2010.

2. CDM Registration Details

Date of Registration: 11/02/2007

Reference No.: 0766

PDD version and date: 1.1, 07/12/2006

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

Reference: <http://cdm.unfccc.int/Projects/DB/RWTUV1243585208.59/view>

3. Monitoring Plan

The monitoring period is chosen from 26/02/2008 to 28/02/2010.

The following table details out the data used for the emission reduction calculation from the project

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activity.

Data and Parameters used to determine Emission Reductions:

ID number	Data type	Data variable	Data unit	Measured (m), calculate d (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic / paper)	For how long 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 is 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 e / 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 place.
3. $GEN_{l,y}$	Electricity	Gross	kWh	estimated	Yearly	100%	Electronic	2 yrs after the credit period (12 yrs)	Central Electricity Authority (CEA) Data
4. $AUX_{i,y}$	Electricity	Auxiliary Power	kWh	estimated	Yearly	100%	Electronic	2 yrs after the	Central Electricity

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		Consumption in power plant j in year y						credit period (12 yrs)	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)	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)	Central Electricity Authority (CEA) Data
7. $COEF_k$	Coefficient	Coefficient of emission for fuel type k	tCO ₂ e/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)	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	IPCC default values

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								period (12 yrs)	
11. OXID _k	Number	Oxidation factor for fuel type k	fraction	estimated	Yearly	100%	Electronic	2 yrs after the credit period (12 yrs)	IPCC default values

For more details on the monitoring of each parameter, please refer to Annex 1.

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	<p>The data is 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.</p> <p>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 is used for actual estimations.</p>
2, 3, 4, 5, 6,7,8,9,10,11	L	<p>Data is taken from CEA data as published annually on power generation in NEWNE Grid available at CEA Carbon emission database version 5¹</p>

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 Rolex Rings Private Limited (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.

¹ <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>



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.

As per para 8 of “Guidelines for Assessing Compliance With The Calibration Frequency Requirements (Version 01)”, *In cases where neither the monitoring methodology, nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the DOE shall ensure that the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer specification. If local/national standards or the manufacturer specification is not available, international standards may be used.*

In the project case calibration frequency of meter is not specified either in monitoring methodology or in monitoring plan of registered CDM-SCC-PDD. Calibration frequency for the project case is considered as per national standard, CEA Regulation on “Installation and operation of meters”² Para 18 (3). As per this regulation energy meters has to be calibrated once in five years and the same has been followed. Calibration details of the energy meters are given below:

SI No	Meter location	Site	Date of testing	Meter Serial No	Make	Accuracy Class/Least Count	Calibration Agency
1	B1 - B2 - B4	Bhogat	31-11-2007	GJB 00291	Secure	0.2S	Gujarat Vidut Board
			25-11-2008	GJB 01386			Secure Meters Limited
2	B86	Gandhavi	11-09-2007	GJU 01415	Secure	0.2S	Gujarat Vidut Board
3	V9	Vanku	10-01-2008	GJB 00125	Secure	0.2S	Gujarat Vidut Board
4	V10	Vanku	10-01-2008	GJU 00470	Secure	0.2S	Gujarat Vidut Board
5	V18	Vanku	10-01-2008	GJU 00128	Secure	0.2S	Gujarat Vidut Board
6	Substation	Gandhavi	27-11-2007	GJB 00488	Secure	0.2S	Paschim Gujarat Vij Company Limited
7	Substation	Vanku	20-09-2005	GJB 00591	Secure	0.2S	Secure Meters Limited

Frequency-

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

4. GHG Emission Reduction Calculation

Baseline Emissions

² http://www.cea.nic.in/e&c/regulations/notified_regulations/Metering_Regulations.pdf



Baseline emissions are calculated as:

$$BE_y = GEN_i \times EF_y / 1000$$

Where:

BE_y - Baseline emissions in year y, tCO₂e

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 CO₂e/kWh

Sample calculation for the month of Mar 2008

$$BE_y = 819375 \text{ MWh} \times 0.93143 \text{ tCO}_2/\text{MWh}$$

$$= 763 \text{ tCO}_2\text{e}$$

Project Emissions

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, project emissions are zero.

Emissions due to Leakage:

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.

Emission Reductions:

$$ER_y = BE_y$$

Where,

ER_y - Emission reductions, tCO₂e

BE_y - Baseline emissions. tCO₂e

* Grid Emission Factor is referred from the Carbon Dioxide Baseline Database, Version 05 published by Central Electricity Authority, Ministry of Power, Government of India available at www.cea.nic.in

5. Monitored Data*

Month	Generation Units (KWh)			Total units (KWh)
	WM I	WM II		
	Bhogat	Vanku	Lamba	
Mar-08	3 75 769	2 97 423	1 46 183	8 19 375
Apr-08	2 13 752	1 70 693	1 00 882	4 85 327
May-08	6 60 039	5 34 601	2 61 214	14 55 854
Jun-08	9 06 824	6 00 596	3 69 070	18 76 490
Jul-08	9 75 146	6 26 034	3 45 650	19 46 830
Aug-08	8 91 202	4 48 248	3 38 901	16 78 351
Sep-08	4 26 132	4 08 323	1 64 365	9 98 820
Oct-08	1 44 857	1 08 278	49 626	3 02 761

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Nov-08	3 82 191	2 44 057	1 44 888	7 71 136
Dec-08	5 03 071	3 07 721	1 85 182	9 95 974
Jan-09	4 85 041	2 62 555	1 90 221	9 37 817
Feb-09	3 55 077	2 20 104	1 42 209	7 17 390
Mar-09	3 20 155	2 32 459	1 37 100	6 89 714
Apr-09	3 48 863	2 65 584	1 49 219	7 63 666
May-09	4 50 122	4 07 666	1 66 710	10 24 498
Jun-09	8 32 641	7 80 771	2 81 380	18 94 792
Jul-09	7 41 053	4 43 964	2 98 218	14 83 235
Aug-09	12 01 129	8 92 489	4 25 166	25 18 784
Sep-09	4 16 377	2 73 575	1 54 246	8 44 198
Oct-09	2 46 574	1 27 410	1 04 271	4 78 255
Nov-09	2 97 479	2 46 079	1 27 695	6 71 253
Dec-09	3 72 493	3 21 814	1 70 334	8 64 641
Jan-10	4 16 110	2 35 551	1 84 822	8 36 483
Feb-10	3 23 589	2 57 432	1 31 681	7 12 702
Total	1 22 85 686	42 28 633	47 69 233	1 36 75 839

* The monitoring period for all the three sites is from 26th February 2008 to 28th February 2010.

6. Emission Reduction:

Emission reduction (Monthly)

Month	Estimation of project activity emissions (tCO ₂ e)	Estimations of baseline emissions (tCO ₂ e)	Estimation of leakage (tCO ₂ e)	Estimation of overall emission reductions (tCO ₂ e)
Mar-08	0	763	0	763
Apr-08	0	452	0	452
May-08	0	1356	0	1356
Jun-08	0	1748	0	1748
Jul-08	0	1813	0	1813
Aug-08	0	1563	0	1563
Sep-08	0	930	0	930
Oct-08	0	282	0	282
Nov-08	0	718	0	718
Dec-08	0	928	0	928
Jan-09	0	874	0	874
Feb-09	0	668	0	668
Mar-09	0	642	0	642
Apr-09	0	711	0	711
May-09	0	954	0	954
Jun-09	0	1765	0	1765
Jul-09	0	1382	0	1382



Aug-09	0	2346	0	2346
Sep-09	0	786	0	786
Oct-09	0	445	0	445
Nov-09	0	625	0	625
Dec-09	0	805	0	805
Jan-10	0	779	0	779
Feb-10		664	0	664
Total	0	24001	0	24001

Emission reduction (Calendar Year)

Month	Estimation of project activity emissions (tCO ₂ e)	Estimations of baseline emissions (tCO ₂ e)	Estimation of leakage (tCO ₂ e)	Estimation of overall emission reductions (tCO ₂ e)
2008	0	10554	0	10554
2009	0	12005	0	12005
2010	0	1443	0	1443
Total	0	24001	0	24001

The total GHG emission reduction accounts to **24001 tCO₂e** for this monitoring period.

Comparison of Estimated Emission reduction as per registered PDD with the actual emission reduction achieved in this monitoring period

Estimated Emission Reduction	Actual Emission Reduction	Variation
30684*	24001	-21.78%

* Estimated emission reduction for two year. This is as per registered PDD.

Reason for the variation in actual emission reduction is due to lower capacity utilization in the present monitoring period.



Annex 1

Monitoring Details

Data Variable	Monitoring Details
<i>1. GEN_{i,y} : Electricity generated in Wind Energy Generator i.e. delivered to grid</i>	<p>This parameter is monitored by the Gujarat Energy Development Agency (GEDA) on a monthly basis in form of Joint meter readings (JMR). The electricity supplied by each WTG to grid is certified by GEDA on a monthly basis and same is used for estimation of emission reductions. These GEDA certificates are available for entire monitoring period.</p> <p>Additionally, the electricity generated by each of the wind turbines at each site is monitored with the help of control systems for each Wind Turbine on a continuous basis by Suzlon.</p>
<i>2, 3, 4, 5, 6,7,8,9,10,11</i>	<p>These data variables are required for the calculation of Grid Emission Factor which is referred from the “Carbon Dioxide Baseline Database” Version 05 published by Central Electricity Authority, Ministry of Power, Govt. of India. The database is available at www.cea.nic.in.</p>

