



Monitoring report form (Version 03.1)

Monitoring report

Title of the project activity	20 MW Enercon Wind farms (SAI) Pvt. Limited in Maharashtra
Reference number of the project activity	3854
Version number of the monitoring report	6
Completion date of the monitoring report	06/05/2013
Registration date of the project activity	14/12/2010
Monitoring period number and duration of this monitoring period	03 and from 01/04/2012 to 31/12/2012 (first and last days included)
Project participant(s)	Enercon (India) Limited
Host Party(ies)	Government of India
Sectoral scope(s) and applied methodology(ies)	Sectoral scope: 01; ACM0002/ Version 11
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	25,011 tCO _{2e}
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	27,554 tCO _{2e}

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

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

The objective is development, design, engineering, procurement, finance, construction, operation and maintenance of 20 MW Wind Electricity Generation Project in the state of Maharashtra to provide reliable, renewable power to the NEWNE electricity grid of India. The purpose of the project activity is to utilize renewable wind energy for generation of electricity. The Project will lead to reduction of GHG emissions as it will displace electricity from fossil fuel based electricity generation plants.

(b) Brief description of the installed technology and equipment;

The project is owned by Enercon wind farms (SAI) Pvt. Limited. Enercon (India) Limited is the operation and maintenance contractor for the Project. The generated electricity is supplied to Maharashtra State Electricity Distribution Company Limited ("MSEDCL") under a long-term power purchase agreement (PPA). The project activity involves installation of 25 number of E - 48 machines (each having capacity of 800 kW) in Ahmed Nagar in the state of Maharashtra, with internal electrical lines connecting the Project with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V \pm 12.5%.

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

The first machine under the project activity was commissioned on 28 February, 2007 and last machine was commissioned on 17 March, 2009. The expected operational lifetime of the project is for 20 years.

(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 (1 April, 2012 to 31 December, 2012) is 27,554 tCO₂.

A.2. Location of project activity

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|--------------------------------------|---|
| (a) Host Party (ies): | Government of India |
| (b) Region/ State/ Province, etc.: | Ahmednagar District in the state of Maharashtra |
| (c) City/ Town/ Community, etc.: | Panchpatta site, the site is located at a distance of 120 km from Pune by road. The nearest railway station is at Pune. |
| (d) Physical/ Geographical location. | |

The details of the geo-coordinates of individual machines have been given below:

S. No	WEG No.	Loc.	Latitude (North)	Longitude (East)
1.	523		19.6264	73.7842
2.	524		19.6275	73.7838
3.	525		19.6286	73.7834
4.	526		19.6296	73.7830
5.	527		19.6307	73.7829
6.	79		19.7480	73.8370
7.	529		19.6328	73.7829
8.	530		19.6341	73.7836
9.	504		19.6076	73.7888
10.	506		19.6087	73.7888

11.	507	19.6104	73.7887
12.	521	19.6244	73.7849
13.	510	19.6133	73.7888
14.	512	19.6155	73.7889
15.	513	19.6166	73.7887
16.	514	19.6176	73.7884
17.	35	19.6604	73.8144
18.	36	19.6617	73.8145
19.	37	19.6630	73.8146
20.	38	19.6642	73.8144
21.	39	19.6655	73.8141
22.	516	19.6196	73.7877
23.	517	19.6205	73.7871
24.	518	19.6216	73.7866
25.	519	19.6224	73.7859

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 Country)	Enercon (India) Limited (Private)	No

A.4. Reference of applied methodology

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

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

Tool: “Tool to calculate the emission factor for an electricity system” – version 2

“Tool for the demonstration and assessment of additionality” – version 5.2

References:

<http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT>

A.5. Crediting period of project activity

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The length of the Crediting period of the project activity as per registered PDD is 10 years (Fixed). The crediting period start date is 14/12/2010 and length of crediting period is 10 years (from 14/12/2010 – 13/12/2020). The monitoring period for the project activity has been considered as 01 April, 2012 to 31st December, 2012.

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

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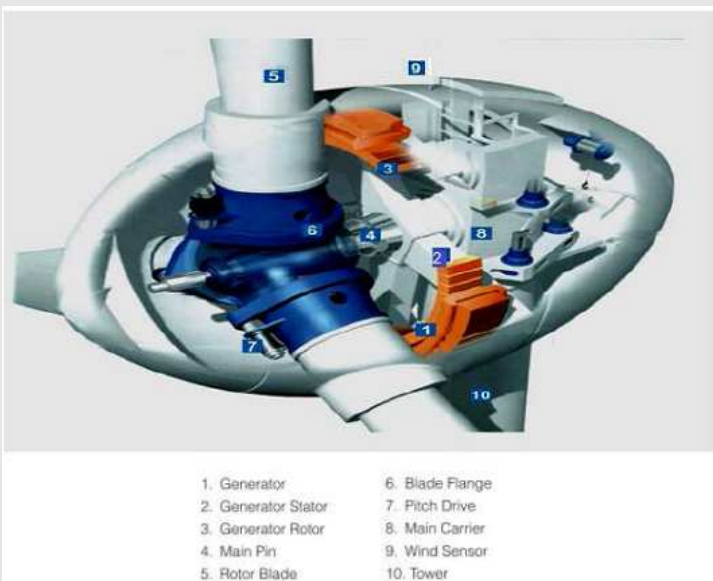
The first machine under the project activity was commissioned on 28 February, 2007 and last machine was commissioned on 17 March, 2009. The project activity consists of 25 WEGs (800 kW) of Enercon make E-48 models. The commissioning date for all the machines included in the project activity is given in the table below:

S. NO.	WEG Location no.	Unique Identification No.	Date of Commissioning
1	523	EWFSPL -01	17 March, 2009
2	524	EWFSPL -02	26 February, 2009
3	525	EWFSPL -03	26 February, 2009
4	526	EWFSPL -04	11 February, 2009
5	527	EWFSPL -05	11 February, 2009
6	79	EWFSPL -06	22 May, 2008
7	529	EWFSPL -07	26 February, 2009
8	530	EWFSPL -08	17 March, 2009
9	504	EWFSPL -09	17 March, 2009
10	506	EWFSPL -10	26 February, 2009
11	507	EWFSPL -11	11 February, 2009
12	521	EWFSPL -12	4 December, 2008
13	510	EWFSPL -13	4 December, 2008
14	512	EWFSPL -14	4 December, 2008
15	513	EWFSPL -15	13 September, 2008
16	514	EWFSPL -16	13 September, 2008
17	35	EWFSPL -17	28 February, 2007
18	36	EWFSPL -18	28 February, 2007
19	37	EWFSPL -19	28 February, 2007
20	38	EWFSPL -20	28 February, 2007
21	39	EWFSPL -21	28 February, 2007
22	516	EWFSPL -22	13 September, 2008
23	517	EWFSPL -23	24 September, 2008
24	518	EWFSPL -24	4 December, 2008
25	519	EWFSPL -25	4 December, 2008

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

The project involves 25 wind energy converters (WECs) of Enercon make (800 kW E-48) with internal electrical lines connecting the project with local evacuation facility. 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 salient features of the 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.



B.2. Post registration changes

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

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Not applicable

B.2.2. Corrections

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There is no correction in this monitoring period.

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

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At the time of project registration, the PPA has been signed considering the meter accuracy as 0.5, which is also being reflected in the registered PDD. But afterwards the meters have been installed with an accuracy class of 0.2, which have been observed during the site visit. Accordingly, the accuracy class for the meters has been mentioned as 0.2 in the monitoring report. This has no impact on the monitoring procedures as the meters installed are of higher accuracy and leads to a more accurate and conservative approach. The PP has revised the PDD to incorporate the change and the same has been approved on 02 January, 2013, as post registration changes during the second verification of the project (Source: <https://cdm.unfccc.int/Projects/DB/DNV-UK1279516994.31/view>).

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

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Not applicable

B.2.5. Changes to start date of crediting period

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Not applicable

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

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Not applicable

SECTION C. Description of monitoring system

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Approved consolidated baseline and monitoring methodology ACM0002/ Version 11, 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 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 as per the registered PDD, an *ex-ante* determination of the grid emission factor has been followed, the monitoring of operating margin emission factor and build margin emission factor is not required.

The following monitoring procedure has been followed:

All the machines of project activity (EWF SPL 01 to 25) are connected to 33 KV feeders (feeder number F2, F3, F4 and F6) in addition to the 23 machines of the other customers, with a total capacity of 38.4 MW (48 WEGs) at Panchpatta location.

The following table has provided the details of the machines of the project activity along with the machines connected from other customers to the same feeders:

Feeder number	Total number of WEGs and Capacity connected to the Feeders	EWF SPL WEGs connected to the respective Feeders	Name of the Sub-station
F 2	7 (5.6 MW)	7	33/ 132 kV Panchpatta substation
F 3	17 (13.6 MW)	12	
F 4	11 (8.8 MW)	5	
F 6	13 (10.4 MW)	1	

There is one main and one check meter at each 33 kV feeder point for recording the electricity supplied to the grid. These feeders are further connected to the 100 MVA, 33/ 132 kV transformer to step the feeder voltage from 33 kV to 132 kV. The detailed diagram of all the WEGs of the project activity along with other WEGs have been shown in Appendix 1 below.

In order to determine the net electricity supplied to the grid by the project activity, the following apportionment procedure is followed:

The electricity generation by each wind turbine is calculated by the following two - step procedures:

- The first recording is carried out at the controller panel of each machine. The monitoring of the controller panel readings of all these wind turbines is done through a common monitoring station as a part of the central monitoring system (CMS).

In line with the above, $EG_{gross, v}$ is the electricity generated from an individual wind turbine measured at its panel. The summation of the total electricity generated from the wind turbines of the project proponent recorded from the individual panel meter (in MWh) is denoted as:

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

where, n = number of WEGs of SAI connected at common MSEDCL meter

The summation of the total electricity generated from the other wind turbines connected to the common MSEDCL meter at the sub-station with Sai turbines is denoted as (in MWh)

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

where, m = number of WEGs of other customers connected at the common MSEDCL meter

- b) The second metering is carried out at the grid interconnection point (sub-station), where the Joint Reading (in the form of Monthly credit notes) is taken on monthly basis in the presence of the representatives of the Company (Enercon) & the state electricity utility (MSEDCL). This Joint Reading is used for the apportionment of the amount of electricity supplied by the individual customer to the grid against which the utility makes the payment to each customer including the project proponent. The Joint reading gives both the “export” ($EG_{JMR, export}$) and “import” ($EG_{JMR, import}$) of the electricity to/from the NEWNE grid based on the common MSEDCL meter readings.

Based on the above two, the apportioning of electricity generated from the various wind turbines connected to the MSEDCL meter is done as shown below. This apportioned value is then used by the project proponent to raise invoice to MSEDCL.

EG_{export} , the electricity exported to the grid by the project activity is calculated as follows:

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

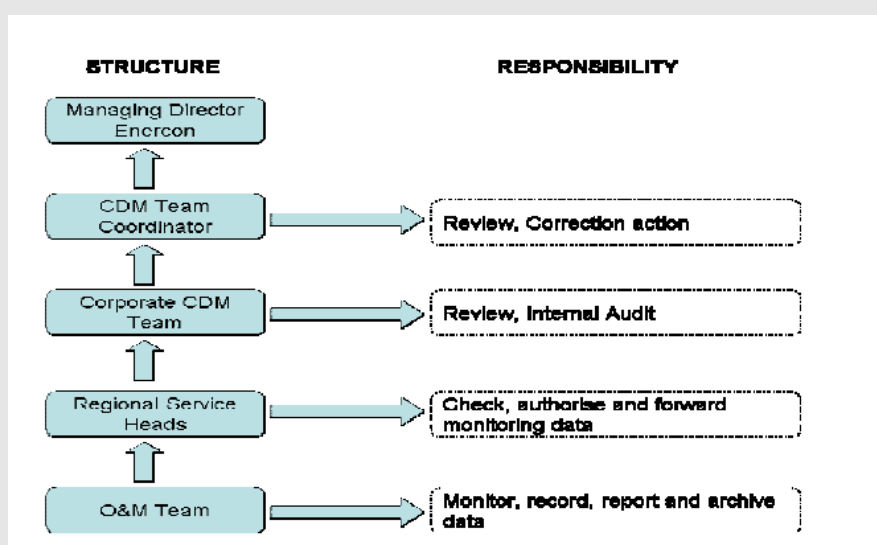
EG_{import} , the electricity drawn from the grid by the project activity is calculated as follows:

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

Therefore, the net electricity supplied to the grid is calculated as follows:

$$EG_y = EG_{export} - EG_{import}$$

The net electricity supplied to the grid can be sourced from the invoices raised on the state utility (i.e. Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL)) by each customer on monthly basis. This value can be further cross-checked by the cheques received by the customers from the State Utility. The Project is operated and managed by Enercon (India) Ltd. The operational and management structure implemented by Enercon is as follows:



Details of the monitoring equipments, QC/ QA procedures followed:

Metering Equipment: Metering system for the project activity consists of one main and one check meters of accuracy class of 0.2 at 33 kV metering point of each feeder. All the meters are Tri-vector meters.

Meter Readings: The monthly meter readings (both main and check meters) are taken jointly by the parties each month. At the conclusion of each meter reading an appointed representative of MSEDCL and Enercon sign a Joint Reading Report as indicated by the main meter.

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: Main and check meters are tested for accuracy with reference to a portable standard meter. The portable standard meter is owned by MSEDCL. If during testing, both the Main and Check Meter are found within the permissible limit of error i.e. 0.2%, the energy computation will be as per the Main Meter. The consumption registered by the main meters alone will hold good for the purpose of metering electricity supplied to the grid as long as the error in the main meters is within the permissible limits.

- The main meter readings are apportioned based upon the LCS meter readings (Panel reading) from the individual WTGs to compute net electricity supplied from individual WTGs. The LCS meter readings are archived electronically on continuous basis. Joint reading taken at MSEDCL substation is on monthly basis. Therefore, cumulative panel reading for each month is used for purpose of allocation of net electricity supplied to the grid from the project activity.
- In case, there is any mismatch in the energy values recorded by the LCS meter (panel reading) and the energy values calculated by the inverting system, the machine will stop working and generate the error report.

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 meters shall be immediately calibrated and the correction is applied to the reading registered by the main meter to arrive the correct reading of energy 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 variation between the main meter and the check meter is within the permissible limit for meters of 0.2% accuracy class.

Training and maintenance:

In order to ensure that Enercon's staffs who are positioned to take care all the activities starting from project construction to operation and maintenance, Enercon Training Academy provides need based periodical training to meet the requirements of the project. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all the trainees. The training facility is located at Daman and is fully functional and equipped with qualified trainers, training equipments, classrooms and hostel facilities.

Calibration Details

The metering equipments are inspected & calibrated by state utility. Calibration details for the all the main and backup meters are provided below (the calibration of Main meter and back up meters is done on annual basis).

Feeder No.	Meter Type	Meter Sr. no.	Accuracy class	Make	Calibration Done prior to this monitoring period	Latest Calibration done	Calibration due on
F 2	Main Meter	14831534 ¹	0.2	Elster	14/6/2011	20/06/2012 ² & 29/10/2012	28/10/2013
	Check Meter	14831528 ³	0.2	Elster	14/6/2011	20/06/2012 & 01/08/2012	31/07/2013
F 3	Main Meter	14831529 ⁴	0.2	Elster	14/6/2011	20/06/2012 & 1/8/2012	31/07/2013
	Check Meter	14831530 ⁵	0.2	Elster	14/6/2011	20/06/2012 & 1/8/2012	31/07/2013
F 4	Main Meter	14831520 ⁶	0.2	Elster	14/6/2011	20/06/2012 & 29/10/2012	28/10/2013
	Check Meter	14831521 ⁷	0.2	Elster	14/6/2011	20/06/2012 & 31/07/2012	30/07/2013
F 6	Main Meter	14831533 ⁸	0.2	Elster	14/6/2011	20/06/2012 & 29/10/2012	28/10/2013
	Check Meter	14831535 ⁹	0.2	Elster	14/6/2011	20/06/2012 & 29/10/2012	28/10/2013

From the above table, it can be observed that the old meters as referred in the calibration reports for the calibration performed on 20 June, 2012 have been replaced. The latest new meter numbers have been shown in the table above. The meters were changed due to display hang. As this meter changes have taken

¹ Old Main meter no. 4862979 as per the calibration performed on 20 June, 2012 and the meter change date for the latest meter is 29 October, 2012.

² Calibration done for old ABT meters

³ Old Check meter no. 4961781 as per the calibration performed on 20 June, 2012 and the meter change date for the latest meter is 01 August, 2012.

⁴ Old Main meter no. 4862986 as per the calibration performed on 20 June, 2012 and the meter change date for the latest meter is 01 Aug, 2012.

⁵ Old Check meter no. 4862988 as per the calibration performed on 20 June, 2012 and the meter change date for the latest meter is 01 August, 2012.

⁶ Old Main meter no. 4862984 as per the calibration performed on 20 June, 2012 and the meter change date for the latest meter is 29 October, 2012.

⁷ Old Check meter no. 5126137 as per the calibration performed on 20 June, 2012 and the meter change date for the latest meter is 31 July, 2012.

⁸ Old Main meter no. 4862987 as per the calibration performed on 20 June, 2012 and the meter change date for the latest meter is 29 October, 2012.

⁹ Old Check meter no. 4862982 as per the calibration performed on 20 June, 2012 and the meter change date for the latest meter is 29 October, 2012.

place within the validity period of the calibration done for the old meters dated 20 June, 2012 and all the new meters are duly calibrated during installation in the period of July – October, 2012, when the meters got changed, therefore, the calibration for the new meters is valid till July – October, 2013 as has been shown in the table above. From the above explanation, it can be seen that there is no calibration delay happened in the year 2012. The calibration reports of the old & new main and check meters have been provided to the DOE.

The calibration details of the LCS meters in - built in the controller panel of the WTGs are as follows (the calibration of LCS meter is done on annual basis):

S. No.	Meter, Serial No.	Make	Calibration Entity	Date of Calibration prior to this monitoring period	Latest Calibration done	Calibration due on
1.	01183959	ELSTER	YMPL	22/10/2011	22/02/2013	21/02/2014
2.	01215610	ELSTER	YMPL	22/10/2011	22/02/2013	21/02/2014
3.	475537	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
4.	475553	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
5.	475728	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
6.	475533	NZR	YMPL	21/10/2011	21/02/2013	20/02/2014
7.	01184004	ELSTER	YMPL	22/10/2011	22/02/2013	21/02/2014
8.	01215541	ELSTER	YMPL	22/10/2011	22/02/2013	21/02/2014
9.	01215571	ELSTER	YMPL	22/10/2011	22/02/2013	21/02/2014
10.	01215575	ELSTER	YMPL	22/10/2011	22/02/2013	21/02/2014
11.	475489	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
12.	475521	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
13.	475523	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
14.	475541	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
15.	475750	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
16.	475543	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
17.	475519	NZR	YMPL	21/10/2011	21/02/2013	20/02/2014
18.	475094	NZR	YMPL	21/10/2011	21/02/2013	20/02/2014
19.	475558	NZR	YMPL	21/10/2011	21/02/2013	20/02/2014
20.	475560	NZR	YMPL	21/10/2011	21/02/2013	20/02/2014
21.	475095	NZR	YMPL	21/10/2011	21/02/2013	20/02/2014
22.	475545	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
23.	475294	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
24.	475536	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014
25.	475709	NZR	YMPL	22/10/2011	22/02/2013	21/02/2014

The calibration frequency of the main and back up meters is in conformance with the frequency mentioned in the registered PDD. Calibration has been done on annual basis and the calibration results do not show any error in the calibration reports.

The line diagram showing all relevant monitoring points are in Appendix 1.

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.)

Data / Parameter:	$EF_{OM, y}$
Unit:	tCO ₂ e/MWh
Description:	Operating Margin Emission Factor of Western Regional Electricity Grid
Source of data:	"CO ₂ Baseline Database for Indian Power Sector", version 2 published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied:	0.9985
Purpose of data:	Baseline Emission Calculations
Additional comment:	None

Data / Parameter:	$EF_{BM,y}$
Unit:	tCO ₂ e/MWh
Description:	Build Margin Emission Factor of Western Regional Electricity Grid
Source of data:	"CO ₂ Baseline Database for Indian Power Sector", version 2 published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied:	0.6300
Purpose of data:	Baseline Emission Calculations
Additional comment:	None

Data / Parameter:	$EF_{CM,y}$
Unit:	tCO ₂ e/MWh
Description:	Combined Margin Emission Factor of Western Regional Electricity Grid
Source of data:	"CO ₂ Baseline Database for Indian Power Sector", version 2 published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied:	0.90641
Purpose of data:	Baseline Emission Calculations
Additional comment:	None

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter:	EG_y
Unit:	MWh (Mega-Watt hour)
Description:	Net electricity supplied to the grid by the machines of the Project
Measured/ Calculated / Default:	Calculated as the difference of EG _{Export} and EG _{Import}
Source of data:	The net electricity supplied by the project activity can be checked from the invoices raised on the State Utility. This apportionment has been done based on the Joint Reading report (in the form of Monthly credit notes) as recorded by the representative of the Enercon and MSEDCL.
Value(s) of monitored parameter:	30,614
Monitoring equipment:	The details have been provided in the tabular form in section C.
Measuring/ Reading/ Recording frequency:	Calculated on Monthly basis
Calculation method (if applicable):	Please refer to Section C for the apportionment procedure.

QA/QC procedures:	QA/QC procedures are implemented by MSEDCL pursuant to the provisions of the Power Purchase Agreement (PPA). The value of electricity supplied to the grid mentioned in the month credit notes can be cross – checked by the invoices raised to the State Utility. The data (electricity supplied to the grid) is archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Baseline Emission Calculations
Additional comment:	-

Data / Parameter:	EG_{JMR, Export}
Unit:	MWh (Mega-Watt hour)
Description:	Electricity Export recorded at main meters connected to the feeders at the MSEDCL substation
Measured/ Calculated / Default:	Measured
Source of data:	Electricity export as per the joint reading (in the form of Monthly credit notes) recorded by the Company representative (Enercon) and State Utility.
Value(s) of monitored parameter:	60,968
Monitoring equipment:	The Meters are tri-vector meters of accuracy class 0.2. The details have been explained in the section C. This reading is jointly taken by the representatives of the Company (Enercon) and the state utility.
Measuring/ Reading/ Recording frequency:	Measured on continuous basis and recording is done on monthly basis
Calculation method (if applicable):	Not applicable
QA/QC procedures:	QA/QC procedures are as implemented by MSEDCL pursuant to the provisions of the Power Purchase Agreement (PPA). The calibration of the meters is done once in a year to ensure the accuracy of the meters. The data is archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Baseline Emission Calculations
Additional comment:	-

Data / Parameter:	EG_{JMR, Import}
Unit:	MWh (Mega-Watt hour)
Description:	Electricity Import recorded at main meters connected to the feeders at the MSEDCL substation.

Measured/ Calculated / Default:	Measured
Source of data:	Electricity import as per the joint reading (in the form of Monthly credit notes) recorded by the Company representative (Enercon) and State Utility.
Value(s) of monitored parameter:	42.60
Monitoring equipment:	The Meters are tri-vector meters of accuracy class 0.2. The details have been explained in the section C. This reading is jointly taken by the representatives of the Company (Enercon) and the state utility.
Measuring/ Reading/ Recording frequency:	Measured on continuous basis and recording is done on monthly basis
Calculation method (if applicable):	Not applicable
QA/QC procedures:	QA/QC procedures are implemented by MSEDCL pursuant to the provisions of the Power Purchase Agreement (PPA). The calibration of the meters is done once in a year to ensure the accuracy of the meters. The data is archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Baseline Emission Calculations
Additional comment:	-

Data / Parameter:	$N \sum_{y=0} EG_{gross, y}$
Unit:	MWh (Meg -Watt hour)
Description:	Summation of $EG_{gross, y}$ is the electricity generated from wind turbines of the project activity measured through its panel
Measured/ Calculated / Default:	Measured (as reflected in the emission reduction spreadsheet)
Source of data:	Generation value from the WTG panels (electronically)
Value(s) of monitored parameter:	31,421
Monitoring equipment:	Generation data will be archived from central monitoring station that collects data from the WTG panels.
Measuring/ Reading/ Recording frequency:	On Monthly basis

Calculation method (if applicable):	Individually monitored for wind turbines from the WTG panels and can be aggregated to arrive at the value
QA/QC procedures:	QA/QC procedures are implemented by MSEDCL pursuant to the provisions of the Power Purchase Agreement (PPA). The data is archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Baseline Emission Calculations
Additional comment:	-

Data / Parameter:	M Σ EG gross, y y=0
Unit:	MWh (Mega-Watt hour)
Description:	Summation of EG _{gross, y} is the electricity generated from individual wind turbines other than the project activity connected to common MSEDCL meter measured through its panel.
Measured/ Calculated / Default:	Measured (as reflected in the emission reduction spreadsheet)
Source of data:	Generation value from the WTG panels (electronically)
Value(s) of monitored parameter:	31,086
Monitoring equipment:	Generation data will be archived from central monitoring station that collects data from the WTG panels.
Measuring/ Reading/ Recording frequency:	On Monthly basis
Calculation method (if applicable):	Individually monitored for wind turbines from the WTG panels and can be aggregated to arrive at the value
QA/QC procedures:	QA/QC procedures are implemented by MSEDCL pursuant to the provisions of the Power Purchase Agreement (PPA). The data is archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Baseline Emission Calculations
Additional comment:	-

Data / Parameter:	EG_{Export}
Unit:	MWh (Mega-Watt hour)
Description:	Electricity exported by the project activity to the grid
Measured/ Calculated / Default:	Calculated as per empirical formula given in section C
Source of data:	Calculated as per empirical formula given in section C

Value(s) of monitored parameter:	30,638
Monitoring equipment:	Calculated as per empirical formula given in section C
Measuring/ Reading/ Recording frequency:	Calculated on Monthly basis
Calculation method (if applicable):	Detailed calculation has been explained in section C
QA/QC procedures:	The data is archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Baseline Emission Calculations
Additional comment:	-

Data / Parameter:	EG_{Import}
Unit:	MWh (Mega-Watt hour)
Description:	Electricity Import by the project activity from the grid
Measured/ Calculated / Default:	Calculated as per empirical formula given in section C
Source of data:	Calculated as per empirical formula given in section C
Value(s) of monitored parameter:	23.79
Monitoring equipment:	Calculated as per empirical formula given in section C
Measuring/ Reading/ Recording frequency:	Calculated on Monthly basis
Calculation method (if applicable):	Detailed calculation has been explained in section C.
QA/QC procedures:	The data is archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Baseline Emission Calculations
Additional comment:	-

D.3. Implementation of sampling plan

>>

Not applicable

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

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

>>

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

Where,

BE is baseline emissions in year y, tCO₂e

EG_y is the net electricity supplied to the grid in year y and is applied directly from the month credit notes and can be cross-checked by the invoices raised to the State Utility.

EF_y is the CO₂ emission factor of the grid (0.90641 tCO₂e/ MWh; fixed ex-ante).

Therefore, Baseline Emission calculation for the period of 01/04/2012 to 31/12/2012:

$$\text{Baseline Emission (BE}_y) = \text{EG}_y * \text{EF}_y$$

$$\begin{aligned} \text{Where, EG}_y &= \text{EG}_{\text{Export}} - \text{EG}_{\text{Import}} = (30,638 - 23.79) \text{ MWh} \\ &= 30,614 \text{ MWh} \end{aligned}$$

Therefore,

$$\text{Baseline Emission (BE}_y) = 30,614 \text{ (MWh)}^{10} * 0.90641 \text{ (tCO}_2\text{/MWh)}$$

After applying the correction factor due to delayed calibration of the meters in line with "CLEAN DEVELOPMENT MECHANISM VALIDATION AND VERIFICATION STANDARD" ver 03.0, Appendix 1: calibration),

$$\begin{aligned} \text{Where, EG}_y &= \text{EG}_{\text{Export}} - \text{EG}_{\text{Import}} = (30,638 * (1 - 0.5\%) * (1 - 0.2\%) - 23.79 * (1 + 0.5\%) * (1 + 0.2\%)) \\ &= (30,424 - 23.95) \text{ MWh} \\ &= 30,400 \text{ MWh} \end{aligned}$$

Therefore,

$$\begin{aligned} \text{Baseline Emission (BE}_y) &= 30,400 \text{ (MWh)}^{11} * 0.90641 \text{ (tCO}_2\text{/MWh)} \\ &= 27,554 \text{ tCO}_2 \end{aligned}$$

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

>>

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

$$\text{PE}_y = 0$$

E.3. Calculation of leakage

>>

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

$$\text{L}_y = 0$$

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

¹⁰Net electricity supplied to the grid as discussed in the section C.

¹¹Net electricity supplied to the grid as discussed in the section C.

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
Total (01/04/2012 to 31/12/2012)	27,554	0	0	27,554

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 (t CO₂e)	25,011 (9 months equivalent of annually 33,348 tCO₂e emission reductions estimated in the registered PDD)	27,554

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

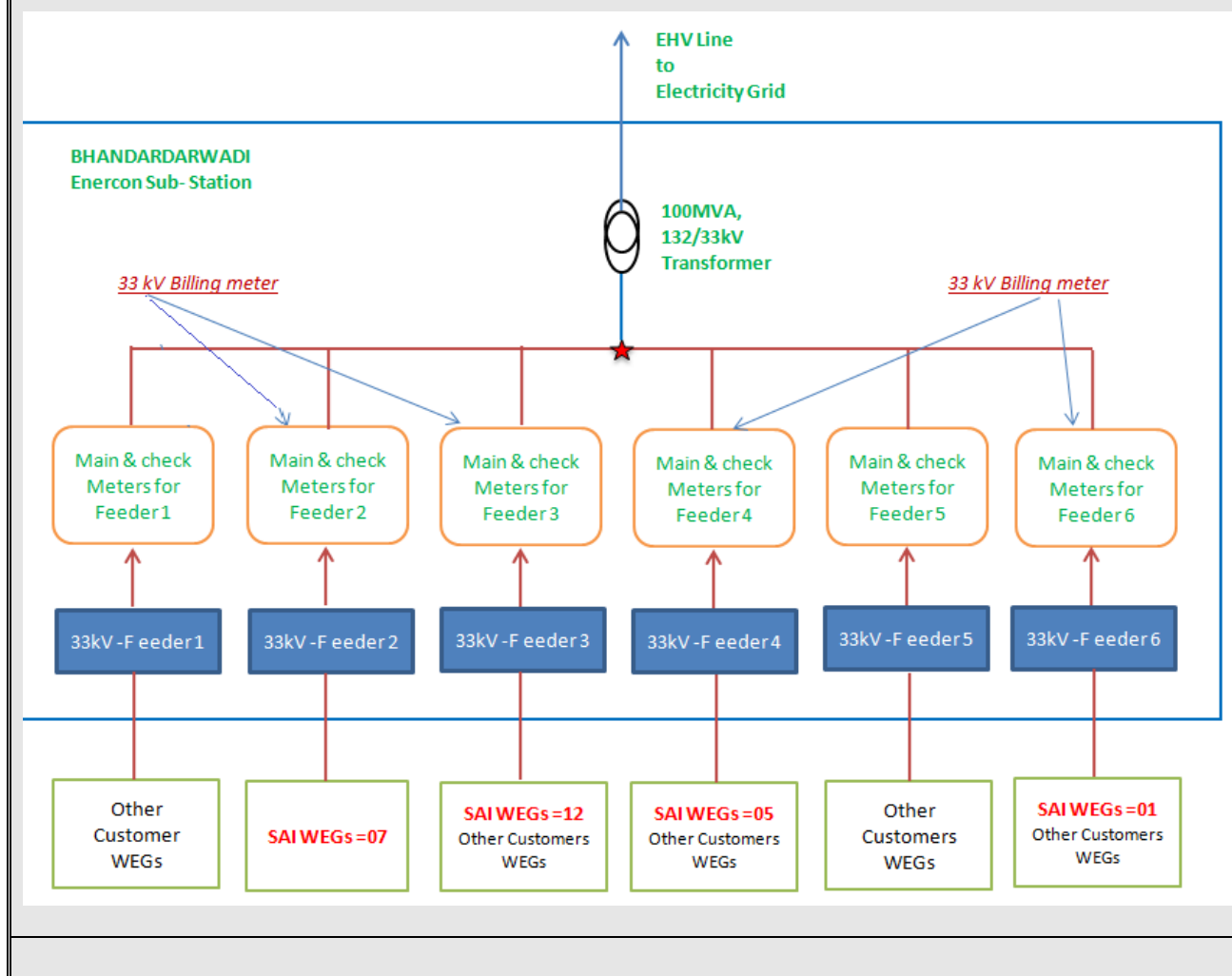
>>

The Emission Reduction (ER) value in the monitoring period (i.e. 9 months starting from 1 April, 2012 – 31 December, 2012) is 10.17 % higher as compared to the value estimated in the registered PDD. This difference is due to the fact that annual wind cycle has not been completely covered in the current monitoring period. However, the consolidated emission reduction observed for the project activity starting from January, 2012 till December, 2012 (one complete year) is 3.69 % lower than the corresponding annual value mentioned in the registered PDD, which is due to the lower PLF observed at the project site.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO₂e)	27,554	Not applicable

Appendix I: Line diagram showing relevant metering points:



Document information

Version	Date	Description
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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Business Function: issuance
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