

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

<b>Title of the project activity</b>	Enercon Wind Farms in Karnataka Bundled Project – 30.40 MW
<b>Reference number of the project activity</b>	1291
<b>Version number of the monitoring report</b>	1
<b>Completion date of the monitoring report</b>	19/11/2012
<b>Registration date of the project activity</b>	18/03/2010
<b>Monitoring period number and duration of this monitoring period</b>	01/09/2011-30/09/2012 3 <sup>rd</sup> Monitoring Period
<b>Project participant(s)</b>	Enercon (India) Ltd. Japan Carbon Finance
<b>Host Party(ies)</b>	India
<b>Sectoral scope(s) and applied methodology(ies)</b>	Sectoral Scope 1 Energy industries (renewable/ non-renewable sources). Approved consolidated baseline methodology ACM0002 (Version 6.0, EB 58)
<b>Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD</b>	71,180 tCO <sub>2</sub>
<b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period</b>	62,983 tCO <sub>2</sub>

**SECTION A. Description of project activity****A.1. Purpose and general description of project activity**

&gt;&gt;

- (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 71,180 tCO<sub>2</sub>e 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.

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. Panama Business Centre: 1.60 MW
3. Balasahab Ladkat: 1.60 MW
4. Elpro International: 0.80 MW
5. Gautam Ladkat: 0.80 MW
6. Panama Infrastructure: 1.60 MW
7. Sameer Ladkat: 0.80 MW
8. Steelfab Offshore 0.80 MW
9. MK Agrotech Private Ltd: 1.60 MW
10. Srinivas Sirigeri: 0.80 MW
11. Dempo Industries: 0.80 MW
12. Desai Brothers: 0.80 MW
13. Dewanchand Ramsaran: 0.80 MW
14. Abhilash Garments & Estates (P) Ltd: 0.80 MW
15. Prasad Global Solutions: 1.60 MW
16. Gangadhar Narsingdas Agarwal: 4.00 MW
17. Siddaganga Oil Extractions Ltd.: 1.60 MW
18. Power Link System Private Limited: 0.80 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 (01/09/2011 to 30/09/2012) is 62,983 tCO<sub>2</sub>.

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

The project activity involves supply, erection, commissioning and operation of 38 machines of rated capacity 800 KW each. The machines are Enercon E-53 make. Enercon (India) Ltd (EIL) is the turbine supplier and is the operations and maintenance contractor.



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

The WECs under the project activity were commissioned between 29/03/2006 and 29/12/2006. The expected operational lifetime of the project is for 20 years. The project activity was registered as CDM project on 18/03/2010. The first monitoring period is from 01/09/2011 to 30/09/2012.

(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 (01/09/2011 to 30/09/2012) is 62,983 tCO<sub>2</sub>.

## A.2. Location of project activity

>>

(a) *Host Party(ies);*  
India

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

(c) *City/Town/Community, etc.;*  
The Project is spread across villages of Gadag & Chitradurga District of Karnataka state in India.

(d) *Physical/ Geographical location.*

The Project is located in Gadag & Chitradurga district in the Indian State of Karnataka. Approximate distance of the project activity from Bangalore by road is 200 km. The nearest major railway station as well as airport is Bangalore. The longitude and latitude details of WECs are given below:

Sr. No.	Project Owner	Unique Identification No.	Lo c. 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	76	28	6.3
3		EWCLA-03	3	14	2	52.6	76	28	5
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
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	76	27	58.6
12	Panama Business Centre	PBCGH2-01	65	13	57	23.5	76	24	55
13		PBCGH2-02	66	13	57	20	76	24	54.6
14	Balasaheb Ladkat	BMLGH2-01	67	13	57	16.3	76	24	55.9
15		BMLGH2-02	68	13	57	12.9	76	24	57.5
16	Elpro International	EILGH2-01	59	13	58	50.7	76	25	24.9
17	Gautam Ladkat	GLGH2-01	69	13	57	10.8	76	25	0.9
18	Panama Infrastructure	PIPPGH2-01	43	13	59	28.2	76	23	46.2
19		PIPPGH2-02	44	13	59	28.5	76	23	50.8



20	Sameer Ladkat	SLGH2-01	45	13	59	22.4	76	23	52.6
21	Steelfab Offshore	SFOGH2-01	71	13	57	3.6	76	25	4.9
22	MK Agrotech Private Ltd.	MKAGH2-01	61	13	58	44.3	76	25	26.3
23		MKAGH2-02	62	13	58	40.9	76	25	28
24	Srinivas Sirigeri	SSHD-01	7	13	57	0.10	76	19	29.80
25	Dempo Industries	DIPLHD-01	6	13	57	4.30	76	19	28.20
26	Desai Brothers	DBLHD-01	1	13	59	27.70	76	18	45.70
27	Dewanchand Ramsaran	DRGH2-01	72	13	57	0	76	25	6.7
28	Abhilash Garments & Estates (P) Ltd.	AGEGA-01	11	15	80	57.30	75	38	38.20
29	Prasad Global Solutions	PGSGA-01	1	15	10	7.90	75	38	34.50
30		PGSGA-02	17	15	8	19.4	75	38	1.80
31	Gangadhar Narsingdas Agarwal	GNAGA-01	6	15	9	34.3	75	38	27.1
32		GNAGA-02	7	15	9	26.4	75	38	31.5
33		GNAGA-03	8	15	9	20.5	75	38	32
34		GNAGA-04	12	15	8	48.7	75	38	39.4
35		GNAGA-05	13	15	8	44.7	75	38	41
36	Siddaganga Oil Extractions Ltd.	SOEGA-01	14	15	8	40.3	75	38	44.3
37		SOEGA-02	15	15	8	36.5	75	38	46.8
38	Power Link System Private Limited	PLSHD-01	5	13	57	8.10	76	19	27.30

**A.3. Parties and project participant(s)**

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (Host)	Enercon (India) Ltd.	No
Government of Japan	Japan Carbon Finance	No

**A.4. Reference of applied methodology**

&gt;&gt;

- (a) ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 6.0)

<http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html>

**A.5. Crediting period of project activity**

&gt;&gt;

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 (from 18/03/2010 to 17/03/2020).

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

&gt;&gt;



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 totalling to a capacity of 30.4 MW.

The commissioning date for all the WECs included in the project activity is given in the table below.

Sr. 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	Panama Business Centre	PBCGH2-01	65	31/03/2006
13		PBCGH2-02	66	31/03/2006
14	Balasaheb Ladkat	BMLGH2-01	67	31/03/2006
15		BMLGH2-02	68	31/03/2006
16	Elpro International	EILGH2-01	59	31/03/2006
17	Gautam Ladkat	GLGH2-01	69	31/03/2006
18	Panama Infrastructure	PIPPGH2-01	43	31/03/2006
19		PIPPGH2-02	44	31/03/2006
20	Sameer Ladkat	SLGH2-01	45	31/03/2006
21	Steelfab Offshore	SFOGH2-01	71	31/03/2006
22	MK Agrotech Private Ltd.	MKAGH2-01	61	31/03/2006
23		MKAGH2-02	62	31/03/2006
24	Srinivas Sirigeri	SSHD-01	7	29/03/2006
25	Dempo Industries	DIPLHD-01	6	29/03/2006
26	Desai Brothers	DBLHD-01	1	29/03/2006
27	Dewanchand Ramsaran	DRGH2-01	72	31/03/2006
28	Abhilash Garments & Estates (P) Ltd.	AGEGA-01	11	29/12/2006
29	Prasad Global Solutions	PGSGA-01	1	29/12/2006
30		PGSGA-02	17	29/12/2006
31	Gangadhar Narsingdas Agarwal	GNAGA-01	6	29/12/2006
32		GNAGA-02	7	29/12/2006
33		GNAGA-03	8	29/12/2006
34		GNAGA-04	12	29/12/2006
35		GNAGA-05	13	29/12/2006
36	Siddaganga Oil Extractions Ltd.	SOEGA-01	14	31/03/2006
37		SOEGA-02	15	31/03/2006
38	Power Link System Private Limited	PLSHD-01	5	29/03/2006

The project activity involves 38-wind energy convertors (WEC's) of Enercon make (800 kW, E-48) with internal electrical lines connecting the project activity with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V  $\pm$  12.5%. The 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.

## **B.2. Post registration changes**

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

>>

Not Applicable

### **B.2.2. Corrections**

>>

Not Applicable

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

>>

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

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

>>

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.2 of the Monitoring report. The change of investor has been also been incorporated in the Monitoring report.

### **B.2.5. Changes to start date of crediting period**

>>

Not Applicable

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

&gt;&gt;

Not Applicable

**SECTION C. Description of monitoring system**

&gt;&gt;

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:

Sr. No.	Name of Customer	Capacity (MW)	Enercon Sub-station	State Utility Sub-station
1	Enercon Wind Farms (Chitradurga) 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	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	Ramagiri, 66/11 kV KPTCL substation
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	4.0		

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:

$$Z = \frac{(x_1+x_2+x_3...+x_n)-y}{(X_1+X_2+X_3...+X_n)} \times 100$$

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

$$Z = \frac{(x_1+x_2+x_3...+x_n)-Y}{(X_1+X_2+X_3...+X_n)} \times 100$$

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 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) =  $(X_1+X_2+X_3...+X_n)$

$X_i$  = 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 ( $EG_{Export}$ )

#### **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 =  $EG_{Export} - \text{Transmission Loss } (T_E)$

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 ( $EG_{Import}$ )

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 =  $EG_{import} + 15\% * EG_{import}$   
=  $115\% * EG_{import}$

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.

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

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 ( $T_E$ ) between 33 kV metering point and high voltage side of receiving substation
4. Net Electricity supplied to the Grid [ $EG_{export} - 115\% * EG_{import} - T_E$ ]

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.

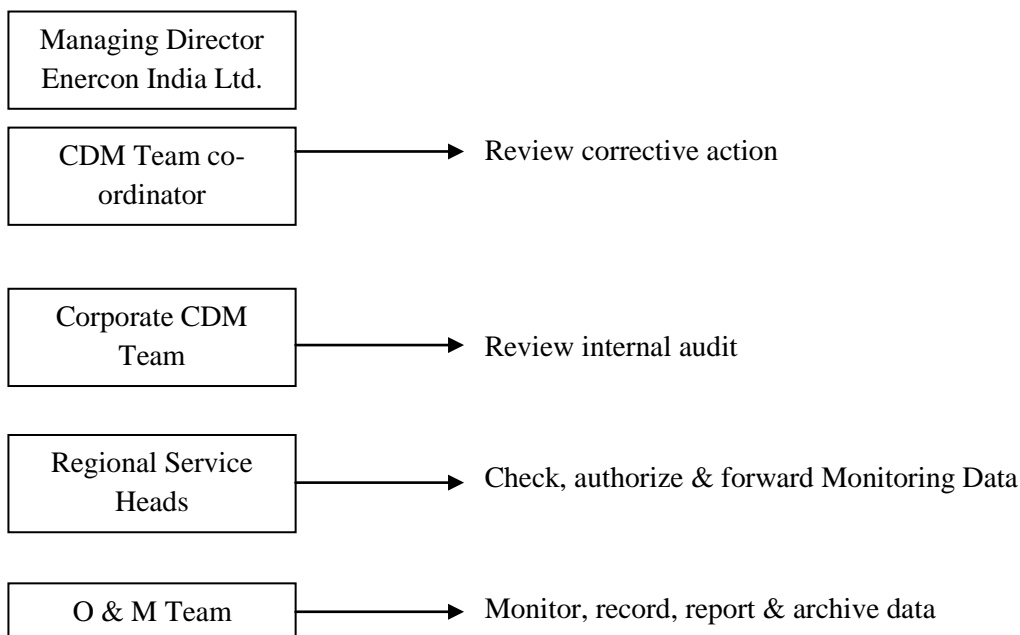
In addition to the JMR (Form B) at 33kV metering location for each of the sub project included in the project activity, the following documents are also be provided to the DoE for verification:

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:

STRUCTURERESPONSIBILITY**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 maximum 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 requirements:**

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Energy Converters (WECs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that Enercon's 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.

**SECTION D. Data and parameters****D.1. Data and parameters fixed ex ante or at renewal of crediting period***(Copy this table for each piece of data and parameter.)*

<b>Data/Parameter</b>	EF <sub>OM,y</sub>
<b>Unit</b>	tCO <sub>2</sub> e/MWh
<b>Description</b>	Operating Margin Emission Factor of Southern Electricity Grid
<b>Source of data</b>	“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>
<b>Value(s) applied</b>	1.0038
<b>Purpose of data</b>	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.
<b>Additional comment</b>	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

<b>Data/Parameter</b>	EF <sub>BM,y</sub>
<b>Unit</b>	tCO <sub>2</sub> e/MWh
<b>Description</b>	Build Margin Emission Factor of Southern Electricity Grid
<b>Source of data</b>	“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>
<b>Value(s) applied</b>	0.718
<b>Purpose of data</b>	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002.
<b>Additional comment</b>	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.



<b>Data/Parameter</b>	EF <sub>CM,y</sub>
<b>Unit</b>	tCO <sub>2</sub> e/MWh
<b>Description</b>	Combined Margin Emission Factor of Southern Electricity Grid
<b>Source of data</b>	“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>
<b>Value(s) applied</b>	In case of wind power projects default weights of 0.75 for EF <sub>grid,OM,y</sub> and 0.25 for EF <sub>grid,BM,y</sub> are applicable as per ACM0002. Combined Margin Emission Factor (EF <sub>grid,CM,y</sub> ) = 0.93204
<b>Purpose of data</b>	Combined Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with CDM methodologies: ACM0002, and Tool to Calculate the emission Factor for an Electricity System.
<b>Additional comment</b>	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Emission factor (EF<sub>y</sub>) 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<sub>OM</sub> and 0.25 for EF<sub>BM</sub> 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***(Copy this table for each piece of data and parameter.)*

<b>Data/Parameter</b>	EG <sub>y</sub>
<b>Unit</b>	MWh (Mega-watt hour)
<b>Description</b>	Net electricity supplied to the grid by the Project
<b>Measured/Calculated/Default</b>	Calculated
<b>Source of data</b>	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.
<b>Value(s) of monitored parameter</b>	Annual electricity supplied to the grid by the Project (EG <sub>y</sub> ) = 61367.199MWh
<b>Monitoring equipment</b>	Calculated as per formulas better described under section C.
<b>Measuring/Reading/Recording frequency</b>	Monthly

**Calculation method  
(if applicable)**

Monitoring: All the meters are two-way trivector meters capable of recording import and export of electricity 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.

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:

Sr. No.	Name of Customer	Capacity (MW)	Enercon Sub-station
1	Enercon Wind Farms (Chitradurga) 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	

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.

Frequency of recording data: Monthly

Recording: The values of electricity supplied to the grid are sourced from JMR for the sub projects at 33 kV metering point.

Responsibility: Joint responsibility of Enercon and state utility.

Refer section C for an illustration of the provisions for measurement methods.



<b>QA/QC procedures</b>	Refer section C for an illustration of the provisions for QA/QC procedures.
<b>Purpose of data</b>	To calculate emission reduction.
<b>Additional comment</b>	The data will be archived for crediting period + 2 years.

<b>Data/Parameter</b>	EG <sub>Export</sub>
<b>Unit</b>	MWh (Mega-watt hour)
<b>Description</b>	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.
<b>Measured/Calculated/Default</b>	Measured at Main & Check Meters
<b>Source of data</b>	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.
<b>Value(s) of monitored parameter</b>	62238.330
<b>Monitoring equipment</b>	Accuracy Class-0.2 Serial Number of Main Meter: Refer Appendix III of the MR Serial Number of Check Meter: Refer Appendix III of the MR Calibration Frequency: Annually Date of Last Calibration: Refer Appendix III of the MR
<b>Measuring/Reading/Recording frequency</b>	Monthly
<b>Calculation method (if applicable)</b>	NA
<b>QA/QC procedures</b>	Refer section C for an illustration of the provisions for QA/QC procedures.
<b>Purpose of data</b>	To calculate net electricity exported to grid.
<b>Additional comment</b>	The data will be archived for crediting period + 2 years.





<b>Data/Parameter</b>	EG <sub>import</sub>
<b>Unit</b>	MWh (Mega-watt hour)
<b>Description</b>	Electricity Import 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.
<b>Measured/Calculated /Default</b>	Measured at Main & Check Meters.
<b>Source of data</b>	Electricity import from the grid as per joint meter reading for each of the subproject taken at 33kV metering point.
<b>Value(s) of monitored parameter</b>	79.730
<b>Monitoring equipment</b>	Accuracy Class-0.2 Serial Number of Main Meter: Refer Appendix III of the MR Serial Number of Check Meter: Refer Appendix III of the MR Calibration Frequency: Annually Date of Last Calibration: Refer Appendix III of the MR
<b>Measuring/Reading/ Recording frequency</b>	Monthly
<b>Calculation method (if applicable)</b>	NA
<b>QA/QC procedures</b>	Refer section C for an illustration of the provisions for QA/QC procedures.
<b>Purpose of data</b>	To calculate net electricity exported to grid.
<b>Additional comment</b>	The data will be archived for crediting period + 2 years.



<b>Data/Parameter</b>	T <sub>E</sub>
<b>Unit</b>	MWh (Mega-watt hour)
<b>Description</b>	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.
<b>Measured/Calculated /Default</b>	Calculated as per the procedure mentioned in the PPA. Refer section C of the MR.
<b>Source of data</b>	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.
<b>Value(s) of monitored parameter</b>	791.401
<b>Monitoring equipment</b>	Calculated as per formulas better described under section C.
<b>Measuring/Reading/Recording frequency</b>	Monthly
<b>Calculation method (if applicable)</b>	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 subprojects at 33 kV metering point. Responsibility: Joint responsibility of Enercon and state utility
<b>QA/QC procedures</b>	Refer section C for an illustration of the provisions for QA/QC procedures.
<b>Purpose of data</b>	To calculate emission reduction.
<b>Additional comment</b>	The data will be archived for crediting period + 2 years.

### D.3. Implementation of sampling plan

>>

No sampling plan is followed by PP.

## SECTION E. Calculation of emission reductions or GHG removals by sinks

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

>>

The baseline emissions are to be calculated as follows:

$$BE_y = EG_y * EF_y$$

Where:

BE<sub>y</sub> = Baseline emissions in year y (tCO<sub>2</sub>/yr)

EG<sub>y</sub> = 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. (MWh/yr)

$EF_y$  = 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.

Baseline Emission for the period (01/09/2011 to 30/09/2012)  
= 61367.199 (MWh) \* 0.93204 (tCO<sub>2</sub>/MWh)  
= 62,983 tCO<sub>2</sub>

## E.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.

## E.3. Calculation of leakage

>>

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

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

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (tCO <sub>2</sub> e)	Leakage (tCO <sub>2</sub> e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO <sub>2</sub> e)
01/09/2011 – 31/12/2011	15,023	0	0	15,023
01/01/2012 – 30/09/2012	47,960	0	0	47,960
<b>Total</b>	<b>62,983</b>	<b>0</b>	<b>0</b>	<b>62,983</b>

## E.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 <sub>2</sub> e)	71,180	62,983

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

>>

The emission reduction has been calculated for 13 months under the present monitoring period, while in registered PDD the Emission Reductions are calculated for a year (12 months). Proportionate number of CERs for a period of thirteen months as per registered PDD comes out to be 71,180. However, actual number of CERs achieved in the present monitoring period is 62,983. This reflects a difference of 11.5% on the downside, which is due to the low PLF achieved by the project activity.

-----

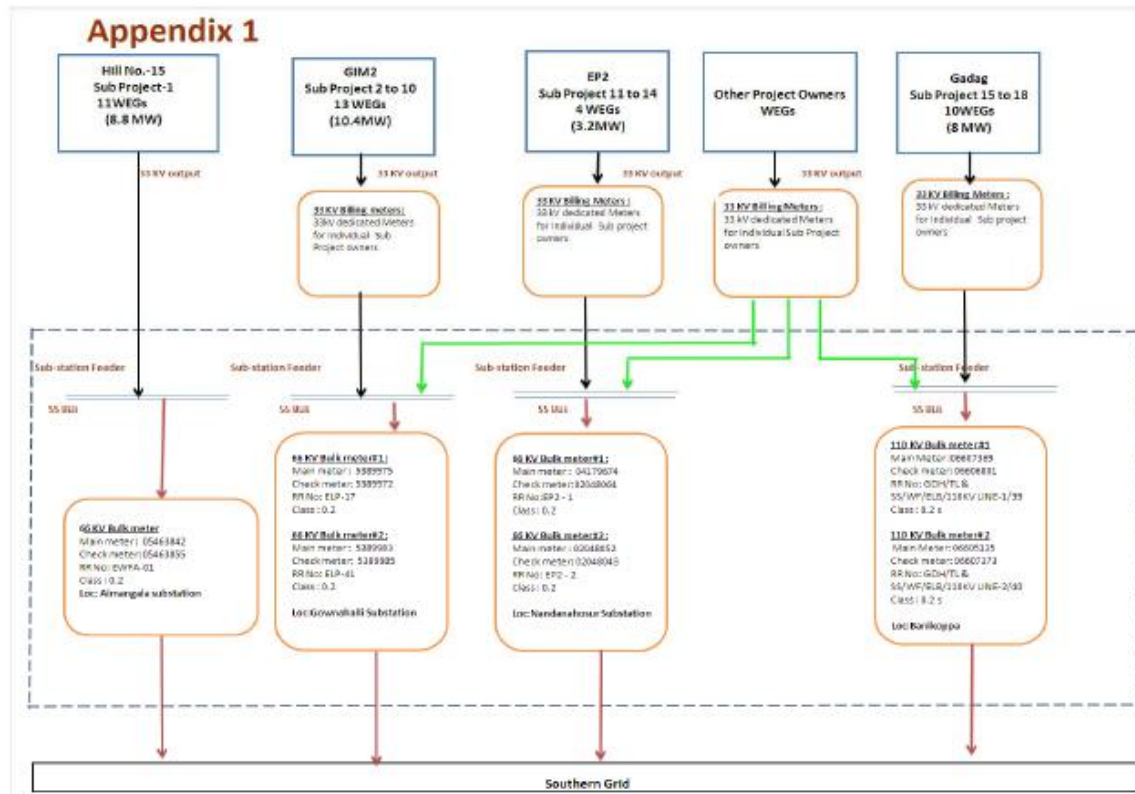


## History of the document

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.
<b>Decision Class:</b> Regulatory <b>Document Type:</b> Form <b>Business Function:</b> Issuance		

## Appendix I

### Line Diagram Showing Relevant Metering Points





## Appendix II:

Net Electricity Exported to Grid (EG<sub>y</sub>)

## 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 )	Emission Reductions (tCO <sub>2</sub> e)
Sep-11	6966690	1829	76080	6888782	0.9320	6,421
Oct-11	1965390	13145	26232	1926014	0.9320	1,795
Nov-11	3816510	2243	44129	3770139	0.9320	3,514
Dec-11	3570420	4934	30842	3534645	0.9320	3,294
Jan-12	1855740	11765	24612	1819364	0.9320	1,696
Feb-12	2634330	8384	29045	2596902	0.9320	2,420
Mar-12	2751990	12041	33409.634	2706540	0.9320	2,523
Apr-12	2061270	17147	30642.352	2013481	0.9320	1,877
May-12	5982720	4692	68208	5909820	0.9320	5,508
Jun-12	9933330	621	122931	9809778	0.9320	9,143
Jul-12	11282010	794	193148	11088068	0.9320	10,334
Aug-12	9417930	2139	112123	9303668	0.9320	8,671
Sep-12	6281790	3519	69078	6209193	0.9320	5,787



## Appendix III

## Metering system details:

The details of meters installed at the substation are provided below:

Project Owner	RR No.	Site	District	Meter Type	Meter Sr. No.	Accuracy Class	Make	Last Calibration done	Latest Calibration Done	
Enercon Wind Farms (Chitradurga) Ltd.	EWFA-01	Hill No-15	Chitradurga	Main Meter	5463842	0.2	L & T	10/06/2011	10-06-2011	
				Check meter	5463855	0.2	L & T	10/06/2011	10-06-2011	
Panama Business Centre	ELP-33	GIM-II	Chitradurga	Main Meter	8001400	0.2	L & T	22/08/2011	22-08-2011	15-05-2012
				Check meter	5390230	0.2	L & T	22/08/2011	22-08-2011	15-05-2012
Balasahab Ladkat	ELP-34	GIM-II	Chitradurga	Main Meter	5390421	0.2	L & T	06/07/2011	06-07-2011	15-05-2012
				Check meter	5341085	0.2	L & T	06/07/2011	06-07-2011	15-05-2012
Elpro International	ELP-29	GIM-II	Chitradurga	Main Meter	5436130	0.2	L & T	30/07/2011	30-07-2011	15-05-2012
				Check meter	5436135	0.2	L & T	30/07/2011	30-07-2011	15-05-2012
Gautam Ladkat	ELP-35	GIM-II	Chitradurga	Main Meter	5389971	0.2	L & T	06/07/2011	06-07-2011	15-05-2012
				Check meter	5389974	0.2	L & T	06/07/2011	06-07-2011	15-05-2012
Panama Infrastructure	ELP-23	GIM-II	Chitradurga	Main Meter	5389981	0.2	L & T	13/06/2011	13-06-2011	15-05-2012
				Check	5271055	0.2	L & T	13/06/2011	13-06-2011	15-05-2012



				meter						
Sameer Ladkat	ELP-24	GIM-II	Chitradurga	Main Meter	5436122	0.2	L & T	30/07/2011	30-07-2011	15-05-2012
				Check meter	5436121	0.2	L & T	30/07/2011	30-07-2011	15-05-2012
Steelfab Offshore	ELP-37	GIM-II	Chitradurga	Main Meter	5437939	0.2	L & T	08/07/2011	08-07-2011	15-05-2012
				Check meter	5437956	0.2	L & T	08/07/2011	08-07-2011	15-05-2012
MK Agrotech Private Ltd	ELP-31	GIM-II	Chitradurga	Main Meter	5389904	0.2	L & T	30/07/2011	30-07-2011	15-05-2012
				Check meter	5436140	0.2	L & T	30/07/2011	30-07-2011	15-05-2012
Srinivas Sirigeri	EP2-29	EP-II	Chitradurga	Main Meter	5463840	0.2	L & T	21/03/2011	21-03-2011	26-12-2011
				Check meter	5462963	0.2	L & T	21/03/2011	21-03-2011	26-12-2011
Dempo Industries	EP2-27	EP-II	Chitradurga	Main Meter	5463847	0.2	L & T	21/03/2011	21-03-2011	26-12-2011
				Check meter	5463838	0.2	L & T	21/03/2011	21-03-2011	26-12-2011
Desai Brothers	EP2-25	EP-II	Chitradurga	Main Meter	5437948	0.2	L & T	18/03/2011	18-03-2011	26-12-2011
				Check meter	5463853	0.2	L & T	18/03/2011	18-03-2011	26-12-2011
Dewanchand Ramsaran	ELP-38	GIM-II	Chitradurga	Main Meter	5389379	0.2	L & T	08/07/2011	08-07-2011	15-05-2012
				Check meter	5389378	0.2	L & T	08/07/2011	08-07-2011	15-05-2012
Abhilash Garments & Estates (P)	GDG/TL & SS/WF/AG EM/Loc	Gadag	Gadag	Main Meter	5463841	0.2	L & T	06/06/2011	06-06-2011	
				Check	6760772	0.2	L & T	06/06/2011	06-06-2011	





Ltd.	No-11/46			meter						
Prasad Global Solutions	GDG/TL & SS/WF/PGS M/Loc No-1/41	Gadag	Gadag	Main Meter	6607372	0.2	L & T	06/06/2011	06-06-2011	
				Check meter	5389381	0.2	L & T	06/06/2011	06-06-2011	
Prasad Global Solutions	GDG/TL & SS/WF/PGS R/Loc No-17/50	Gadag	Gadag	Main Meter	6675385	0.2	L & T	06/06/2011	06-06-2011	
				Check meter	6675392	0.2	L & T	06/06/2011	06-06-2011	
Gangadhar Narsingdas Agarwal	GDG/TL & SS/WF/GN AM/Loc No-12 & 13/47	Gadag	Gadag	Main Meter	6675414	0.2	L & T	06/06/2011	06-06-2011	
				Check meter	6675384	0.2	L & T	06/06/2011	06-06-2011	
Gangadhar Narsingdas Agarwal	GDG/TL & SS/WF/GN AM/Loc No-6,7 & 8/45	Gadag	Gadag	Main Meter	6675402	0.2	L & T	06/06/2011	06-06-2011	
				Check meter	6760764	0.2	L & T	06/06/2011	06-06-2011	
Siddaganga Oil Extractions Ltd.	GDG/TL & SS/WF/GN AM/Loc No 14 & 15/48	Gadag	Gadag	Main Meter	5463849	0.2	L & T	06/06/2011	06-06-2011	
				Check meter	6605127	0.2	L & T	06/06/2011	06-06-2011	
Power Link System Private Limited	EP2-28	EP-II	Chitradurga	Main Meter	5437934	0.2	L & T	21/03/2011	21-03-2011	26-12-2011
				Check meter	5462964	0.2	L & T	21/03/2011	21-03-2011	26-12-2011



S. No.	Name of Substation	Meter RR No.	Main Meter	Check Meter	Calibration	
					2011	2012
1	Enercon Sub-station at Imangala	EWFA-01	05463842	05463855	10-Jun-11	11-Jun-12
2	EP-II Sub-station at Nandana Hosuru	EP2-01	04179674	02048064	24-Mar-11	06-Mar-12
		EP2-02	02048052	02048043	24-Mar-11	06-Mar-12
3	GIM-II Sub-station at Gownalli	ELP-17	05271046	05389972	19-Mar-11	13-Jun-12
		ELP-41	05389983	05389985	19-Mar-11	13-Jun-12
4	Gadag Sub-station at Banikoppa	Line I (GDG/TL&SS/WF/ELB/110LINE-I/39)	06607369	06606801	14-Jul-11	NA
		Line II (GDG/TL&SS/WF/ELB/110LINE-II/39)	06605135	06607373	14-Jul-11	NA