



**Monitoring report form  
(Version 05.1)**

**MONITORING REPORT**

<b>Title of the project activity</b>	Renewable Energy Wind Power Project in Rajasthan	
<b>UNFCCC reference number of the project activity</b>	5090	
<b>Version number of the monitoring report</b>	1	
<b>Completion date of the monitoring report</b>	24/05/2016	
<b>Monitoring period number and duration of this monitoring period</b>	03 (01/02/2014 – 31/10/2014; including first and last days of monitoring period.)	
<b>Project participant(s)</b>	Vish Wind Infrastructure LLP	
<b>Host Party</b>	India	
<b>Sectoral scope(s)</b>	Sectoral Scope: 1	
<b>Selected methodology(ies)</b>	ACM0002, version 12.3.0	
<b>Selected standardized baseline(s)</b>	Not Applicable	
<b>Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD</b>	36,640	
<b>Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period</b>	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	NA	34,132

## SECTION A. Description of project activity

### A.1. Purpose and general description of project activity

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The purpose of the project activity is to utilize renewable wind energy for generation of electricity. Project activity is the installation of green field energy production using wind as a source of power generation. In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the NEWNE, which are/ will be predominantly based on fossil fuels. Whereas the operation of Wind Energy Generators (WEG's) is emission free and no emissions occur during the lifetime of the project activity.

The project consists of 37 machines of Wind World (The name of Enercon (India) Ltd. has been changed to Wind World (India) Ltd. From 1st January 2013, hereafter it will be referred as Wind World (India) Ltd.) Make E-53 type WEGs of 800KW capacity each totalling to the capacity of 29.6 MW. The WEGs generates 3-phase power at 400V, which is stepped up to 33 kV and further transmitted to Wind World Sub-station. From Wind World substation electricity is further evacuated to the Rajasthan regional electricity grid which is part of the NEWNE (Northern, Eastern, Western and North-Eastern) grid in India. The clean and green electricity supplied by the project will aide in sustainable growth in the region. Vish Wind Infrastructure LLP (hereafter referred as 'VWIL') is the project owner and project participant for the project activity.

The first machine under the project activity was commissioned on 23 September 2010 and last machine under the project activity was commissioned on 26 January 2011. The expected operational lifetime of the project is for 20 years.

The total emission reductions achieved under current monitoring period (01/02/2014 – 31/10/2014) is 34,132 tCO<sub>2</sub>e.

### A.2. Location of project activity

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The Project is located in Jaisalmer & Jodhpur district in the Indian State of Rajasthan. The Project is spread across Ugawa, Korwa & Kita villages of Jaisalmer District and Salodi & Jelu Villages of Jodhpur district in the Rajasthan state of India. The nearest railway station for project activity located at Ugawa, Korwa & Kita villages (District-Jaisalmer) is Jaisalmer approximately at a distance of 50 Kms from site, while the nearest railway station for project activity located at Salodi & Jelu villages (District-Jodhpur) is Jodhpur approximately at a distance of 50 Kms.

Individual WEG location numbers and coordinates are detailed out in below table:-

S.No.	WEG Loc No.	Village	District	State	Latitude	Longitude
1	41	Ugawa	Jaisalmer	Rajasthan	N 26° 37'51.5"	E 70° 57'51.2"
2	39	Ugawa	Jaisalmer	Rajasthan	N 26° 37'41.5"	E 70° 57'33.5"
3	38	Ugawa	Jaisalmer	Rajasthan	N 26° 37'35.4"	E 70° 57'38.7"
4	37	Ugawa	Jaisalmer	Rajasthan	N 26° 37'33.3"	E 70° 57'45.8"
5	36	Ugawa	Jaisalmer	Rajasthan	N 26° 37'27.8"	E 70° 57'49.9"
6	35	Ugawa	Jaisalmer	Rajasthan	N 26° 37'21.6"	E 70° 57'53.9"
7	34	Ugawa	Jaisalmer	Rajasthan	N 26° 37'17.7"	E 70° 57'59.2"
8	33	Ugawa	Jaisalmer	Rajasthan	N 26° 37'14.6"	E 70° 58'05.7"
9	31	Ugawa	Jaisalmer	Rajasthan	N 26° 37'11.3"	E 70° 58'13.3"
10	30	Ugawa	Jaisalmer	Rajasthan	N 26° 37'01.5"	E 70° 58'13.1"
11	50	Korwa	Jaisalmer	Rajasthan	N 26° 37'47.9"	E 70° 56'27.3"
12	53	Korwa	Jaisalmer	Rajasthan	N 26° 38'06.1"	E 70° 56'13.0"
13	121	Kita	Jaisalmer	Rajasthan	N 26° 41'05.2"	E 71° 00'07.2"

14	582	Kita	Jaisalmer	Rajasthan	N 26° 41'58.8"	E 71° 01'44.9"
15	601	Kita	Jaisalmer	Rajasthan	N 26° 40'24.0"	E 71° 04'28.4"
16	602	Kita	Jaisalmer	Rajasthan	N 26° 40'12.2"	E 71° 04'31.5"
17	603	Kita	Jaisalmer	Rajasthan	N 26° 40'08.5"	E 71° 04'19.3"
18	153	Jelu	Jodhpur	Rajasthan	N 26° 31'22.3"	E 72° 46'00.2"
19	154	Jelu	Jodhpur	Rajasthan	N 26° 31'24.2"	E 72° 45'52.0"
20	155	Jelu	Jodhpur	Rajasthan	N 26° 31'31.9"	E 72° 45'46.5"
21	156	Jelu	Jodhpur	Rajasthan	N 26° 31'44.0"	E 72° 45'39.4"
22	157	Jelu	Jodhpur	Rajasthan	N 26° 31'49.0'	E 72° 45'33.5"
23	158	Jelu	Jodhpur	Rajasthan	N 26° 31'50.8"	E 72° 45'25.1"
24	159	Jelu	Jodhpur	Rajasthan	N 26° 31'55.7"	E 72° 45'17.0"
25	161	Jelu	Jodhpur	Rajasthan	N 26° 31'22.1"	E 72° 45'03.8"
26	162	Jelu	Jodhpur	Rajasthan	N 26° 31'26.4"	E 72° 45'15.8"
27	163	Jelu	Jodhpur	Rajasthan	N 26° 31'19.3"	E 72° 45'24.0"
28	164	Jelu	Jodhpur	Rajasthan	N 26° 31'15.2"	E 72° 45'11.9"
29	165	Jelu	Jodhpur	Rajasthan	N 26° 30'49.8"	E 72° 45'18.1"
30	166	Jelu	Jodhpur	Rajasthan	N 26° 30'44.3"	E 72° 45'22.1"
31	167	Jelu	Jodhpur	Rajasthan	N 26° 30'32.8"	E 72° 45'17.4"
32	168	Jelu	Jodhpur	Rajasthan	N 26° 30'36.7"	E 72° 45'40.3"
33	169	Jelu	Jodhpur	Rajasthan	N 26° 30'43.3"	E 72° 45'35.3"
34	10	Salodi	Jodhpur	Rajasthan	N 26° 25'35.7"	E 72° 48'32.9"
35	11	Salodi	Jodhpur	Rajasthan	N 26° 25'25.2"	E 72° 48'35.8"
36	509	Salodi	Jodhpur	Rajasthan	N 26° 26'51.1"	E 72° 50'44.5"
37	510	Salodi	Jodhpur	Rajasthan	N 26° 26'57.7"	E 72° 50'35.8"

### 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 whether the Party involved wishes to be considered as project participant (yes/no)
India (host)	Vish Wind Infrastructure LLP (Private entity)	No

### A.4. Reference of applied methodology and standardized baseline

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

**Reference:** Approved consolidated baseline methodology ACM0002 (Version 12.3.0, EB 66)

UNFCCC web reference of methodology:

<http://cdm.unfccc.int/methodologies/DB/MPY3HVJIMTKE5P0UNTYE827D6Q7EHB>

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

- Tool to calculate the emission factor for an electricity system – Version 02.2.0
- Tool for the demonstration and assessment of additionality – Version 5.2

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

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Type of crediting period : Fixed

Start date of crediting period : 28/02/2012  
Length of crediting period : 10 years (fixed crediting period)

#### A.6. Contact information of responsible persons/entities

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Mr. Yogesh Mehra

Designated Partner, Vish Wind Infrastructure LLP

Email Id: [yogesh.mehra@windworldindia.com](mailto:yogesh.mehra@windworldindia.com)

Contact No: +91-22-6692 4848

Wind World Tower, A-9, Veera Industrial Estate, Veera Desai Road, Andheri (W),  
Mumbai-400053.

The responsible person is also a project participant; refer Appendix 1 for further details.

## SECTION B. Implementation of project activity

### B.1. Description of implemented registered project activity

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The project activity consists of 37 machines (800 kW) of Wind World make E-53. The first machine under the project activity was commissioned on 23 September 2010 and last machine under the project activity was commissioned on 26 January 2011. The commissioning dates for all the machines include in the project activity are given in the table below:

S.No	Village	Dist.	No. of Loc.	Loc. No.	No. of WEGs	Date of Comm.
1	Ugawa	Jaisalmer	1	41	4	23-Sep-10
		Jaisalmer	1	39		23-Sep-10
		Jaisalmer	1	38		23-Sep-10
		Jaisalmer	1	37		23-Sep-10
2	Ugawa	Jaisalmer	1	36	6	23-Sep-10
		Jaisalmer	1	35		23-Sep-10
		Jaisalmer	1	34		23-Sep-10
		Jaisalmer	1	33		23-Sep-10
		Jaisalmer	1	31		23-Sep-10
		Jaisalmer	1	30		23-Sep-10
3	Korwa	Jaisalmer	1	50	2	23-Sep-10
		Jaisalmer	1	53		23-Sep-10
4	Kita	Jaisalmer	1	121	5	30-Sep-10
		Jaisalmer	1	582		30-Sep-10
		Jaisalmer	1	601		30-Sep-10
		Jaisalmer	1	602		30-Sep-10
		Jaisalmer	1	603		30-Sep-10
5	Jelu	Jodhpur	1	153	20	30-Sep-10
		Jodhpur	1	154		30-Sep-10
		Jodhpur	1	155		30-Sep-10
		Jodhpur	1	156		30-Sep-10
		Jodhpur	1	157		30-Sep-10
		Jodhpur	1	158		30-Sep-10
		Jodhpur	1	159		30-Sep-10
		Jodhpur	1	161		30-Sep-10
		Jodhpur	1	162		30-Sep-10
		Jodhpur	1	163		30-Sep-10
		Jodhpur	1	163		30-Sep-10

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		Jodhpur	1	164		30-Sep-10
		Jodhpur	1	165		30-Sep-10
		Jodhpur	1	166		30-Sep-10
		Jodhpur	1	167		30-Sep-10
		Jodhpur	1	168		17-Nov-10
		Jodhpur	1	169		17-nov-10
		Salodi	Jodhpur	1		10
	Jodhpur		1	11	26-Jan-11	
	Jodhpur		1	509	26-Jan-11	
	Jodhpur		1	510	26-Jan-11	
			<b>Total</b>		<b>37</b>	

Wind World operation and maintenance activities are ISO 9001:2008 certified. Referring to the data available it can be inferred that there have not been any major special events for any of the 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. During the monitoring period there were no events or situations occurred, which may impact the applicability of the methodology.

The project activity consists of 37 WEGs of Wind World make E-53 and each machine capacity is of 800 kW (E-53) totalling to the capacity of 29.6 MW. The WEGs generates 3-phase power at 400V, which is stepped up to 33 kV and connected to 33kV metering points. From 33 kV metering point's electricity transmitted to Wind World Sub-station. At sub-station electricity is step-up to 220 kV. From Wind World substation electricity is further evacuated to the state electricity grid at 220kV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V  $\pm$  12.5%. The other salient features of the state-of-art-technology are:-

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawal (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEG with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking 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

Wind World (India) Ltd has secured and facilitated the technology transfer for wind based renewable energy generation from Wind World GmbH, has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured. Diagram of main component of Wind World make E-53 is shown in below picture:-



Figure: Wind World make E-53 Diagram.

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

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

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Not Applicable

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

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The corrections to the registered PDD have been approved by UNFCCC on 23-Sept-2014.

Revised PDD version 11, dated 08-July-2014

### **B.2.3. Changes to start date of crediting period**

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Not Applicable

### **B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration**

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Not Applicable

### **B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline**

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The permanent changes from the registered monitoring plan have been approved by UNFCCC on 23-Sept-2014.

Revised PDD version 11, dated 08-July-2014

### **B.2.6. Changes to project design of registered project activity**

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Not applicable

**B.2.7. 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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Wind World (India) Limited is EPC contractor for the project activity. Wind World (India) Limited will be responsible for the maintaining all the monitoring data on behalf of Vish Wind Infrastructure LLP in respect of the project activity. Wind World (India) Limited has implemented the management structure for managing the monitored data.

This approved monitoring methodology requires monitoring of the following:

- Net electricity supplied 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

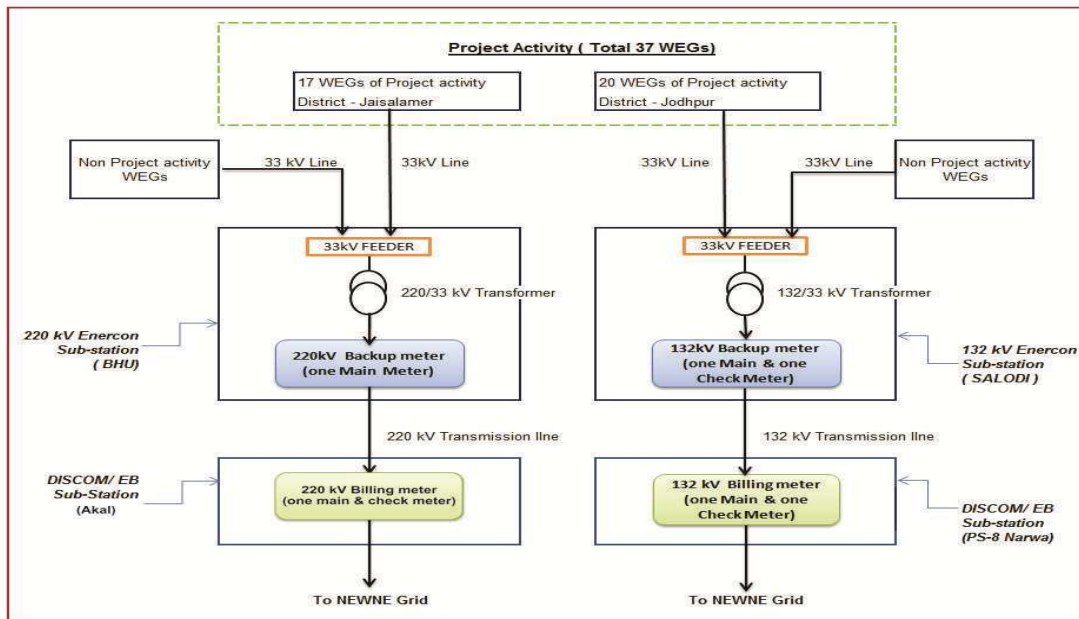
Emission factor of the project activity is fixed *ex ante* hence no further monitoring of this parameter is required. As per ACM0002 leakage need not be considered hence leakage has not been considered for the project activity. Hence, the sole parameter for monitoring is the net electricity supplied by the project activity to the grid.

The Project activity is operated by WWIL (EPC contractor for the project activity) and managed by the PP. The operational and maintenance contract for the project activity is with WWIL, which is an ISO 9001 certified company. WWIL follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

The break-up sheet reflecting net electricity supplied by the project activity to the grid is prepared by EPC contractor based on the allocation procedure explained below. Based on this break-up sheet, tariff Invoice is raised by PP to DISCOM.

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

Layout of Metering arrangement for project activity is as follows:-



From the above layout it is clear that project activity WEGs (37Nos) along with WEGs of other customers, who are not the part of project activity are connected to WWIL Sub-stations which are further connected to EB sub-station through EHV line. The detail of metering points are as follows:-

- 1) 17WEGs of project activity installed in Jaisalmer district is connected through 220kV Wind World (India) Limited (herein after referred as WWIL) pooling sub-station (220kV BHU sub-station), through 33kV feeder lines. At WWIL pooling sub-station BHU electricity is stepped up to 220kV, wherein the backup meter (one main meter) is connected. From WWIL pooling sub-station electricity is transmitted to state utility (DISCOM) sub-station (AKAL sub-station) through 220kV transmission line/ EHV line wherein the billing meter (one main meter & one check meter) is connected. At Akal sub-station metering is done at 220kV billing meter. From EB sub-station electricity is further transmitted to NEWNE grid.
- 2) 20WEGs of project activity installed in Jodhpur district is connected through 132kV Wind World (India) Limited (herein after referred as WWIL) pooling sub-station (132kV SALODI sub-station), through 33kV feeder lines. At WWIL pooling sub-station SALODI electricity is stepped up to 132kV, wherein the backup meter (one main & one check meter) connected. From WWIL pooling sub-station electricity is transmitted to state utility (DISCOM) sub-station (PS-8 Narwa Sub-station) through 132kV transmission line/ EHV line wherein billing meter (one main & one check meter) is connected. At EB sub-station metering is done at 132kV billing meter. From EB sub-station electricity is further transmitted to NEWNE grid.

The net electricity supplied to the grid will be calculated on monthly basis at the EB/DISCOM substations (Akali & PS-8 Narwa) wherein the billing meter is connected. The monthly joint meter readings are taken by the representatives of DISCOM and WWIL (EPC Contractor) who also signs the JMR. Simultaneously, the monthly joint meter reading of backup meters available at WWIL pooling sub-stations (BHU & SALODI) is also taken by representatives of RVPN/DISCOM and WWIL. The copy of JMR at backup meters is available with WWIL.

Since the project activity WEGs are connected through common metering system along with non-project activity WEGs of other customers at the main meter, apportioning of electricity export & import as recorded in JMR is being done to calculate the electricity export & import by individual customer's WEGs Apportioning is being done based on the net electricity generation (Gross Export-Gross Import) recorded at LCS meter installed in individual WEGs



Based on the monthly JMR reading, which is signed by representative of DISCOM and EPC contractor; WWIL prepares the monthly breakup<sup>1</sup> generation sheets which indicate the export, import & net electricity supplied by individual customers to the grid.

The monthly generation sheet is submitted to both, DISCOM as well as individual investors. PP raises the invoice based on the monthly breakup sheet corresponding to the net electricity generation value indicated in the monthly breakup sheet. DISCOM based on the JMR reading along with monthly breakup sheet prepared by WWIL and the invoice raised by investors, conduct the audit to cross check the net electricity values and in case all the values are found to be correct, DISCOM release the payment against the invoice raised by individual investors.

The values of the net electricity supplied to grid by project activity can be cross checked with invoices raised by the PP on DISCOM.

### **Procedure for apportioning:-**

#### **Case 1:- Procedure used by EPC Contractor to prepare monthly breakup sheets for project activity.**

The monthly JMR reading contains the electricity export, import & net electricity supplied by all the WEGs of project activity as well as non-project activity connected to the metering system at DISCOM substation. Hence in order to arrive at the electricity export, import & net electricity supplied by WEGs of the project activity based on the net electricity generation (Gross Export-Gross Import) recorded at LCS meter, following procedure is used by EPC contractor:-

As LCS meter measures the net electricity generation (Gross Export-Gross Import) by individual WEG, which is the difference of export and import and doesn't provide individual reading of Export & Import; the apportioning of electricity export & import at recorded at billing meter as indicated in JMR sheet is done based on net electricity generation (Gross Export-Gross Import) of WEGs. This is a standard procedure that is followed in the state of Rajasthan and is accepted by the state DISCOM for payment of tariff invoices.

Electricity exported by all WEGs of project activity is apportioned on the basis of summation of net electricity generation (Gross Export-Gross Import)<sup>2</sup> ( by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site and the electricity export recorded at the main meter mentioned in the JMR. The formula used for computing electricity export to the grid by the project activity is as follows:-

Electricity Export to the grid by the Project activity,

$$EG_{\text{Export},y} = \frac{EG_{\text{JMR,Export}} * \sum EG_{\text{Controller},j}}{\sum EG_{\text{Controller},i}} \dots\dots\dots(1)$$

As LCS meter measures the net electricity generation (Gross Export – Gross Import) by WEGs and doesn't provide individual reading of Export & Import. Therefore apportioning of export as well as import for all WEG of the project activity is also apportioned on the basis of summation of net

<sup>1</sup> As per section 4.2 (ii) of PPA 'Measurement of Energy and Metering':- The Joint Meter Reading taken at common evacuation /injection system shall be supported by controller readings of individual power producers using such common evacuation/ injection system. Based on this breakup, limited to total energy injection, the power purchase form the individual power plant shall be regulated for the purpose of payment.

<sup>2</sup> LCS meter installed in individual WEGs control panel measures the net electricity generation (Gross Export-Gross Import) by WEG and therefore  $\sum EG_{\text{Controller},j}$  is used by developer to calculate electricity export & import by individual developer (project activity & non project activity WEGs).

electricity generation by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site and the electricity import recorded at the main meter mentioned in the JMR. The formula used for computing electricity import from the grid by the project activity is as follows

Electricity Import from the grid by the Project activity,

$$EG_{Import,y} = \frac{EG_{JMR,Import} * \sum EG_{Controller,j}}{\sum EG_{Controller,i}} \dots\dots\dots(2)$$

Wherein,

$\sum EG_{Controller,j}$	=	Summation of net electricity generation by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site.
$\sum EG_{Controller,i}$	=	Summation of net electricity generation by all WEG (i number of WEGs) of project activity or non project activity, as measured at the controller (LCS meter) at project site,
$EG_{JMR,Export}$	=	Electricity export by project and non project recorded at respective billing meters located at DISCOM sub-station. This can be checked from JMR certificates.
$EG_{JMR,Import}$	=	Electricity import by project and non project recorded at respective billing meters located at DISCOM sub-station. This can be checked from JMR certificates.
$EG_{Export,y}$	=	Electricity export by project activity calculated as per formula 1 above
$EG_{import,y}$ above.	=	Electricity import by project activity calculated as per formula 2 above.

Therefore net electricity supplied to grid by 37 WEGs of the project activity is calculated as the difference of equation (1) & (2),

$EG_{Facility,y} = EG_{Export,y} - EG_{Import,y}$
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Even though the above mentioned of apportioning is done by the EPC Contractor and submitted to respective DISCOM, the same undergoes the series of audit by the hierarchy of auditors (Asst. Auditors, divisional auditors & account auditors) and then finally authorised by the Superintending engineer (SE) of the circle office of respective DISCOMs. The above mentioned procedure of apportioning will be done separately for WEGs of project activity installed at Jaisalmer & Jodhpur site by EPC Contractor.

The apportioning of electricity generated by the all WEGs (project activity and non-project activity) is entirely under the jurisdiction of the EPC Contractor. The project participant has no role in computing and furnishing the apportioned electricity generated for them or any other project developer. The above apportioning procedure for deriving the apportioned electricity generated by the project activity has been included only to bring clarity to the apportioning and overall monitoring procedure.

### **Case 2:- Apportioning procedure in case the date of verification period doesn't match with the billing cycle dates**

In case the date of project registration is not in line with billing cycle of project activity then the calculation of net electricity supplied to grid for period between date of registration and next date of

billing cycle will be done by PP based on data available for that month. Although it is not applicable for current monitoring period.

<p>Net electricity export to the grid by a WEG @ SEB meter for n no. of days =</p> <p>(Daily controller net electricity generation (Gross Export-Gross Import) of that WEG for n no. of days)</p> <p>x (Total Net generation of that WEG @ SEB main meter for a month)</p>
<p>Monthly controller net electricity generation (Gross Export-Gross Import) of that WEG for that month</p>

#### **Procedure to deal with data uncertainty:**

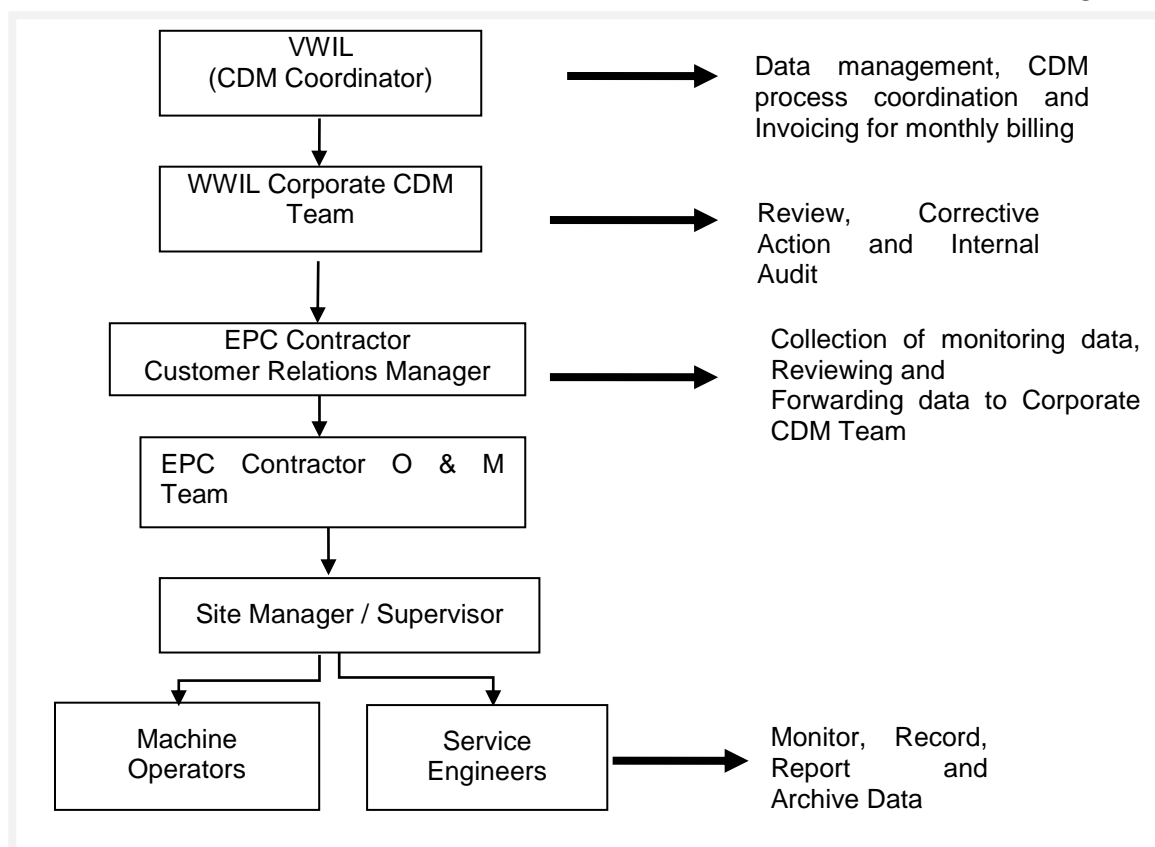
During the annual calibration, if the meter is found to be outside the permissible limits of the error and if that meter readings have been used in JMR, the (–ve) error value would be applied to electricity export and (+ve) error value will be applied to import of electricity from grid to all the JMR values since the date of last calibration. The meter would be replaced immediately with new calibrated meter.

#### **Training and maintenance requirements:**

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Energy Generators (WEGs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that WWIL's service staffs 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 Wind World Training Academy provides need-based training to meet the training requirements of WWIL 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.

#### **Monitoring roles and responsibilities**

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



### **Meter Test Checking Details:**

The metering equipment's were inspected & tested by State Utility. Meter details & calibration details for the all the main and check meters are as follows:-

Jaisalmer Site (220 KV Feeder Line)				
Location of meter		Akai Sub -station (Electricity board)		Bhu Sub-station (Wind World)
Type of meter		Main Meter	Check Meter	Back up meter
Meter Sr. No.		11068579	11068580	RJB 00050
Meter Make		L&T	L&T	Secure
Accuracy class		0.2%	0.2%	0.2%
Type		All the meters are two-way Tri-vector meters capable of recording import and export of electricity.		
Frequency		Annual		
Calibration Details	2013	26-Dec-13	26-Dec-13	28-Dec-13
	2015	14-Feb-15	14-Feb-15	11-Feb-15

Jodhpur Site (132 KV Feeder Line)				
Location of meter		PS-8 Sub-station (Electricity Board)		Salodi Sub-station (Wind World)
Type of meter		Main Meter	Check Meter	Backup main meter Backup check meter
Meter Sr. No.		RJB 00354	RJB 00356	RJB 00358 RJB 00357
Meter Make		Secure	Secure	Secure Secure
Accuracy class		0.2%	0.2%	0.2% 0.2%
Type		All the meters are two-way Tri-vector meters capable of recording import and export of electricity.		

Frequency		Annual			
Calibration Details	2012	20-Dec-12	20-Dec-12	20-Dec-12	20-Dec-12
	2014	11-Mar-14	11-Mar-14	11-Mar-14	11-Mar-14
	2015	21-Feb-15	21-Feb-15	21-Feb-15	21-Feb-15

The main and check meters are tested for accuracy on annual basis by state utility and in case of error; meters are calibrated by state utility. Further during the annual meter testing, all the meters were under the permissible limit of error and accordingly none of the meter was replaced during the current monitoring period.

As per Guidelines for assessing compliance with the calibration frequency requirements, (VVS Version 07.0 para 283 (a)) states that: "Applying the maximum permissible error of the instrument to the measured values, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error;"

In Current Monitoring Period for the meters installed at Jodhpur Site, calibration was due on 20-Dec-13 but the same is done on 11-Mar-14. Hence the calibration of the meters got delayed for the period from 20-Dec-2013 to 11-Mar-2014, however the current monitoring period starts on 01-Feb-14, hence the correction factor has been applied for the months Feb-14 & Mar-14 only.

## SECTION D. Data and parameters

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

Data/parameter:	EF <sub>grid,CM,y</sub>			
Unit	tCO <sub>2</sub> e/MWh			
Description	Combined Margin Emission Factor of NEWNE Electricity Grid.			
Source of data	<p>Combined Margin Emission Factor (<b>EF<sub>grid,CM,y</sub></b>) is calculated as the weighted average of Operating Margin Emission Factor (<b>EF<sub>grid,OM,y</sub></b>) and Build Margin Emission Factor (EF<sub>grid,BM,y</sub>).</p> <p>The “CO<sub>2</sub> Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <p>The “CO<sub>2</sub> Baseline Database for Indian Power Sector” is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a></p>			
Value(s) applied)	<p>“CO<sub>2</sub> Baseline Database for Indian Power Sector”, version 5 published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <table><tr><td>Combined Margin Emission Factor (<b>EF<sub>grid,CM,y</sub></b>)</td><td>0.9225</td></tr></table> <p>Refer Annex – 1 for comprehensive calculation of Combined Margin Emission Factor.</p>		Combined Margin Emission Factor ( <b>EF<sub>grid,CM,y</sub></b> )	0.9225
Combined Margin Emission Factor ( <b>EF<sub>grid,CM,y</sub></b> )	0.9225			
Choice of data or measurement methods and procedures	Combined Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with CDM methodologies: ACM0002, and Tool to Calculate the emission Factor for an Electricity System.			
Purpose of data	Calculation of Baseline Emissions			
Additional comments	Value is fixed ex-ante for entire crediting period.			

Data/parameter:	EF <sub>grid,OM,y</sub>
Unit	tCO <sub>2</sub> e/MWh
Description	Operating Margin Emission Factor of NEWNE Electricity Grid

Source of data	"CO <sub>2</sub> Baseline Database for Indian Power Sector", version 5 published by the Central Electricity Authority, Ministry of Power, Government of India.  The "CO <sub>2</sub> Baseline Database for Indian Power Sector" is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) applied)	1.0050
Choice of data or measurement methods and procedures	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.
Purpose of data	Calculation of Baseline Emissions
Additional comments	Value is fixed ex-ante for entire crediting period.

<b>Data/parameter:</b>	EF <sub>grid, BM, y</sub>
Unit	tCO <sub>2</sub> e/MWh
Description	Build Margin Emission Factor of NEWNE Electricity Grid
Source of data	"CO <sub>2</sub> Baseline Database for Indian Power Sector, version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO <sub>2</sub> Baseline Database for Indian Power Sector" is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) applied)	0.6752
Choice of data or measurement methods and procedures	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002.
Purpose of data	Calculation of Baseline Emissions
Additional comments	Value is fixed ex-ante for entire crediting period.

## D.2. Data and parameters monitored

<b>Data/parameter:</b>	<b>EG<sub>facility, y</sub></b>
Unit	MWh (Mega-watt hour)
Description	Net electricity generation supplied to the grid by the Project activity.
Measured/calculated/default	Calculated
Source of data	The break-up sheet prepared by EPC contractor based on Joint Meter Reading (JMR)
Value(s) of monitored parameter	36999.18797 MWh
Monitoring equipment	Since it is calculated value, hence not applicable.
Measuring/reading/recording frequency:	Frequency of measurement/recording data: Continuously monitoring and Monthly recording  Refer section 'C' (Description of monitoring system) for an illustration of the provisions for measurement methods.  Monthly values of parameter are provided in the ER calculation sheet.
Calculation method (if applicable):	The procedures for calculation of net electricity supplied to grid has been followed as per the provisions of the power purchase agreement and details of calculation method has been explained in monitoring plan under section C of monitoring report.
QA/QC procedures:	Value of EG <sub>facility, y</sub> can be cross checked with the tariff invoices raised on the DISCOM . All the billing Main & Backup meters are calibrated by DISCOM annually and the records are available with the EPC Contractor (WWIL)
Purpose of data:	Calculation of Baseline Emissions

Additional comments:	The data will be archived both in electronic and hard paper format for crediting period + 2 years.
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<b>Data/parameter:</b>	<b>EG<sub>Export,y</sub></b>
Unit	MWh (Mega-watt hour)
Description	Electricity export to the grid by the Project activity.
Measured/calculated/default	Calculated
Source of data	The break-up sheet based on Joint Meter Reading (JMR) prepared by EPC Contractor.
Value(s) of monitored parameter	37030.34618 MWh
Monitoring equipment	Since it is calculated value, hence not applicable.
Measuring/reading/recording frequency:	Frequency of recording data: Monthly.  Further all the meters have the capability of continuous measurement of data.  Refer section 'C' for an illustration of the provisions for measurement methods.  Monthly values of parameter are provided in the ER calculation sheet.
Calculation method (if applicable):	Based on the monthly JMR reading recorded at main meters installed at DISCOM sub-stations and the LCS controller meters (panel meters) readings.
QA/QC procedures:	Value of EG <sub>Export,y</sub> can be cross checked with the tariff invoices raised on the DISCOM. All the billing & Backup meters are calibrated by DISCOM annually and the records are available with the EPC Contractor (WWIL).
Purpose of data:	Calculation of Baseline Emissions
Additional comments:	The data will be archived both in electronic and hard paper format for crediting period + 2 years.

<b>Data/parameter:</b>	<b>EG<sub>Import,y</sub></b>
Unit	MWh (Mega-watt hour)
Description	Electricity Import from grid by the Project activity.
Measured/calculated/default	Calculated
Source of data	The break-up sheet based on Joint Meter Reading (JMR) prepared by EPC Contractor.
Value(s) of monitored parameter	311.5821 MWh
Monitoring equipment	Since it is calculated value, hence not applicable.
Measuring/reading/recording frequency:	Frequency of recording data: Monthly  Further all the meters have the capability of continuous measurement of data.  Refer section 'C' for an illustration of the provisions for measurement methods.  Monthly values of parameter are provided in the ER calculation sheet.
Calculation method (if applicable):	based on the monthly JMR reading recorded at main meters installed at DISCOM sub-stations and the LCS controller meter (panel meters) readings
QA/QC procedures:	Value of EG <sub>Import,y</sub> can be cross checked with the tariff invoices raised on the DISCOM. All the billing & Backup meters are calibrated by DISCOM annually and the records are available with the EPC Contractor (WWIL).
Purpose of data:	Calculation of Baseline Emissions

Additional comments:	The data will be archived both in electronic and hard paper format for crediting period + 2 years
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Data/parameter:	$\sum EG_{\text{Controller},j}$
Unit	MWh (Mega-watt hour)
Description	Summation of net electricity generation (Gross Export-Gross Import) by all the WEGs of project activity (j number of WEGs), as measured at the controller (LCS meter) at project site. Each WEG has exclusive LCS meter that records net electricity generation (Gross Export-Gross Import) from the WEG. j is number of WEGs of project activity connected to main meter (JMR/billing meter) at DISCOM substation and backup meter at WWIL substation..
Measured/calculated/default	Measured
Source of data	Monthly operating logs recorded in electronic format by EPC contractor.
Value(s) of monitored parameter	38368.872MWh
Monitoring equipment	Controller meter (LCS).
Measuring/reading/recording frequency:	Frequency of measuring/recording data: Continuous measurement and Monthly recording  The value is recorded continuously by the online monitoring station. This reading can also be seen in the electronic panel installed inside the WEG tower. The 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 WEGs. In case there is any mismatch in the energy values recorded by the Panel meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The operations and maintenance staff will attend to the problem immediately in order to identify and correct the error.  Monthly values of parameter are provided in the ER calculation sheet.
Calculation method (if applicable):	Not Applicable
QA/QC procedures:	This data parameter will be logged electronically on a monthly basis by EPC contractor on its online portal. The value of this parameter shall be compared with the value of $EG_{\text{facility},y}$ and the conservative approach would be taken by the PP for estimating the net electricity supplied value for the calculation of emission reduction.
Purpose of data:	Calculation of Baseline Emissions
Additional comments:	The data will be archived both in electronic and hard paper format for crediting period + 2 years

### D.3. Implementation of sampling plan

&gt;&gt;

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

&gt;&gt;

"The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in tCO<sub>2</sub>e/MWh) calculated in a transparent and conservative manner as the weighted average emissions (in tCO<sub>2</sub>e/MWh) as described in PDD Version 11 dated 08/07/2014.

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



Where,

$BE_y$  is baseline emissions in year  $y$ , tCO<sub>2</sub>e.

$EG_{PJ,y}$  is 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).

$EF_{grid,CM,y}$  is Combined margin CO<sub>2</sub> 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" (tCO<sub>2</sub>/MWh)

Since the project activity is the installation of a new grid connected renewable power plant the  $EG_{PJ,y}$  is calculated as :

$$EG_{PJ,y} = EG_{facility,y}$$

$EG_{facility,y}$  is Quantity of net electricity generation supplied by the project plant/unit to the grid in year  $y$  (MWh/yr)

$$\begin{aligned} \text{So, } BE_y &= EG_{facility,y} * EF_{grid,CM,y} \\ BE_y &= 36999.18797 * 0.9225 \\ &= 34,132 \end{aligned}$$

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

>>

Since the project activity is a renewable energy project which generates electricity using wind power and hence does not result in project emissions.

## E.3. Calculation of leakage

>>No leakage is considered from the project activity as per approved methodology ACM0002 version 12.3.0

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

Item	Baseline emissions or baseline net GHG removals by sinks (t CO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	GHG emission reductions or net GHG removals by sinks (t CO <sub>2</sub> e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
01/02/2014-31/10/2014	34,132	0	0	0	34,132	34,132
<b>Total</b>	34,132	0	0	0	34,132	34,132

## E.5. Comparison of actual emission reductions or net 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 <sub>2</sub> e)	36,640	34,132

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

>>

There is marginal change of 6.85% (downside) in the expected and annual emission reductions due to lower PLF achieved during the monitoring period.

## Appendix 1. Contact information of project participants and responsible persons/entities

<b>Project participant and/or responsible person/ entity</b>	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
<b>Organization name</b>	Vish Wind Infrastructure LLP
<b>Street/P.O. Box</b>	A-9, Veera Industrial Estate, Veera Desai Road, Andheri (W)
<b>Building</b>	Wind World Tower
<b>City</b>	Mumbai
<b>State/region</b>	Maharashtra
<b>Postcode</b>	400 053
<b>Country</b>	India
<b>Telephone</b>	+91-22-6692 4848
<b>Fax</b>	+91-22 - 67040473 / 66921175
<b>E-mail</b>	<a href="mailto:yogesh.mehra@windworldindia.com">yogesh.mehra@windworldindia.com</a>
<b>Website</b>	<a href="http://www.windworldindia.com">www.windworldindia.com</a>
<b>Contact person</b>	
<b>Title</b>	Designated Partner
<b>Salutation</b>	Mr.
<b>Last name</b>	Mehra
<b>Middle name</b>	-
<b>First name</b>	Yogesh
<b>Department</b>	Corporate
<b>Mobile</b>	+91-98200 40301
<b>Direct fax</b>	+91-22-6692 1177
<b>Direct tel.</b>	+91-22-6702 2832
<b>Personal e-mail</b>	<a href="mailto:yogesh.mehra@windworldindia.com">yogesh.mehra@windworldindia.com</a>

**Annex 1****BASELINE INFORMATION**

The Operating Margin data for the most recent three years and the Build Margin data for the NEWNE Region Electricity Grid as published in the CEA database version 5.0 <sup>3</sup>are as follows:

**Simple Operating Margin**

	<b>NEWNE Grid (tCO<sub>2</sub>e/GWh)</b>
Simple Operating Margin – 2006-07	1.0085
Simple Operating Margin – 2007-08	0.9999
Simple Operating Margin – 2008-09	1.0066
Average Operating Margin of last three years	1.0050

**Build Margin**

	<b>tCO<sub>2</sub>e/GWh</b>
Build Margin- 2008-09	0.6752

**Combined Margin calculations**

	<b>Weights</b>	<b>tCO<sub>2</sub>e/GWh</b>
Operating Margin	0.75	1.0050
Build Margin	0.25	0.6752
Combined Margin		0.9225

Detailed information on calculation of Operating Margin Emission Factor and Build Margin

<sup>3</sup> [http://www.cea.nic.in/reports/planning/cdm\\_co2/cdm\\_co2.htm](http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm)

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## Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to the Host Party;</li> <li>• Remove reference to programme of activities;</li> <li>• Overall editorial improvement.</li> </ul>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;</li> <li>• Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>;</li> <li>• Editorial improvement.</li> </ul>
03.2	5 November 2013	Editorial revision to correct table in page 1.
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 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.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		