



Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT

Title of the project activity	8.75 MW Wind Power Project in Gujarat	
UNFCCC reference number of the project activity	0776 ¹	
Version number of the PDD applicable to this monitoring report	1.1	
Version number of this monitoring report	01	
Completion date of this monitoring report	19/09/2018	
Monitoring period number	05 th	
Duration of this monitoring period	01/01/2013 to 10/02/2017 (both first & last date included)	
Monitoring report number for this monitoring report	Not Applicable	
Project participants	M/s Rolex Rings Private Limited Mitsubishi Corporation Emergent Ventures India Pvt. Ltd.	
Host Party	India	
Sectoral scopes	1 : Energy industries (renewable / non-renewable sources)	
Applied methodologies and standardized baselines	AMS-I.D. ver. 9- Grid connected renewable electricity generation	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0 tCO ₂ e	34,547 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	63,137 tCO ₂ e	

¹ <http://cdm.unfccc.int/Projects/DB/RWTUV1163765609.51/view>

SECTION A. Description of project activity

A.1. General description of project activity

This is a wind energy project of capacity 8.75 MW comprising 7 Wind Turbine Generators (WTG's) of 1.25 MW 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.

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.

The table below contains the commissioning dates for WTGs. These are also the start date of operation of WTGs respectively:

Capacity	Unique ID	Location	Commissioning Date
1.25 MW	B1	Bhogat	27/03/2003
1.25 MW	B2	Bhogat	29/07/2003
1.25 MW	B4	Bhogat	29/07/2003
1.25 MW	W06	Lamba	01/06/2005
1.25 MW	V09	Vanku	29/04/2006
1.25 MW	V10	Vanku	18/04/2006
1.25 MW	V18	Vanku	29/04/2006

Total emission reductions achieved in the monitoring period are 34,547 tCO₂e.

A.2. Location of project activity

The project sites are located in the State of Gujarat.

Capacity	Unique ID	Location	Latitude/Longitude
1.25 MW	B1	Bhogat	21° 57' 26.28"N, 69° 13' 19.5594"E
1.25 MW	B2	Bhogat	21° 57' 41.76"N , 69° 13' 30.72"E
1.25 MW	B4	Bhogat	21° 57' 48.5994"N, 69° 13' 23.52"E
1.25 MW	W06	Lamba	21° 51' 53.2794"N, 69° 19' 27.12"E
1.25 MW	V09	Vanku	23° 6' 51.8394"N, 68° 49' 59.8794"E
1.25 MW	V10	Vanku	23° 6' 38.88"N, 68° 49' 59.8794"E
1.25 MW	V18	Vanku	23° 6' 40.6794"N, 68° 50' 27.9594"E



A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (host Party)	Rolex Rings Private Limited (RRPL)	No
Government of Japan	Mitsubishi Corporation	No
Government of Switzerland	Emergent Ventures India Pvt. Ltd.	No

A.4. Reference to applied methodologies and standardized baselines

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

A.5. Crediting period type and duration

Start date of crediting period: 11/02/2007

Choice of crediting period: Fixed crediting period for 10 years

Crediting period Duration : 11/02/2007 to 10/02/2017

SECTION B. Implementation of project activity**B.1. Description of implemented project activity**

The project is a Renewable Energy project with maximum output capacity of 8.75 MW. WTGs installed in the project activity are of each 1.25 MW capacity. The technical details of WTG are given in table below –

Wind Turbine Generator Type	1.25 MW
Make	Suzlon
Rotor	
Rotor Diameter	64 m
Number of rotor blades	03
Orientation	Upwind / Horizontal axis
Hub Height	65 m
Swept Area	3217 square meter
Rotational Speed	13.8 / 20.7 rpm
Rotational Direction	Clockwise
Rotor Blade Material	GRP
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
Gear Box	
Type	Integrated 3 Stage 1 planetary & 2 helical
Manufacturer	Flender - Winergy
Nominal load	1390 kW
Type of cooling	Oil cooling system, Forced lubrication
Gear ratio	1: 74.917
Generator	
Type	Asynchronous 4/6 pole
Rotational 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

Diagram showing technical detail of the WTG:



All WTGs part of the project activity have been commissioned and are operating. The commissioning details of all the WTGs are mentioned in section A.1 of the Monitoring Report.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

Not applicable, as there is no temporary deviations from the registered monitoring plan, applied methodologies or standard baselines, during the current Monitoring Period.

B.2.2. Corrections

Not applicable, as there are no corrections, during the current Monitoring Period.

B.2.3. Changes to the start date of the crediting period

Not applicable, as there is no change to the start date of the crediting period.

B.2.4. Inclusion of monitoring plan

Not applicable, as there is no inclusion of monitoring plan, during the current Monitoring Period.

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

Not applicable, as there are no permanent changes, during the current Monitoring Period.

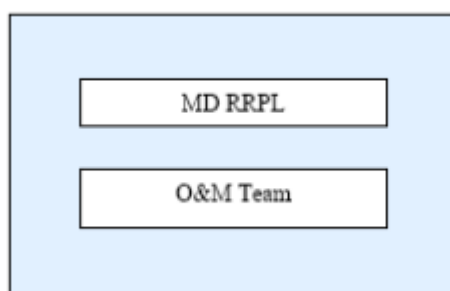
B.2.6. Changes to project design

Not applicable, as there is no change to the project design.

SECTION C. Description of monitoring system

As per the registered PDD, following monitoring systems has been implemented in the project activity.

Organizational structure, roles and responsibilities



The WTGs are owned by RRPL and the machines are under contract for the turnkey 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. O&M team contracted by Rolex Rings Private Limited (RRPL) maintains this meter. 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.

O&M team maintains a daily log 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 personnel maintain GEB meter 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 EB 52 annex 60, "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"*.

For substation meters

The PP has used the calibration approach, for substation meters, as per the available local standards (GETCO - Gujarat Energy Transmission Corporation Ltd.). As per this GETCO guideline, the substation meters would be tested once in three years.

For energy meters other than substation

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"* Para 18 (3). As per this regulation energy meters require to be calibrated once in five years. However, taking the conservative approach, PP has considered the guidance on calibration of meters for small scale projects which prescribes calibration of meters at least once in 3 years, As per para 12 (c) of EB 35 Annex 35 *"Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in 3 years"*. However the PP has considered the errors for non-calibrated periods considering the frequency of calibration of energy meters as one year. This is conservative.

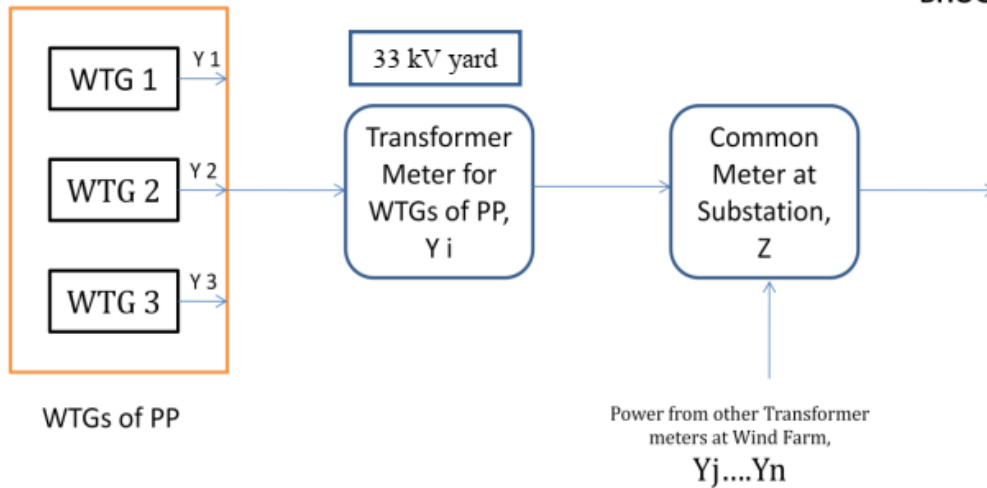
Data reading frequency

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

Emergency procedures for the monitoring system

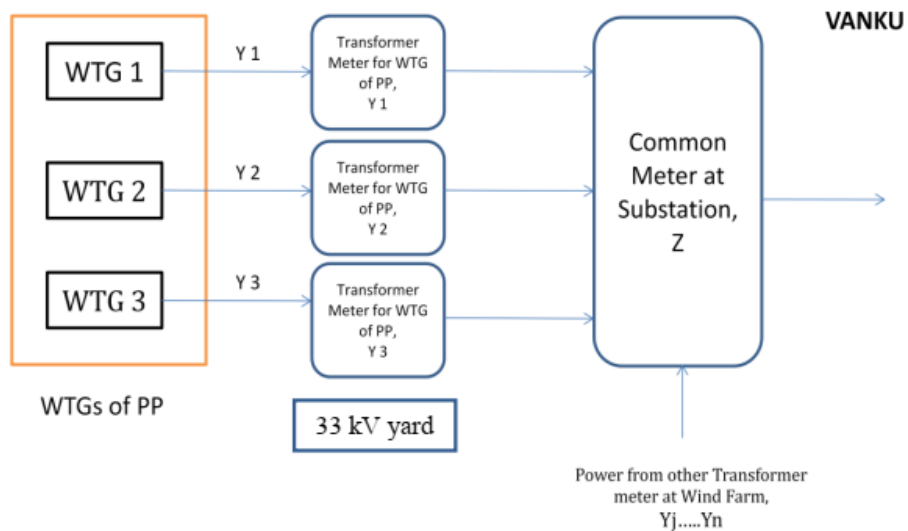
If there are problems found with performance of the meter, necessary actions are taken by Gujarat electricity Board GEB (GETCO). The Installation of meters and their maintenance is under the control of the GEB and the PP has no control over the same. However, in case of meter failure, the affected period will not be considered for the emission reduction calculation.

Line diagrams, showing relevant monitoring points, are provided below.



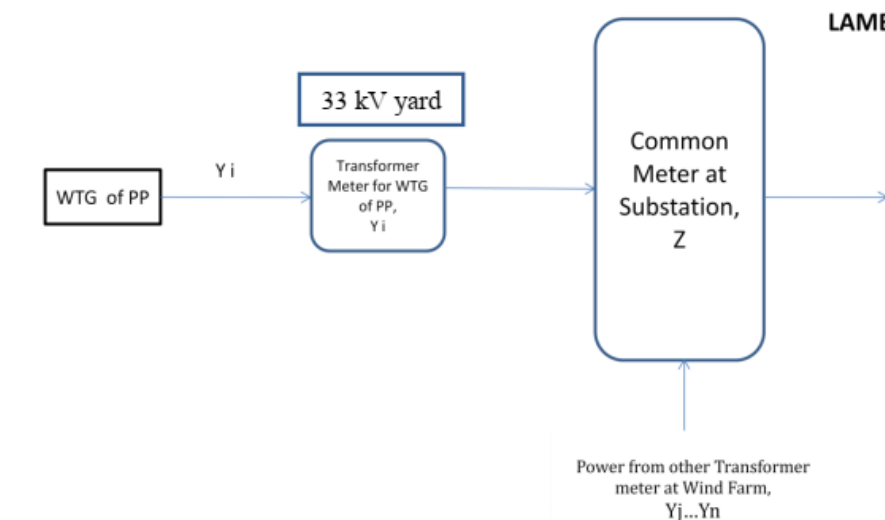
Net Electricity apportioned to WTGs of PP (WTGs 1, 2 & 3) = $Y_i \times Z / (Y_i + Y_j + \dots + Y_n)$

Both Transformer meter and Common meter are calibrated at regular intervals.



Net Electricity apportioned to WTG of PP (WTG 1) = $Y_1 \times Z / (Y_1 + Y_2 + Y_3 + \dots + Y_n)$

Transformer meters and Common meter are calibrated at regular intervals.



Net Electricity apportioned to WTG of PP (WTG 1) = $Y_i \times Z / (Y_i + \dots + Y_n)$

Transformer meters and Common meter are calibrated at regular intervals.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	NA
Unit	-
Description	-
Source of data	-
Value(s) applied	-
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	-
Additional comments	-

Note - Since there is no any ex-ante parameter involved for the project activity, the above table is kept as blank.

D.2. Data and parameters monitored

Data/Parameter	GEN _{i,y}
Unit	kWh
Description	Electricity generated in Wind Energy Generator (i) i.e. delivered to grid
Measured/calculated/default	Measured
Source of data	Energy meter
Value(s) of monitored parameter	42,130,881.79 kWh

Monitoring equipment	The energy meters are used to measure the electricity generated and delivered to grid
Measuring/reading/recording frequency	Measuring frequency: Continuous Recording frequency: Continuous Reading frequency: Monthly
Calculation method (if applicable)	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.
QA/QC procedures	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 is a two-way meter and is 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 is used for actual estimations.
Purpose of data/parameter	This parameter is used to determine baseline emissions
Additional comments	-

Data/Parameter	EFy
Unit	t CO ₂ /MWh
Description	CO ₂ emission factor of the grid.
Measured/calculated/default	Calculated
Source of data	Latest version of CO ₂ Baseline Database Version 13, June 2018 Published by Central Electricity Authority (CEA) ²
Value(s) of monitored parameter	0.83 for year 2012-13 0.81 for year 2013-14 0.82 for year 2014-15 0.82 for year 2015-16 0.82 for year 2016-17
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Frequency: Yearly
Calculation method (if applicable)	Calculated as emission factor pertaining to current generation mix, i.e. the year in which generation from project activity takes place. The values are taken from CO ₂ Baseline Database Version 13, June 2018 published by Central Electricity Authority of India. The monitoring period is from 01/01/2013 to 10/02/2017 , thus emission factor for years 2012-13, 2013-14, 2014-15, 2015-16, 2016-17 need to be considered. As per CEA database, the respective year emission factor is considered for ER calculations.
QA/QC procedures	Not required
Purpose of data/parameter	This parameter is used to determine baseline emissions
Additional comments	-

² http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

D.3. Implementation of sampling plan

Not Applicable.

SECTION E. Calculation of emission reductions or net anthropogenic removals**E.1. Calculation of baseline emissions or baseline net removals**

Baseline emissions are calculated as:

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

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/MWh

Calculation for the period 01/01/2013 to 31/03/2013

$$\begin{aligned} BE_y &= 2,097,214 \text{ (kWh)} \times 0.83 \text{ (tCO}_2\text{/MWh)} / 1000 \\ &= 1,740.69 \text{ (tCO}_2\text{e)} \end{aligned}$$

Calculation for the period 01/04/2013 to 31/03/2014

$$\begin{aligned} BE_y &= 10,146,214 \text{ (kWh)} \times 0.81 \text{ (tCO}_2\text{/MWh)} / 1000 \\ &= 8,218.43 \text{ (tCO}_2\text{e)} \end{aligned}$$

Calculation for the period 01/04/2014 to 31/03/2015

$$\begin{aligned} BE_y &= 9,989,703 \text{ (kWh)} \times 0.82 \text{ (tCO}_2\text{/MWh)} / 1000 \\ &= 8,191.56 \text{ (tCO}_2\text{e)} \end{aligned}$$

Calculation for the period 01/04/2015 to 31/03/2016

$$\begin{aligned} BE_y &= 10,497,043 \text{ (kWh)} \times 0.82 \text{ (tCO}_2\text{/MWh)} / 1000 \\ &= 8607.58 \text{ (tCO}_2\text{e)} \end{aligned}$$

Calculation for the period 01/04/2016 to 10/02/2017

$$\begin{aligned} BE_y &= 9,400,707.786 \text{ (kWh)} \times 0.82 \text{ (tCO}_2\text{/MWh)} / 1000 \\ &= 7,708.58 \text{ (tCO}_2\text{e)} \end{aligned}$$

The total baseline emissions for the entire monitored period are:

$$BE_y = 34,466 \text{ tCO}_2\text{e (Rounddown value)}$$

E.2. Calculation of project emissions or actual net removals

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.

E.3. Calculation of leakage emissions

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.

$$L_y = 0$$

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	34,466	0	0	0	34,466	34,466

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante (t CO ₂ e)
34,466	63,137

E.6. Remarks on increase in achieved emission reductions

From E.5 above, we can observe that actual emission reduction for the monitoring is lower than estimated emission reductions by 45%. This is due to low PLF during current monitoring period.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		