MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	Tungabhadra Wind Power Project In Karnataka
Reference number of the project activity	1268
Version number of the monitoring report	1
Completion date of the monitoring report	15/10/2012
Registration date of the project activity	27/10/2008
Monitoring period number and duration of this monitoring period	3rd Verification, 01/09/2011 to 31/08/2012
Project participant(s)	Enercon (India) Limited
Host Party(ies)	India
Sectoral scope(s) and applied methodology(ies)	Energy industries (renewable/ non-renewable sources). *Consolidated methodology for grid-connected electricity generation from renewable sources,* ***ACM0002, Version 6***
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	49,331 tCO_2
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	52,607 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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(a) *Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks;*

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 (GHG's) into the atmosphere, which is estimated to be approximately 52,607 tCO_2e for this monitoring period, 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 Wind Energy Convertors (WEC's) is emission free.

(b) *Brief description of the installed technology and equipments;*

The Project involves 38-wind energy converters (WECs) of Enercon make (600 kW E-40) 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. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The other salient features of the state-of-art-technology are referred in Appendix 2. The line diagram of wind farm including metering points and substations is attached as Appendix 1.

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

The machines under the project activity were commissioned on 23 April 2007, 12 Sep 2007 & 31 Dec 2007. The expected operational lifetime of the project is for 20 years. The length of the Crediting period of the project activity as per registered PDD is 10 years (Fixed). The length of crediting period is from 27 October 2008 to 26 October 2018 (Fixed). In first CER verification, the monitoring period considered was the period from 27 October 2008 to 30 Nov 2009. The second monitoring period was from 1 December 2009 to 31 August 2011. The third monitoring period considered is from 01 Sep 2011 to 31 Aug 2012.

(d) *Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period.*

The total emission reductions achieved under this monitoring period (01 Sep 2011 to 31 Aug 2012) is 52,607 tCO2.

A.2. Location of project activity

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(a) *Host Party(ies);*

India

(b) *Region/State/Province, etc.;*

Southern Region/Karnataka State

(c) *City/Town/Community, etc.;*

The project activity is located at village Singatalur, Koralahalli and Hammigi at Mundargi in Gadag district in the state of Karnataka, India.

(d) *Physical/ Geographical location.*

The project area extends between latitude 15^o 3' 0.6'' to 15^o 5' 58.1'' – North and 75^o 50' 0.7'' to 75^o 52' 58.9'' – East. The Project is connected to the KPTCL 110/33/11 kV substation at Bannikoppa village.

Individual WEG location numbers and coordinates are detailed out in below Table 1: -

Unique Identification Number	Loc. No.	Latitude			Longitude		
		Degree	Minutes	Seconds	Degree	Minutes	Seconds
EILKGS 1	1	15	3	27.4	75	52	4.0
EILKGS 2	2	15	3	30.0	75	52	2.0
EILKGS 3	3	15	3	29.9	75	51	57.9
EILKGS 4	4	15	3	32.4	75	51	51.3
EILKGS 5	5	15	3	36.1	75	51	43.0
EILKGS 6	6	15	3	37.3	75	51	39.6
EILKGS 7	7	15	3	38.3	75	51	34.1
EILKGS 8	8	15	3	45.3	75	51	40.0
EILKGS 9	9	15	3	49.2	75	51	39.1
EILKGS 10	10	15	3	52.2	75	51	36.7
EILKGS 11	11	15	3	54.1	75	51	32.7
EILKGS 12	12	15	3	54.3	75	51	16.4
EILKGS 13	13	15	3	58.1	75	51	15.3
EILKGS 14	14	15	4	4.2	75	51	17.2
EILKGS 15	15	15	4	7.5	75	51	14.4
EILKGS 16	16	15	4	5.7	75	51	4.8
EILKGS 17	17	15	4	9.5	75	51	1.6
EILKGS 18	18	15	4	20.9	75	51	0.7
EILKGS 19	19	15	4	23.2	75	50	58.1
EILKGS 20	20	15	4	27.2	75	50	54.0
EILKGS 21	21	15	4	34.3	75	51	5.4
EILKGS 22	22	15	4	36.7	75	50	58.9
EILKGS 23	23	15	4	38.9	75	50	51.6
EILKGS 24	24	15	4	38.1	75	50	40.6
EILKGS 25	25	15	4	37.1	75	50	30.2
EILKGS 26	26	15	4	42.4	75	50	38.5
EILKGS 27	27	15	4	45.6	75	50	35.0
EILKGS 28	28	15	4	48.0	75	50	30.7
EILKGS 29	29	15	4	51.0	75	50	26.8
EILKGS 30	30	15	4	54.5	75	50	22.4
EILKGS 31	31	15	4	57.0	75	50	19.9
EILKGS 32	32	15	5	0.6	75	50	16.6
EILKGS 33	33	15	4	16.5	75	51	3.5
EILKGS 34	34	15	5	4.8	75	50	33.7
EILKGS 35	35	15	5	8.0	75	50	30.8
EILKGS 36	36	15	5	11.5	75	50	26.1
EILKGS 37	37	15	5	12.7	75	50	19.3
EILKGS 38	38	15	5	15.5	75	50	16.3

A.3. Parties and project participant(s)

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (Host)	Enercon (India) Limited	No

A.4. Reference of applied methodology

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Methodology: "Consolidated methodology for grid-connected electricity generation from renewable sources", **ACM0002 Version 6.**

Baseline Methodology: Consolidated monitoring methodology for grid-connected electricity generation from renewable sources, **ACM0002, Version 6.**

Monitoring Methodology: Consolidated monitoring methodology for grid-connected electricity generation from renewable sources, **ACM0002, Version 6.**

ACM0002 draws upon the following tools:

- Tool to calculate the emission factor for an electricity system
- Tool for the demonstration and assessment of additionality

Further information with regards to the methodology / tools can be obtained at
http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT

A.5. Crediting period of project activity

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The length of the Crediting period of the project activity as per registered PDD is 10 years (Fixed). The crediting period start date is 27 Oct 2008 and length of crediting period is 10 years (27 October 2008 to 26 October 2018 (Fixed)).

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The Project involves 38-wind energy converters (WECs) of Enercon make (600 kW E-40) 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. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The other salient features of the state-of-art-technology are referred in Appendix 2.

For project activities that consist of more than one site, the report shall clearly describe the status of implementation and starting date of operation for each site. For CDM project activities with phased implementation, the report shall indicate the progress of the proposed CDM project activity achieved in each phase.

The starting date of operation of the project activity

The first WEC under the project activity was commissioned on 23rd April 2007 and last WEC under the project activity was commissioned on 31st December 2007. The commissioning date for all the WECs included in the project activity is given in the table below.

Table 2:

Unique Identification Number	Loc. No.	Date of Commissioning
EILKGS 1	1	31/12/2007
EILKGS 2	2	31/12/2007
EILKGS 3	3	31/12/2007
EILKGS 4	4	31/12/2007
EILKGS 5	5	31/12/2007
EILKGS 6	6	31/12/2007
EILKGS 7	7	31/12/2007
EILKGS 8	8	31/12/2007
EILKGS 9	9	31/12/2007
EILKGS 10	10	31/12/2007
EILKGS 11	11	31/12/2007
EILKGS 12	12	23/04/2007
EILKGS 13	13	23/04/2007
EILKGS 14	14	31/12/2007
EILKGS 15	15	31/12/2007
EILKGS 16	16	23/04/2007
EILKGS 17	17	23/04/2007
EILKGS 18	18	23/04/2007
EILKGS 19	19	23/04/2007
EILKGS 20	20	23/04/2007
EILKGS 21	21	12/09/2007
EILKGS 22	22	31/12/2007
EILKGS 23	23	31/12/2007
EILKGS 24	24	12/09/2007
EILKGS 25	25	12/09/2007
EILKGS 26	26	23/04/2007
EILKGS 27	27	23/04/2007
EILKGS 28	28	23/04/2007
EILKGS 29	29	31/12/2007
EILKGS 30	30	31/12/2007
EILKGS 31	31	31/12/2007
EILKGS 32	32	31/12/2007
EILKGS 33	33	12/09/2007
EILKGS 34	34	12/09/2007
EILKGS 35	35	12/09/2007
EILKGS 36	36	12/09/2007
EILKGS 37	37	12/09/2007
EILKGS 38	38	12/09/2007

The information regarding the actual operation of the project

The project activity consists of 38 WECs (600 kW) of Enercon make E-40 totaling to a capacity of 22.8 MW. During the monitoring period, the WECs were operating normally. Hence no major breakdown was found during this period. .

A brief description of: (i) events or situations that occurred during the monitoring period (ii) how the issues resulting from these events or situations are being addressed.

Enercon (India) limited is responsible for operation and maintenance activities for this project. Enercon (India) limited operation and maintenance activities are ISO 9001:2008 certified and all the events are recorded in the log book available at the project site. Referring to the data available it can be inferred that there have not been any major special events for any of the WECs that are included in the project activity. As a part of regular maintenance the WECs 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. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

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Not Applicable

B.2.2. Corrections

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Not Applicable

B.2.3. Permanent changes from registered monitoring plan or applied methodology

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We have applied for the revision in monitoring plan. The same has been approved by EB on 18-Feb-2011.

B.2.4. Changes to project design of registered project activity

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Not Applicable

B.2.5. Changes to start date of crediting period

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Not Applicable

B.2.6. Types of changes specific to afforestation or reforestation project activity

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Not Applicable

SECTION C. Description of monitoring system

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Approved monitoring methodology ACM0002 / Version 06 Sectoral Scope: 1, "Consolidated methodology for grid-connected electricity generation from renewable sources", by CDM - Meth Panel 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 project activity at 33 kV metering point for the project activity. In addition to this there are two main and check meters (bulk meters) at 110 kV metering point at the Enercon substation and are connected to the machines of the project activity and the machines commissioned by the other project developers. Therefore in order to determine the electricity supplied to the grid by the project at 110 kV at the Bannikoppa substation, the state utility applies the transmission loss to the meter reading recorded at the 33 kV metering point. The transmission loss calculated by the state utility is endorsed / confirmed jointly by the representatives of Enercon and the state utility. The transmission loss applied to the project activity by the state utility is reflected in the JMR (Form B) recorded at 33kV metering point. Electricity supplied to the grid is calculated by

applying transmission loss to the meter readings taken at 33 kV metering location of the project activity.

The procedure for calculation of transmission loss as given in the PPA is set-out below:

$$Z = \frac{(X1+X2+X3...+Xn)-Y}{(X1+X2+X3...+Xn)} \times 100$$

Z = Percentage transmission loss for export incurred in transmission line between the meter located at 33 kV metering point and the meters located at 110kV metering point (two bulk meters) high voltage side of receiving sub-station.

Xi = Energy Export Reading of energy meter installed at 33kV metering point

Here Xi represents X1, X2, X3,…Xn which are the meters that are installed at 33kV metering point and are connected to the receiving substation by internally connected lines to the receiving station.

Y = Energy Export Readings at bulk meters (two in number) installed at high voltage side of transformer of the receiving station at 110 kV.

The Export Reading Xi is adjusted for transmission loss that is determined by the state utility and is applied directly to the JMR (Form B) taken at 33 kV metering point. This can be checked from the JMR signed jointly by the representatives of Enercon and the state utility.

Transmission Loss in Export **(T_E)** = Percentage Transmission Loss (Z) * Energy Export at 33kV metering point (EGExport)

Empirical Formula for Energy Export after adjustment of transmission loss (Equation 1)

Net Energy Export after adjustment of transmission loss = **EGexport – Transmission Loss (T_E)**

The transmission loss in export is generally less than 5%. However in case of Energy Import, the state utility conservatively applies adjustment of 15% to the import values noted at 33 kV metering point.

Transmission Loss in Import **(T_I)** = 15% * Energy Import at 33kV metering point (EGImport)

Empirical Formula for Energy Import after adjustment of transmission loss (Equation 2)

Net Energy Import after adjustment of transmission loss **= EGimport +15%*EGimport**
= 115%* EGimport

Therefore Energy Supplied to Grid after adjustment of transmission loss is difference of equation 1 and 2 as given in the JMR (Form B) signed jointly by Enercon and the state utility.

EGy = EGexport – 115%*EGimport – Transmission Loss (T_E)

The Joint meter reading noted at 33 kV metering location contains the following data:-

1. Electricity Export (EGexport)
2. Electricity Import (EGimport)
3. Transmission Loss (T_E) between 33 kV metering point and 110 kV metering point (two bulk meters) at Enercon substation
4. Electricity supplied to the Grid [EGexport-115%*EGimport-T_E]

JMR is signed by the representatives of Enercon and the state utility. The meter readings (both export and import), transmission loss and electricity supplied to the grid are recorded in the JMR (33 kV metering point). Hence all these values have been reproduced from the JMR for calculation of emission reductions.

In addition to the JMR (Form B) at 33kV metering location for the project activity, the following documents will also be provided to the DoE for verification:

1. JMR (Form B) at 110kV metering point (two bulk meters) at Enercon substation

2. Transmission loss calculation endorsed / confirmed jointly by the representatives of Enercon and the state utility.

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

Monitoring Information:

The reference of the monitoring information as described under this section has been taken from the PPA.

Metering: Electricity supplied to the grid is metered jointly by state utility and Enercon through one main and one check meter at 33 kV metering point connecting exclusively the machines of project activity.

In addition to this there are two main and check meters (Bulk meters) at 110 kV metering point at Enercon substation covering machines of the project activity and machines of other project developers. The schematic diagram indicating location of meters at 33 kV and 110 kV metering points for the project activity is attached as Appendix 1.

Metering Equipment: Metering system for the project activity consists of one main and one check meter of 0.2 percent accuracy class at 33 kV metering point and two main and check meters at 110 kV metering point. All the meters are two-way Trivector meters capable of recording import and export of electricity. The meters installed are capable of recording and storing half hourly readings of all electrical parameters for a minimum period of 35 days with digital output.

Meter Readings: The electricity supplied to the grid is recorded by taking JMR for 22.8 MW at 33kV metering point in the presence of representatives of state utility and Enercon. The JMR at 33kV metering point contains the value of energy exported, energy imported, transmission loss and electricity supplied to the grid during the recording period. This JMR is certified by state utility. These certified readings are then used to prepare the invoices to be raised on Discom. Thus the electricity supplied to the grid as mentioned in the JMR can be crosschecked with the value mentioned in the invoices.

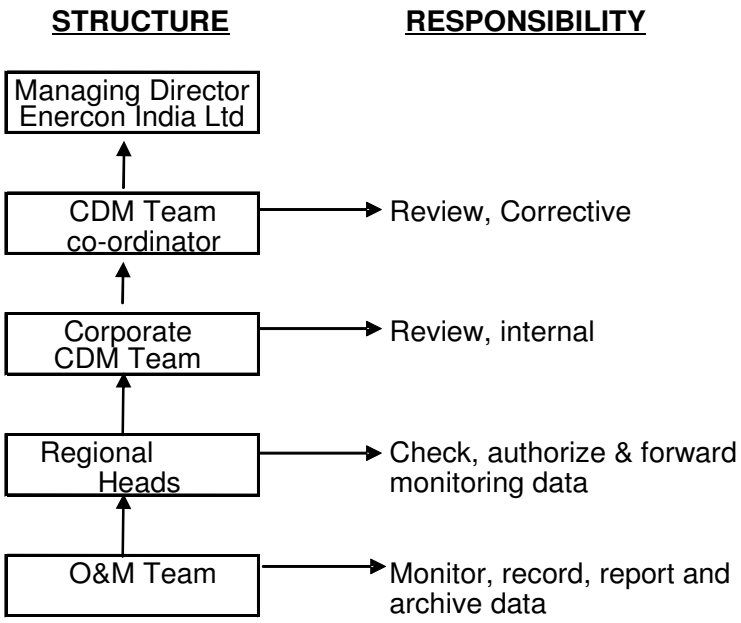
Inspection of Energy Meters: All main and check energy meters and all associated instruments, transformers installed at the Project are of 0.2% accuracy class. Each meter is jointly inspected and sealed on behalf of the Parties and is not to be interfered with by either Party except in the presence of the other Party or its authorized representatives.

Meter Test Checking: All main and check meters are tested for accuracy with reference to a portable standard meter. The portable standard meter is owned by state utility. The main and check meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2 accuracy class. The consumption registered by the main meters alone will hold good for the purpose of metering electricity supplied to the grid as long as the error in the main meters is within the permissible limits. All the meters will be tested / calibrated for accuracy annually.

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 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. There will be a revision in the meter reading for the period from the previous calibration test up to the current test based on the readings of 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 main meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive the correct reading of energy supplied for metering electricity supplied to the grid for the period from the last month's meter reading up to the current test. Meter reading for the period thereafter till the next monthly reading shall be as per the calibrated main meter.

Operational and Management structure implemented by Enercon:



The reading is monitored continuously by the online monitoring station (online monitoring station is located at the project site where all the data [historical and instantaneous] from the LCS or panel meters of all WECs is retrieved) at the project site. In case of data loss, the data can be archived from this online monitoring system.

The data (electricity supplied to the grid) will be archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period.

Training imparted to the Personnel

Enercon (India) Limited has been instrumental in imparting training to the persons it recruits to serve in the organisation. EIL has a separate training facility, called Enercon Training Academy, which gives training to the persons who are to be deployed On-Site to take care of all the activities starting from project construction to operation to maintenance. The training facility is located at Daman and is fully functional and equipped with qualified trainers, training equipments, classrooms and hostel facilities. The training academy has a fixed schedule which is applicable to all those who reside in the training academy. The training schedule and the training period depend upon the role the trainee has to perform.

The trainers are well equipped to judge the capabilities of the trainees. All trainees, who are to be associated to the technical side of project are given six to twelve months' rigorous training on all the aspects of wind turbine installation and maintenance depending upon the requirements. Enercon conducts periodical test to rate the trainees and thus they are deployed as per the outcomes of their performance during the training period.

Calibration Details

The metering equipments were inspected & calibrated by state utility. Meter details for the all the main and check meters are as follows:-

Meter description	Serial No.	Make	Accuracy class	Metering point	Calibration for 2009	Calibration for 2010	Calibration for 2011	Calibration due in 2012
Main meter (Bulk Meter I)	6607369	L&T	0.2	Bannikoppa S/s 110 KV	30-Mar-09	25-May-10	14-Jul-11	13-Jul-12
Check meter (Bulk Meter I)	6606801	L&T	0.2	Bannikoppa S/s 110 KV	30-Mar-09	25-May-10	14-Jul-11	13-Jul-12
Main meter (Bulk Meter II)	6605135	L&T	0.2	Bannikoppa S/s 110 KV	30-Mar-09	25-May-10	14-Jul-11	13-Jul-12
Check meter (Bulk Meter II)	6607373	L&T	0.2	Bannikoppa S/s 110 KV	30-Mar-09	25-May-10	14-Jul-11	13-Jul-12
Main meter at 33 KV	6767626	L&T	0.2	Kapathgudda South 33KV	8-Dec-09	5-Oct-10	26-Nov-11	25-Nov-12
Check Meter at 33 KV	6767637	L&T	0.2	Kapathgudda South 33KV	8-Dec-09	5-Oct-10	26-Nov-11	25-Nov-12

- As per revised Monitoring plan, the meters shall be tested for accuracy once annually. However it can be seen from above table that the consecutive calibrations are not done for the bulk meter annually on time. Therefore in accordance with "Guidelines For Assessing Compliance With The Calibration Frequency Requirements"–Annex 60 to EB 52, Paragraph 4(a) where calibration is not carried out in line with the frequency mentioned in the registered PDD, as a conservative approach, the energy export and import values (as mentioned in the JMR) can be considered after applying the maximum possible value of error of the instrument to the measured values.
- Since the latest test certificate shows that meters are operating within their accuracy class 0.2%. In accordance with Annex 60, EB 52 we have applied a correction factor of +0.2% for imports & transmission loss and -0.2% for exports for the entire monitoring period. The correction factor applied to meter reading can be validated from calculation of emission reductions provided in spreadsheet and section D.
- In 2011, the Bulk main & check meters were calibrated on 14-Jul-2011 and the next calibration was due in 13 Jul 2012. The calibrations of these meters have not been performed till date. Hence there is gap of two months i.e. Jul-2012 & Aug-2012. Therefore, we have applied the error factor for the months Jul-2012 & Aug-2012.
- In 2010, the main & check meters at 33 kV were calibrated on 05-Oct-2010 and the next calibration was due in 04 Oct 2011. In 2011, the main & check meters were calibrated on 26-Nov-2011 and the next calibration is due in 25-Nov-2011. Hence there was gap of two months

i.e Oct-2011 & Nov-2011. Therefore, we have applied the error factor for the months Oct-2011 & Nov- 2011.

The error factor has been applied for the transmission loss and not for export and import values for Jul 2012 & Aug 2012 because of the reason that delay in the calibration happened in the case of bulk meter 110 KV at Bannikoppa S/s. The bulk meters are only used for calculation of the transmission loss.

The error factor has been applied for export and import values for Oct 2011 & Nov 2011 because of the reason that delay in the calibration happened in the case of meters at 33 KV at Kapathgudda South.

SECTION D. Data and parameters

SECTION E.
E.1. Data and parameters fixed ex ante or at renewal of crediting period

Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO2e/MWh
Description:	Operating Margin Emission Factor of Southern Regional Electricity Grid
Source of data used:	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) :	2002 – 03: 0.9970 2003 – 04: 1.0094 2004 – 05: 1.0038
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	None

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO2e/MWh
Description:	Build Margin Emission Factor of Southern Regional Electricity Grid (year 2004-05)
Source of data used:	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) :	0.7180
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	None

Data / Parameter:	$EF_{CM,y}$
Data unit:	tCO2e/MWh
Description:	Combined Margin Emission Factor of Southern Regional Electricity Grid (year 2004-05)

Source of data used:	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) :	0.93204
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	None

E.2. Data and parameters monitored

Data / Parameter	**EGy**
Unit	MWh (Mega-Watt hour)
Description	Net electricity supplied to the grid by the Project
Measured /Calculated /Default	Calculated by subtracting import & transmission loss value from Export value. Refer section C of the MR.
Source of data	Electricity supplied to the grid as per Joint Meter Readings (Form B) taken at 33 kV metering point for each of the sub project included in the project activity.
Value(s) of monitored parameter	Electricity supplied to the grid by the Project = 56447.740 MWh
Monitoring equipment	Calculated as per formulas better described under section C.
Measuring/ Reading/ Recording frequency	Monthly
Calculation method (if applicable)	Monitoring: The procedures for metering and meter reading will be as per the provisions of the power purchase agreement except or otherwise explicitly stated in the monitoring plan in section B.7.2 of the PDD. Metering system for the project activity consists of one main and check meter at 33 kV metering location. Both meters are **two-way tri-vector meters capable of recording import and export of electricity**. In addition to this there are two main and check meters (bulk meters) at 110 kV metering point at the Enercon (India) Limited (herein after referred as "Enercon") substation at Bannikoppa. The bulk meter is connected to the machines of the project activity and the machines commissioned by the other project developers. Therefore in order to determine the electricity supplied to the grid by the project activity at high voltage (110 kV) side of Enercon substation, the state utility (herein after referred to as "KPTCL/HESCOM") applies the transmission loss between 110 kV metering points (two in number) and meter reading recorded at the 33 kV metering points for all the machines that are connected to 110 kV bulk meters at Enercon substation at Bannikoppa. The transmission loss calculated by the state utility is endorsed / confirmed jointly by the representatives of Enercon and the state utility. The transmission loss applied to the project activity by the state utility is reflected in the JMR (Form B) recorded at 33kV metering point. Refer Appendix 1 for location of meting points at 33kV and 110 kV. Frequency of recording data: Monthly

	Recording: The values of electricity supplied to the grid is sourced from JMR for 22.8 MW at 33 kV metering point. Responsibility: Joint responsibility of Enercon and state utility.
QA/QC procedures	Refer section C for an illustration of the provisions for QA/QC procedures.
Purpose of data	Baseline Emissions calculations
Additional comment	Not Applicable

Data / Parameter:	EG_{export}
Unit	MWh (Mega-Watt hour)
Description	Electricity Export recorded at meters (main and check meters). All the subprojects included in the project activity have dedicated main and check meters at 33 kV metering point.
Measured /Calculated /Default	Measured at Main & Check Meters
Source of data	Electricity Export recorded at meters (main and check meters). All the subprojects included in the project activity have dedicated main and check meters at 33 kV metering point.
Value(s) of monitored parameter	This value has been taken from the JMR (Form B) taken at 33kV metering point and has been applied directly. 58114.470 MWh
Monitoring equipment	Accuracy Class-0.2 Serial Number of Main Meter: Refer section C of the MR Serial Number of Check Meter: Refer section C of the MR Calibration Frequency: Annually Date of Last Calibration: Refer section C of the MR Validity of Last Calibration: Refer section C of the MR
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Monitoring: Electricity export to the grid is recorded by the meters (main and check meters) at 33kV point. Refer section C & D.2 for an illustration of the provisions for QA/QC procedures. Frequency of recording data: Monthly Recording: The values of electricity exports to the grid are sourced from JMR for the sub projects at 33 kV metering point. Responsibility: Joint responsibility of Enercon and state utility
QA/QC procedures	Refer section C for an illustration of the provisions for QA/QC procedures.
Purpose of data	Baseline Emissions calculations
Additional comment	Not Applicable

Data / Parameter	EG_{import}
Unit	MWh (Mega-Watt hour)
Description	Electricity Import recorded at the meters (main and check meters). All the subprojects included in the project activity have dedicated main and check meters at 33 kV metering point.
Measured /Calculated /Default	Measured at Main & Check Meters
Source of data	Electricity import from the grid as per joint meter reading for each of the sub project taken at 33kV metering point.

Value(s) of monitored parameter:	31.257 MWh (115%* $\mathbf{EG_{import}}$)
Monitoring equipment	Accuracy Class-0.2 Serial Number of Main Meter: Refer section C of the MR Serial Number of Check Meter: Refer section C of the MR Calibration Frequency: Annually Date of Last Calibration: Refer section C of the MR Validity of Last Calibration: Refer section C of the MR
Measuring/ Reading/ Recording frequency	Monthly
Calculation method (if applicable)	Monitoring: Electricity import from the grid is recorded by meters (main and check meters) at 33kV metering point. Refer section C & D.2 for an illustration of the provisions for measurement methods. Frequency of recording data: Monthly Recording: The values of electricity import to the grid are sourced from JMR for the sub projects at 33 kV metering point. Responsibility: Joint responsibility of Enercon and state utility
QA/QC procedures	Refer section C for an illustration of the provisions for QA/QC procedures
Purpose of data	Baseline Emissions calculations
Additional comment	Not Applicable

Data / Parameter	$\mathbf{T_E}$
Unit	MWh (Mega-Watt hour)
Description	Transmission loss for export between the metering location at 33 kV metering point and the high voltage side of the substation to which the subproject is connected.
Measured /Calculated /Default	Calculated as per the procedure mentioned in the PPA. Refer section C of the MR.
Source of data	Transmission Loss for export is sourced from the joint meter reading (Form B) taken at 33kV metering point for all the sub projects included in the project activity.
Value(s) of monitored parameter	1635.473 MWh
Monitoring equipment	Calculated as per formulas better described under section C.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable)	Monitoring: Transmission loss between metering location at 33 kV and the metering location at receiving substation is applied to the meter reading taken at meters connected at 33 KV point for the project activity. The Substation is connected to the machines of the project activity and the machines commissioned by the other project owners. Therefore transmission loss is applied by the state utility as reflected in the JMR (Form B) taken at 33kV point for all the sub projects included in the project activity. The JMR is signed by the representatives of Enercon and the state utility. Refer section C of MR. Frequency of recording data: Monthly Recording: The value of transmission loss is sourced from JMR for all the sub projects at 33 kV metering point. Responsibility: Joint responsibility of Enercon and state utility

QA/QC procedures	Refer section C for an illustration of the provisions for QA/QC procedures.
Purpose of data	Baseline Emissions calculations
Additional comment	Not Applicable

E.3. Implementation of sampling plan

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No sampling plan is followed by PP.

SECTION F. Calculation of emission reductions or GHG removals by sinks

F.1. Calculation of baseline emissions or baseline net GHG removals by sinks

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"The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2e/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO2e/kWh) as described in registered PDD.

$$\mathbf{BE_y = EG_y * EF_y}$$

Where,

BE is baseline emissions in year y, tCO2e

EGy is the 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.

EFy *is* the CO2 emission factor of the grid (932.04 tCO_2e/GWh fixed ex-ante)

Electricity Generation and CER Calculation								
Duration of Generation		**Month**	**Export**	**Import**	**Transmission Loss**	**Net Export**	**Baseline Emission Factor**	**Emission Reductions**
From	**To**		**[kWh]**	**[kWh]**	**[kWh]**	**[kWh]**	**[tCO2e/MWh]**	**[tCO2e]**
1-Sep-11	1-Oct-11	1-Sep-11	5,952,000	-	149,919	5,802,081	0.932	5,407
1-Oct-11	1-Nov-11	1-Oct-11	1,857,000	8,625	44,715	1,766,348	0.932	1,646
1-Nov-11	1-Dec-11	1-Nov-11	3,619,500	1,725	71,189	3,474,162	0.932	3,238
1-Dec-11	1-Jan-12	1-Dec-11	3,120,000	1,725	61,410	3,056,865	0.932	2,849
1-Jan-12	1-Feb-12	1-Jan-12	1,800,000	3,450	39,461	1,757,089	0.932	1,637
1-Feb-12	1-Mar-12	1-Feb-12	2,494,500	3,450	55,128	2,435,922	0.932	2,270
1-Mar-12	1-Apr-12	1-Mar-12	2,491,500	3,450	55,969	2,432,081	0.932	2,266
1-Apr-12	1-May-12	1-Apr-12	2,433,000	5,175	65,757	2,362,068	0.932	2,201
1-May-12	1-Jun-12	1-May-12	6,426,000	1,725	169,050	6,255,225	0.932	5,830
1-Jun-12	1-Jul-12	1-Jun-12	10,059,000	1,725	283,797	9,773,478	0.932	9,109
1-Jul-12	1-Aug-12	1-Jul-12	10,158,000	-	433,779	9,724,221	0.932	9,063
1-Aug-12	1-Sep-12	1-Aug-12	7,813,500	-	205,298	7,608,202	0.932	7,091
		Total	**58,224,000**	**31,050**	**1,635,473**	**56,447,740**		52,607

F.2. Calculation of project emissions or actual net GHG removals by sinks

>>

The project activity is a renewable energy project which generates electricity using wind power and hence does not result in project emissions.

F.3. Calculation of leakage

>>

No leakage is considered from the project activity as per approved methodology ACM0002.

F.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

The total emission reductions achieved during the monitoring period is **52, 607** tCO_2e.

Total baseline emissions: **52, 607** tCO_2e
Total project emissions: Zero
Total leakage: Zero

Total Emission reductions, ER = BEy – PEy - LEy
= **52, 607** tCO2e

F.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	49,331	52,607

F.6. Remarks on difference from estimated value in registered PDD

>>

There is change of 6.23% in the expected and annual emission reductions. The difference in the total CERs is due to high wind availability leading to high plant load factor. The change in the PLF of 6.23% is within the sensitivity range as per the PDD.

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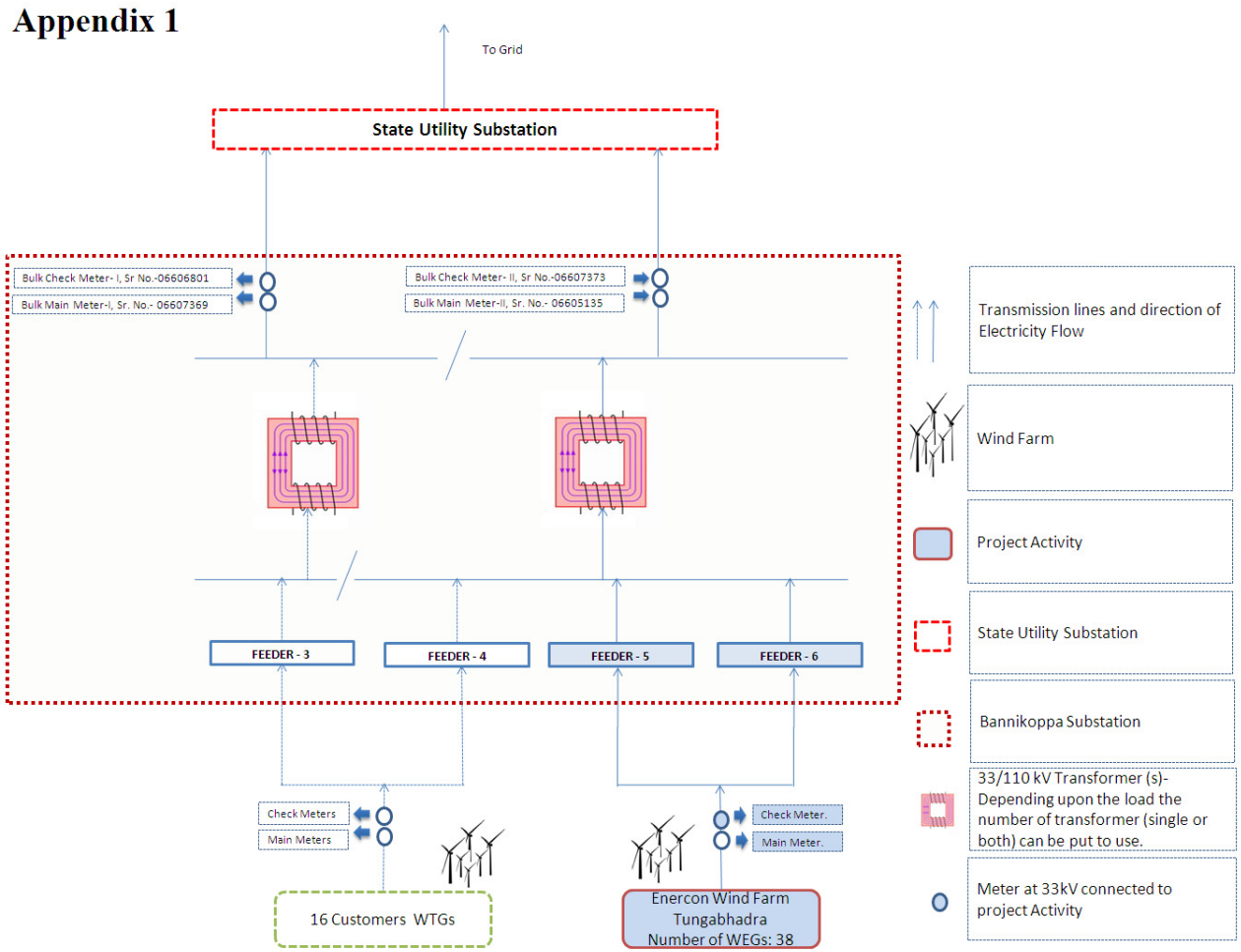
History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Form **Business Function**: Issuance		

Appendix 1: Line Diagram Showing Relevant Metering Points



Appendix 2: The other salient features of the state-of-art-technology

Enercon (India) Ltd has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH and has established a manufacturing plant at Daman in India where, along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured. The other salient features of the state-of-art-technology are as follows:

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawl (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEC with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator, which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking System.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts Generation of power at wind speed of 3 m/s.