



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

**MONITORING REPORT**

Monitoring Period: 11/02/2007 to 25/02/2008 (Inclusive of both days)

Version: 1.0

Date: 19/03/2008

Certified Emission Reductions (CERs): **10734 tCO<sub>2</sub>e**

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



<b><u>Contents</u></b>	<b><u>Page No.</u></b>
<b>1. Introduction</b>	<b>3</b>
<b>2. CDM Registration Details</b>	<b>3</b>
<b>3. Monitoring Plan</b>	<b>3</b>
<b>4. GHG Emission Reduction Calculation</b>	<b>9</b>
<b>5. Monitored Data</b>	<b>10</b>
<b>6. Estimated Emission Reduction</b>	<b>10</b>
<i>Annex 1: Monitoring Details</i>	<b>11</b>
<i>Annex 2: Project activity description</i>	<b>12</b>

## **1. Introduction**

The purpose of the monitoring report is to calculate and demonstrate the GHG emission reduction quantity achieved by this project for periodic verification.

The monitoring report shall cover the activity from 11<sup>th</sup> February 2007 to 25<sup>th</sup> February 2008.

## **2. CDM Registration Details**

**Date of Registration:** 11/02/07

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

## **3. Monitoring Plan**

The monitoring period is chosen from 11.02.07 to 25.02.08

The following table details out the data to be monitored for the emission reduction estimation from the project activity.



### Data and Parameters used to determine Emission Reductions:

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 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 <sub>2</sub> emission factor of the grid.	t CO <sub>2</sub> / 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.

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3. $GEN_{l,y}$	Electricity	Gross	kWh	estimated	Yearly	100%	Electronic	2 yrs after the credit period (12 yrs)	Western Region Electricity Board (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)	Western Region Electricity Board (WREB) / Central Electricity Authority (CEA) Data

**“First Monitoring Report: 8.75 MW Wind Power Project in Gujarat”**



7. $COEF_k$	<i>Coefficient</i>	<i>Coefficient of emission for fuel type k</i>	<i>tCO<sub>2</sub>e/tonne</i>	<i>Calculated</i>	<i>Yearly</i>	<i>100%</i>	<i>Electronic</i>	<i>2 yrs after the credit period (12 yrs)</i>	
8. $NCV_k$	<i>Calorific value</i>	<i>Net calorific value for fuel type k</i>	<i>Kcal/kg</i>	<i>Estimated</i>	<i>Yearly</i>	<i>100%</i>	<i>Electronic</i>	<i>2 yrs after the credit period (12 yrs)</i>	<i>Western Region Electricity Board (WREB) / Central Electricity Authority (CEA) Data</i>
9. $HRate_{j,y}$	<i>Kilo Calories</i>	<i>Heat Rate of Power plant j</i>	<i>kCal / KWh</i>	<i>Estimated</i>	<i>Yearly</i>	<i>100%</i>	<i>Electronic</i>	<i>2 yrs after the credit period (12 yrs)</i>	<i>Central Electricity Authority (CEA) Data</i>
10. $EF_k$	<i>Emission factor coefficient</i>	<i>Emissions coefficient of fuel k</i>	<i>tC / TJ</i>	<i>estimated</i>	<i>Yearly</i>	<i>100%</i>	<i>Electronic</i>	<i>2 yrs after the credit period (12 yrs)</i>	<i>IPCC default values</i>
11. $OXID_k$	<i>Number</i>	<i>Oxidation factor for fuel type k</i>	<i>fraction</i>	<i>estimated</i>	<i>Yearly</i>	<i>100%</i>	<i>Electronic</i>	<i>2 yrs after the credit period (12 yrs)</i>	<i>IPCC default values</i>

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

**“First Monitoring Report: 8.75 MW Wind Power Project in Gujarat”**



**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><i>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&amp;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.</i></p> <p><i>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.</i></p>
2, 3, 4, 5, 6,7,8,9,10,11	L	<p><i>Data is taken from CEA data as published annually on power generation in WR Grid available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>.</i></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 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.

**“First Monitoring Report: 8.75 MW Wind Power Project in Gujarat”**



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.



#### **4. GHG Emission Reduction Calculation**

##### **Baseline Emissions**

Baseline emissions are calculated as:

$$\mathbf{BE_y = GEN_i \times EF_y / 1000}$$

**Where:**

BE<sub>y</sub> - Baseline emissions in year y, tCO<sub>2</sub>e

GEN<sub>i</sub> – Net power wheeled to the grid from wind mill i, kWh

EF<sub>y</sub><sup>\*</sup> - Grid emission factor calculated ex-post for year y, kg CO<sub>2</sub>/kWh

##### **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:**

$$\mathbf{ER_y = BE_y}$$

Where

ER<sub>y</sub> - Emission reductions, tCO<sub>2</sub>e

BE<sub>y</sub> – Baseline emissions. tCO<sub>2</sub>e

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\* Grid Emission Factor is referred from the Carbon Dioxide Baseline Database, Version 03 published by Central Electricity Authority, Ministry of Power, Government of India available at [www.cea.nic.in](http://www.cea.nic.in)

## 5. Monitored Data\*

Month	Electricity exported to Grid (kWh)			Total Electricity Export to the Grid (kWh)
	Vanku	Bhogat	Gandhvi	
Feb-07	148414	149,377	57,358	355,149
Mar-07	223608	333354	142340	699,302
Apr-07	319117	307258	129543	755,918
May-07	706074	579366	214363	1,499,803
Jun-07	616875	630182	206684	1,453,741
Jul-07	630642	834722	322082	1,787,446
Aug-07	785550	1047685	406358	2,239,593
Sep-07	309231	277329	112896	699,456
Oct-07	111146	111921	43611	266,678
Nov-07	112977	228025	81564	422,566
Dec-07	402743	555754	234263	1,192,760
Jan-08	389770	480933	196859	1,067,562
Feb-08	268862	368396	172065	809,323
<b>Total Electricity Export to Grid (kWh)</b>				<b>13,249,297</b>

## 6. Estimation of Emission Reductions:

Month	Total Electricity Export to the Grid (kWh)	Grid Emission Factor (tCO <sub>2</sub> /MWh)	GHG Emission Reduction (tCO <sub>2</sub> )
Feb-07	355,149	0.8628	306.5
Mar-07	699,302	0.8628	603.4
Apr-07	755,918	0.8628	652.3
May-07	1,499,803	0.8628	1294.2
Jun-07	1,453,741	0.8628	1254.4
Jul-07	1,787,446	0.8628	1542.4
Aug-07	2,239,593	0.8628	1932.5
Sep-07	699,456	0.8628	603.5
Oct-07	266,678	0.8628	230.1
Nov-07	422,566	0.8628	364.6
Dec-07	1,192,760	0.8628	1029.2
Jan-08	1,067,562	0.8628	921.1
Feb-08	809,323	0.8628	698.3
<b>Total GHG Emission Reduction (tCO<sub>2</sub>)</b>			<b>10734.1</b>

\* The monitoring period for all the three sites is 11<sup>th</sup> February 2007 to 25<sup>th</sup> February 2008.

The total GHG emission reduction accounts to **10734 tCO<sub>2</sub>** for this monitoring period.

**“First Monitoring Report: 8.75 MW Wind Power Project in Gujarat”**

## Annex 1

### Monitoring Details

Data Variable	Monitoring Details
1. $GEN_{i,y}$ : <i>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 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> <p>The JMR record for the month of February 2007 is from 1<sup>st</sup> February to 28<sup>th</sup> February, but to account the electricity generation from 11<sup>th</sup> February (date of registration) to 28<sup>th</sup> February 2007) the following approach has been taken:</p> $\sum E_{11-28} - (\sum E_{1-28} - E_{JMR}) = \text{Electricity generation for the month of February 2007 (11th Feb to 28th Feb 2007)}$ <p>Where,</p> <p><math>\sum E_{11-28}</math> = Summation of electricity generated on a daily basis from 11<sup>th</sup> to 28<sup>th</sup> February taken from Daily Reports</p> <p><math>\sum E_{1-28}</math> = Summation of electricity generated on a daily basis from 1<sup>st</sup> to 28<sup>th</sup> February taken from Daily Reports</p> <p><math>E_{JMR}</math> = Electricity exported as per the JMR records, for the complete month i.e. 1<sup>st</sup> to 28<sup>th</sup> February.</p> <p><math>(\sum E_{1-28} - E_{JMR})</math> = Transmission losses for the whole month of February. These losses have been considered from 11<sup>th</sup> to 28<sup>th</sup> itself for a conservative estimate.</p>
2, 3, 4, 5, 6,7,8,9,10,11	<p>These data variables are required for the calculation of Grid Emission Factor which is referred from the “Carbon Dioxide Baseline Database” Version 03 published by Central Electricity Authority, Ministry of Power, Govt. of India. The database is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>.</p>



## **Annex 2**

### **Project Activity Description**

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 at by these WTG's is wheeled to the forging and component manufacturing plant of RRPL 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.

The project reduces greenhouse gas (GHG) emission by reducing use of electricity generated in the Western Grid of India, which predominantly uses fossil fuels for power generation. The Grid emission factor for the monitoring period is 0.8628 tCO<sub>2</sub>/MWh. Hence during this period the project activity has effectively reduced 0.8628 tonnes of carbon dioxide per Mega Watt of electricity generated.

<b>Capacity</b>	<b>Unique Id</b>	<b>Location</b>	<b>Commissioning Date</b>
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