

**MONITORING REPORT FORM (CDM-MR)**  
**Version 01 “In effect as of: 28/09/2010”**

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**MONITORING REPORT**  
**Version 1.0 and Date 11/10/2011**

**Title: “ENERCON WIND FARMS IN KARNATAKA BUNDLED PROJECT – 30.40 MW”**

**Project Reference No: 1291, 2nd CER verification**

**Monitoring Period - FROM 1/09/2010 TO 31/08/2011 (including first and last day)**

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

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

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**Objective of the Project**

The objective is development, design, engineering, procurement, finance, construction, operation and maintenance of Enercon Wind Farm (Chitradurga) Ltd of 8.8 MW and other wind power projects of 21.60 MW capacity (“Project”) in the Indian state of Karnataka to provide reliable, renewable power to the Karnataka state electricity grid which is part of the Southern regional electricity grid. The Project leads to reduced greenhouse gas emissions because it displaces electricity from fossil fuel based electricity generation plants.

The Project harnesses renewable resources in the region, and thereby displacing non-renewable natural resources thereby ultimately leading to sustainable economic and environmental development. Enercon (India) Ltd (“Enercon”) is equipment supplier and the operations and maintenance contractor for the Project. The generated electricity is supplied to Karnataka Power Transmission Company Ltd (“KPTCL”)/ Bangalore Electricity Supply Company Ltd (“BESCOM”) / Hubli Electricity Supply Company Ltd (“HESCOM”) under long-term power purchase agreements (PPA). Enercon Wind Farm (Chitradurga) Ltd is owned by Enercon (India) Ltd and Enercon GmbH and the rest of the projects are owned by Enercon’s customers. The details of the Projects are as under:

1. Enercon Wind Farms (Chitradurga) Ltd:	8.80 MW
2. Steelfab Offshore	0.80 MW
3. Dewanchand Ramsaran:	0.80 MW
4. Elpro International:	0.80 MW
5. Gautam Ladkat:	0.80 MW
6. Sameer Ladkat:	0.80 MW
7. Panama Business Centre:	1.60 MW
8. Balasahab Ladkat:	1.60 MW
9. Panama Infrastructure:	1.60 MW
10. MK Agrotech Private Ltd:	1.60 MW
11. Srinivas Sirigeri:	0.80 MW
12. Power Link System Private Limited	0.80 MW
13. Dempo Industries:	0.80 MW
14. Desai Brothers:	0.80 MW
15. Abhilash Garments & Estates (P) Ltd:	0.80 MW
16. Prasad Global Solutions:	1.60 MW
17. Siddaganga Oil Extractions Ltd.:	1.60 MW
18. Gangadhar Narsingdas Agarwal:	4.00 MW

The first machine under the project activity was commissioned on 29/03/2006 and the last machine under the project activity was commissioned on 29/12/2006. The expected operational lifetime of the project is for 20 years. The total emission reductions achieved under this monitoring period (1/09/2010 to 31/08/2011) is **52,058 tCO<sub>2</sub>**.

<b>A.2. Project Participants</b>
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Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)
Government of India (Host)	Enercon (India) Ltd
Government of Japan	Japan Carbon Finance

<b>A.3. Location of the project activity:</b>
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The Project is located in the State of Karnataka that forms part of the Southern regional electricity grid of India. Approximate distance of the project activity from Bangalore by road is 200 km. The nearest major railway station as well as airport is Bangalore. Geo-coordinates of individual machines in the project activity are given below:

S.No	Project Owner	Unique Identification No.	Loc No	Latitude			Longitude		
				Deg.	Min.	Sec.	Deg.	Min.	Sec.
1	Enercon Wind Farms (Chitradurga) Ltd	EWCLA-01	1	14	2	45.2	76	28	8.3
2		EWCLA-02	2	14	2	49.0	76	28	6.3
3		EWCLA-03	3	14	2	52.6	76	28	5.0
4		EWCLA-04	4	14	2	56.7	76	28	4.4
5		EWCLA-05	5	14	3	0.6	76	28	3.8
6		EWCLA-06	6	14	3	4.4	76	28	3.0
7		EWCLA-07	7	14	3	8.8	76	28	2.4
8		EWCLA-08	8	14	3	14.6	76	28	1.2
9		EWCLA-09	9	14	3	18.4	76	28	0.3
10		EWCLA-10	10	14	3	22.1	76	27	59.2
11		EWCLA-11	11	14	3	26.0	76	27	58.6
12	Steelfab Offshore	SFOGH2-01	71	13	57	3.6	76	25	4.9
13	Dewanchand Ramsaran	DRGH2-01	72	13	57	0	76	25	6.7
14	Elpro International	EILGH2-01	59	13	58	50.7	76	25	24.9
15	Gautam Ladkat	GLGH2-01	69	13	57	10.8	76	25	0.9
16	Sameer Ladkat	SLGH2-01	45	13	59	22.4	76	23	52.6
17	Panama Business Centre	PBCGH2-01	65	13	57	23.5	76	24	55
18		PBCGH2-02	66	13	57	20	76	24	54.6
19	Balasahab Ladkat	BMLGH2-01	67	13	57	16.3	76	24	55.9
20		BMLGH2-02	68	13	57	12.9	76	24	57.5
21	Panama Infrastructure:	PIPPGH2-01	43	13	59	28.2	76	23	46.2
22		PIPPGH2-02	44	13	59	28.5	76	23	50.8
23	MK Agrotech Private Ltd	MKAGH2-01	61	13	58	44.3	76	25	26.3
24		MKAGH2-02	62	13	58	40.9	76	25	28

25	Srinivas Sirigeri	SSHD-01	7	13	58	35.6	76	28	23.3
26	Power Link System Private Limited	PLSHD-01	5	13	58	26	76	28	23.2
27	Dempo Industries	DIPLHD-01	6	13	58	29.3	76	28	21.2
28	Desai Brothers	DBLHD-01	1	13	58	11.2	76	28	32.6
29	Abhilash Garments & Estates (P) Ltd	AGEGA-01	11	15	8	57.3	75	38	38.2
30	Prasad Global Solutions:	PGSGA-01	1	15	10	7.9	75	38	34.5
31		PGSGA-02	17	15	8	19.4	75	39	1.8
32	Siddaganga Oil Extractions Ltd	SOEGA-01	14	15	8	40.3	75	38	44.3
33		SOEGA-02	15	15	8	36.5	75	38	46.8
34	Gangadhar Narsingdas Agarwal	GNAGA-01	6	15	9	34.3	75	38	27.1
35		GNAGA-02	7	15	9	26.4	75	38	31.5
36		GNAGA-03	8	15	9	20.5	75	38	32.0
37		GNAGA-04	12	15	8	48.7	75	38	39.4
38		GNAGA-05	13	15	8	44.7	75	38	41.0

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

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The Project involves 38 wind energy converters (WECs) of Enercon make 800 kW E-48 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  $400\text{ V} \pm 12.5\%$ . The other salient features of the state-of-art-technology are:

- 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 Systems.
- 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.

Enercon (India) Ltd 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:**

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The approved consolidated baseline and monitoring methodology **ACM0002 Version 6.0** (19 May 2006) has been used. The titles of these baseline and monitoring methodologies are "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" and "Consolidated monitoring methodology for grid-connected electricity generation from renewable sources.

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

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18/03/2010

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

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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 18/03/2010 and length of crediting period is 10 years (from 18/03/2010 to 17/03/2020). The first monitoring period was from 18 Mar 2010 to 31 Aug 2010. The second monitoring period is considered from 1 September 2010 to 31 August 2011.

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

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Organization:	Enercon (India) Ltd
Street/P.O.Box:	Enercon Tower, A-9, Veera Industrial Estate, Veera Desai Road,
Building:	
City:	Andheri (W),
State/Region:	Mumbai
Postfix/ZIP:	400053
Country:	India
Telephone:	+91-22-66924848
FAX:	+91-22-66921175
E-Mail:	<a href="mailto:yogesh.mehra@enerconindia.net">yogesh.mehra@enerconindia.net</a>
URL:	
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Mehra
Middle Name:	
First Name:	Yogesh
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Organization:	Japan Carbon Finance, Ltd.
Street/P.O.Box:	6 <sup>th</sup> Floor, 1-3 Kundankita, 4-chrome
Building:	Chiyoda-ku

City:	Tokyo
State/Region:	
Postfix/ZIP:	102-0073
Country:	Japan
Telephone:	+81 3 5212 8870
FAX:	+81 3 5212 8886
E-Mail:	<a href="mailto:jcf@jcarbon.co.jp">jcf@jcarbon.co.jp</a>
URL:	<a href="http://www.jcarbon.co.jp/">http://www.jcarbon.co.jp/</a>
Represented by:	
Title:	Director General
Salutation:	Mr.
Last Name:	Toshio
Middle Name:	
First Name:	Matsuda
Department:	Carbon Finance Department

## **SECTION B. Implementation of the project activity**

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

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The first machine under the project activity was commissioned on 29/03/2006 and last machine under the project activity was commissioned on 29/12/2006. The project activity consists of 38 machines (800 kWh) of Enercon make E-48 totaling to a capacity of 30.4 MW. The commissioning date for all the machines included in the project activity is given in the table below.

S.No	Project Owner	Unique Identification No.	Loc No	Commissioning date
1	Enercon Wind Farms (Chitradurga) Ltd	EWCLA-01	1	06/05/2006
2		EWCLA-02	2	06/05/2006
3		EWCLA-03	3	06/05/2006
4		EWCLA-04	4	06/05/2006
5		EWCLA-05	5	06/05/2006
6		EWCLA-06	6	06/05/2006
7		EWCLA-07	7	31/03/2006
8		EWCLA-08	8	31/03/2006
9		EWCLA-09	9	31/03/2006
10		EWCLA-10	10	31/03/2006
11		EWCLA-11	11	31/03/2006
12	Steelfab Offshore	SFOGH2-01	71	31/03/2006
13	Dewanchand Ramsaran	DRGH2-01	72	31/03/2006
14	Elpro International	EILGH2-01	59	31/03/2006
15	Gautam Ladkat	GLGH2-01	69	31/03/2006
16	Sameer Ladkat	SLGH2-01	45	31/03/2006

17	Panama Business Centre	PBCGH2-01	65	31/03/2006
18		PBCGH2-02	66	31/03/2006
19	Balasahab Ladkat	BMLGH2-01	67	31/03/2006
20		BMLGH2-02	68	31/03/2006
21	Panama Infrastructure:	PIPPGH2-01	43	31/03/2006
22		PIPPGH2-02	44	31/03/2006
23	MK Agrotech Private Ltd	MKAGH2-01	61	31/03/2006
24		MKAGH2-02	62	31/03/2006
25	Srinivas Sirigeri	SSHD-01	7	29/03/2006
26	Power Link System Private Limited	PLSHD-01	5	29/03/2006
27	Dempo Industries	DIPLHD-01	6	29/03/2006
28	Desai Brothers	DBLHD-01	1	29/03/2006
29	Abhilash Garments & Estates (P) Ltd	AGEGA-01	11	29/12/2006
30	Prasad Global Solutions:	PGSGA-01	1	29/12/2006
31		PGSGA-02	17	29/12/2006
32	Siddaganga Oil Extractions Ltd	SOEGA-01	14	31/03/2006
33		SOEGA-02	15	31/03/2006
34	Gangadhar Narsingdas Agarwal	GNAGA-01	6	29/12/2006
35		GNAGA-02	7	29/12/2006
36		GNAGA-03	8	29/12/2006
37		GNAGA-04	12	29/12/2006
38		GNAGA-05	13	29/12/2006

Enercon operation and maintenance activities are ISO 9001:2000 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 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**

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Revision of monitoring plan has been successfully completed and approved by UNFCCC on 21/07/2011 for the project activity.

#### **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**

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The notification for changes was submitted to UNFCCC with respect to typological error in PDD regarding location and geo-coordinates of the project activity & change of one investor i.e. one WEC of R K Marble was transferred to Power Link System Private Limited. UNFCCC has approved the notification on 16/06/2011. The

correct location & geo-coordinates of the project activity has been reflected in section A.3 of the Monitoring report. The change of investor has been also been incorporated in the Monitoring report.

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

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Approved monitoring methodology ACM0002 / Version 06 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 dedicated main and check meters for each of the sub projects included in the project activity at 33 kV metering point. The feeders of 33 kV metering point are further connected to step up transformer at substation and subsequently to bulk meter at high voltage side of receiving substation. The bulk meters are connected to machines of the project activity and the machines commissioned by the other project developers. The subprojects included in the project activity are connected to following four substations where the bulk meters are located:

S. No.	Name of Customer	Capacity (MW)	Enercon Sub-station	State Utility Sub-station
1	Enercon Wind Farms (Chitradurga) Pvt Ltd	8.8	Enercon Sub-station at Imangala	Aiamangala, 66/11 kV KPTCL sub-station
2	Steelfab Offshore	0.8	GIM-II Sub-station at Gownalli	Hiriyur, 220/66/11 kV KPTCL sub-station
3	Dewanchand Ramsaran	0.8		
4	Elpro International	0.8		
5	Gautam Ladkat	0.8		
6	Sameer Ladkat	0.8		
7	Panama Business Centre	1.6		
8	Balasaheb Ladkat	1.6		
9	Panama Infrastructure	1.6		
10	MK Agrotech Private Ltd	1.6		
11	Srinivas Sirigeri	0.8	EP-II Sub-station at Nandana Hosuru	Ramagiri, 66/11 kV KPTCL sub-station
12	Dempo Industries	0.8		
13	Power Link Systems Pvt Ltd	0.8		
14	Desai Brothers	0.8		
15	Siddganga Oil Extraction	1.6	Gadag Sub-station at Banikoppa	Dambal, 110/33/11 kV KPTCL sub-station.
16	Abhilash Garments	0.8		
17	Prasad Global Solution	1.6		
18	Gangadhar Narsingdas Agarwal	40		

Therefore in order to determine the net electricity supplied to the grid by the project at high voltage side of receiving 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) for each sub project recorded at 33kV metering point. Net electricity supplied to the grid is calculated by applying transmission loss to the meter readings taken at 33 kV metering location for all the sub projects included in the project activity.

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

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

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 meters located at 33 kV metering point (including the machines of the project activity and other project developers) and the meters located at high voltage side (bulk meter: main and check) of receiving sub-station.

Summation of meter readings at 33 kV metering points for all the project developers connected to receiving substation (including the machines of the project activity and other project developers)=  
 $(X1 + X2 + X3 ... + Xn)$

$X_i$  = Energy Export Reading ( $X_i$ ) noted at energy meter installed at 33kV metering point where i vary from 1 to n which represents the meters connected to project activity and other project developers.  $X_1, X_2, X_3, \dots, X_n$  are the meters that are installed at 33kV metering point (including the machines of the project activity and other project developers) and further connected to the receiving substation by internally connected lines.

Y = Energy Export Reading at bulk meter installed at high voltage side of transformer of the receiving sub-station

The Export Reading  $X_i$  is adjusted for transmission loss that is determined by the state utility and is applied directly to the JMR (Form B) for each sub project included in the project activity 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 ( $T_E$ ) = Transmission Loss (Z) \* Energy Export at 33kV metering point ( $E_{G\text{Export}}$ )

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

Net Energy Export for each of the sub project after adjustment of transmission loss =  **$E_{G\text{Export}} - T_E$**

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 ( $E_{G\text{Import}}$ )

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

Net Energy Import for each of the sub project after adjustment of transmission loss =  **$E_{G\text{Import}} + 15\% * E_{G\text{Import}}$**

$$= 115\% * EG_{import}$$

Therefore Energy Supplied to Grid for each of the sub project 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.

$$EG_y (\text{Sub project}) = EG_{export} - 115\% * EG_{import} - \text{Transmission Loss (TE)}$$

The Joint meter reading for each of the sub project noted at 33 KV metering location contains the following data:-

1. Electricity Export ( $EG_{export}$ )
2. Electricity Import ( $EG_{import}$ )
3. Transmission Loss (TE) between 33 kV metering point and high voltage side of receiving substation
4. Net Electricity supplied to the Grid [ $EG_{export} - 115\% * EG_{import} - TE$ ]

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

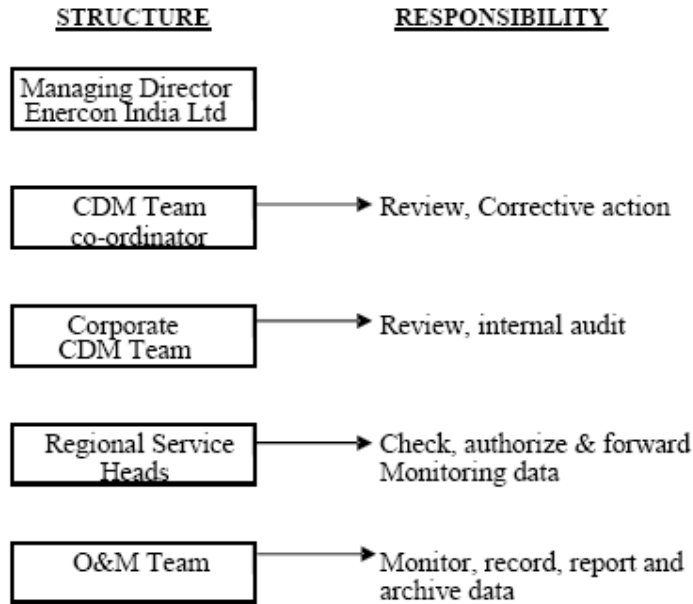
In addition to the JMR (Form B) at 33kV metering location for each of the sub project included in the project activity, the following documents are also be provided to the DoE for verification:

1. JMR (Form B) at high voltage side of receiving sub-station (bulk meters: main and check).
2. Transmission loss calculation endorsed / confirmed jointly by the representatives of Enercon and the state utility.

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

Net electricity Supplied to Grid for the project activity is summation of Net electricity Supplied to Grid for each of the sub project included in the project activity.

The Project is operated and managed by Enercon (India) Ltd. The operational and management structure implemented by Enercon is as follows:



The detailed monitoring plan is described below:

- **Metering:** Electricity supplied to the grid is metered jointly by state utility and Enercon through dedicated main and check meters at 33 kV metering point for each of the sub project included in the project activity.

In addition to this there are main and check meters (Bulk meters) at high voltage side of receiving sub-station covering sub projects of the project activity and machines of other project developers. There are four receiving stations to which the sub projects included in the project activity are connected.

The schematic diagram shows location of meters for the project activity is attached as Appendix 1.

- **Metering Equipment:** Metering system for the project activity consists of main and check meters at 33kV metering point for each of the sub project included in the project activity and set(s) of main and check meters at high voltage side of receiving substation. 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 the electrical parameters for a minimum period of 35 days with digital output.
- **Meter Readings:** The electricity export and import to the grid is recorded by taking a Joint Meter Reading (JMR) in the presence of Officials from state Utility and Enercon (India) Ltd at 33kV metering point for each of the sub project included in the project activity. The Joint meter reading contains the value of energy imported, exported, transmission loss and the net electricity exported to the grid during the recording period. This Joint meter reading is certified by the Executive engineer of the state utility and by Enercon Officials. These certified readings are then used by the state utility to prepare the tariff invoices. Thus net electricity supplied to the grid for each of the sub project included in the project activity can be crosschecked with the value mentioned in the invoices raised on the state utility by each of the sub project included in the project activity.
- **Inspection of Energy Meters:** All the 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 accredited representatives.

- **Meter Test Checking:** All the main and check meters are tested (and calibrated if found necessary) for accuracy on annual basis with reference to a portable standard meter. The portable standard meter is owned by KPTCL. 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 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 are 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.
- If during any of the monthly meter readings, the variation between the main meter and the check meter is more than the permissible limit for meters of 0.2% accuracy class, all the meters shall be re-tested and calibrated immediately.



The schematic showing the location of meters for the project activity is given in Appendix 1:

### Training and maintenance:

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 service staff is deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. The Enercon Training Academy provides need-based training to meet the training requirements of Enercon projects. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving.

### Calibration Details

The metering equipments were inspected & calibrated by state utility. Calibration details for the all the main and backup meters are provided below.

Project Owner	RR.NO	Site	District	Meter Type	Meter Sr. no.	Accuracy class	Make	Last Calibration done	Latest Calibration Done		Calibration Due Date
Enercon Wind Farms (Chitradurga) Ltd	EWFA-01	Hill No-15	Chitradurga	Main Meter	5463842	0.2	L&T	2/09/2010	10/6/2011	10/6/2011	9/6/2012
				Check Meter	5463855	0.2	L&T	2/09/2010	10/6/2011	10/6/2011	9/6/2012
Steelfab Offshore	ELP-37	GIM-II	Chitradurga	Main Meter	5437939	0.2	L&T	27/02/2010	15/12/2010	8/7/2011	7/7/2012
				Check Meter	5437956	0.2	L&T	27/02/2010	15/12/2010	8/7/2011	7/7/2012
Dewanchand Ramsaran	ELP-38	GIM-II	Chitradurga	Main Meter	5389379	0.2	L&T	27/02/2010	15/12/2010	8/7/2011	7/7/2012



				Check Meter	5389378	0.2	L&T	27/02/2010	15/12/2010	8/7/2011	7/7/2012
Gautam Ladkat	ELP-35	GIM-II	Chitradurga	Main Meter	5389971	0.2	L&T	27/02/2010	15/12/2010	6/7/2011	5/7/2012
				Check Meter	5389974	0.2	L&T	27/02/2010	15/12/2010	6/7/2011	5/7/2012
Balasahab Ladkat	ELP-34	GIM-II	Chitradurga	Main Meter	5390421	0.2	L&T	19/2/2010	15/12/2010	6/7/2011	5/7/2012
				Check Meter	5341085	0.2	L&T	19/2/2010	15/12/2010	6/7/2011	5/7/2012
Dempo Industries	EP2-27	EP-II	Chitradurga	Main Meter	5463847	0.2	L&T	16/06/2010	21/03/2011		20/03/2012
				Check Meter	5463838	0.2	L&T	16/06/2010	21/03/2011		20/03/2012
Desai Brothers	EP2-25	EP-II	Chitradurga	Main Meter	5437948	0.2	L&T	16/06/2010	18/03/2011		17/03/2012
				Check Meter	5463853	0.2	L&T	16/06/2010	18/03/2011		17/03/2012
Abhilash Garments & Estates (P) Ltd:	GDG/TL & SS/WF/AGEM/Loc No - 11/46	Gadag	Gadag	Main Meter	5463841	0.2	L&T	3/6/2010	19/11/2010	6/6/2011	5/6/2012
				Check Meter	6760772	0.2	L&T	3/6/2010	19/11/2010	6/6/2011	5/6/2012
Prasad Global Solutions	GDG/TL & SS/WF/PGSM/Loc No - 1/41	Gadag	Gadag	Main Meter	6607372	0.2	L&T	3/6/2010	19/11/2010	6/6/2011	5/6/2012
				Check Meter	5389381	0.2	L&T	3/6/2010	19/11/2010	6/6/2011	5/6/2012
Prasad Global Solutions	GDG/TL & SS/WF/PGSR/Loc No - 17/50	Gadag	Gadag	Main Meter	6675385	0.2	L&T	3/6/2010	3/11/2010	6/6/2011	5/6/2012
				Check	6675392	0.2	L&T	3/6/2010	3/11/2010	6/6/2011	5/6/2012



				Meter							
Siddaganga Oil Extractions Ltd	GDG/TL & SS/WF/GNAM/Loc No14 & 15/48	Gadag	Gadag	Main Meter	5463849	0.2	L&T	3/6/2010	19/11/2010	6/6/2011	5/6/2012
				Check Meter	6605127	0.2	L&T	3/6/2010	19/11/2010	6/6/2011	5/6/2012
Gangadhar Narsingdas Agarwal	GDG/TL & SS/WF/GNAM/Loc No - 12 & 13/47	Gadag	Gadag	Main Meter	6675402	0.2	L&T	3/6/2010	19/11/2010	6/6/2011	5/6/2012
				Check Meter	6760764	0.2	L&T	3/6/2010	19/11/2010	6/6/2011	5/6/2012
Gangadhar Narsingdas Agarwal	GDG/TL & SS/WF/GNAM/Loc No - 6, 7 & 8 /45	Gadag	Gadag	Main Meter	6675414	0.2	L&T	3/6/2010	18/11/2010	6/6/2011	5/6/2012
				Check Meter	6675384	0.2	L&T	3/6/2010	18/11/2010	6/6/2011	5/6/2012
Power Link System Private Limite	EP2-28	EP-II	Chitradurga	Main Meter	5437934	0.2	L&T	16/06/2010	21/03/2011		20/03/2012
				Check Meter	5462964	0.2	L&T	16/06/2010	21/03/2011		20/03/2012
Elpro International	ELP-29	GIM-II	Chitradurga	Main Meter	5436130	0.2	L&T	25/09/2010	30/7/2011		29/7/2012
				Check Meter	5436135	0.2	L&T	25/09/2010	30/7/2011		29/7/2012
Sameer Ladkat	ELP-24	GIM-II	Chitradurga	Main Meter	5436122	0.2	L&T	29/09/2010	30/7/2011		29/7/2012
				Check Meter	5436121	0.2	L&T	29/09/2010	30/7/2011		29/7/2012
Panama Business Centre	ELP-33	GIM-II	Chitradurga	Main Meter	5390229	0.2	L&T	30/08/2010	22/8/2011		21/8/2012
				Check Meter	5390230	0.2	L&T	30/08/2010	22/8/2011		21/8/2012



Panama Infrastructure	ELP-23	GIM-II	Chitradurga	Main Meter	5389981	0.2	L&T	28/09/2010	13/6/2011		12/6/2012
				Check Meter	5389986	0.2	L&T	28/09/2010	13/6/2011		12/6/2012
MK Agrotech Private Ltd	ELP-31	GIM-II	Chitradurga	Main Meter	5389904	0.2	L&T	24/09/2010	30/7/2011		29/7/2012
				Check Meter	5436140	0.2	L&T	24/09/2010	30/7/2011		29/7/2012
Srinivas Sirigeri	EP2-29	EP-II	Chitradurga	Main Meter	5463840	0.2	L&T	16/06/2010	21/03/2011		20/03/2012
				Check Meter	5462963	0.2	L&T	16/06/2010	21/03/2011		20/03/2012

The details of uploading sub-station for each WEC is provided below::

S. No.	Name of Customer	M/C Model	Type of M/C	No. of M/C	Capacity (MW)	Sub-stion
1	Enercon Wind Farms (Chitradurga) Pvt Ltd	E-48	0.8	11	8.8	Aiamangala, 66/11 kV KPTCL sub-station
2	Steelfab Offshore	E-48	0.8	1	0.8	
3	Dewanchand Ramsaran	E-48	0.8	1	0.8	
4	Elpro International	E-48	0.8	1	0.8	
5	Gautam Ladkat	E-48	0.8	1	0.8	
6	Sameer Ladkat	E-48	0.8	1	0.8	
7	Panama Business Centre	E-48	0.8	2	1.6	
8	Balasahab Ladkat	E-48	0.8	2	1.6	
9	Panama Infrastructure	E-48	0.8	2	1.6	
						Hiriyur, 220/66/11 kV KPTCL sub-station





10	MK Agrotech Private Ltd	E-48	0.8	2	1.6	Ramagiri, 66/11 kV KPTCL sub-station
11	Srinivas Sirigeri	E-48	0.8	1	0.8	
12	Dempo Industries	E-48	0.8	1	0.8	
13	Power Link Systems Pvt Ltd	E-48	0.8	1	0.8	
14	Desai Brothers	E-48	0.8	1	0.8	
15	Siddganga Oil Extraction	E-48	0.8	2	1.6	Dambal, 110/33/11 kV KPTCL sub-station.
16	Abhilash Garments	E-48	0.8	1	0.8	
17	Prasad Global Solution	E-48	0.8	1	0.8	
18	Prasad Global Solution	E-48	0.8	1	0.8	
19	Gangadhar Narsingdas Agarwal	E-48	0.8	3	2.4	
20	Gangadhar Narsingdas Agarwal	E-48	0.8	2	1.6	

Calibration detail of the main and check meter at the substation are provided below:

S. No	Name of Substation	Meter RR. No	Main meter	Check meter	Calibration	
					2010	2011
1	Enercon Sub-station at Imangala	EWFA-01	05463842	05463855	02.09.2010	10.06.2011
2	EP-II Sub-station at Nandana Hosuru	EP2-01	04179674	02048064	13.05.2010	24.03.2011
		EP2-02	02048052	02048043		
3	GIM-II Sub-station at Gownalli	ELP-17	05271046	05389972	23.04.2010	19.03.2011
		ELP-41	05389983	05389985		
4	Gadag Sub-station at Banikoppa	Line I (GDG/TL&SS/WF/ELB/1 10LINE-I/39)	06607369	06606801	25.05.2010	14.07.2011
		Line II (GDG/TL&SS/WF/ELB/1 10LINE-II/39)	06605135	06607373		



- As per the 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 installed at Gadag Sub-station at Banikoppa 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 net energy export 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 the transmission loss for the month May-2011, Jun-2011 & Jul-2011 which can be verified from calculation of emission reductions provided in spreadsheet.

The line diagrams showing all relevant monitoring points are appendix 1.

#### SECTION D. Data and parameters

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

<b>Data / Parameter:</b>	<b><math>EF_{OM,y}</math></b>						
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 1.1” 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):	<table border="1"> <tr> <td>2002 – 03</td><td>0.9970</td></tr> <tr> <td>2003 – 04</td><td>1.0094</td></tr> <tr> <td>2004 – 05</td><td>1.0038</td></tr> </table>	2002 – 03	0.9970	2003 – 04	1.0094	2004 – 05	1.0038
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						

<b>Data / Parameter:</b>	<b><math>EF_{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 1.1” published by the Central Electricity Authority, Ministry of Power, Government of India.



	The “CO2 Baseline Database for Indian Power Sector” is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>		
Value(s):	2004 – 05	0.718	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions		
Additional comment:	None		

<b>Data / Parameter:</b>	<b><math>EF_{CM,y}</math></b>
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 Version 1.1” published by the Central Electricity Authority, Ministry of Power, Government of India.  The “CO2 Baseline Database for Indian Power Sector” is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s):	0.93204
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	None

Emission factor (EFy) of the grid is calculated as a combined margin (CM) Combined margin (CM), calculated as the weighted average of the operating margin (OM) and build margin (BM) factor. In case of wind power projects default weights of 0.75 for  $EF_{OM}$  and 0.25 for  $EF_{BM}$  are applicable as per ACM0002.

$$EF_y = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y}$$

$$= 0.93204 \text{ tCO}_2\text{e/MWh}$$

## D.2. Data and parameters monitored

Data / Parameter:	EGy
Data 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	55856.791 MWh (for detail refer appendix 2)



parameter:																																																									
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions																																																								
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculated as per formulas better described under section C.																																																								
Measuring/ Reading/ Recording frequency:	Monthly																																																								
Calculation method (if applicable):	<p>Monitoring: All the meters are <b>two-way trivector meters capable of recording import and export of electricity</b> and provide output in the form of net electricity supplied to the grid. The procedures for metering and meter reading is as per the provisions of the power purchase agreement except or otherwise explicitly stated in the monitoring plan. Metering system for the project activity consists of dedicated main and check meters for each of the sub project owner included in the project activity at 33 kV metering location.</p> <p>In addition to this Joint meter readings are also noted at main and check meters (bulk meters) located at the substations. The subprojects included in the project activity are connected to following four substations:</p> <table><tr><th>S. No.</th><th>Name of Customer</th><th>Capacity (MW)</th><th>Enercon Sub-station</th></tr><tr><td>1</td><td>Enercon Wind Farms (Chitradurga) Pvt Ltd</td><td>8.8</td><td>Enercon Sub-station at Imangala</td></tr><tr><td>2</td><td>Steelfab Offshore</td><td>0.8</td><td rowspan="9">GIM-II Sub-station at Gownalli</td></tr><tr><td>3</td><td>Dewanchand Ramsaran</td><td>0.8</td></tr><tr><td>4</td><td>Elpro International</td><td>0.8</td></tr><tr><td>5</td><td>Gautam Ladkat</td><td>0.8</td></tr><tr><td>6</td><td>Sameer Ladkat</td><td>0.8</td></tr><tr><td>7</td><td>Panama Business Centre</td><td>1.6</td></tr><tr><td>8</td><td>Balasahab Ladkat</td><td>1.6</td></tr><tr><td>9</td><td>Panama Infrastructure</td><td>1.6</td></tr><tr><td>10</td><td>MK Agrotech Private Ltd</td><td>1.6</td></tr><tr><td>11</td><td>Srinivas Sirigeri</td><td>0.8</td><td rowspan="4">EP-II Sub-station at Nandana Hosuru</td></tr><tr><td>12</td><td>Dempo Industries</td><td>0.8</td></tr><tr><td>13</td><td>Power Link Systems Pvt Ltd</td><td>0.8</td></tr><tr><td>14</td><td>Desai Brothers</td><td>0.8</td></tr><tr><td>15</td><td>Siddganga Oil Extraction</td><td>1.6</td><td rowspan="2">Gadag Sub-station at Banikoppa</td></tr><tr><td>16</td><td>Abhilash Garments</td><td>0.8</td></tr></table>	S. No.	Name of Customer	Capacity (MW)	Enercon Sub-station	1	Enercon Wind Farms (Chitradurga) Pvt Ltd	8.8	Enercon Sub-station at Imangala	2	Steelfab Offshore	0.8	GIM-II Sub-station at Gownalli	3	Dewanchand Ramsaran	0.8	4	Elpro International	0.8	5	Gautam Ladkat	0.8	6	Sameer Ladkat	0.8	7	Panama Business Centre	1.6	8	Balasahab Ladkat	1.6	9	Panama Infrastructure	1.6	10	MK Agrotech Private Ltd	1.6	11	Srinivas Sirigeri	0.8	EP-II Sub-station at Nandana Hosuru	12	Dempo Industries	0.8	13	Power Link Systems Pvt Ltd	0.8	14	Desai Brothers	0.8	15	Siddganga Oil Extraction	1.6	Gadag Sub-station at Banikoppa	16	Abhilash Garments	0.8
S. No.	Name of Customer	Capacity (MW)	Enercon Sub-station																																																						
1	Enercon Wind Farms (Chitradurga) Pvt Ltd	8.8	Enercon Sub-station at Imangala																																																						
2	Steelfab Offshore	0.8	GIM-II Sub-station at Gownalli																																																						
3	Dewanchand Ramsaran	0.8																																																							
4	Elpro International	0.8																																																							
5	Gautam Ladkat	0.8																																																							
6	Sameer Ladkat	0.8																																																							
7	Panama Business Centre	1.6																																																							
8	Balasahab Ladkat	1.6																																																							
9	Panama Infrastructure	1.6																																																							
10	MK Agrotech Private Ltd	1.6																																																							
11	Srinivas Sirigeri	0.8	EP-II Sub-station at Nandana Hosuru																																																						
12	Dempo Industries	0.8																																																							
13	Power Link Systems Pvt Ltd	0.8																																																							
14	Desai Brothers	0.8																																																							
15	Siddganga Oil Extraction	1.6	Gadag Sub-station at Banikoppa																																																						
16	Abhilash Garments	0.8																																																							



	17	Prasad Global Solution	1.6	
	18	Gangadhar Narsingdas Agarwal	4.0	
	<p>The bulk meters 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 activity at high voltage side of the substation, the state utility applies the transmission loss between 33 kV metering point and meter reading noted at high voltage side of the receiving substation 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.</p> <p>Frequency of recording data: Monthly</p> <p>Recording: The values of electricity supplied to the grid are sourced from JMR for the sub projects at 33 kV metering point.</p> <p>Responsibility: Joint responsibility of Enercon and state utility.</p> <p>Refer section C for an illustration of the provisions for measurement methods.</p>			
	QA/QC procedures applied:	Refer section C for an illustration of the provisions for QA/QC procedures.		

Data / Parameter:	<b>EGexport</b>
Data 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:	56553.420 MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	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/	Monthly



Recording frequency:	
Calculation method (if applicable):	<p>Monitoring: Electricity export to the grid is recorded by the meters (main and check meters) at 33kV point. Refer section C &amp; D.2 for an illustration of the provisions for QA/QC procedures.</p> <p>Frequency of recording data: Monthly</p> <p>Recording: The values of electricity exports to the grid are sourced from JMR for the sub projects at 33 kV metering point.</p> <p>Responsibility: Joint responsibility of Enercon and state utility</p>
QA/QC procedures applied:	Refer section C for an illustration of the provisions for QA/QC procedures.

Data / Parameter:	<b>EGimport</b>
Data 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:	78.950 MWh (115%* EGimport)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>Accuracy Class-0.2</p> <p>Serial Number of Main Meter: Refer section C of the MR</p> <p>Serial Number of Check Meter: Refer section C of the MR</p> <p>Calibration Frequency: Annually</p> <p>Date of Last Calibration: Refer section C of the MR</p> <p>Validity of Last Calibration: Refer section C of the MR</p>
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	<p>Monitoring: Electricity import from the grid is recorded by meters (main and check meters) at 33kV metering point. Refer section C &amp; D.2 for an illustration of the provisions for measurement methods.</p> <p>Frequency of recording data: Monthly</p> <p>Recording: The values of electricity import to the grid are sourced from JMR for the sub projects at 33 kV metering point.</p> <p>Responsibility: Joint responsibility of Enercon and state utility</p>
QA/QC procedures applied:	Refer section C for an illustration of the provisions for QA/QC procedures.

Data / Parameter:	<b>TE</b>
Data 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:	617.679 MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Calculated as per formulas better described under section C.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	<p>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.</p> <p>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.</p> <p>Frequency of recording data: Monthly</p> <p>Recording: The value of transmission loss is sourced from JMR for all the sub projects at 33 kV metering point.</p> <p>Responsibility: Joint responsibility of Enercon and state utility</p>
QA/QC procedures applied:	Refer section C for an illustration of the provisions for QA/QC procedures.

The data is stored in hard format and soft format by PP (Enercon) at the project site office. Joint meter reading is taken in the presence of the persons representing Enercon [Operation and Maintenance Contractor] and the state utility. The archive 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**

>>>



The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO<sub>2</sub>e/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO<sub>2</sub>e/kWh) as described in registered PDD.

$$BE_y = EG_y * EF_y$$

Where,

**BE** is baseline emissions in year y, tCO<sub>2</sub>e

**EG<sub>y</sub>** is the net electricity supplied to the grid in year y and is applied directly from JMR certified by state utility. This value can also be cross checked from the invoice.

**EF<sub>y</sub>** is the CO<sub>2</sub> emission factor of the grid (932.04 tCO<sub>2</sub>e/GWh fixed ex-ante). Refer Appendix 3 for detail.

Emission reduction calculation for the period 01/09/2010 to 31/08/2011:

$$\begin{aligned} \text{Emission Reductions (ER)} &= 55856.791(\text{MWh}) * 932.04 (\text{tCO}_2/\text{GWh}) / 10^6 \\ &= \mathbf{52,058 \text{ tCO}_2} \end{aligned}$$

#### E.2. Project emissions calculation

>>

The project activity is a renewable energy project which generates electricity using wind power. Hence, there are no project emissions.

#### E.3. Leakage calculation

>>

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

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

>>

The total emission reductions achieved during the monitoring period is **52,058 tCO<sub>2</sub>**. The detailed calculation is provided in appendix 2.

Total baseline emissions: **52,058 tCO<sub>2</sub>**

Total project emissions: Zero

Total leakage: Zero

$$\begin{aligned} \text{Total Emission reductions, ER} &= BE_y - PE_y \\ &= \mathbf{52,058 \text{ tCO}_2} \end{aligned}$$

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

>>

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO <sub>2</sub> e)	60367 (335 days equivalent of annually 65,774 emission reductions estimated in the registered PDD)	52,058



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

&gt;

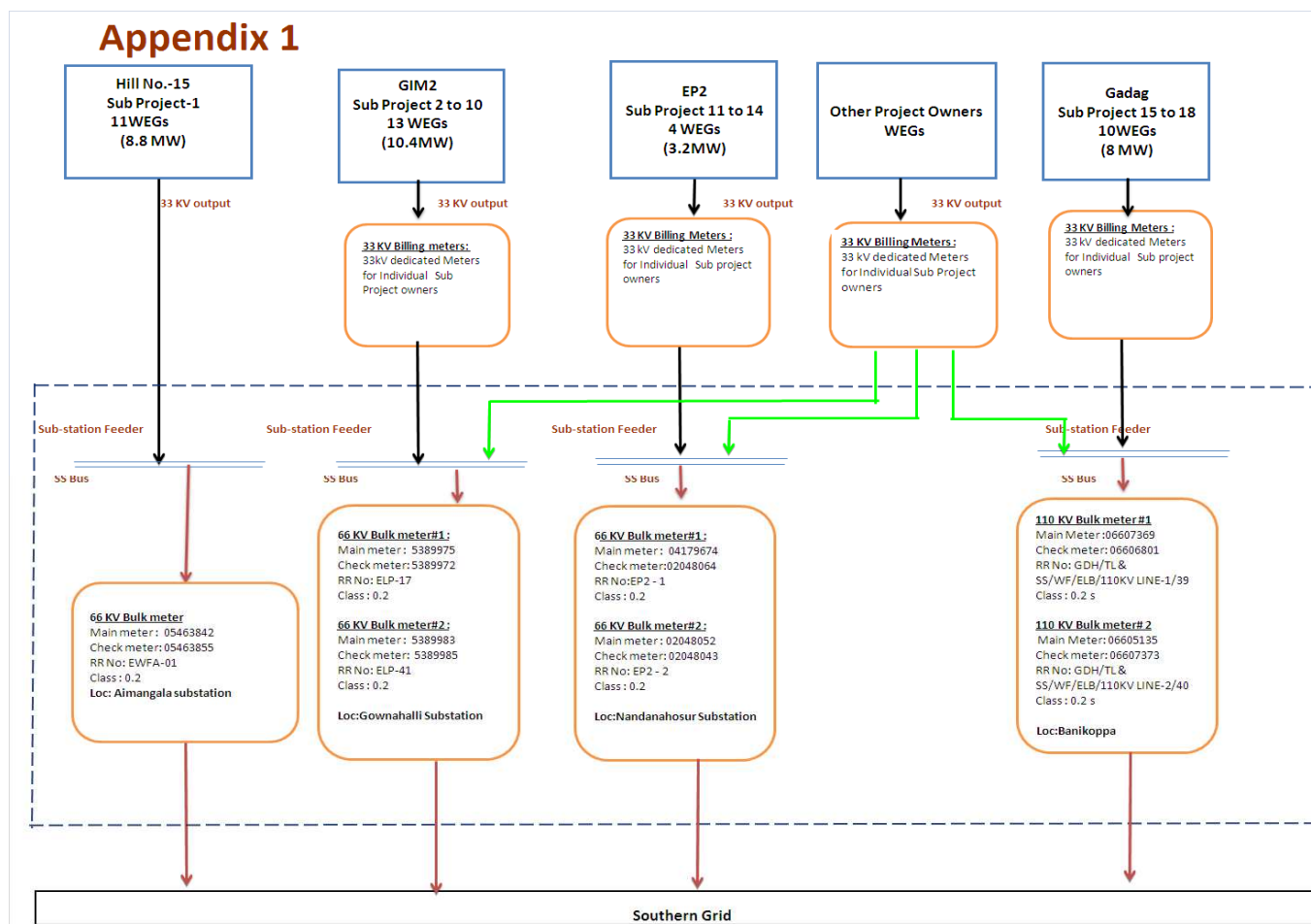
There is decrease of 13% in the expected and annual emission reductions. The reason behind decrease in PLF is due to the low wind availability.

**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		



## Appendix 1: Line Diagram Showing Relevant Metering Points



**Appendix 2:****Net Electricity Exported to Grid (EGy)****Electricity Generation and CER Calculation**

Month	Export[kWh]	Import[kWh]	Transmission Loss[kWh]	Net Electricity supplied to Grid[kWh]	Baseline Emission Factor (tCO <sub>2</sub> e/MWh) EF <sub>y</sub>	Emission Reductions (tCO <sub>2</sub> e) E <sub>Ry</sub>
Sep-10	5035680	5900	46170	4983611	0.9320	4,645
Oct-10	3066510	7038	26671	3032801	0.9320	2,827
Nov-10	2041800	8177	24549	2009075	0.9320	1,872
Dec-10	2372340	4623	16289	2351428	0.9320	2,192
Jan-11	2632680	5520	33816	2593344	0.9320	2,417
Feb-11	2327130	7866	27130	2292134	0.9320	2,136
Mar-11	2135940	11989	22404	2101547	0.9320	1,959
Apr-11	1898430	16802	24034	1857595	0.9320	1,731
May-11	4645920	7280	49631	4589009	0.9320	4,277



Jun-11	10169760	2726	110393	10056641	0.9320	9,373
Jul-11	11166300	552	135449	11030299	0.9320	10,280
Aug-11	9060930	480	101142	8959308	0.9320	8,350
Total	56553420	78950	617679	55856791	Total CERs	52,058