

**MONITORING REPORT FORM (CDM-MR) \***  
**Version 01 - in effect as of: 28/09/2010**

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\* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

## **MONITORING REPORT**

**Version 03.0**

**Date: 23/03/2012**

**Title: GEI Wind Power Project in Karnataka, India**

**UNFCCC Reference No: 4144**

**Monitoring Period Number: 01**

**and**

**Monitoring Period: From 01/04/2011 to 30/09/2011 (Including first and last day)**

### **SECTION A. General description of the project activity**

#### **A.1. Brief description of the project activity: >>**

>>

##### **1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions:**

The project activity is the successful installation and generation of 31.2 MW through efficient utilization of renewable energy source viz., wind energy at Harthi, Kurtakoti and Malasamudra villages of Gadag district in Karnataka in order to generate electricity to be fed to Southern grid.

The purpose of the project activity is to utilize renewable wind energy for generation of electricity. The project activity replaces anthropogenic emissions of greenhouse gases (GHGs) into the atmosphere, by displacing the equivalent amount of electricity generation through the operation of existing fuel mix in the grid comprising mainly fossil fuel based power plants and future capacity expansions connected to the grid.

In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the Southern grid, which are/ will be predominantly based on fossil fuels. Whereas the electricity generation from operation of WECs is emission free. As per the applicable methodology, the baseline scenario for the project activity is the grid based electricity system, which is also the pre-project scenario.

The first machine under the project activity was commissioned on 17.12.2007 and the last machine under the project activity was commissioned on 10.10.2008. The expected operational lifetime of the project is for 20 years. 39 numbers of Wind Energy Converters (WECs) are installed for power generation which are E-53 of Enercon make having installed capacity of 800 kW each.

##### **2. Brief description of the installed technology and equipments:**

The project activity involves 39 WECs of Enercon make (800 kW, E-53) with internal electrical lines connecting the project activity with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV at the Project site and further stepped up to 220 KV at the Receiving sub- station for the purpose of interconnection with the KPTCL/HESCOM grid at the sub-station of the KPTCL/HESCOM. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V  $\pm$  12.5%. The life time of the WEC is 20 years as provided by the equipment supplier.

**3. Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.).**

The commissioning dates of all the WTGs installed in the project activity have been provided in the table below:

Sl. No.	Location No.	No. of WTGs	Commissioning Date	Village
1	170a	4	17.12.2007.	Harthi
2	170			
3	171			
4	236			
5	229	6	17.03.2008.	Malasamudra
6	181			
7	180			
8	163			Kurthkoti
9	226			Malasamudra
10	230			
11	173	8	25.06.2008.	Harthi
12	231			Malasamudra
13	174			Harthi
14	233			

15	232			
16	234			
17	169A			
18	237			
19	168	10	07.07.2008.	Kurthkoti
20	169			Harthi
21	235			
22	136			
23	137			
24	138			
25	139			
26	140			
27	141			
28	179			Malasamudra
29	228	4	11.09.2008.	Malasamudra
30	172			Harthi
31	227			Malasamudra
32	239			Harthi

33	167	4	29.09.2008.	Kurthkoti
34	176			Harthi
35	178			Kurthkoti
36	164			Kurthkoti
37	165	3	10.10.2008.	Kurthkoti
38	166			Kurthkoti
39	177			Malasamudra
<b>Total</b>		<b>39</b>		

#### 4. Total emission reductions achieved in this monitoring period:

The total emission reductions achieved under this monitoring period (from 01/04/2011 to 30/09/2011) is **35, 209 tCO<sub>2</sub>**.

#### A.2. Project Participants

>>

Generacion Eolica India Limited (Henceforth "GEI")

#### A.3. Location of the project activity:

>>

The project activity is located at Harthi, Kurthkoti & Malasamudra villages in Gadag district of Karnataka state in India. The GPS coordinates have been provided in the following table:

Sl. No.	Location No.	No. of WTGs	Village	Longitude	Latitude
1	170a	4	Harthi	15°20'53"	75°34'29.2"
2	170			15°20'59"	75°34'27.5"
3	171			15°21'5.8"	75°34'26.1"

4	236			15°21'14.3"	75°34'38.8"
5	229	6	Malasamudra	15°21'59.9"	75°34'23"
6	181			15°22'16.6"	75°33'57.8"
7	180			15°22'10.4"	75°34'0.9"
8	163		Kurthkoti	15°22'8.3"	75°33'44.8"
9	226		Malasamudra	15°22'19.2"	75°34'13.5"
10	230			15°21'52.7"	75°34'23.9"
11	173	8	Harthi	15°21'19.4"	75°34'19.9"
12	231		Malasamudra	15°21'46.8"	75°34'27.7"
13	174		Harthi	15°21'31.5"	75°34'15.5"
14	233			15°21'33.3"	75°34'30.6"
15	232			15°21'39.6"	75°34'28.6"
16	234			15°21'27.8"	75°34'33.5"
17	169A			15°21'20"	75°34'3.7"
18	237			15°21'8.1"	75°34'41.3"
19	168	10	Kurthkoti	15°21'35.7"	75°33'56.8"

20	169		Harthi	15°21'29.5"	75°34'1.5"
21	235			15°21'21.3"	75°34'39.2"
22	136			15°20'26.5"	75°34'5.7"
23	137			15°20'32.6"	75°34'4.6"
24	138			15°20'39.9"	75°34'4.9"
25	139			15°20'44.8"	75°33'57.3"
26	140			15°20'50.9"	75°33'57.3"
27	141			15°20'59.2"	75°33'56.9"
28	179	4	Malasamudra	15°22'3.6"	75°34'2.6"
29	228		Malasamudra	15°22'6.2"	75°34'18.1"
30	172		Harthi	15°21'11"	75°34'22.3"
31	227		Malasamudra	15°22'15.2"	75°34'25.2"
32	239		Harthi	15°20'52.8"	75°34'41.2"

33	167	4	Kurthkoti	15°21'42.8"	75°33'54.3"
34	176		Harthi	15°21'44.5"	75°34'9.5"
35	178		Kurthkoti	15°21'58.1"	75°34'5.6"
36	164		Kurthkoti	15°22'2.8"	75°33'48.1"
37	165	3	Kurthkoti	15°21'55.3"	75°33'50.5"
38	166		Kurthkoti	15°21'49.3"	75°33'51.3"
39	177		Malasamudra	15°21'51.4"	75°34'8.1"
<b>Total</b>		<b>39</b>			

#### **A.4. Technical description of the project**

>>

The project activity involves 39 WECs of Enercon make (800 kW, E-53) with internal electrical lines connecting the Project with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV at the project site and further stepped up to 220 KV at the Receiving sub - station, for the purpose of interconnection with the KPTCL/HESCOM grid at the sub-station of the KPTCL/HESCOM.

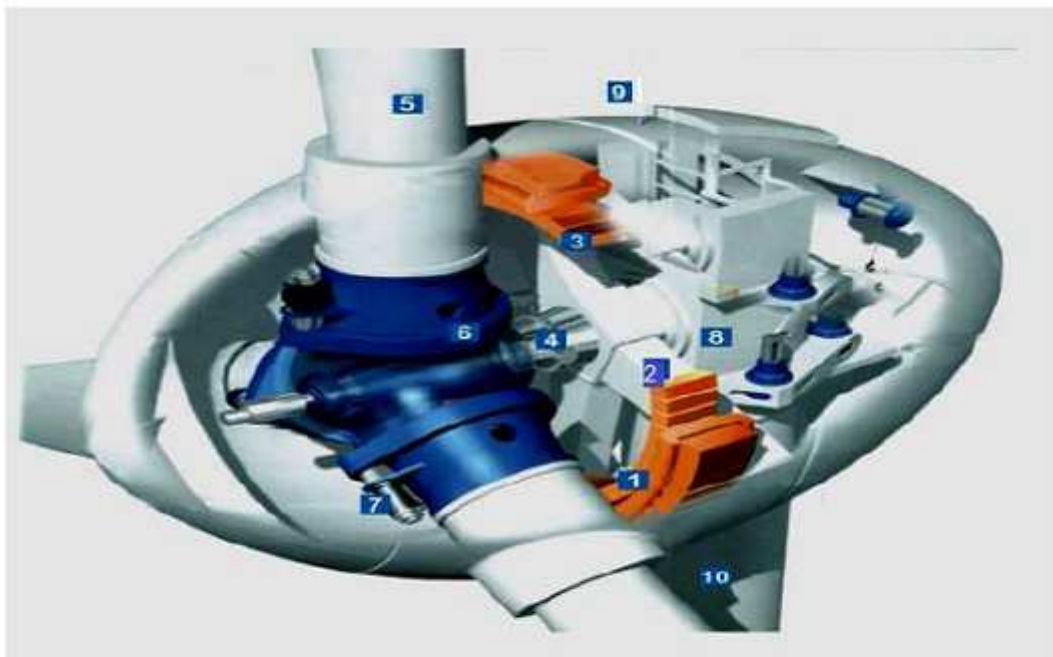
The project activity can operate in the frequency range of 47.5-51.5 Hz and in the voltage range of 400 V  $\pm$ 12.5%. The life time of the WEC is 20 years as provided by the equipment supplier. The other salient features of the state-of-art-technology are:

#### **E 53 Specifications**

Turbine model	Enercon E- 53
Rated power	800 KW
Rotor Diameter	53 m
Hub height	75 m
Turbine type	Gearless horizontal axis wind turbine with variable rotor speed



Power Regulation	Independent electromechanical pitch system for each blade.
Cut in wind speed	2.5 m/s
Rated wind speed	12 m/s
Cut out Wind speed	28-34 m/s
Extreme Wind Speed	59.5 m/s
Rated rotational speed	32 rpm
Operating range rot. speed	12-29 rpm
Orientation	Upwind
No of Blades	3
Blade Material	Fibre Glass Epoxy reinforced with integral lightning protection
Gear box type	Gear less
Generator type	Synchronous generator
Braking	Aerodynamic
Output Voltage	400 V
Yaw System	Active yawing with 4 electric yaw drives with brake motor and friction bearing
Tower	74 m concrete



- |                     |                 |
|---------------------|-----------------|
| 1. Generator        | 6. Blade Flange |
| 2. Generator Stator | 7. Pitch Drive  |
| 3. Generator Rotor  | 8. Main Carrier |
| 4. Main Pin         | 9. Wind Sensor  |
| 5. Rotor Blade      | 10. Tower       |

Enercon (India) Limited has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH, has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured.

**A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:**

>>

Title: Consolidated baseline and monitoring methodology for "Grid -connected electricity generation renewable sources"

Reference: Approved consolidated baseline methodology ACM0002 (Version 11, EB 52)

ACM0002 draws upon the following tools which have been used for ex-ante Emission Reduction calculation:

- Tool to calculate the emission factor for an electricity system - Version 02, EB 50
- Tool for the demonstration and assessment of additionality - Version 05.2, EB 39

Further information with regards to the methodology / tools can be obtained at <http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>

**A.6. Registration date of the project activity:**

>>

09/03/2011

**A.7. Crediting period of the project activity and related information (start date and choice of crediting period):**

>>

The length of the Crediting period of the project activity as per registered PDD is 10 years (Fixed). The crediting period start date is 01/04/2011 and length of crediting period is 10 years (from 01/04/2011 to 31/03/2021).

**A.8. Name of responsible person(s)/entity(ies):**

&gt;&gt;

Organization:	M/s Generation Eolica India Limited
Street/P.O.Box:	3, Amrit Keshav Nayak Marg, Fort
Building:	12/13, Esplanade, 3 <sup>rd</sup> Floor
City:	Mumbai
State/Region:	Maharashtra
Postcode/ZIP:	400 001
Country:	India
Telephone:	+91 - 9910021375
FAX:	+91 22 22072666
E-Mail:	<a href="mailto:avegagarwal@fersa.es">avegagarwal@fersa.es</a>
URL:	
Represented by:	Mr Ignacia Moreno Hernandez
Title:	Director
Salutation:	Mr
Last name:	Hernandez
Middle name:	Moreno
First name:	Ignacio
Department:	
Mobile:	
Direct FAX:	+34 933620405
Direct tel:	+34 932405306
Personal e-mail:	<a href="mailto:imoreno@fersa.es">imoreno@fersa.es</a>

**SECTION B. Implementation of the project activity****B.1. Implementation status of the project activity**

&gt;&gt;

The start date of the project activity is 24/08/2006, which is the date of placement of purchase order for the WECs<sup>1</sup>. The first WTG under this project activity was commissioned on 17<sup>th</sup> December, 2007 and the last WTG was commissioned on 10<sup>th</sup> October, 2008. All 39 WTGs are Enercon make (E-53), having a capacity of 800kW each. There is no such event occurred during the monitoring period, which may impact the applicability of the methodology. The detailed commissioning schedule for the WTGs has been shown below:

Sl. No.	Commissioning Date	No. of WTGs	Location No. of WTGs
1	17.12.2007.	4	170a
2			170
3			171
4			236

<sup>1</sup> The copy of the Purchase Order has already been provided to the DOE during validation.

5	17.03.2008.	6	229
6			181
7			180
8			163
9			226
10			230
11	25.06.2008.	8	173
12			231
13			174
14			233
15			232
16			234
17			169A
18			237
19	07.07.2008.	10	168
20			169
21			235
22			136
23			137
24			138
25			139
26			140
27			141
28			179
29	11.09.2008.	4	228
30			172
31			227

32			239
33	29.09.2008.	4	167
34			176
35			178
36			164
37	10.10.2008.	3	165
38			166
39			177

Enercon operation and maintenance activities are ISO 9001:2000 certified and all the events are recorded at the project site. Referring to the data available, it can be inferred that there have not been any major special event for any machines that are included in the project activity. As a part of regular maintenance, the machines are stopped for mechanical and electrical maintenance for 16 to 18 hours annually and for visual inspection for 6 to 7 hours quarterly.

#### **B.2. Revision of the monitoring plan**

>>

Not applicable.

#### **B.3. Request for deviation applied to this monitoring period**

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Not applicable.

#### **B.4. Notification or request of approval of changes**

>>

Not applicable.

### **SECTION C. Description of the monitoring system**

>>

Approved monitoring methodology ACM0002 Version 11 Sectoral Scope: 1, “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”, by CDM – Meth Panel is proposed to be used to monitor the emission reductions.

This approved monitoring methodology requires monitoring of the following:

- Electricity generation from the project activity; and
- Operating margin emission factor and build margin emission factor of the grid, where *ex-post* determination of grid emission factor has been chosen

Since the baseline methodology is based on *ex-ante* determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required.

There is one main and check meter dedicated to the machines of the project activity at 33 kV metering point (billing point) as shown in the line diagram below. The 33 kV metering points are further

connected to step up transformers and subsequently to the bulk meters (there are three sets of main and check meters as bulk meter) at 220 kV metering point for the machines of the project activity.

In order to determine the net electricity supplied to the grid by the project, the State utility applies the transmission loss to the meter reading recorded at 33 kV metering point. The reading at 33 kV metering point will be taken by the representatives of Enercon and the State utility. This reading is recorded in the form of JMR (Form B) and is signed by the representatives of Enercon and State Utility. Both electricity export and import are metered at this metering point.

The electricity supplied to the grid is apportioned based on transmission Loss. The Joint meter reading contains the following data:-

1. Electricity Export
2. Electricity Import
3. Transmission Loss (Between the 33 kV metering point and 220 kV pooling substation)
4. Net Electricity supplied to the Grid [Electricity Export-115% of Electricity Import-Transmission Loss]

$$\begin{aligned} \text{EGy} &= Gp - Li \\ &= (Gpe - 115\% * Gpi) - Li \end{aligned}$$

Where,

EGy : Net Electricity supplied to grid by the project activity

$$Gp = (Gpe - 115\% * Gpi)$$

Where,

Gpe : Electricity Export recorded at the meter(s) connected 39 machines of the project activity

Gpi : Electricity Import recorded at the meter(s) connected 39 machines of the project activity.

Li : Transmission loss

Transmission loss is certified by the state utility in the JMR (Form B). The procedure for calculation of transmission loss by the State utility is as follows:

$$L = \sum jGj - N$$

Where,

$\sum jGj$  = Summation of electricity generation data measured at all the feeders connected to pooling substation

N = Electricity generation data measured at substation from the feeders emanating from the pooling substation

L = Total transmission loss

$$Li : Gp * (L / \sum Gj)$$

Where,

$G_p$  = Generation of electricity by the project activity recorded at the feeder connected to 39 turbines of the project activity [Export ( $G_{pe}$ ) – 115% \* Import ( $G_{pi}$ )]

Transmission Loss is directly applied from the Joint Meter Report (Form B) for the project activity and the JMR (Form B) is signed jointly by the representatives of the Company (Enercon) and the state utility.

Therefore, Energy Supplied to the Grid after adjustment of transmission loss is as follows:

$$\text{EGy} = \text{EG export} - 115\% * \text{EG import} - \text{Transmission Loss}$$

The meter readings (both export and import), transmission loss and net electricity supplied to the grid are recorded in the JMR (Form B). Hence, all these values are sourced from the JMR for the calculation emission reduction. Please refer to section D.2 for details on calibration and QA/QC procedures.

The net electricity supplied to the grid can be cross checked from the invoices raised on the state utility for supply of net electricity supplied to the grid.

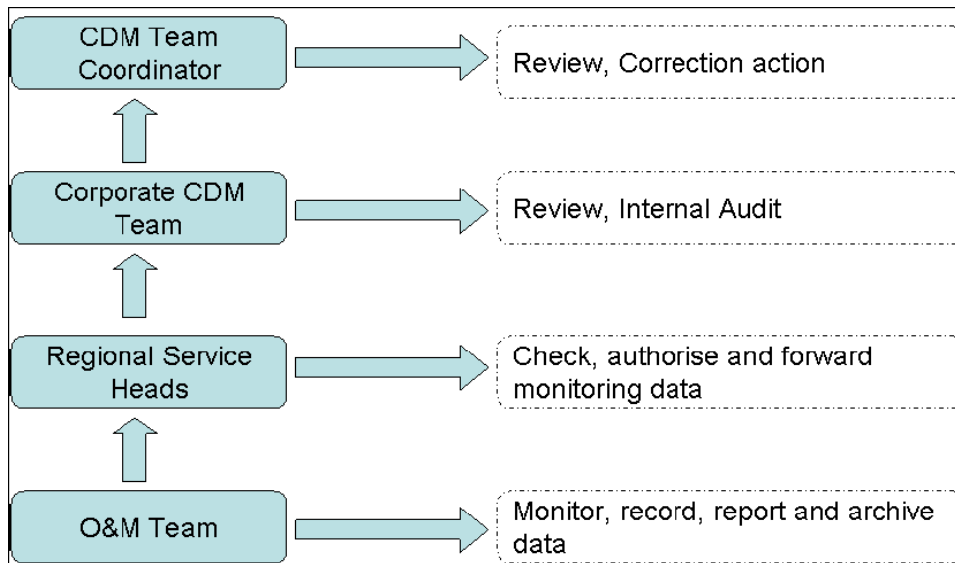
The Project is operated and managed by GEL. The operational and maintenance contract for the project is with Enercon. Enercon is an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. Enercon (India) Limited follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure. All the meters will be tested for accuracy once every year. The project will adhere to all the mandatory regulatory and statutory requirements at the state as well as national level. Enercon is Operation and Maintenance contractor for the project activity and provides the daily generation report to the project proponent.

### **Training and maintenance requirements**

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Energy Converters (WECs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure that Enercon's staffs who are positioned to take care all the activities starting from project construction to operation and maintenance, Enercon Training Academy provides need based periodical training to meet the requirements of the project. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all the trainees. The training facility is located at Daman and is fully functional and equipped with qualified trainers, training equipments, classrooms and hostel facilities.

The operational and management structure implemented is as follows:



### **Metering details & QA/ QC procedures**

**Metering Equipments:** Metering system for the project activity consists of one main and one check meter at 33 kV metering point & three sets of main & check meters (bulk meters) at 220 kV sub-station end. Both the meters are **two-way tri-vector meters of accuracy class 0.2s capable of recording import and export of electricity**. The metering equipment is calibrated annually.

**Meter Readings:** The Net electricity supplied to the grid is recorded in the form of Joint Meter Reading (JMR) (Form B) in the presence of State Utility and the representative of the Project proponent (Enercon). The Joint meter reading contains the value of energy imported and exported and the net supply to the grid during the recording period. This JMR is certified by the Authorized representative of the state utility and representative of the Company (Enercon). These certified readings are then used to prepare the invoices to be raised on State Utility. Therefore, the net electricity supplied to the grid as mentioned in the JMR can be cross-checked with the invoices.

**Inspection of Energy Meters:** All main and check energy meters (export and import) are of 0.2s accuracy class. Each meter is jointly inspected and sealed on behalf of the Parties and is not to be interfered with by either Party except in the presence of the other Party or its accredited representatives.

**Meter Test Checking:** All the main & check meters will be tested for accuracy with a standard meter by the KPTCL's testing Division. The KPTCL will carry out the calibration, periodical testing, sealing and maintenance of meters. The KPTCL will provide a copy of the test reports.

If during the meter test checking,

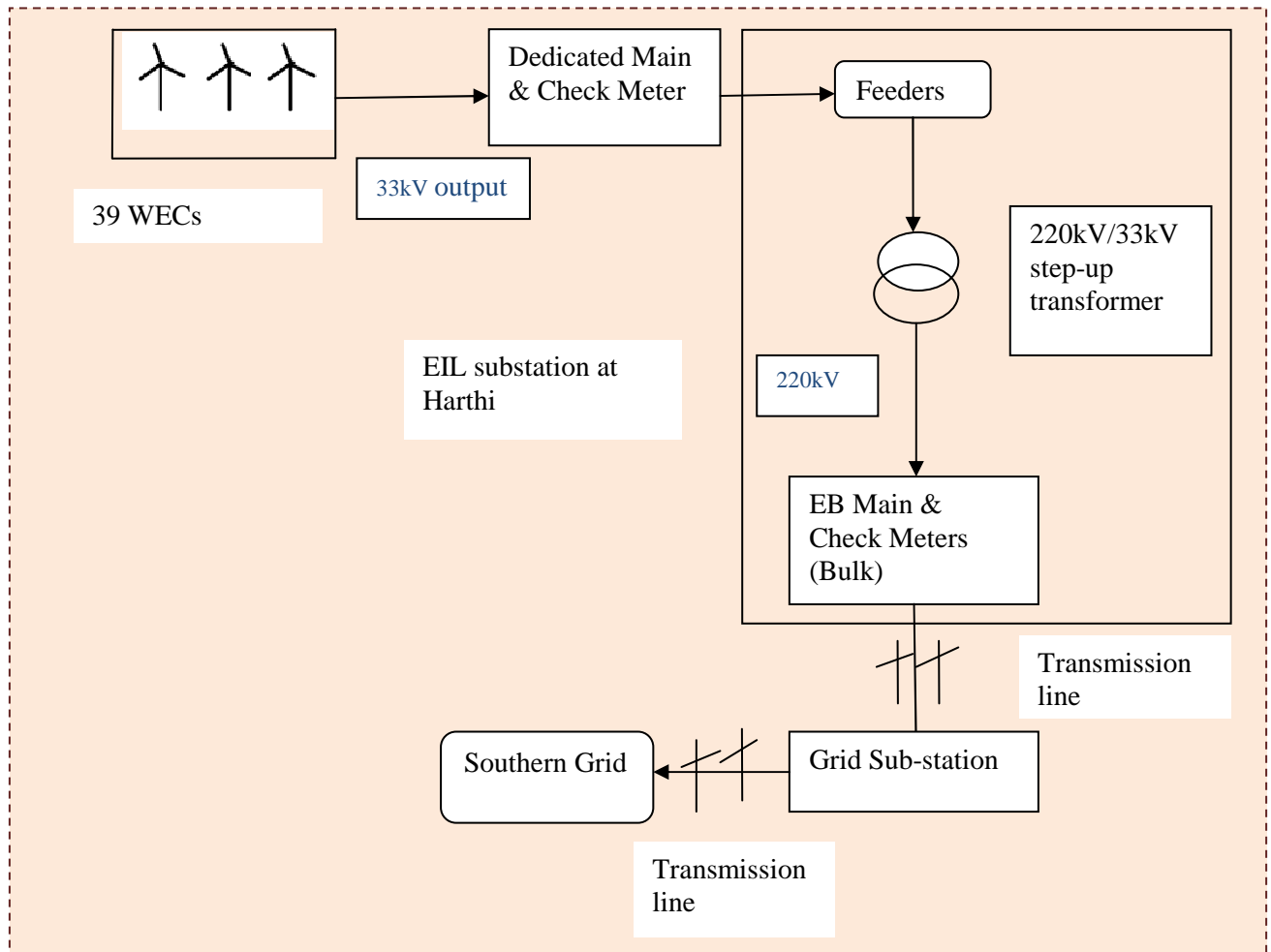
- ✓ the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then the meter reading will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.
- ✓ the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limit of error, then the meter reading for the month up to the date and time of such test shall be as per the check meter. The main meter shall be calibrated immediately and meter reading for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.



- ✓ both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters shall be immediately calibrated and the correction will be applied to the reading registered by the main meter to arrive the correct reading of energy supplied to the grid for the period up to the last test.

In case of the failures such as burning of the meter and the erratic display of the metered parameters and when the error found in testing the meters is beyond the permissible limit of error, the meter shall be calibrated immediately and the correction will be applied to the reading registered by the main meter to arrive the correct reading of energy supplied to the grid for the period up to last test.

The line diagram of the metering system for the project activity is as follows:



The calibration reports for the meters (both main & check meter) at 33 kV metering point have been shown below:

Meter Type	Meter Sr. no.	Accuracy class	Make	Latest Calibration done	Calibration due on
Main Meter	05389382	0.2	L&T	28/04/2011	28/04/2012
Check Meter	07022924	0.2	L&T	28/04/2011	28/04/2012

From the above table, it can be seen that calibration of the meters at 33 kV metering points have been done on annual basis and the calibration results show the error within the permissible limits.

The calibration reports for the bulk meters (both main & check meters) at 220 kV substation have been shown below:

Substation	Meter Type	Meter Sr. no.	Accuracy class	Make	Latest Calibration done	Calibration due on
220 kV Sub-station	Main Meter	07022944	0.2	L&T	22/06/2011	22/06/2012
	Check Meter	07022903	0.2	L&T	22/06/2011	22/06/2012
	Main Meter	07022908	0.2	L&T	22/06/2011	22/06/2012
	Check Meter	07022915	0.2	L&T	22/06/2011	22/06/2012
	Main Meter	06760786	0.2	L&T	22/06/2011	22/06/2012
	Check Meter	06767587	0.2	L&T	22/06/2011	22/06/2012

From the above table, it can be seen that calibration of the bulk meters have been done on annual basis and the calibration results show the error within the permissible limits.

#### SECTION D. Data and parameters

##### D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

*(Copy this table for each data and parameter. To report multiple values, a table may be used)*

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO <sub>2</sub> e/MWh
Description:	Operating Margin Emission Factor of Southern Regional Electricity Grid
Source of data used:	“CO <sub>2</sub> Baseline Database for Indian Power Sector” Version 04

	published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO <sub>2</sub> Baseline Database for Indian Power Sector” is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) :	0.998157
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Additional comment:	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

<b>Data / Parameter:</b>	<b><math>EF_{grid,BM,y}</math></b>
Data unit:	tCO <sub>2</sub> e/MWh
Description:	Build Margin Emission Factor of Southern Regional Electricity Grid
Source of data used:	“CO <sub>2</sub> Baseline Database for Indian Power Sector” Version 04 published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO <sub>2</sub> Baseline Database for Indian Power Sector” is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) :	0.71332
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Additional comment:	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

<b>Data / Parameter:</b>	<b><math>EF_{grid,CM,y}</math></b>
Data unit:	tCO <sub>2</sub> e/MWh
Description:	Combined Margin Emission Factor of Southern Regional Electricity Grid
Source of data used:	“CO <sub>2</sub> Baseline Database for Indian Power Sector” Version 04 published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO <sub>2</sub> Baseline Database for Indian Power Sector” is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) :	0.92694
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Additional comment:	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

<b>D.2. Data and parameters monitored</b>	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
<b>Data / Parameter:</b>	<b>EG<sub>y</sub></b>
Data unit:	MWh (Mega-watt hour)

Description:	Net electricity supplied to the grid by the Project
Measured /Calculated /Default:	Calculated from the measured values
Source of data:	Electricity supplied to the grid as per Joint Meter Reading (Form B) taken at 33 kV metering point. This value can be cross-checked by the tariff invoices raised on KPTCL/HESCOM.
Value(s) of monitored parameter:	37,984
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculated as per the formula described in section C.
Measuring/ Reading/ Recording frequency:	Monitored on continuous basis and recorded on monthly basis.
Calculation method (if applicable):	<p>The net supplied electricity is calculated after deducting the net import and transmission loss from the gross generation.</p> <p>Net electricity supplied to the grid = Gross electricity generated – 115% of Import – Transmission loss</p>
QA/QC procedures applied:	<p>QA/QC procedures are implemented by KPTCL/HESCOM pursuant to the provisions of the power purchase agreement.</p> <p>The values of electricity supplied to the grid mentioned in the JMR (Form B) for the projects at 33 kV metering point can be cross checked with values mentioned in the invoice raised on HESCOM.</p> <p>The data (electricity supplied to the grid) will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.</p>

<b>Data / Parameter:</b>	<b>Gpe</b>
Data unit:	MWh (Mega-watt hour)
Description:	Electricity Export recorded at the meter(s) connected 39 machines of the project activity.
Measured /Calculated /Default:	Measured
Source of data:	Electricity export to the grid as per Joint Meter Reading (Form B) taken at 33 kV metering point. This value can be cross-checked by the tariff invoices raised on HESCOM.
Value(s) of monitored parameter:	38,208
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration	<p>L&amp;T Make; accuracy class: 0.2s.</p> <p>The meters are calibrated once in a year.</p>

frequency, date of last calibration, validity)	<p>Last calibration done: 28/04/2011 ; valid till 27<sup>th</sup> April, 2012</p> <p>Serial numbers of the meters:</p> <p>Main Meter: 05389382 Check Meter: 07022924</p>
Measuring/ Reading/ Recording frequency:	Monitored on continuous basis and recorded on monthly basis.
Calculation method (if applicable):	-
QA/QC procedures applied:	<p>The calibration of the meters is done once in a year to ensure the accuracy of the meters.</p> <p>The data (electricity export to the grid) will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.</p>

<b>Data / Parameter:</b>	<b>Gpi</b>
Data unit:	MWh (Mega-watt hour)
Description:	Electricity Import recorded at the meter(s) connected 39 machines of the project activity.
Measured /Calculated /Default:	Measured
Source of data:	Electricity import from the grid as per Joint Meter Reading (Form B) taken at 33 kV metering point. This value can be cross-checked by the tariff invoices raised on HESCOM.
Value(s) of monitored parameter:	8.97
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>L&amp;T Make; accuracy class: 0.2s.</p> <p>The meters are calibrated once in a year.</p> <p>Last calibration done: 28/04/ 2011; valid till 27<sup>th</sup> April, 2012</p> <p>Serial numbers of the meters:</p> <p>Main Meter: 05389382 Check Meter: 07022924</p>
Measuring/ Reading/ Recording frequency:	Monitored on continuous basis and recorded and on monthly basis.
Calculation method (if applicable):	-
QA/QC procedures applied:	The calibration of the meters is done once in a year to ensure the accuracy of the meters.

	The data (electricity import from the grid) will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
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<b>Data / Parameter:</b>	<b>Li</b>
Data unit:	MWh (Mega-watt hour)
Description:	Transmission loss between the metering point for the project activity feeding the pooling substation of Enercon and the metering point at EB Substation.
Measured /Calculated /Default:	Calculated as per the formula described in section C.
Source of data:	Transmission Loss will be directly applied from the Form B for the project activity.
Value(s) of monitored parameter:	215
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-
Measuring/ Reading/ Recording frequency:	On monthly basis.
Calculation method (if applicable):	<p>EB Substation is connected to the machines of the project activity and the machines commissioned by the other project developers. The project proponent does not have control over the data of the other project developers.</p> <p>Therefore, the project developer has to rely upon the transmission loss applied to the project activity by the state utility as reflected in the JMR (Form B). The JMR is signed by the representatives of Enercon and the state utility.</p>
QA/QC procedures applied:	The data (Transmission losses) will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.

## SECTION E. Emission reductions calculation

### E.1. Baseline emissions calculation

>>

As described in the registered PDD, the baseline emission  $BE_y = EG_y * EF_y$

Where,

$BE_y$  = Baseline emissions in year y, tCO<sub>2</sub>e

$EG_y$  = Net electricity supplied to the grid in year y and is applied directly from JMR (Form B) certified by state utility. This value can also be cross checked from the invoice..

$EF_y$  = CO<sub>2</sub> emission factor of the grid (0.92694 tCO<sub>2</sub>e/ MWh; fixed ex-ante).

Therefore, Baseline Emission for the monitoring period 01/04/2011 to 30/09/2011 is

$$BE_y = EG_y * EF_y$$

$$= 37,984 \text{ (MWh)} * 0.92694 \text{ (tCO}_2\text{/MWh)}$$

$$= 35,209 \text{ tCO}_2$$

### E.2. Project emissions calculation

>>

The project activity uses wind power to generate electricity and hence the emissions from the project activity have been taken as zero.

Therefore,

$$PE_y = 0$$

### E.3. Leakage calculation

>>

No leakage has been considered from the project activity as per the approved methodology ACM0002. Therefore,

$$L_y = 0$$

### E.4. Emission reductions calculation / table

>>

The total emission reductions achieved during the monitoring period is **35,209** tCO<sub>2</sub>. The details have been provided below as well as in the Emission Reduction (ER) spread sheet.

Total baseline emissions: 35,209 tCO<sub>2</sub>

Total project emissions: Zero

Total leakage: Zero

$$\begin{aligned} \text{Total Emission reductions (ER}_y\text{)} &= BE_y - PE_y - L_y \\ &= \mathbf{35,209 \text{ tCO}_2} \end{aligned}$$

<b>Period</b>	<b>Baseline Emission factor (EFy) (tCO<sub>2</sub>e/MWh)</b>	<b>Baseline Emission (tCO<sub>2</sub>e)</b>	<b>Project Emission (tCO<sub>2</sub>e)</b>	<b>Leakage (tCO<sub>2</sub>e)</b>	<b>Emission Reduction (ERy) (tCO<sub>2</sub>e)</b>
<sup>2</sup> 01/04/2011 to 30/09/2011	0.92694	35, 209	<b>0</b>	<b>0</b>	35, 209

#### **E.5. Comparison of actual emission reductions with estimates in the CDM-PDD**

>>

<b>Item</b>	<b>Values applied in ex-ante calculation of the registered CDM-PDD</b>	<b>Actual values reached during the monitoring period</b>
<b>Emission reductions (tCO<sub>2</sub>e)</b>	<b>32,048</b> (Six months equivalent of annually <b>64,095</b> emission reductions estimated in the registered PDD)	<b>35,209</b>

#### **E.6. Remarks on difference from estimated value in the PDD**

>>

The PLF value (27.7%) is higher by 9.56% in the monitoring report as it is calculated on the basis of the generation data of six months as compared to the annual PLF value (25.3%) considered in the registered PDD. This is due to the reason that the PLF for wind projects follow a seasonal pattern and the present monitoring period of this project covers the peak wind season. Accordingly, the resulting emission reduction value is higher (9.86%) than the estimated emission reduction value mentioned in the registered PDD.

Moreover, this electricity generation from wind is beyond the control of Project Proponent (PP). In the registered PDD, 10% sensitivity of the PLF has been performed and has been shown that the return is not crossing the benchmark value. Hence, this variation in the PLF has been already covered in the sensitivity analysis of the project in the registered PDD.

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<sup>2</sup> The crediting period start date is 1<sup>st</sup> April, 2011. The billing cycle is from 1st to 1st of every month.



#### History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
<b>Decision Class:</b> Regulatory <b>Document Type:</b> Guideline, Form <b>Business Function:</b> Issuance		