Monitoring report form for CDM project activity
(Version 07.0)

MONITORING REPORT		
Title of the project activity	Renewable Energy Wind Power Project in Rajasthan	
UNFCCC reference number of the project activity	5090	
Version number of the PDD applicable to this monitoring report	11.0	
Version number of this monitoring report	1.1	
Completion date of this monitoring report	10/07/2019	
Monitoring period number	06	
Duration of this monitoring period	01/09/2017 – 31/12/2018; including first and last days of monitoring period	
Monitoring report number for this monitoring period	NA	
Project participants	Vish Wind Infrastrukture LLP ACT Financial Solutions B.V. First Climate Markets A.G.	
Host Party	India	
Applied methodologies and standardized baselines	ACM0002, version 12.3.0 Consolidated baseline methodology for grid-connected electricity generation from renewable sources	
Sectoral scopes	Sectoral Scope: 1	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	NA	42,481[1] tCO_2
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	65,362[2] tCO_2	

[1] Detail calculation has been provided in ER Sheet.

[2] Detail calculation has been provided in ER Sheet.

SECTION A. Description of project activity

A.1. 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 01/01/2013, 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 23/09/2010 and last machine under the project activity was commissioned on 26/01/2011. The expected operational lifetime of the project is for 20 years.

The total emission reductions achieved under current monitoring period (01/09/2017 – 31/12/2018) is 42,481 tCO_{2e}.

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 participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Vish Wind Infrastrukture LLP (Private entity)	No
Netherlands	ACT Financial Solutions B.V.	No
Germany	First Climate Markets A.G.	No

A.4. References to applied methodologies and standardized baselines

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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 type and duration

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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)

SECTION B. Implementation of project activity

B.1. Description of implemented 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 23/09/2010 and last machine under the project activity was commissioned on 26/01/2011. 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	23/09/2010
		Jaisalmer	1	39		23/09/2010
		Jaisalmer	1	38		23/09/2010
		Jaisalmer	1	37		23/09/2010
2	Ugawa	Jaisalmer	1	36	6	23/09/2010
		Jaisalmer	1	35		23/09/2010
		Jaisalmer	1	34		23/09/2010
		Jaisalmer	1	33		23/09/2010
		Jaisalmer	1	31		23/09/2010
		Jaisalmer	1	30		23/09/2010
3	Korwa	Jaisalmer	1	50	2	23/09/2010
		Jaisalmer	1	53		23/09/2010
4	Kita	Jaisalmer	1	121	5	30/09/2010
		Jaisalmer	1	582		30/09/2010
		Jaisalmer	1	601		30/09/2010
		Jaisalmer	1	602		30/09/2010
		Jaisalmer	1	603		30/09/2010
5	Jelu	Jodhpur	1	153	20	30/09/2010
		Jodhpur	1	154		30/09/2010
		Jodhpur	1	155		30/09/2010
		Jodhpur	1	156		30/09/2010
		Jodhpur	1	157		30/09/2010
		Jodhpur	1	158		30/09/2010
		Jodhpur	1	159		30/09/2010
		Jodhpur	1	161		30/09/2010
		Jodhpur	1	162		30/09/2010
		Jodhpur	1	163		30/09/2010
		Jodhpur	1	164		30/09/2010
		Jodhpur	1	165		30/09/2010
		Jodhpur	1	166		30/09/2010
		Jodhpur	1	167		30/09/2010
		Jodhpur	1	168		17/11/2010
		Jodhpur	1	169		17/11/2010
	Salodi	Jodhpur	1	10		26/01/2011
		Jodhpur	1	11		26/01/2011
		Jodhpur	1	509		26/01/2011
		Jodhpur	1	510		26/01/2011
			Total		**37**	

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 ± 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 drawl (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 the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

>>
Not Applicable

B.2.2. Corrections

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The corrections to the registered PDD, have been approved by UNFCCC on 23/09/2014 (PRC Reference PRC-5090-002).
Revised PDD version 11.0, dated 08/07/2014

B.2.3. Changes to the start date of the crediting period

>>
Not Applicable

B.2.4. Inclusion of monitoring plan

>>
Not Applicable

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

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The permanent changes from the registered monitoring plan have been approved by UNFCCC on 23/09/2014 (PRC Reference PRC-5090-002).
Revised PDD version 11.0, dated 08/07/2014

B.2.6. Changes to project design

>>
Not applicable

B.2.7. Changes specific to afforestation or reforestation project activity

>>
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

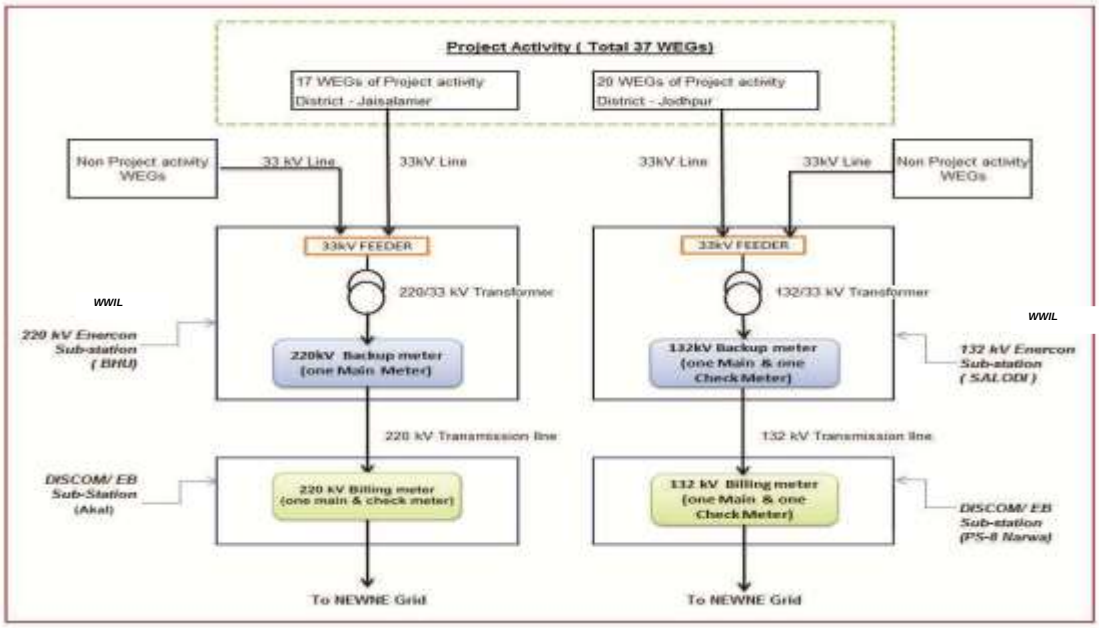
Emission factor of the project activity is fixed ex ante hence no further monitoring of this parameter is required. As per ACM0002 leakage need not be considered hence leakage has not been considered for the project activity. Hence, the sole parameter for monitoring is the net electricity supplied by 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 is, calculated on monthly basis at the EB/DISCOM substations (Akal & PS-8 Narwa) wherein the billing meter is connected. The representatives of DISCOM and WWIL (EPC Contractor), who also signs the JMR take the Monthly Joint Meter reading. 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[3] 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. DISOM 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 standard procedure 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)[4] (by all the WEGs (j number of WEGs) of

[3] 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.

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,

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

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 WEGs of the project activity were also apportioned, on the basis of 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 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,

$$\mathbf{EG_{Import,y}} = \frac{\mathbf{EG_{JMR,Import}} * \sum EG_{Controller,\ j}}{\sum EG_{Controller,i}} \quad \text{.....(2)}$$

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.
$\mathbf{EG_{Export,y}}$	=	Electricity export by project activity calculated as per formula 1 above
$\mathbf{EG_{import,y}}$	=	Electricity import by project activity calculated as per formula 2 above.

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

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

$$EG_{Facitlity,y} = EG_{Export,y} - EG_{Import,y}$$

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.

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

Procedure to deal with data uncertainty:

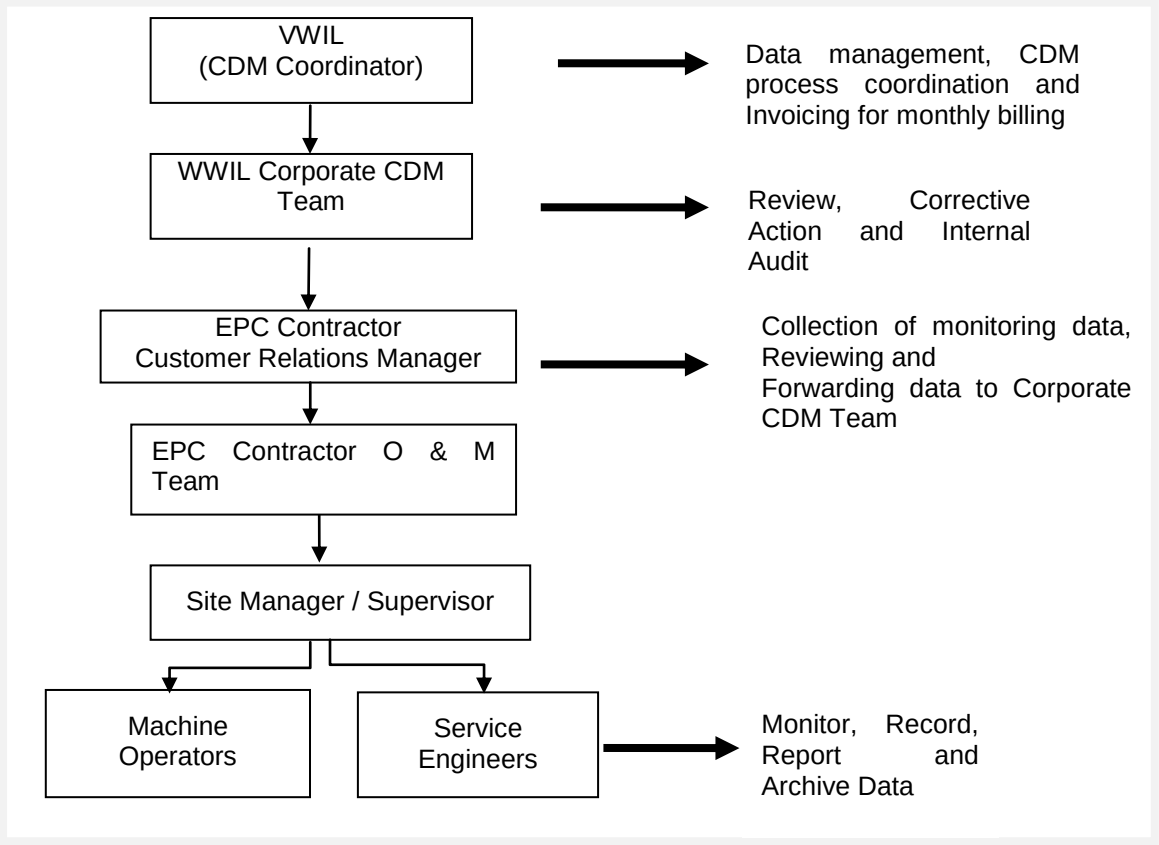
During the annual calibration, if the meter is found to be outside the permissible limits of the error and if that meter readings have been used in JMR, the (–ve) error value would be applied to electricity export and (+ve) error value will be applied to import of electricity from grid to all the JMR 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 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		Akal Sub -station (Electricity board)		Bhu Sub-station (Wind World)
Type of meter		Main Meter	Check Meter	Back up meter
Meter Sr. No.		15624843	15624844	15197055
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	2017	09/03/2017	09/03/2017	25/05/2017
	2018	14/05/2018	14/05/2018	14/05/2018

Jodhpur Site (132 KV Feeder Line)				
Location of meter	PS-8 Sub-station (EB)		Salodi Sub-station (Wind World)	
Type of meter	Main Meter	Check Meter	Backup main meter	Backup check meter
Meter Sr. No.	RJB00354	RJB00356	RJB00358	RJB00357
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	2017	16/06/2017 and 14/08/2019	16/06/2017 and 14/08/2019	16/06/2017 and 14/08/2019	16/06/2017 and 14/08/2019

As per Guidelines for assessing compliance with the calibration frequency requirements, (CDM Standard : CDM validation and verification standard for project activities VVS Version 02.0for PAs para 366 (a)) states that: "Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, 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 Jaisalmer site, calibration was due on 09/03/2018 but the same was done on 14/05/2018.Hence the calibration of the meters got delayed for the period from 09/03/2018 to 13~~09~~/05/2018. However, the billing cycle is from 01st of every month to last day of the month, hence the correction factor is applied for month Mar-18 to May-18.

For Jodhpur site, the calibration was due on 16/06/2018 but the same has~~was~~ been ~~not~~ conducted on 14/08/2019~~as of yet~~. ~~PP has requested state electricity board for conducting the meter calibration but it is not under the control of PP to bind the government entity.~~ Hence, the calibration of the meters got delayed for the period from 16/06/2018 to 31/12/2018. Hence, the correction factor (maximum permissible error of "0.2%"~~) is~~) is applied for month of Jun-18 to Dec-18.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,CM,y}$
Unit	tCO_2e/MWh
Description	Combined Margin Emission Factor of NEWNE Electricity Grid.
Source of data	Combined Margin Emission Factor (***EFgrid*$_{CM,y}$**) is calculated as the weighted average of Operating Margin Emission Factor (***EFgrid*$_{OM,y}$**) and Build Margin Emission Factor ($EFgrid_{BM,y}$). The "CO_2 Baseline Database for Indian Power Sector" 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) applied	"CO_2 Baseline Database for Indian Power Sector", version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. Combined Margin Emission Factor (***EFgrid*$_{CM,y}$**) 0.9225 Refer Annex – 1 for comprehensive calculation of Combined Margin Emission Factor.
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/parameter	Calculation of Baseline Emissions
Additional comments	Value is fixed ex-ante for entire crediting period.

Data/Parameter	$EF_{grid,OM,y}$
Unit	tCO_2e/MWh
Description	Operating Margin Emission Factor of NEWNE Electricity Grid
Source of data	"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) 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/parameter	Calculation of Baseline Emissions
Additional comments	Value is fixed ex-ante for entire crediting period.

Data/Parameter	$EF_{grid,BM,y}$
Unit	tCO_2e/MWh
Description	Build Margin Emission Factor of NEWNE Electricity Grid
Source of data	"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) 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/parameter	Calculation of Baseline Emissions
Additional comments	Value is fixed ex-ante for entire crediting period.

D.2. Data and parameters monitored

Data/Parameter	**$EG_{facitlity,y}$**
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	46,058.23 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 $EG_{facitlity,y}$ 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/parameter	Calculation of Baseline Emissions
Additional comments	The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data/Parameter	**$EG_{Export,y}$**
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	46,144.61 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 $EG_{Export,y}$ 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/parameter	Calculation of Baseline Emissions
Additional comments	The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data/Parameter	**$EG_{Import,y}$**
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	86.37 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 $EG_{Import,y}$ 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/parameter	Calculation of Baseline Emissions
Additional comments	The data will be archived both in electronic and hard paper format for crediting period + 2 years

Data/Parameter	$\sum EG_{Controller,j}$
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	45,858.442 MWh
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 $EG_{facitlity,y}$ 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/parameter	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

>>
Not Applicable

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>>
"The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in tCO_2e/MWh) calculated in a transparent and conservative manner as the weighted average emissions (in tCO_2e/MWh) as described in PDD Version 11 dated 08/07/2014.

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

Where,

$\mathbf{BE_y}$ is baseline emissions in year y, tCO_2e.

$\mathbf{EG_{PJ,y}}$ 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_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" (tCO_2/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)

So, $BE_y = EG_{facility,y} * EF_{grid,CM,y}$
$BE_y = 46058.23 * 0.9225$
$= 42,481$

E.2. Calculation of project emissions or actual net removals

>>
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 emissions

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

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)		
				Before 01/01/2013	From 01/01/2013	Total amount
01/09/2017-31/12/2017	7,313	0	0	0	7,313	7,313
01/01/2018-31/12/2018	35,168	0	0	0	35,168	35,168
Total	42,481	0	0	0	42,481	42,481

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante for this monitoring period in the PDD (t CO_2e)
42,481	65,362

E.5.1. Explanation of calculation of "amount estimated ex ante for this monitoring period in the PDD"

>>
As per CDM registered PDD, 48,988 tCO2e is the amount of CERs generated annually. Therefore, following unitary method, the amount of estimated ex ante for this monitoring period is identified. The total number of days in this monitoring period is 487 = (48,988 /365)* 487 = 65,362 tCO2e

E.6. Remarks on increase in achieved emission reductions

>>
There is change of 35 % (downside) in the expected and annual emission reductions due to lower PLF achieved during the monitoring period. During the monitoring period CERs are low due to considerably low monsoon availability and low wind availability leading to low PLF.

E.7. Remarks on scale of small-scale project activity

>>
Not applicable

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 [5]are as follows:

Simple Operating Margin

	NEWNE Grid (tCO_2e/GWh)
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

	tCO_2e/GWh
Build Margin- 2008-09	0.6752

Combined Margin calculations

	Weights	**tCO_2e/GWh**
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

[5] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

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Document information

Version	*Date*	*Description*
07.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
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 (EB 70, 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).

Version	*Date*	*Description*
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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