



**Monitoring report form
(Version 03.1)**

Monitoring report

Title of the project activity	Green House Gas Abatement through installation of a wind power project for export to the Grid.
Reference number of the project activity	5112
Version number of the monitoring report	1.2
Completion date of the monitoring report	25/01/2013
Registration date of the project activity	19/12/2011
Monitoring period number and duration of this monitoring period	Monitoring Period 1 from 01/01/2012 to 31/10/2012 (both days inclusive)
Project participant(s)	India Power Corporation Private Limited
Host Party(ies)	India
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope – Sectoral Scope 1 Applied Methodology - ACM0002 version 12.1.0
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	40,315 tCO ₂
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	34,821 tCO ₂

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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India Power Corporation Limited (IPCL) was set up with the main objective of developing and setting up power projects and generation, distribution and supply of Power. The company has invested in various clean power generation schemes. The project activity of a wind based power project is one such initiative of IPCL.

The project activity involves successful installation of multiple wind energy based electricity generation facilities. The project proponent has installed 31 nos. wind energy based electricity generation units of 800 kW capacities each (a total of 24.8MW). The electricity generated in the project activity will be wheeled to the Western Regional Grid¹. In absence of the project activity, an equivalent amount of electricity would have been generated by the power plants connected to the Western Regional Grid.

The project activity resulted in reduction of 34,821 tCO₂ during the first monitoring period from 01/01/2012 to 31/10/2012 (both days inclusive)

A.2. Location of project activity

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The site is near village Sumana in district Jamnagar, Gujarat Coordinates: Latitude-22°28' North, Longitude - 70°06' East). The site is located about 45 Km to the South of Jamnagar and nearly 80 Km to 100 Km from the west coast. The site is well connected by road network and the nearest railway station is Jamnagar railway station nearly 50 Km from project site. The nearest airport is the Jamnagar Airport nearly 60 Km from project site. The location of the corresponding wind turbines in different areas are listed in a table in Annexure A.



¹ As per the recent CEA Guidelines – Users Guide Version 4 the Western Regional Grid has been made a part of the NEWNE Grid (covering former Northern, Eastern, Western and North-Eastern regions). Hence for Emission Reduction Computations the Emission Factor of this NEWNE Grid shall be taken. For the references to the project activity, however the description shall include export of power to the Western Regional Grid (which is a part of the NEWNE Grid).

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)
India (host)	India Power Corporation Limited	No

A.4. Reference of applied methodology

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ACM0002 - "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", Version 12.1.0

"Tool for the demonstration and assessment of additionality", Version 05.2

"Tool to determine remaining lifetime of equipment", Version 1

"Tool to calculate the emission factor for an electricity system", version 2.2.0

A.5. Crediting period of project activity

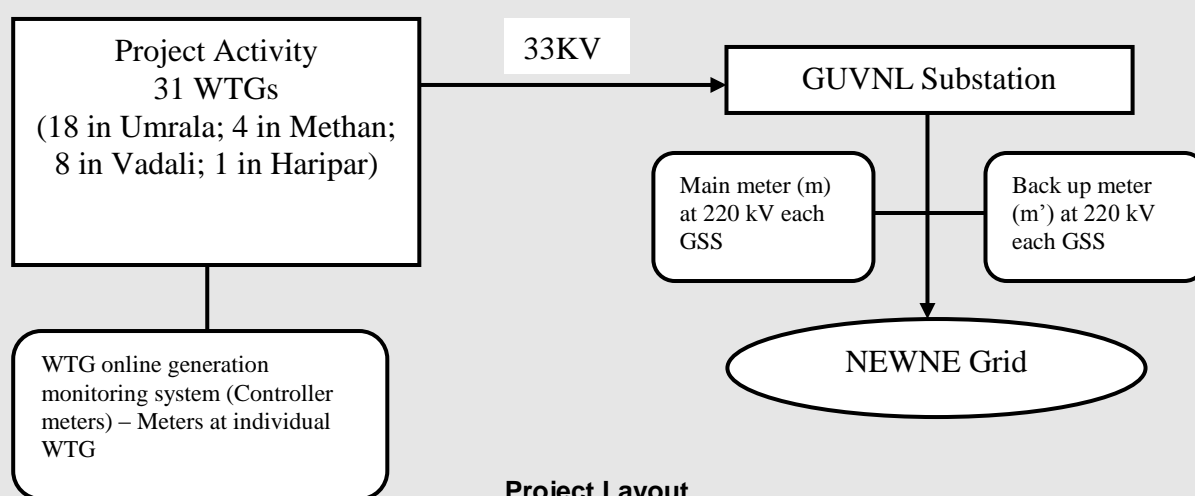
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The project activity has a Fixed Crediting Period of 10 years 00 months from 01/01/2012 to 31/12/2021.

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

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The project activity has 31 nos. 800 KW rated capacity (a total of 24.8MW considering all the facilities) of wind based electricity generation units. The kinetic energy of the wind blowing in the atmosphere is used to generate electricity by rotating the blades of the wind mills installed for the purpose. The mechanical energy generated by the rotation of the blades of the wind mills are used to rotate the turbines to generate electricity.



The electricity generated from the 31 nos. wind energy based electricity generation facilities at Methan, Umarala and Haripar villages in Jamnagar District and Vadali village in Rajkot District is wheeled to the substation at Moti Paneli, Jamnagar (where it is further stepped up to 220 KV) from where it is dispatched to

the Western Regional Grid.

The technical specifications of the wind energy based electricity generation units are mentioned below:

1	Turbine Model	Enercon E-48
2	Rated Power	800KW
3	Rotor diameter	48m
4	Hub height	56m (Steel Tower)
5	Turbine Type	Gearless horizontal axis wind turbine with variable rotor speed
6	Power regulation	Independent electromechanical Pitch system for each blade
7	Cut-in Wind Speed	3 m/s
8	Rated Wind Speed	12m/s
9	Cut-out Wind Speed	28-34m/s
10	Extreme Wind Speed	59.5m/s
11	Rated Rotational Speed	31.5rpm
12	Operating range rotational speed	16-31.5 rpm
13	Orientation	Upwind
14	No. of blades	3
15	Blade Material	Glass Fibre reinforced Epoxy
16	Gear box type	Gear less
17	Generator type	Synchronous Generator
18	Braking	Aerodynamic
19	Output Voltage	400V
20	Yaw System	Active yawing with 4 electric yaw drives with brake motor And friction bearing
21	Tower	56 m Steel

The project proponent thus generates electrical energy from the 31 facilities for export to the Western Regional Grid which is part of the NEWNE grid of India.

B.2. Post registration changes

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

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There are no temporary deviations from registered monitoring plan or applied methodology during this monitoring period, hence this section is not applicable.

B.2.2. Corrections

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There are no corrections to project information or parameters fixed at validation applicable during this monitoring period or submitted with this monitoring report, hence this section is not applicable.

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

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There are no permanent changes from registered monitoring plan or applied methodology during this monitoring period, hence this section is not applicable.

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

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There are no changes to project design from the registered project design during this monitoring period, hence this section is not applicable.

B.2.5. Changes to start date of crediting period

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The start date of the crediting period was envisaged as 01/01/2012 or the date of submission of the Project to the UNFCCC, whichever is later. Hence, the crediting period starts from 01/01/2012 and there is no change required in the same.

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

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The project activity is not an afforestation or reforestation project activity, hence this section is not applicable.

SECTION C. Description of monitoring system

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The monitoring plan is being devised as per approved consolidated monitoring methodology ACM0002 Version 12.1.0

“Consolidated monitoring methodology for grid-connected electricity generation from renewable sources”.

Metering

- The electricity supplied to the grid is metered at the substation of the utility. Representatives of Discom and ENERCON jointly take the main reading and sign the meter reading. Simultaneously, the joint meter reading at backup metering system is also be taken by representatives of Discom and ENERCON.
- The IPCL wind power Project at Gujarat has three metering points:
 - a. LCS (Local Control System) meter installed by the WEG supplier known as WEG controller.
 - b. Cluster meter is installed on behalf of GEDA after calibration and approved by GEDA. This meter is used to record the readings of a cluster of WEGs belonging to a particular customer or single WEG.
 - c. Meters installed at the WEG substation known as substation meter (Main and Check meters). These meters are owned by the state electricity utility which records both export and import meter readings.
- The electricity metered at the substation meter is proportionally divided among the customers connected to the meter on the basis of the pro rata readings taken from the cluster meters. There is a transmission loss between the cluster meters and the substation.

- The meters are jointly inspected / tested once in a year. The main and the backup metering systems are sealed in presence of representatives of ENERCON and state electricity utility. Joint inspection and testing is carried out as and when difference in monthly meter readings exceeds the sum of maximum error as per accuracy class of main and back up meters.

Metering Equipment and Metering Arrangement Information

- The meters are two-way meter and measure the electricity import and export and give the net electricity.
- In case the meters are found to operate outside the permissible limits, the meters will be either replaced immediately or calibrated. Whenever a main meter goes defective, the consumption recorded by the backup meter will be referred.
- If main as well as back up metering system becomes defective, the details of the malfunctioning along with date and time and snaps shot parameters along with load survey will be retrieved from the main meter. The exact nature of the malfunctioning will be determined after analyzing the data so retrieved and the consumption recorded by the main meter will be adjusted accordingly.
- The LCS meters do not require calibration.
- Monthly generation report is prepared based on the meter readings taken at the main and the backup meter. Joint meter reading is signed by the representative of the ENERCON and the GUVNL. In case of any error observed in the meter readings of the individual WEGs and import export meter, the operators will inform the project participant and which will be subsequently informed to the GUVNL persons.
- The cluster meter, main meter and the check meter at the substation will be calibrated annually.
- The main and check meters are tri-vector meter of accuracy class of 0.2s.
- In the event that the date of registration is in the middle of the month, while the statement showing energy generated/break up of net export units is issued on monthly basis. The apportioning will be carried out based on LCS data for CER estimation.
- The uncertainty of the data is considered to be low as the monitoring equipment(s) are of reputed make. In case any of the meter is found faulty, then it is calibrated and correction is applied to the data.
- Electricity generation data from the wind farms can also be cross checked with the sales receipts of electricity to the respective electricity companies. PP will keep a record of the payment received from sale of electricity to the electricity companies.

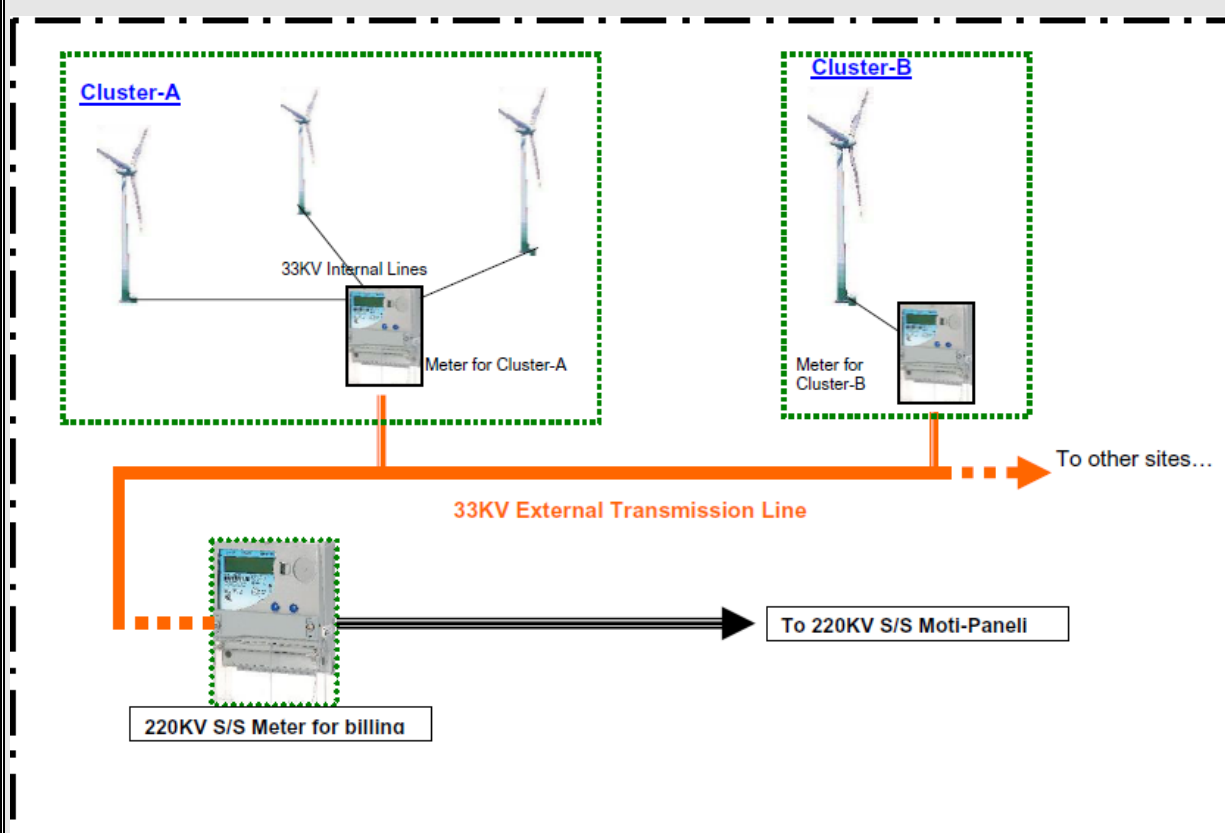
Electricity share allocation procedure:

Joint meter reading will be taken jointly by the State Electricity Board (SEB) and Enercon once in a month. The SEB will issue a monthly Share Certificate of the total net electricity generated by the project proponent based on the Joint meter reading. The share certificate will be used as evidence for net electricity exported.

At the Enercon (sending) substations, there are various feeders (s/s meters) to which the WEGs of the project proponent are connected through the cluster meters. WEGs of other promoters through their cluster meters are also connected to the same feeders as that of the project proponent, having a common metering facility at that feeder. Therefore, net electricity supplied to the SEB by all the WEGs connected to a particular feeder has to be apportioned between all promoters on the basis of net electricity export readings by individual cluster meter connected to that particular feeder, so as to account for contribution of individual promoters of WEGs. Apportioning of the net electricity supplied to the SEB by all the WEGs connected to the feeder between all promoters is done by SEB.

The apportioning of electricity generated by the entire wind farm is entirely under the jurisdiction of the state electricity board.

Below is a schematic diagram showing meters involved during apportioning of electricity:



- Controller readings – shall mean the energy reading of individual WEG
- Cluster Meter – shall mean the energy meter used to record the energy production for a cluster of WEGs or single WEG. This is being installed on behalf of GEDA after calibrating and approved by GEDA.
- S/S meter – shall mean the meter installed in Substation for recording of energy at the 220KV side.

Preparing generation share certificate:

- Site technician will collect the generation readings from the WEGs every day and will prepare the daily generation report.
- Through these collective reports of everyday, monthly generation figures are available.
- Cluster meter readings are also taken daily on the same time the controller readings are taken to get the exact generation recording of these meter.

- iv. On the billing day decided by GEDA, the reading of the S/S meter is taken at the same time of daily WEG readings.
- v. By calculating in the pro-rata basis, the generated units are being allocated to individual customers according to the generated units.

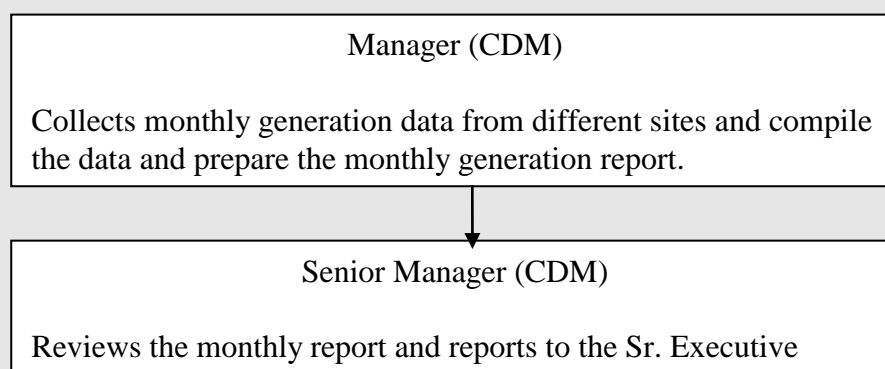
Electricity measurement initiates with recording of electricity generation at the LCS of respective WEGs which measures the generation of electricity from the particular WEG. Simultaneously, export and import readings are also recorded. At the time of Joint Meter Reading (JMR), the generation readings from the cluster meters connected to a particular feeder are measured.

Parallel to the above process, Main meter readings for the above feeder are also measured (export & import) and recorded at the sending substation of the windfarm in the presence of representative of SEB and Enercon.

The description of apportioning electricity generated by the project proponent has been included only to bring clarity to the apportioning procedure. However, the same is not part of the monitoring plan of the of the project activity.

Monitoring roles and responsibilities.

The Project is operated by ENERCON (O&M contractor for the project activity) 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.



Calibration Procedure

Calibration of meters has been undertaken at least once in three years.

Archiving of Data

Field data was stored on computer electronically and archived at Project site. Monthly monitoring reports are available at both the Project site and IPCL's administrative office electronically. All data will be kept up to 2 years after the end of crediting periods or the last issuance of CERs, which occur later.

Training & Implementation

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 WEGs, 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 staffs is capable of 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 training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving.

SECTION D. Data and parameters**D.1. Data and parameters fixed ex ante or at renewal of crediting period**

Data / Parameter:	$EF_{grid,CM,y}$
Unit:	tCO ₂ / MWh
Description:	Combined margin CO ₂ 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".
Source of data:	CO ₂ Baseline Database Version 04, (Combined Margin Emission Factor for NEWNE Grid) published by Central Electric Authority (CEA), India
Value(s) applied):	0.91
Purpose of data:	Calculation of baseline emissions
Additional comment:	Information available from authorized government agencies – National standard value has been calculated by Central Electricity Authority (CEA) as per guidelines of ACM0002 methodology. This ensures its reliability\

D.2. Data and parameters monitored

Data / Parameter:	$EG_{facility,y}$
Unit:	MWh
Description:	Electricity supplied by the project activity to the grid (net export)
Measured/ Calculated / Default:	Measured
Source of data:	Power Export Bills.
Value(s) of monitored parameter:	38,265.561

Monitoring equipment:

Transformer Meter 1

Make	Secure	
Serial No	GJU04175	
Accuracy Class	0.2s	
TYPE	E3M021	
Date of Calibration	22/01/2010	17/01/2012
Calibration Due Date	16/01/2015	
Frequency of calibration	Once in three years.	
Calibrating Agency	PGVCL	

Transformer Meter 2

Make	Secure	
Serial No	GJU04176	
Accuracy Class	0.2s	
TYPE	E3M021	
Date of Calibration	22/01/2010	17/01/2012
Calibration Due Date	16/01/2015	
Frequency of calibration	Once in three years.	
Calibrating Agency	PGVCL	

Transformer Meter 3

Make	Secure	
Serial No	GJU01470	
Accuracy Class	0.2s	
TYPE	E3M021	
Date of Calibration	22/01/2010	17/01/2012
Calibration Due Date	16/01/2015	
Frequency of calibration	Once in three years.	
Calibrating Agency	PGVCL	

Transformer Meter 4

Make	Secure	
Serial No	KAB11082	
Accuracy Class	0.2s	
TYPE	E3M021	
Initial Test Certificate	29/05/2010	
Date of Calibration	17/01/2012	
Calibration Due Date	16/01/2015	
Frequency of calibration	Once in three years.	
Calibrating Agency	PGVCL	

Measuring/ Reading/ Recording frequency:	Measured continuously, recorded monthly
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Meter reading is noted both electronically and on paper. Meter is owned and calibrated by GUVNL. The LCS meters cannot be calibrated. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system/programmable logic; the machine will stop working and generate the error report.
Purpose of data:	Calculation of baseline emissions
Additional comment:	This data is used for determining the power fed to the grid and hence the emission reductions. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
Data / Parameter:	$EG_{CLUSTER,i,j}$
Unit:	MWh
Description:	Net Electricity exported (Export-Import) by cluster meters, j, of the project proponent connected to feeder, i
Measured/ Calculated / Default:	Measured
Source of data:	Generation report provided by Enercon
Value(s) of monitored parameter:	38,265.561

Monitoring equipment:	<u>Cluster Meter 1 – Wadali</u>		
	Make	Secure	
	Serial No	MPB 04015	
	Accuracy Class	0.5s	
	TYPE	E3MO55	
	Date of Calibration	19/07/2011	24/06/2012
	Calibration Due Date	23/06/2015	
	Frequency of calibration	Once in three years.	
	Calibrating Agency	GEDA	
	<u>Cluster Meter 2 – Urmala</u>		
	Make	Secure	
	Serial No	MPB 04014	
	Accuracy Class	0.5s	
	TYPE	E3MO55	
	Date of Calibration	19/07/2011	24/06/2012
	Calibration Due Date	23/06/2015	
	Frequency of calibration	Once in three years.	
	Calibrating Agency	GEDA	
	<u>Cluster Meter 3- Fulnath</u>		
	Make	Secure	
	Serial No	MPB 04017	
	Accuracy Class	0.5s	
	TYPE	E3MO55	
	Date of Calibration	19/07/2011	24/06/2012
	Calibration Due Date	23/06/2015	
	Frequency of calibration	Once in three years.	
	Calibrating Agency	GEDA	
	Measuring/ Reading/ Recording frequency:	Measured continuously, recorded daily	
Calculation method (if applicable):	Not applicacble		
QA/QC procedures:	These meters are installed on behalf of GEDA after approval be GEDA. These meters shall be calibrated annually.		
Purpose of data:	This parameter is not directly used for baseline emissions calculations		

Additional comment:	This data is be used for apportioning the net electricity supplied to the grid by all the WEGs connected to a particular feeder between all promoters. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
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D.3. Implementation of sampling plan

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There is no requirement of a sampling plan, hence this section is 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

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Baseline emissions for the project are:

$$BE_y = EG_y * EF_{grid,CM,y}$$

Where,

EG_y = Net electricity exported to the grid (MWh)

$$= 38,265.561 \text{ MWh}$$

$EF_{grid,CM,y}$ = Combined margin emission factor (tCO₂/MWh)

$$= 0.91 \text{ tCO}_2/\text{MWh}$$

Therefore, $BE_y = 38,265.561 * 0.91 \text{ tCO}_2$

$$= 34,821 \text{ tCO}_2$$

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

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Project emissions for the project activity is zero as there is no use of fossil fuel.

E.3. Calculation of leakage

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There is no leakage because of the project activity.

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

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	34,821	0	0	34,821

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 CO ₂ e)	40,315	34,821

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

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The actual emission reductions achieved during the monitoring period is 13.63% lower than the ex-ante emission reductions calculated in the registered PDD. The difference is due to the lower PLF achieved due to lower wind availability.

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 CO ₂ e)	34,821	0

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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