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

CONTENTS

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

MONITORING REPORT
Version 1.0 and Date 03/04/2012

Title: 50.4 MW Tata Wind Farm - in Maharashtra
Project Reference No: 2819
Monitoring Period 02- FROM 01/06/2011 TO 31/01/2012 (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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"The Tata Power Company Limited" is the project sponsor. The objective is development, design, engineering, procurement, finance, construction, operation and maintenance of "50.4 MW Tata Wind Farm - in Maharashtra" to provide reliable, renewable power to the Maharashtra state electricity grid which is part of the Western electricity grid. The Project activity lead to reduced greenhouse gas emissions because it displaces electricity from fossil fuel based electricity generation plants.

The aggregate 50.4 MW project activity comprises of total 63 numbers wind energy generators, with each WEG having a capacity of 800 kW. Enercon (India) Ltd ("Enercon") is the equipment supplier and the operations and maintenance contractor for the Project. The Project harnesses renewable resources in the region, and thereby displacing non-renewable natural resources and thus leading to sustainable economic and environmental development. "The Tata Power Company Limited" has sponsored the Project. Project activity supplies the electricity to the Maharashtra state grid that forms part of the Western electricity grid of India and this power would be consumed by the Distribution business of The Tata Power Company Limited.

The first WEG under the project activity was commissioned on 10 Mar 2007 and last WEG under the project activity was commissioned on 15 December 2007. The expected operational lifetime of the project is for 20 years. The total emission reductions achieved under this monitoring period (01 June 2011 to 31 January 2012) is **77,712** tCO_2.

A.2. Project Participants

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1) The Tata Power Company Limited
   Country – India (Host)
2) Enercon (India) Limited
   Country – India
3) Asian Development Bank as Trustee of the Asia Pacific Carbon Fund (Spain)
   Country - Spain
4) Kingdom of Spain
   Country - Spain
5) Swedish Energy Agency
   Country - Sweden

A.3. Location of the project activity:

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The Project consists of 63 numbers of E-48 WEGs of 800 kW each installed at Khandke site of Ahmednagar district of Maharashtra State in India. The longitude and latitude details of each of the wind mill are given in the table below:

WEG Sr. No.	Unique Identification Number	Location	Latitude	Longitude
1	TPCL-1	Agadgaon	N19^o 10' 29.8"	E74^o 50' 59.8"
2	TPCL-2		N19^o 10' 37.9"	E74^o 50' 54.2"

WEG Sr. No.	Unique Identification Number	Location	Latitude	Longitude
3	TPCL-3		N19° 10’ 44.8”	E74° 50’ 50.7”
4	TPCL-4		N19° 10’ 41.0”	E74° 50’ 38.7”
5	TPCL-5		N19° 10’ 32.7”	E74° 50’ 38.7”
6	TPCL-6		N19° 10’ 24.5”	E74° 50’ 30.4”
7	TPCL-7		N19° 10’ 18.3”	E74° 50’ 24.7”
8	TPCL-8		N19° 09’ 41.6”	E74° 50’ 43.5”
9	TPCL-9		N19 ° 09’ 36.8”	E74° 51’ 03.9”
10	TPCL-10		N19° 10’ 07.1”	E74° 50’ 36.2”
11	TPCL-11		N19° 09’ 58.7”	E74° 50’ 39.9”
12	TPCL-12		N19° 09’ 49.8”	E74° 50’ 41.6”
13	TPCL-13		N19 ° 09’ 33.0”	E74° 50’ 46.9”
14	TPCL-14		N19° 09’ 22.4”	E74° 50’ 37.7”
15	TPCL-15		N19° 09’ 10.1”	E74° 50’ 41.0”
16	TPCL-16		N19° 09’ 01.1”	E74° 50’ 44.4”
17	TPCL-17		N19° 08’ 54.9”	E74° 50’ 43.9”
18	TPCL-18		N19° 09’ 56.7”	E74° 50’ 07.0”
19	TPCL-19		N19° 10’ 08.9”	E74° 50’ 14.8”
20	TPCL-20	Rajani Ph-1 Deogaon	N19 ° 11’ 07.7”	E74° 51’ 41.8”
21	TPCL-21		N19° 11’ 01.2”	E74° 51’ 48.0”
22	TPCL-22		N19 ° 10’ 54.1”	E74° 51’ 52.7”
23	TPCL-23		N19° 10’ 38.8”	E74° 51’ 43.3”
24	TPCL-24		N19° 10’ 31.6”	E74° 51’ 43.6”
25	TPCL-25		N19° 10’ 19.8”	E74° 51’ 41.5”
26	TPCL-26		N19° 08’ 51.1”	E74° 49’ 37.4”
27	TPCL-27		N19° 08’ 58.0”	E74° 49’ 39.9”
28	TPCL-28		N19° 09’ 04.4”	E74° 49’ 36.5”
29	TPCL-29		N19° 09’ 10.5”	E74° 49’ 34.8”
30	TPCL-30		N19° 09’ 37.2”	E74° 49’ 46.3”
31	TPCL-31		N19° 08’ 29.4”	E74° 49’ 55.1”
32	TPCL-32		N19° 08’ 21.5”	E74° 49’ 52.7”
33	TPCL-33		N19° 08’ 17.1”	E74° 49’ 51.7”
34	TPCL-34		N19° 08’ 06.1”	E74° 49’ 59.9”
35	TPCL-35		N19° 06’ 18.3”	E74° 53’ 30.7”
36	TPCL-36		N19° 06’ 30.0”	E74° 53’ 21.7”
37	TPCL-37		N19° 06’ 24.9”	E74° 53’ 27.0”
38	TPCL-38	Agadgaon	N19° 06’ 35.0”	E74° 53’ 07.1”
39	TPCL-39		N19° 06’ 42.2”	E74° 53’ 06.4”
40	TPCL-40		N19° 06’ 49.8”	E74° 53’ 07.5”
41	TPCL-41		N19° 07’ 02.2”	E74° 53’ 02.2”
42	TPCL-42		N19° 07’ 08.1”	E74° 52’ 59.1”
43	TPCL-43		N19° 07’ 16.0”	E74° 52’ 59.1”
44	TPCL-44	Rajani Ph-1 Deogaon	N19° 09’ 37.8”	E74° 53’ 13.4”
45	TPCL-45		N19° 09’ 30.0”	E74° 53’ 13.9”
46	TPCL-46		N19° 10’ 11.5”	E74° 53’ 19.6”
47	TPCL-47		N19° 10’ 18.1”	E74° 53’ 06.8”
48	TPCL-48	Mehekari	N19° 10’ 15.5”	E74 ° 52’ 51.7”
49	TPCL-49		N19° 10’ 20.6”	E74° 53’ 19.1”
50	TPCL-50		N19° 10’ 25.2”	E74° 53’ 02.5”
51	TPCL-51		N19° 10’ 21.1”	E74° 52’ 44.9”
52	TPCL-52		N19° 10’ 04.2”	E74° 53’ 27.2”
53	TPCL-53		N19° 10’ 16.5”	E74° 53’ 32.5”
54	TPCL-54		N19° 10’ 24.6”	E74° 53’ 33.3”

WEG Sr. No.	Unique Identification Number	Location	Latitude	Longitude
55	TPCL-55		N19^{o} 10’ 32.9”	E74^{o} 53’ 33.5”
56	TPCL-56		N19^{o} 09’ 59.9”	E74^{o} 53’ 36.4”
57	TPCL-57		N19^{o} 10’ 50.1”	E74^{o} 52’ 23.4”
58	TPCL-58		N19^{o} 10’ 43.9”	E74^{o} 52’ 27.2”
59	TPCL-59		N19^{o} 10’ 59.4”	E74^{o} 52’ 21.1”
60	TPCL-60		N19^{o} 10’ 35.6”	E74^{o} 52’ 33.9”
61	TPCL-61		N19^{o} 10’ 28.5”	E74^{o} 52’ 41.4”
62	TPCL-62		N19^{o} 10’ 38.6”	E74^{o} 52’ 51.6”
63	TPCL-63	Rajani Ph-1 Deogaon	N19^{o} 09’ 47.1”	E74^{o} 53’ 18.3”

A.4. Technical description of the project

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The Project involves 63 wind energy generators (WEGs) of Enercon make (800 kW E-48) with internal electrical lines connecting the Project with local evacuation facility. The WEGs generates 3-phase power at 400V, which is stepped up to 33 kV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The other salient features of the state-of-art-technology are:

- 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 drawal (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEG with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking System.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts generation of power at wind speed of 3 m/s

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. Diagram of main component of Enercon make E-48 is shown in below picture:-

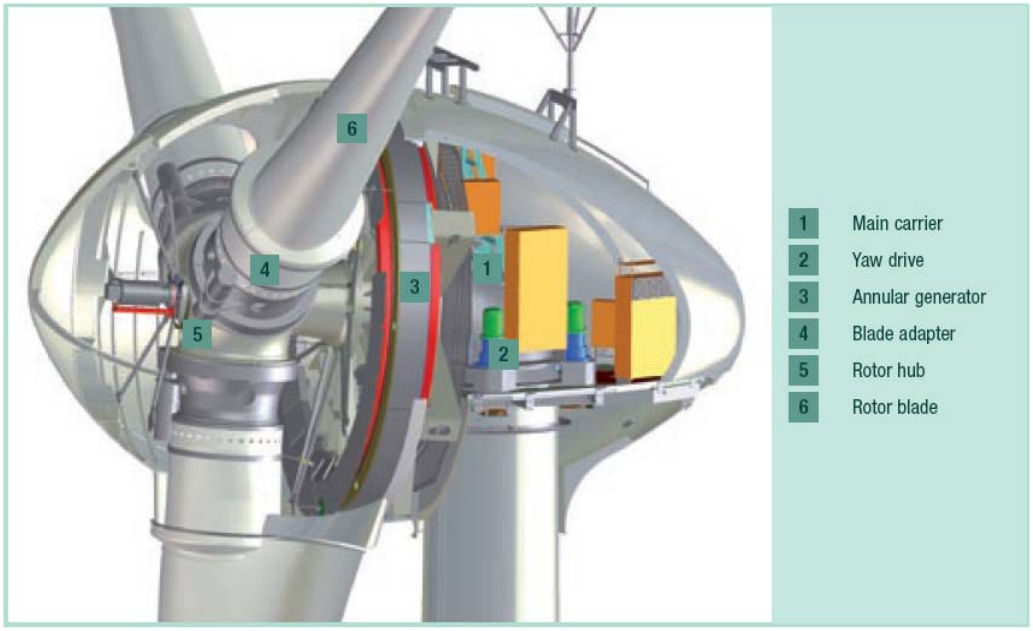

Figure: Enercon make E-48 Diagram.

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

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Title: Consolidated baseline methodology for grid-connected electricity generation from renewable sources

Reference: Approved consolidated baseline methodology ACM0002 (Version 09, EB 45), effective from 27 February 2009.[1]

ACM0002 draws upon the following tools which have been used in the registered PDD:

- Tool to calculate the emission factor for an electricity system – Version 01
- Tool for the demonstration and assessment of additionality – Version 5.2

A.6. Registration date of the project activity:

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01/06/2010[2]

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

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Crediting period of the project activity as per registered PDD is from 01 June 2010 to 31 May 2020 (Fixed).

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

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Contact Information of responsible person(s)/entity(ies) is given in the table below:

For Project Sponsor:

Organization:	The Tata Power Company Limited
Street/P.O.Box:	34, Sant Tukaram Road, Carnac Bunder
Building:	Business Development Department, Corporate Center'A' Block
City:	Mumbai

[1] http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L

[2] http://cdm.unfccc.int/Projects/DB/DNV-CUK1249024361.28/view

State/Region:	Maharashtra
Postfix/ZIP:	400009
Country:	India
Telephone:	+91 22 67171207
FAX:	+91 22 66658626
E-Mail:	rahulshah@tpc.co.in
URL:	www.tatapower.com
Represented by:	
Title:	Head-commercial
Salutation:	Mr.
Last Name:	Shah
Middle Name:	Chandrakant
First Name:	Rahul
Department:	Strategy and Business Development
Mobile:	+91 9223301139
Direct FAX:	+91 22 66658626
Direct tel:	+ 91 67171207
Personal E-Mail:	rahulshah@tpc.co.in

For Project Developer:

Organization:	Enercon (India) Limited
Street/P.O.Box:	Enercon Tower, A-9, Veera Industrial Estate, Veera Desai Road, Andheri (W)
Building:	
City:	Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400 053
Country:	India
Telephone:	+91-22-6692 4848
FAX:	+91-22 - 67040473 / 66921175
E-Mail:	yogesh.mehra@enerconindia.net
URL:	www.enerconindia.net
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Mehra
Middle Name:	
First Name:	Yogesh
Department:	Corporate
Mobile:	+91-98200 40301
Direct FAX:	+91-22-6692 1177
Direct tel:	+91-22-6702 2832
Personal E-Mail:	yogesh.mehra@enerconindia.net

Other Party Involved:

Organization:	Asian Development Bank
Street/P.O.Box:	6 ADB Avenue
Building:	
City:	Mandaluyong City
State/Region:	Metro Manila
Postfix/ZIP:	1550
Country:	Philippines
Telephone:	+ 63 2 632 6473
FAX:	+ 63 2 636 2198

E-Mail:	apcf@adb.org
URL:	www.adb.org
Represented by:	Xianbin Yao
Title:	Director General
Salutation:	Mr.
Last Name:	Yao
Middle Name:	
First Name:	Xianbin
Department:	Regional & Sustainable Development Department (RSDD)
Mobile:	
Direct FAX:	+ 63 2 636 2198
Direct tel:	+ 63 2 632 6781
Personal E-Mail:	xyao@adb.org

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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The first WEG under the project activity was commissioned on 10 Mar 2007 and last WEG under the project activity was commissioned on 15 December 2007. The project activity consists of total 63 WEGs (800 KWH) of Enercon make E-48. The commissioning date for all the WEGs include in the project activity is given in the table below.

WEG Sr. No.	Unique identification Number	Commissioning Dates
1	TPCL-1	22-Mar-07
2	TPCL-2	10-Mar-07
3	TPCL-3	10-Mar-07
4	TPCL-4	10-Mar-07
5	TPCL-5	10-Mar-07
6	TPCL-6	10-Mar-07
7	TPCL-7	10-Mar-07
8	TPCL-8	10-Mar-07
9	TPCL-9	10-Mar-07
10	TPCL-10	10-Mar-07
11	TPCL-11	10-Mar-07
12	TPCL-12	10-Mar-07
13	TPCL-13	10-Mar-07
14	TPCL-14	10-Mar-07
15	TPCL-15	10-Mar-07
16	TPCL-16	10-Mar-07
17	TPCL-17	10-Mar-07
18	TPCL-18	29-Mar-07
19	TPCL-19	31-Mar-07
20	TPCL-20	22-Mar-07
21	TPCL-21	22-Mar-07
22	TPCL-22	22-Mar-07
23	TPCL-23	22-Mar-07
24	TPCL-24	22-Mar-07
25	TPCL-25	22-Mar-07
26	TPCL-26	22-Mar-07
27	TPCL-27	22-Mar-07
28	TPCL-28	22-Mar-07
29	TPCL-29	29-Mar-07

WEG Sr. No.	Unique identification Number	Commissioning Dates
30	TPCL-30	22-Mar-07
31	TPCL-31	22-Mar-07
32	TPCL-32	22-Mar-07
33	TPCL-33	22-Mar-07
34	TPCL-34	22-Mar-07
35	TPCL-35	22-Mar-07
36	TPCL-36	22-Mar-07
37	TPCL-37	22-Mar-07
38	TPCL-38	29-Mar-07
39	TPCL-39	31-Mar-07
40	TPCL-40	29-Mar-07
41	TPCL-41	29-Mar-07
42	TPCL-42	29-Mar-07
43	TPCL-43	29-Mar-07
44	TPCL-44	29-Mar-07
45	TPCL-45	29-Mar-07
46	TPCL-46	29-Mar-07
47	TPCL-47	29-Mar-07
48	TPCL-48	10-Apr-07
49	TPCL-49	10-Apr-07
50	TPCL-50	10-Apr-07
51	TPCL-51	7-May-07
52	TPCL-52	10-Apr-07
53	TPCL-53	7-May-07
54	TPCL-54	7-May-07
55	TPCL-55	7-May-07
56	TPCL-56	7-May-07
57	TPCL-57	15-Dec-07
58	TPCL-58	15-Dec-07
59	TPCL-59	15-Dec-07
60	TPCL-60	15-Dec-07
61	TPCL-61	30-Nov-07
62	TPCL-62	30-Nov-07
63	TPCL-63	30-Nov-07

Enercon (India) Limited is the O & M contractor for the project activity and ISO 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 WEGs that are included in the project activity. As a part of regular maintenance the WEGs are stopped for mechanical and electrical maintenance for 16 to 18 hours annually and for visual inspection for 6 to 7 hours quarterly. During the monitoring period there were no events or situations occurred, which may impact the applicability of the methodology.

B.2. Revision of the monitoring plan

>>
Not applicable

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

>>
Not applicable

B.4. Notification or request of approval of changes

>>
Not applicable

SECTION C. Description of the monitoring system

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Approved monitoring methodology ACM0002 Version 09 Sectoral Scope: 1, "Consolidated baseline methodology for 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 electricity generation from the project activity.

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. Further, wind based electricity generation is not associated with any kind of leakages. Hence, the parameter for monitoring is the electricity generated by the project and supplied to the grid.

Procedure for Computing Net electricity supplied to the grid:

Line diagrams of project activity showing all relevant monitoring points has been shown below. There are total three metering points for the project activity.

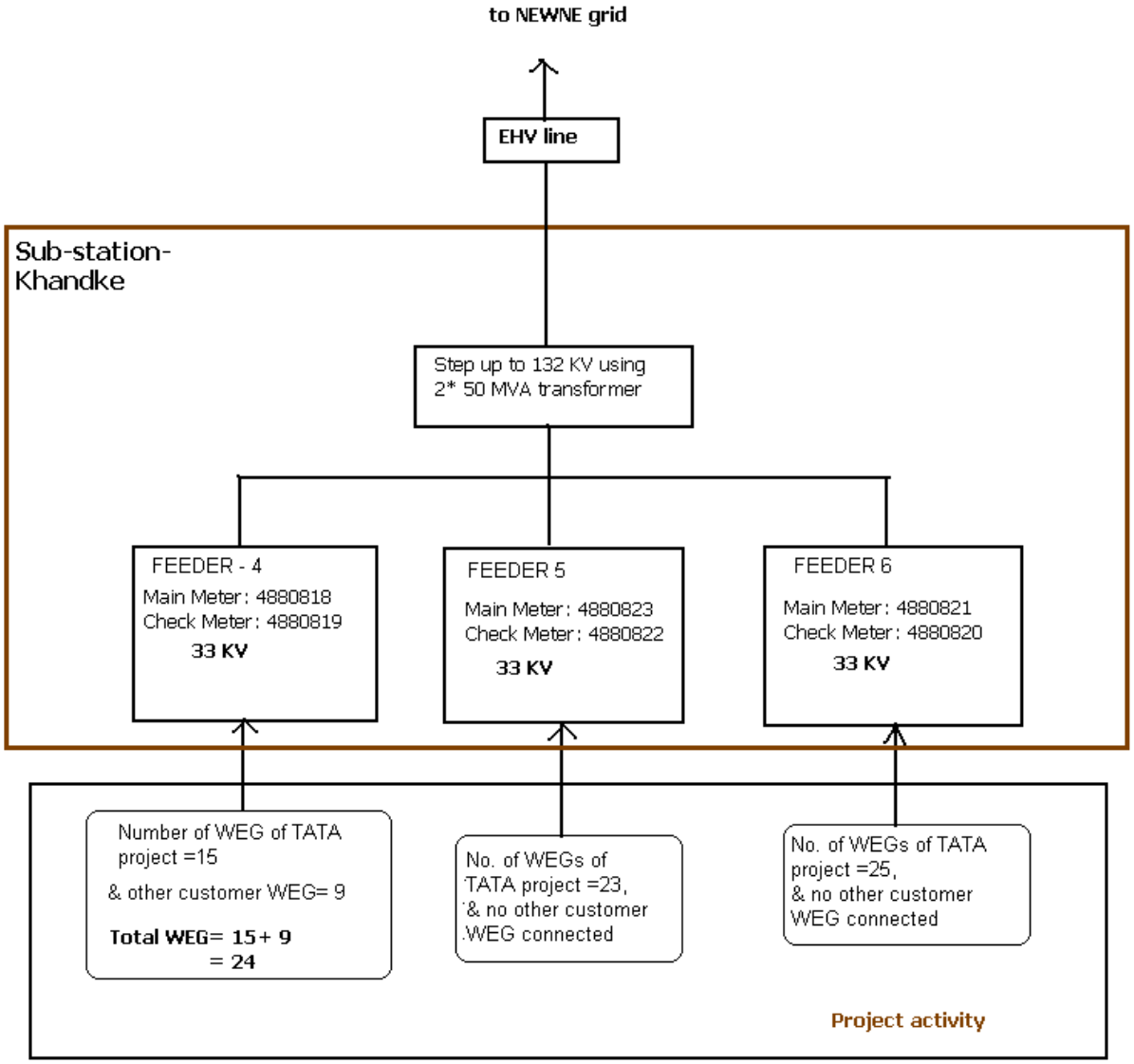


Figure: Line diagram of project activity.

As shown in the above line diagram the project activity is connected to feeder 4, 5 and 6. Each feeder has one set of main & check meter. The main and check meters that are connected to feeder 5 and 6 are

dedicated meters for the project activity i.e. no other customer WEGs are connected to these meters. However main and check meters for feeder 4 is connected to 15 WEGs of the project activity and 09 WEGs of the non-project activity. Therefore for the feeder 4, allocation procedure is applied to compute the electricity that can be allocated to 15 WEGs of the project activity. The allocation procedure is done by the Enercon. These calculations are as per the standard procedures & guidelines of MSEDCL, who is authorising the JMRs and issuing the same to PP.

Feeder 5: The net electricity supplied to the grid by 23 WEGs of the project activity. Feeder 5 has main and check meters that are exclusive to 23 WEGs of the project activity. Therefore EG_{y1} can be directly calculated using the data from JMR (joint meter reading) done at feeder 5. This can be checked from credit note provided by MSCDCL.

$$\mathbf{EG_{y1} = E_{JMR,Export,1} - E_{JMR,Import,1}}$$

Feeder 6: The net electricity supplied to the grid by 25 WEGs of the project activity. Feeder 6 has main and check meters that are exclusive to 25 WEGs of the project activity. Therefore EG_{y2} can be directly calculated using the data from JMR done at feeder 6. This can be checked from credit note provided by MSCDCL.

$$\mathbf{EG_{y2} = E_{JMR,Export,2} - E_{JMR,Import,2}}$$

Feeder 4: Feeder 4 is connected to 15 WEGs of the project activity and 09 WEGs of the non-project. Therefore for the feeder 4, allocation procedure is applied to compute the electricity that can be allocated to15 WEGs of the project activity.

The generated electricity is measured through a two step procedure for feeder 4 wherein the first metering is carried out at the controller of the WEG at the project site. The monitoring of all these WEGs is done from a common monitoring station as a part of central monitoring system. $EG_{gross, y,3}$ is the electricity generated from an individual WEG measured through its controller meter and connected to feeder 4. The summation of total Electricity generated from WEG of the project proponent from individual meters (controller meter) in MWh is presented as:

$$\sum_{y=0}^{n} EG_{gross,y,3}$$

where n = *15 of WEGs of project proponent connected at common MSEDCL meter at feeder 4*

and the summation of total Electricity generated (controller data) from the other WEG (total number of WEGs = m) attached to the common MSEDCL meter at feeder 4 connected to sub-station in MWh is presented as:

$$\sum_{y=0}^{m} EG_{gross,y,3}$$

where m =09 of WEGs of other customer connected at common MSEDCL meter

The second metering is carried out at grid interconnection point (sub-station) wherein the Joint Meter Reading (JMR) is carried out on first day of every month in presence of the representatives of the project proponent & the state electricity utility (MSEDCL). JMRs for all three feeders i.e. feeder 4, feeder 5 and feeder 6 includes electricity exported and imported by the project activity. This JMR is used for calculation of the amount of net electricity supplied to the grid. MSEDCL also provides credit note to the project proponent that provides data on electricity export and import.

The apportioning of electricity generated from the various WEGs is done by ("Enercon") based on the power generation from the individual WEGs connected to this MSEDCL meter. Operation and maintenance personnel from Enercon prepare a monthly report on generation and consumption. This

report contains details of power exported/imported to/from the grid by each of the WEGs connected. MSEDCL provides credit note to the Project Proponent stating electricity export and import.

EG_{export} the electricity supplied to the grid by the project activity WEGs connected at feeder-4 is calculated as follows:

$$EG_{export,3} = \frac{EG_{JMR,\ export,3} \times \sum_{y=0}^{n} EG_{gross,\ y,3}}{(\sum_{y=0}^{n} EG_{gross,\ y,3} + \sum_{y=0}^{m} EG_{gross,\ y,3})}$$

EG_{import} the electricity drawn from the grid by the project activity WEGs connected at feeder-4 is calculated as follows:

$$EG_{import,3} = \frac{EG_{JMR,\ import,3} \times \sum_{y=0}^{n} EG_{gross,\ y,3}}{(\sum_{y=0}^{n} EG_{gross,\ y,3} + \sum_{y=0}^{m} EG_{gross,\ y,3})}$$

EGy, the net electricity supplied to the grid by the project activity WEGs connected at feeder-4, is calculated as follows:

$$EG_{y3} = EG_{export,3}[3] - EG_{import,3}[4]$$

The above method of apportioning is as per the standard procedures & guidelines of MSEDCL and authorised by the MSEDCL. The apportioning procedure is described in details only to provide the clear description of entire procedure by relevant authority.

The net electricity supplied ($EG_y = EG_{y1} + EG_{y2} + EG_{y3}$) to grid will be sourced from JMR which can be cross checked from the credit notes provided by the MSEDCL. Each JMR contains the value of export, import & net electricity export to the grid.

The Project is operated and managed by Enercon (India) Ltd. Enercon India Limited is an ISO 9001:2008 certified Quality Management system from Germanischer Lloyd. Enercon India Limited follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure. The project will adhere to all the mandatory regulatory and statutory requirements at the state as well as national level.

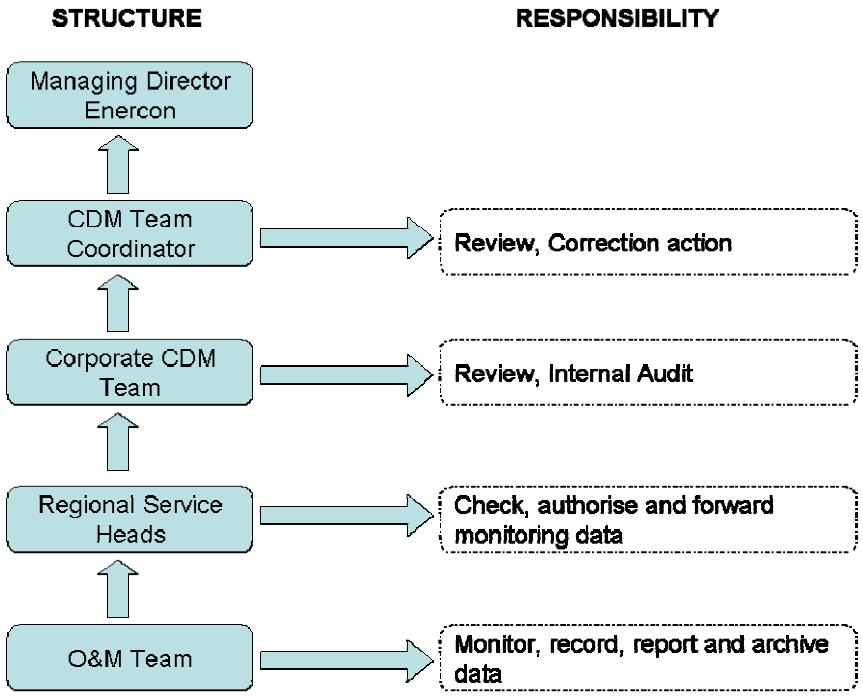
Training and maintenance requirements:

Training on the WEG is an essential pre-requisite, to ensure necessary safety of man and WEG. Further, in order to maximize the output from the Wind Energy Generators (WEGs), it is extremely essential, that the engineers and technicians understand the WEGs 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 WEG, 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.

[3] JMR consist of this value

[4] JMR consist of this value

The operational and management structure implemented by Enercon is as follows:



Details of Meter testing:

The metering equipments were tested by State Utility on annual basis. The main and check meters are tested annually by state utility. Procedure to deal with metering equipment failure:-

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. 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 meter and the corresponding check meter are found to be beyond the permissible limits of error, both the main meter & check meter 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 0.4% accuracy class, all the meters shall be re-tested and calibrated immediately
- The controller meters do not require calibration as the energy readings of electricity generated at the controller meter is cross verified by the energy calculated by inverting system installed in the WEGs. In case there is any mismatch in the energy values recorded by the controller meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The operations and maintenance staff will attend to the problem immediately in order to identify the error and correction factor will be determined

The WEGs of the project activity are connected to three meters and therefore in total there are six meters including main and check meters. Meter details for the all the feeder meters are as follows:-

Feeder No	Main/Check meter	Meter Serial No.	Make	Accuracy	Meter Testing Details	
					2011	Validity
Feeder -4	Main meter	04880818	Elster	0.2s	01/08/2011	31/07/2012
	Check meter	04880819	Elster	0.2s	01/08/2011	31/07/2012
Feeder -5	Main meter	04880823	Elster	0.2s	01/08/2011	31/07/2012
	Check meter	04880822	Elster	0.2s	01/08/2011	31/07/2012
Feeder -6	Main meter	04880821	Elster	0.2s	01/08/2011	31/07/2012
	Check meter	04880820	Elster	0.2s	01/08/2011	31/07/2012

The main and check meters are tested annually by state utility.

SECTION D. Data and parameters

>>

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

Data / Parameter:	$EF_{CM,y}$
Data unit:	tCO2e/MWh
Description:	Combined Margin Emission Factor of Western Electricity Grid
Source of data used:	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector", version 1.1 is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value(s) :	= 0. 94022
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	None

Data / Parameter:	$EF_{OM,y}$	
Data unit:	tCO2e/MWh	
Description:	Operating Margin Emission Factor of Western Electricity Grid	
Source of data used:	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" version 1.1 is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm	
Value(s) :	2002-03	0.9814
	2003-04	0.9903
	2004-05	1.0119

	Average 0.99455
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	None

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO2e/MWh
Description:	Build Margin Emission Factor of Western Electricity Grid
Source of data used:	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" version 1.1 is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value(s) :	2004 – 05 0.77722
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	None

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:	Measured
Source of data:	Electricity supplied to the grid as per the Joint Meter Readings.
Value(s) of monitored parameter:	= 82653.859 MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: Two-way tri-vector meters capable of recording import and export of electricity and provide output in the form of net electricity supplied to the grid. Accuracy class : 0.2% Serial number:-

Feeder No	Main/Check meter	Meter Serial No.
Feeder -4	Main meter	04880818
	Check meter	04880819
Feeder -5	Main meter	04880823
	Check meter	04880822
Feeder -6	Main meter	04880821
	Check meter	04880820

	Calibration frequency: annual Date of Last calibration: 01/08/2011 Validity: 31/07/2012
Measuring/ Reading/ Recording frequency:	Hourly Measurement and Monthly recording of data.
Calculation method (if applicable):	The net electricity supplied to grid is being calculated as difference of electricity exported and imported by the project activity and those values are being sourced from JMR.
QA/QC procedures applied:	Electricity supplied to the grid can be cross checked from monthly credit notes provided by MSEDCL. The metering equipment is maintained in accordance with electricity standards prevalent in Maharashtra. Calibration details are provided under section C.

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 CO2e/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO2e/kWh) as described in registered PDD.

$\mathbf{BE_y = EG_y * EF_y}$

Where,

BE is baseline emissions in year y, tCO2e

EGy is the net electricity supplied to the grid in year y and is applied directly from JMR (Form B) certified by state utility. This value can also be cross checked from the credit notes provided by MSEDCL.

EFy *is* the CO2 emission factor of the grid (940.22 tCO_2e/GWh fixed ex-ante).

Baseline Emission Reductions calculation for project activity:-

Duration	Net Export to grid by project activity (MWh)	Baseline Emission Factor (tCO2e/MWh)	Baseline Emission Reductions (tCO2e)
	[EGy]	**[EFy]**	**[BEy]= [EG_y] * [EF_y]**
01 June 2011 to 31 Jan 2012	82653.859	0.94022	77,712
		Total CERs	**77,712**

E.2. Project emissions calculation

>>

Since the project activity is a renewable energy project which generates electricity using wind power and hence does not result in 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 baseline emission reductions achieved during the monitoring period is **77,712** tCO2.

Total baseline emissions: tCO_2
Total project emissions: Zero
Total leakage: Zero

Emission reductions ERy = BEy – PEy
= **77,712** tCO_2

Duration	**Baseline Emissions [tCO_2e]**	**Project Emissions [tCO_2e]**	**Emission Reductions [tCO_2e]**
	[BEy]	**[PEy]**	**[ERy] = [BEy]- [PEy]**
01 June 2011 to 31 Jan 2012	77,712	0	77,712
		Total CERs	**77,712**

Total Emission Reductions for the monitoring period are **77,712.**

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_2e)	55,348 based on number of days involved in current monitoring period. (as per registered PDD annual emission reductions estimated is 83022)	**77,712**

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

>>

The difference in the total CERs during the current monitoring period is that current monitoring period captures only the high wind season leading to high plant load factor and doesn't captures the low wind season for project activity. In India low wind season occurs during the months of Nov to Apr and after considering the data on annual basis it is expected that the annual PLF for the project activity will be under the additionality limit as mentioned in registered PDD.

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History of the document

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

Annex 1

BASELINE INFORMATION

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. The emission factor for the project activity will be fixed throughout the crediting period.

The Operating Margin data for the most recent three years and the Build Margin data for the Western Electricity Grid as published in the CEA database version 1.1[5] are as follows:

Simple Operating Margin

	Western Grid (tCO2e/MWh)
Simple Operating Margin – 2002-03	0.9814
Simple Operating Margin – 2003-04	0.9931
Simple Operating Margin – 2004-05	1.0119
Average Operating Margin of last three years	0.99455

Build Margin

	Western Grid (tCO2e/MWh)
Build Margin- 2004-05	0.77722

Combined Margin Calculations

	Weights	**Western Grid (tCO2e/MWh)**
Operating Margin	0.75	0.99455
Build Margin	0.25	0.77722
Combined Margin		0.94022

Detailed information on calculation of Operating Margin Emission Factor and Build Margin Emission Factor is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm .

[5] The "CO2 Baseline Database for Indian Power Sector", is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Annex 2

MONITORING INFORMATION

- **Metering:** Electricity supplied to the grid is metered by the Parties (MSEDCL, Project Participants).

- **Metering Arrangement:** The generated power from WEGs (63 Nos x 800kW, total 50.4MW) will be measured at 33 kV bays. The project activity (50.4 MW) is connected to three feeders (feeder 4, 5 and 6) and each feeder has separate metering system of main and check meter. These meters are located at substation premises (S/S – 33/132 kV with 2x50MVA power transformers). The main and check meters that are connected to feeder 5 and 6 are dedicated meters for the project activity i.e. no other customer WEGs are connected to these meters. However main and check meters for feeder 4 is connected to 15 WEGs of the project activity and 09 WEGs of the non-project. Therefore for the feeder 4, allocation procedure is applied to compute the electricity that can be allocated to 15 WEGs of the project activity.

- **Metering Equipment:** Metering system for the project activity consists of one main and one check meter at each feeder. Therefore in total there are three main and three check meters. All the meters are two-way trivector meters capable of recording import and export of electricity. The metering equipment is maintained in accordance with electricity standards prevalent in Maharashtra.

- **Meter Readings:** The Net electricity supplied to the grid is recorded by taking a Joint Meter Reading (JMR) in the presence of officials from MSEDCL and Enercon as O&M contractor, on behalf of project sponsor. The Joint meter reading contains the value of energy imported and exported and the net export to the grid during the recording period. This Joint meter reading is certified by the Executive engineer of MSEDCL and by Enercon Officials. QA/QC of the Joint Meter Readings would be established through the calibration report of the Joint Meter.

- **Inspection of Energy Meters:** All main and check energy meters (export and import) 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:** There is a separate main and check meter for each 33 kV feeder. The Main and Check Meters are close to each other and will be tested for accuracy, with a portable standard meter, by the MSEDCL/MSETCL Testing Division, The MSEDCL/MSETCL will carry out the calibration, periodical testing, sealing and maintenance of meters. All the meters will be tested at the Metering Point. The MSEDCL/MSETCL will provide a copy of the test reports. If during any of the monthly meter readings, the variation between the main meter and the check meter is more than 0.4%, all the meters will be re-tested and calibrated immediately by MSEDCL/MSETCL.

- The controller meters do not require calibration as the energy readings of electricity generated at the controller meter is cross verified by the energy calculated by inverting system installed in the WEGs. In case there is any mismatch in the energy values recorded by the controller meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The operations and maintenance staff will attend to the problem immediately in order to identify the error and correction factor will be determined.