

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

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

MONITORING REPORT

Version number 1.0, Date: 16/04/2012
Title: Vaayu India Wind Power Project in Tamilnadu
Project Reference No: 4930

Monitoring Period – First monitoring period

FROM 19/07/2011 TO 17/02/2012 (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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1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions;

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 103,612 tCO₂e per year, 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.

2. Brief description of the installed technology and equipments;

The project activity involves supply, erection, commissioning and operation of 63 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.

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

The WECs under the project activity were commissioned between 29/09/2010 and 11/07/2011. The expected operational lifetime of the project is for 20 years. The project activity was registered as CDM project on 19/07/2011. The first monitoring period is from 19/07/2011 to 17/02/2012.

4. Total emission reductions achieved in this monitoring period.

The total emission reductions achieved under this monitoring period (19/07/2011 to 17/02/2012) is **27268 tCO₂**.

A.2. Project Participants

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

A.3. Location of the project activity:

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The project is spread across Vagaikulam, Kuruchikulam, Ettankulam, Kalakudi, Muthammalpuram, Ukkirankottai villages in Tirunelveli district in Indian State of Tamilnadu.

S.No.	Location Number	Village	Latitude	Longitude
1	7	KURUCHIKULAM	8° 53' 26.985" N	77° 35' 43.461" E
2	8	KURUCHIKULAM	8° 53' 18.435" N	77° 35' 51.873" E
3	146	VAGAIKULAM	8° 55' 58.299" N	77° 37' 54.634" E
4	147	KALAKUDI	8° 56' 23.880" N	77° 37' 48.373" E
5	149	VAGAIKULAM	8° 55' 38.340" N	77° 37' 38.952" E
6	150	VAGAIKULAM	8° 55' 37.857" N	77° 37' 24.555" E
7	151	VAGAIKULAM	8° 55' 47.538" N	77° 37' 26.390" E
8	153	VAGAIKULAM	8° 55' 37.857" N	77° 37' 24.555" E
9	154	VAGAIKULAM	8° 56' 37.357" N	77° 37' 19.517" E
10	155	VAGAIKULAM	8° 56' 19.107" N	77° 37' 15.101" E
11	156	VAGAIKULAM	8° 55' 55.775" N	77° 37' 11.630" E
12	157	VAGAIKULAM	8° 55' 42.415" N	77° 37' 10.193" E
13	158	VAGAIKULAM	8° 55' 48.057" N	77° 36' 59.013" E
14	159	MUTHAMMALPURAM	8° 56' 33.966" N	77° 37' 6.832" E
15	160	MUTHAMMALPURAM	8° 56' 28.029" N	77° 36' 55.438" E
16	163	VAGAIKULAM	8° 56' 11.019" N	77° 36' 36.636" E
17	165	UKKIRANKOTTAI	8° 56' 12.215" N	77° 36' 19.240" E
18	167	KALAKUDI	8° 55' 8.373" N	77° 36' 58.664" E
19	179	VAGAIKULAM	8° 56' 45.130" N	77° 37' 33.509" E
20	180	VAGAIKULAM	8° 56' 6.770" N	77° 37' 11.676" E
21	181	VAGAIKULAM	8° 56' 3.605" N	77° 36' 54.544" E
22	V48	KURUCHIKULAM	8° 53' 6.300" N	77° 35' 0.824" E
23	V49	KURUCHIKULAM	8° 52' 57.577" N	77° 35' 10.805" E
24	V51	KURUCHIKULAM	8° 52' 40.412" N	77° 35' 9.180" E
25	V58	KURUCHIKULAM	8° 53' 30.146" N	77° 35' 9.922" E
26	V59	KURUCHIKULAM	8° 53' 22.443" N	77° 35' 13.695" E
27	V60	KURUCHIKULAM	8° 53' 10.091" N	77° 35' 16.977" E
28	V63	KURUCHIKULAM	8° 52' 34.838" N	77° 35' 29.519" E
29	V72	KURUCHIKULAM	8° 53' 12.156" N	77° 35' 33.445" E
30	V73	KURUCHIKULAM	8° 53' 2.788" N	77° 35' 33.248" E
31	V74	KURUCHIKULAM	8° 52' 53.993" N	77° 35' 34.953" E
32	V90	KALAKUDI	8° 52' 44.966" N	77° 36' 14.566" E
33	V94	KALAKUDI	8° 52' 22.001" N	77° 36' 14.274" E
34	V100	KALAKUDI	8° 52' 58.118" N	77° 36' 31.636" E
35	V101	KALAKUDI	8° 52' 48.402" N	77° 36' 30.161" E
36	V104	KALAKUDI	8° 52' 20.945" N	77° 36' 35.036" E
37	V105	KALAKUDI	8° 52' 12.502" N	77° 36' 32.883" E
38	V106	KALAKUDI	8° 52' 2.346" N	77° 36' 33.826" E
39	V107	KALAKUDI	8° 53' 21.734" N	77° 36' 59.574" E
40	V108	KALAKUDI	8° 53' 8.659" N	77° 36' 45.416" E

41	V109	KALAKUDI	8° 53' 0.568" N	77° 36' 44.148" E
42	V110	KALAKUDI	8° 52' 51.507" N	77° 36' 46.537" E
43	V114	ETTANKULAM	8° 52' 12.368" N	77° 36' 51.919" E
44	V116	KALAKUDI	8° 53' 12.200" N	77° 37' 22.992" E
45	V119	KALAKUDI	8° 53' 5.291" N	77° 37' 1.747" E
46	V120	KALAKUDI	8° 52' 54.106" N	77° 37' 5.527" E
47	V123	VAGAIKULAM	8° 54' 1.042" N	77° 37' 7.115" E
48	V125	KALAKUDI	8° 53' 20.931" N	77° 37' 25.769" E
49	V127	KALAKUDI	8° 53' 32.234" N	77° 37' 9.822" E
50	V129	KALAKUDI	8° 53' 21.809" N	77° 37' 11.906" E
51	V130	KALAKUDI	8° 53' 2.610" N	77° 37' 22.073" E
52	V132	KALAKUDI	8° 52' 47.738" N	77° 37' 22.916" E
53	V134	VAGAIKULAM	8° 54' 1.377" N	77° 37' 24.029" E
54	V137	KALAKUDI	8° 53' 52.241" N	77° 37' 23.375" E
55	V139	KALAKUDI	8° 53' 44.058" N	77° 37' 25.901" E
56	V141	KALAKUDI	8° 53' 30.641" N	77° 37' 23.385" E
57	V145	KALAKUDI	8° 53' 4.624" N	77° 37' 36.251" E
58	V147	KALAKUDI	8° 52' 56.356" N	77° 37' 32.431" E
59	V164	KALAKUDI	8° 53' 28.505" N	77° 36' 44.968" E
60	V165	KALAKUDI	8° 52' 32.752" N	77° 36' 25.961" E
61	V166	KALAKUDI	8° 53' 36.953" N	77° 36' 41.757" E
62	V167	KALAKUDI	8° 52' 30.367" N	77° 37' 13.700" E
63	W23	VAGAIKULAM	8° 55' 29.524" N	77° 37' 39.052" E

A.4. Technical description of the project

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The project activity involves 63-wind energy converters (WECs) of Enercon make (800 kW E-53) 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 activity can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V \pm 12.5%. The average life time of the WEC is around 20 years as per the industry standards. The other salient features of the state-of-art-technology are:

Turbine model	Enercon E – 53
Rated Power	800 kW
Rated diameter	52.9 m
Hub height	75 m
Turbine type	Gearless horizontal axis wind turbine with variable rotor speed
Power regulation	Independent pitch system for each blade
Cut in wind speed	2.5 m/s
Rated wind speed	12 m/s
Cut out wind speed	28 - 34 m/s
Extreme wind speed	59.5 m/s
Rated rotational speed	32 rpm
Operating range rot. Speed	12 - 29 rpm
Orientation	Upwind
No. of blades	3
Blade material	Fibre glass Epoxy reinforced with integral lightning protection
Gear box type	Gearless
Generator type	Synchronous generator
Braking	Aerodynamic
Output voltage	400 V
Yaw system	Active yawing with 4 electric yaw drives with brake

	motor and friction bearing
Tower	74 m Concrete

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 12.1.0, EB 58)
ACM0002 draws upon the following tools which have been used in the PDD:

- Tool to calculate the emission factor for an electricity system – Version 02
- Tool for the demonstration and assessment of additionality – Version 5.2

A.6. Registration date of the project activity:

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19/07/2011

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

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The length of the Crediting period of the project activity as per registered PDD is 10 years (Fixed). The crediting period start date is 19/07/2011 and length of crediting period is 10 years (from 19/07/2011 to 18/07/2021).

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

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Contact Information of Vaayu (India) Power Corporation Private Limited is given in the table below:

Organization:	Vaayu (India) Power Corporation Private Limited
Street/P.O.Box:	Plot No. 33, Daman Patalia Road
Building:	
City:	Bhimpore
State/Region:	Daman (UT)
Postfix/ZIP:	396210
Country:	India
Telephone:	+91-260-2220624, 2220628
FAX:	+91-260-2221508
E-Mail:	Yogesh.mehra@enerconindia.net
URL:	
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Mehra
Middle Name:	
First Name:	Yogesh
Department:	Corporate
Mobile:	+91-98200 40301
Direct FAX:	+91-260-2221508
Direct tel:	+91-22-22-6702 2832 extn. 7111
Personal E-Mail:	Yogesh.mehra@enerconindia.net

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

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

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

S. No.	WEG S.C. NO	No. & Capacity	Commissioning Date (dd/mm/yyyy)
1	3376	4 X 800 kW	29/9/2010
		5 X 800 kW	2/3/2011
		2 X 800 kW	11/3/2011
2	3461	1 X 800 kW	28/12/2010
3	3462	1 X 800 kW	28/12/2010
4	3463	1 X 800 kW	28/12/2010
5	3464	1 X 800 kW	28/12/2010
6	3465	1 X 800 kW	28/12/2010
7	3466	1 X 800 kW	28/12/2010
8	3467	1 X 800 kW	28/12/2010
9	3470	2X 800 kW	31/12/2010
10	3500	1 X 800 kW	18/3/2011
11	3501	1 X 800 kW	18/3/2011
12	3502	1 X 800 kW	18/3/2011
13	3503	1 X 800 kW	18/3/2011
14	3504	1 X 800 kW	18/3/2011
15	3505	1 X 800 kW	18/3/2011
16	3506	1 X 800 kW	18/3/2011
17	3507	1 X 800 kW	18/3/2011
18	3508	1 X 800 kW	18/3/2011
19	3509	2X 800 kW	18/3/2011
20	3510	1 X 800 kW	18/3/2011
21	3511	1 X 800 kW	18/3/2011
22	3512	1 X 800 kW	18/3/2011
23	3513	1 X 800 kW	18/3/2011
24	3514	1 X 800 kW	18/3/2011
25	3515	1 X 800 kW	18/3/2011
26	3516	1 X 800 kW	18/3/2011
27	3517	1 X 800 kW	18/3/2011
28	3518	1 X 800 kW	18/3/2011
29	3519	1 X 800 kW	18/3/2011
30	3528	1 X 800 kW	22/3/2011
31	3768	1 X 800 kW	1/7/2011
32	3769	1 X 800 kW	1/7/2011

33	3770	1 X 800 kW	1/7/2011
34	3771	1 X 800 kW	1/7/2011
35	3772	1 X 800 kW	1/7/2011
36	3773	1 X 800 kW	1/7/2011
37	3774	1 X 800 kW	1/7/2011
38	3775	1 X 800 kW	1/7/2011
39	3776	1 X 800 kW	1/7/2011
40	3777	1 X 800 kW	1/7/2011
41	3778	1 X 800 kW	1/7/2011
42	3779	1 X 800 kW	1/7/2011
43	3780	1 X 800 kW	1/7/2011
44	3781	1 X 800 kW	1/7/2011
45	3782	1 X 800 kW	1/7/2011
46	3783	1 X 800 kW	1/7/2011
47	3784	1 X 800 kW	1/7/2011
48	3785	1 X 800 kW	1/7/2011
49	3789	1 X 800 kW	11/7/2011
50	3790	1 X 800 kW	11/7/2011
51	3791	1 X 800 kW	11/7/2011

2. The information regarding the actual operation of the project activity during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc.

There have not been any special events comprising of major overhauls and downtime of project activity during the said monitoring period; thus there has not been any change in the operation of project activity during the monitoring period.

3. A brief description of: (i) events or situations that occurred during the monitoring period, which may impact the applicability of the methodology, and (ii) how the issues resulting from these events or situations are being addressed.

There have not been any events or situations that occurred during the monitoring period, which may impact the applicability of the methodology.

B.2. Revision of the monitoring plan

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Not Applicable

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

>>
Not Applicable

B.4. Notification or request of approval of changes

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Not Applicable

SECTION C. Description of the monitoring system

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Approved monitoring methodology ACM0002 Version 12.1.0, “Consolidated baseline 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.

Enercon (India) Limited is O&M contractor for the project activity. Enercon (India) Limited will be responsible for the maintaining all the monitoring data on behalf of VIPCPL in respect of the project activity. Enercon (India) Limited has implemented the management structure for managing the monitored data.

This approved monitoring methodology requires monitoring of the following:

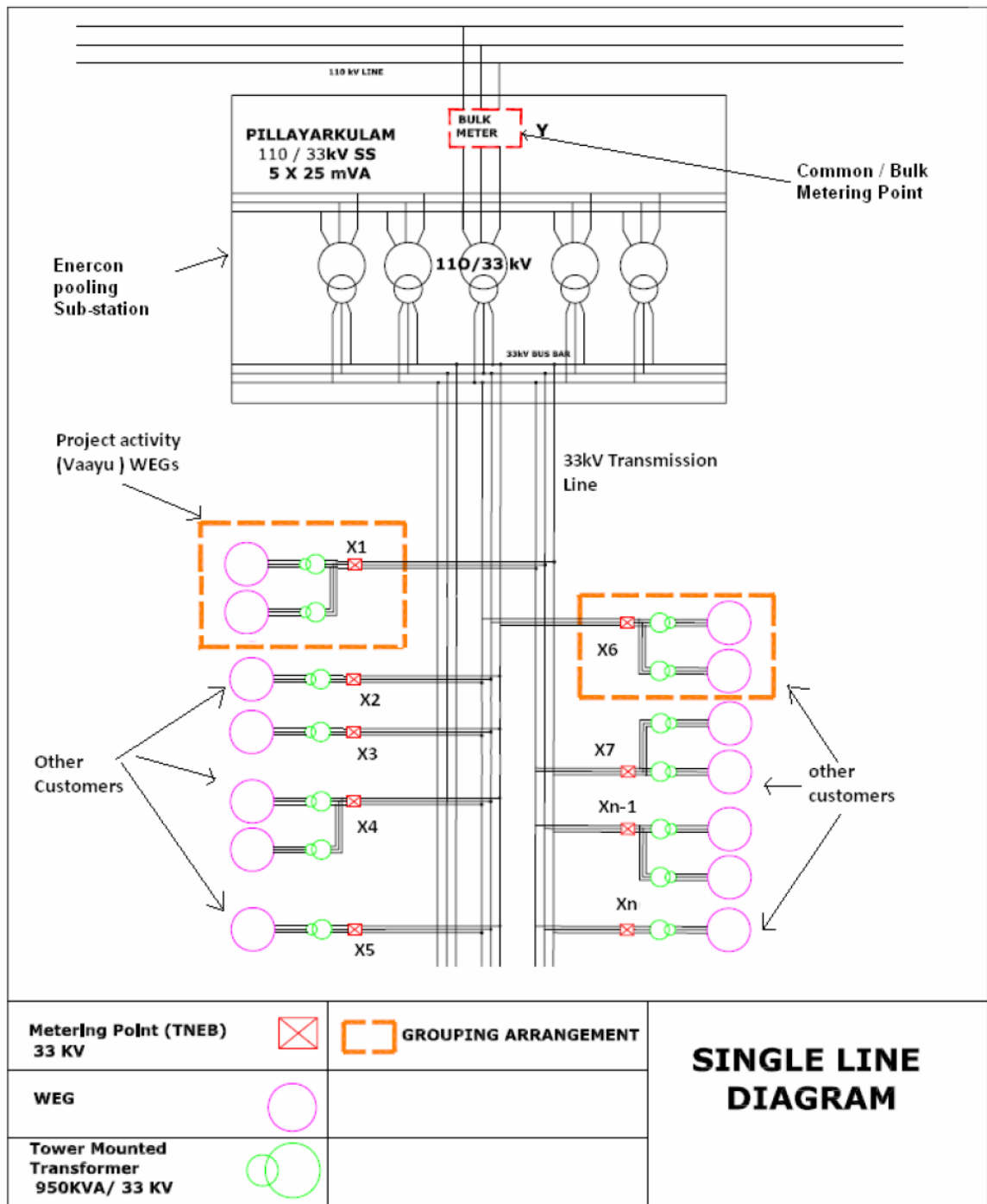
- Electricity generation from the project activity; and
- Operating margin emission factor and build margin emission factor of the grid, where *ex post* determination of grid emission factor has been chosen

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

The Project is operated by Enercon and managed by the PP. The operational and maintenance contract for the project is with Enercon. Enercon is an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. Enercon 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.

Calculation of Net Electricity Supplied to the grid by project activity:

Single Line diagram of Metering arrangement for project activity is shown in below picture:-



From the above line diagram it is clear that the machines of the project activity and other project developers at the wind farm have individual metering points at 33kV at the project site. Further PP will make clusters of WEGs at the project site for the purpose of metering. Each cluster will have a main meter. The WTGs of the project activity will be connected to individual dedicated cluster meters. From the above layout it is clear that the clusters meters (dedicated meters/ individual meters) of project activity and other customers are connected to the Enercon pooling sub-station at Pillayarkulam at bulk metering point at 110 kV. There is one main and one check meter at the Enercon substation. Since the main and check meters (bulk meter) at 110 kV metering point at the ENERCON pooling substation is connected to the machines of the project activity and the machines commissioned by the other project developers, therefore in order to determine the net

electricity supplied to the grid at 110 kV at the ENERCON substation, the state utility apply Line loss to the meter reading recorded at the 33 KV.

The total % of Line loss from WEGs (33kV metering point) to Enercon substation (110kV metering point) is calculated by the state utility. Net Electricity supplied to the grid by project activity is calculated by applying Line loss to the meter readings taken at 33 kV metering point of the project activity.

The procedure for calculation of the percentage Line loss is set-out below:

$$Z = ((X1+X2+X3+X4+.....Xn) - Y) / (X1+X2+X3+X4+.....Xn) \times 100\%$$

Where,

Z = Percentage Line loss incurred in 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 110kV metering point (bulk meter: main and check) at high voltage side of receiving sub-station. Refer above picture for schematic of the flow diagram.

(X1+X2+X3+X4+.....Xn) = Summation of meter readings (Export- Import) 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)

Xi = Net Export (Export – Import) Reading (Xi) 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. X1, X2, X3,...Xn 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 at 110 kV by internally connected lines. Refer above picture for schematic of the flow diagram.

Y = Net Export (Export-Import) Reading at bulk meter installed at high voltage side of transformer of the receiving sub-station at 110 kV connecting machines of the project activity and other project developers. Refer above picture for schematic of the flow diagram.

Therefore Line Loss for the project activity (between 33kV & 110kV metering point) is calculated as follows:-

Line Loss (TE) = Percentage Line Loss * Net Export recorded at 33kV metering point of project activity

$$\mathbf{TE = Z \times (EG_{Export,y} - EG_{Import,y})}$$

Therefore Net Energy Supplied to Grid (or net generation) after adjustment of Line loss is calculated as below:-

$$\mathbf{EG_{PJ,y} = EG_{Export,y} - EG_{Import,y} - TE}$$

The monthly statement showing the Energy Generated by the project activity as provided and duly signed by TNEB/Tirunelveli Electricity Distribution Circle, Tirunelveli) contains the following data:-

1. Electricity Export (EG_{export})
2. Electricity Import (EG_{import})
3. Line Loss (TE) between 33 kV metering point and 110 kV metering point at Enercon substation
4. Net Generation to the Grid [EG_{export}-EG_{import}-TE]

The Electricity Export, Electricity Import, Line Loss and net electricity supplied (Net Generation) to the grid, can be cross checked from the invoices raised on the state utility for supply of net electricity supplied to the grid.

The accuracy of monitoring parameter is ensured by adhering to the calibration and testing of the metering equipment once each year. Enercon provides the daily generation report to the Project proponent. The project proponent also maintains the records of daily generation report and joint meter report.

Training and maintenance:

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the 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.

Quality Control System:

Metering and Monitoring Plan details: The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be applicable as per the PPA (Power purchase agreement) with the State electricity board except or otherwise explicitly mentioned in the PDD.

Metering: The electricity supplied to the grid will be metered from main meters that are connected to the 63 turbines of the project activity. The electricity export and import for the project activity will be taken from the monthly joint meter readings noted from the dedicated meters connecting 63 turbines of the project activity. The PP will make clusters of WECs at the project site for the purpose of metering. Each cluster will have one main meter. Summation of meter reading for all the clusters (connecting 63 machines) will provide net electricity generated by the project activity after adjustment of transmission loss. In addition to the cluster meters there is one main & check meter at high voltage side of Enercon Substation Pillyarkulam at 110kV. The machines of the project activity and other project developers are connected to 110 KV metering point.

Metering Equipment: Metering equipment is electronic trivector meter of 0.2% accuracy class.

Meter Readings: The monthly meter reading is taken jointly by the parties (Enercon personals and personals of TNEB) for every last month. At the conclusion of each meter reading an appointed representative of TNEB and Enercon sign a document indicating the number of Kilowatt-hours (kWh) indicated by the meter.

QA/QC Procedure: All the meters are calibrated/ tested once each year as per the PPA. The calibration is done by the officials of the state utility. Copy of calibration/testing certificate will be kept as record by the PP and will be presented to the DoE during verification exercise.

Main and Check meter: In case the main meter(s) at 33kV metering point (cluster meter) is found to operate outside the permissible limits, the main meter will be either replaced or calibrated immediately and for the period during which meter was faulty the LCS controller reading will be referred to calculate electricity exported by WEGs. At 110kV metering point at Enercon pooling sub-station; in case the main meter(s) is found to operate outside the permissible limits, the main meter will be either replaced or calibrated immediately.

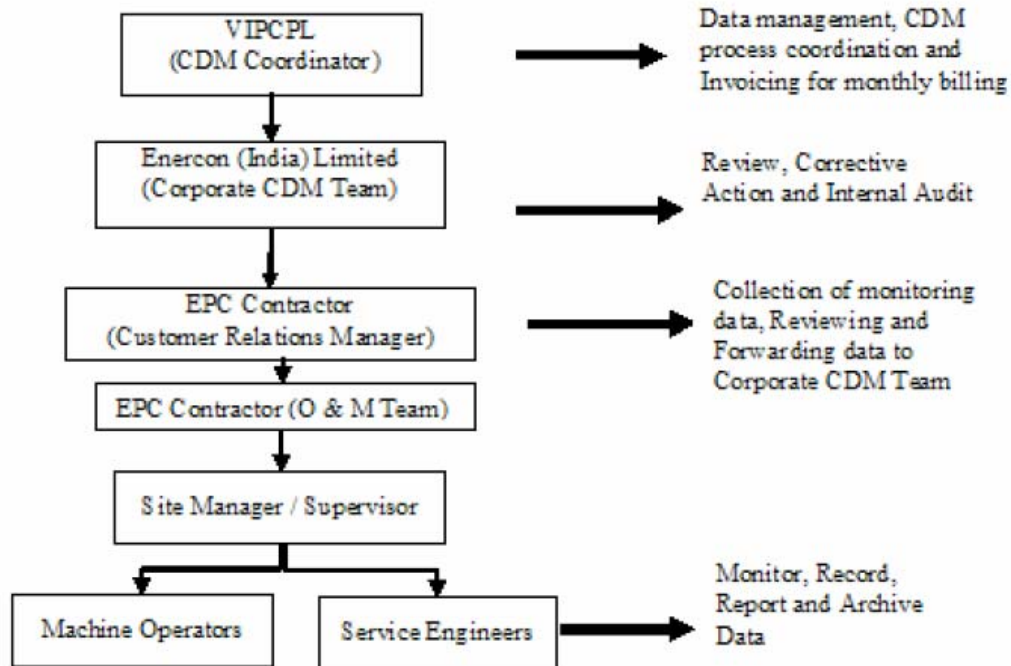
Whenever a main meter goes defective, the consumption recorded by the Check meter will be referred. In case the date of registration or start date of the crediting period of the project does not match with the date of joint meter report, the apportioning for net electricity exported to the grid for first month will be done based upon the meter reading of the controller meter (also known as Local Control System (LCS) meter) located in the WEC tower and thereafter the readings from main meter will be referred.

PP will be monitoring the data sent by the O&M contractor and the data for electricity generated by the project activity will be kept as records for the period of 10+2 years i.e. 2 years beyond the term of crediting period. Enercon is O&M contractor and will be responsible for data recording.

All the main meters and check meters are calibrated once each year and LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WECs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. Further, the net electricity supplied to the grid that is used for calculation of emission reductions can be cross checked from the invoices raised by the PP on the state utility. Therefore there is no data uncertainty.

The project proponent is Vaayu (India) Power Corporation Private Limited will be keeping and monitoring the data for electricity generation and calibration reports post project implementation. Enercon (India) Limited will be the O&M contractor who will be having the responsibility of activities such as maintaining electricity generation records, calibration records and maintenance of the Wind Energy Generators.

The operational and management structure implemented for data monitoring is as follows:



Metering system details:

The details of meters installed at the site for measuring export and import by project activity are provided below:

S. No.	WEG S.C. NO	No. & Capacity	Meter No.	Make	Accuracy Class	Calibration Date (dd/mm/yyyy)

1	3376	4 X 800 kW	TNU04909	Premier	0.20%	11/3/2011
		5 X 800 kW				
		2 X 800 kW				
2	3461	1 X 800 kW	HT2110167	Wallabey	0.20%	9/5/2011
3	3462	1 X 800 kW	HT2110162	Wallabey	0.20%	9/5/2011
4	3463	1 X 800 kW	HT2110156	Wallabey	0.20%	9/5/2011
5	3464	1 X 800 kW	HT2110161	Wallabey	0.20%	9/5/2011
6	3465	1 X 800 kW	HT2110151	Wallabey	0.20%	10/5/2011
7	3466	1 X 800 kW	HT2110149	Wallabey	0.20%	10/5/2011
8	3467	1 X 800 kW	HT2110153	Wallabey	0.20%	10/5/2011
9	3470	2X 800 kW	HT2110153	Wallabey	0.20%	10/5/2011
10	3500	1 X 800 kW	HT2110146	Wallabey	0.20%	9/5/2011
11	3501	1 X 800 kW	HT2110143	Wallabey	0.20%	9/5/2011
12	3502	1 X 800 kW	HT2110152	Wallabey	0.20%	10/5/2011
13	3503	1 X 800 kW	HT2110166	Wallabey	0.20%	9/5/2011
14	3504	1 X 800 kW	HT2110148	Wallabey	0.20%	10/5/2011
15	3505	1 X 800 kW	HT2110154	Wallabey	0.20%	10/5/2011
16	3506	1 X 800 kW	HT2110168	Wallabey	0.20%	10/5/2011
17	3507	1 X 800 kW	HT2110144	Wallabey	0.20%	10/5/2011
18	3508	1 X 800 kW	HT2110163	Wallabey	0.20%	10/5/2011
19	3509	2X 800 kW	HT2110153	Wallabey	0.20%	10/5/2011
20	3510	1 X 800 kW	HT2110165	Wallabey	0.20%	9/5/2011
21	3511	1 X 800 kW	HT2110158	Wallabey	0.20%	9/5/2011
22	3512	1 X 800 kW	HT2110157	Wallabey	0.20%	9/5/2011
23	3513	1 X 800 kW	HT2110147	Wallabey	0.20%	10/5/2011
24	3514	1 X 800 kW	HT2110150	Wallabey	0.20%	10/5/2011
25	3515	1 X 800 kW	HT2110159	Wallabey	0.20%	9/5/2011
26	3516	1 X 800 kW	HT2110164	Wallabey	0.20%	9/5/2011
27	3517	1 X 800 kW	HT2110142	Wallabey	0.20%	9/5/2011
28	3518	1 X 800 kW	HT2110160	Wallabey	0.20%	9/5/2011
29	3519	1 X 800 kW	HT2110145	Wallabey	0.20%	9/5/2011
30	3528	1 X 800 kW	HT2110155	Wallabey	0.20%	9/5/2011
31	3768	1 X 800 kW	HT2110195	Wallabey	0.20%	1/7/2011
32	3769	1 X 800 kW	HT2110220	Wallabey	0.20%	1/7/2011
33	3770	1 X 800 kW	HT2110196	Wallabey	0.20%	1/7/2011
34	3771	1 X 800 kW	HT2110196	Wallabey	0.20%	1/7/2011
35	3772	1 X 800 kW	HT2110219	Wallabey	0.20%	1/7/2011
36	3773	1 X 800 kW	HT2110196	Wallabey	0.20%	1/7/2011
37	3774	1 X 800 kW	HT2110169	Wallabey	0.20%	1/7/2011
38	3775	1 X 800 kW	HT2110191	Wallabey	0.20%	1/7/2011
39	3776	1 X 800 kW	HT2110214	Wallabey	0.20%	1/7/2011
40	3777	1 X 800 kW	HT2110226	Wallabey	0.20%	1/7/2011
41	3778	1 X 800 kW	HT2110198	Wallabey	0.20%	1/7/2011
42	3779	1 X 800 kW	HT2110223	Wallabey	0.20%	1/7/2011
43	3780	1 X 800 kW	HT2110218	Wallabey	0.20%	1/7/2011
44	3781	1 X 800 kW	HT2110229	Wallabey	0.20%	1/7/2011

45	3782	1 X 800 kW	HT2110206	Wallabey	0.20%	1/7/2011
46	3783	1 X 800 kW	HT2110211	Wallabey	0.20%	1/7/2011
47	3784	1 X 800 kW	HT2110192	Wallabey	0.20%	1/7/2011
48	3785	1 X 800 kW	HT2110203	Wallabey	0.20%	1/7/2011
49	3789	1 X 800 kW	HT2110225	Wallabey	0.20%	11/7/2011
50	3790	1 X 800 kW	HT2110228	Wallabey	0.20%	11/7/2011
51	3791	1 X 800 kW	HT2110224	Wallabey	0.20%	11/7/2011

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

(Copy this table for each data and parameter. To report multiple values, a table may be used)

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO ₂ e/MWh
Description:	Operating Margin Emission Factor of Southern Regional Electricity Grid
Source of data used:	“CO ₂ Baseline Database for Indian Power Sector”, version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO ₂ Baseline Database for Indian Power Sector” is available at www.cea.nic.in
Value(s) :	0.98756
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO ₂ e/MWh
Description:	Build Margin Emission Factor of Southern Regional Electricity Grid
Source of data used:	“CO ₂ Baseline Database for Indian Power Sector”, version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO ₂ Baseline Database for Indian Power Sector” is available at www.cea.nic.in
Value(s) :	0.81792
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO ₂ e/MWh

Description:	Combined Margin Emission Factor of Southern Regional Electricity Grid
Source of data used:	<p>“CO2 Baseline Database for Indian Power Sector”, version 5 published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <p>The “CO2 Baseline Database for Indian Power Sector” is available at www.cea.nic.in</p>
Value(s) :	0.94515
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

D.2. Data and parameters monitored	
<i>(Copy this table for each data and parameter. To report multiple values, a table may be used)</i>	
Data / Parameter:	EG_{PJ,y}
Data unit:	MWh (Mega-watt hour)
Description:	Net Electricity Exported to the grid by the project
Measured /Calculated /Default:	Calculated
Source of data:	Monthly billing records which is given by Tamilnadu Electricity Board (TNEB)/ (Tirunelveli Electricity Distribution Circle, Tirunelveli).
Value(s) of monitored parameter:	28853.53
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)	Refer section C for an illustration of the provisions for measurement methods and Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	$EG_{PJ,y} = EG_{Export,y} - EG_{Import,y} - T_E$
QA/QC procedures applied:	Refer section C for an illustration of the provisions for QA/QC procedures.

Data / Parameter:	EG_{Export,y}
Data unit:	MWh (Mega-Watt hour)
Description:	Electricity exported by project activity to grid recorded at 33kV metering points (Cluster meter)
Measured /Calculated /Default:	Measured
Source of data	Monthly billing records which is given by Tamilnadu Electricity Board (TNEB)/ (Tirunelveli Electricity Distribution Circle, Tirunelveli).
Value(s) of monitored parameter:	29834.934

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)	Refer section C for an illustration of the provisions for measurement methods and Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	
QA/QC procedures applied:	Refer section C for an illustration of the provisions for QA/QC procedures.

Data / Parameter:	EG_{Import,y}
Data unit:	MWh (Mega-Watt hour)
Description:	Electricity imported by project activity to grid recorded at 33kV metering points (Cluster meter)
Measured /Calculated /Default:	Measured
Source of data	Monthly billing records which is given by Tamilnadu Electricity Board (TNEB)/ (Tirunelveli Electricity Distribution Circle, Tirunelveli).
Value(s) of monitored parameter:	218.31
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)	Refer section C for an illustration of the provisions for measurement methods and Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	
QA/QC procedures applied:	Refer section C for an illustration of the provisions for QA/QC procedures.

Data / Parameter:	T_E
Data unit:	MWh (Mega-Watt hour)
Description:	Line loss between the metering point at 33 kV metering points of project activity and the metering point at 110 kV at the ENERCON pooling substation.
Measured /Calculated /Default:	Measured
Source of data	Monthly billing records which is given by Tamilnadu Electricity Board (TNEB)/ (Tirunelveli Electricity Distribution Circle, Tirunelveli).
Value(s) of monitored parameter:	763.094
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)	Refer section C for an illustration of the provisions for measurement methods and Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	
QA/QC procedures applied:	Refer section C for an illustration of the provisions for QA/QC procedures.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} * EF_{grid, CM, y}$$

Where:

BE_y = Baseline emissions in year y (tCO₂/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid, CM, y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂/MWh)

Baseline Emission for the period (19/07/2011 to 17/02/2012)

= 28853.53 (MWh) * 0.94515 (tCO₂/MWh)

= **27268 tCO₂**

E.2. Project emissions calculation

>>

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 (Version 12.1.0).

E.4. Emission reductions calculation / table

>>

The total emission reductions achieved during the monitoring period is calculated as:

$$ER_y = BE_y - PE_y - LE_y$$

Where,

ER_y are emission reductions in year y, tCO₂e

BE_y are baseline emissions in year y, tCO₂e

PE_y are project emissions in year y, tCO₂e

LE_y are leakage in year y, tCO₂e

Emission reductions are equal to baseline emissions as emissions due to project and leakage are zero.

Total baseline emissions: **27268** tCO₂

Total project emissions: Zero

Total leakage: Zero

Thus Emission reductions for project activity is

ER_y = BE_y = **27268** tCO₂

Total Emission Reductions for the monitoring period are **27268** tCO₂.

Month	Baseline Emissions, BE _y (tCO ₂ e)	Project Emissions, PE _y (tCO ₂ e)	Leakage Emissions, LE _y (tCO ₂ e)	Emission Reductions, ER _y (tCO ₂ e)
Aug-11	6188	0	0	6188
Sep-11	8578	0	0	8578
Oct-11	6981	0	0	6981
Nov-11	736	0	0	736
Dec-11	2008	0	0	2008
Jan-12	1495	0	0	1495
Feb-12	1282	0	0	1282
Total	27268	0	0	27268

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

>>

This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO₂e)	103,612 for each year, the monitoring period contains 7 months hence estimated CER's as per the PDD are 60,440 (approx)	27268

The CERs for the said monitoring period are 54.88 % lower than CERs as estimated in the PDD.

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

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The CER's for the said monitoring period are 54.88 % lower than as estimated in the PDD. This is due to lower PLF than estimated in PDD.

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		