Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT		
Title of the project activity	Bundled wind energy power projects (2004 policy) in Rajasthan	
UNFCCC reference number of the project activity	1166	
Version number of the PDD applicable to this monitoring report	Registered PDD Version 6	
Version number of this monitoring report	03	
Completion date of this monitoring report	27/11/2017	
Monitoring period number	6th	
Duration of this monitoring period	01/05/2014 to 31/07/2017 (Inclusive of both the dates)	
Monitoring report number for this monitoring report	Not Applicable	
Project participants	M/s Wind World (India) Limited (Previous name: Enercon (India) Limited)	
Host Party	India	
Sectoral scopes	1 : Energy industries (renewable - / non-renewable sources)	
Applied methodologies and standardized baselines	ACM0002 / Version 06 Approved baseline and monitoring methodology title "Consolidated methodology for grid-connected electricity generation from renewable sources"	
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
	0	73,535 tCO_{2e}
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	135,939 tCO_{2e}[1]	

[1] Calculation is provided in Emission Reduction Excel Sheet.

SECTION A. Description of project activity

A.1. General description of project activity

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The objective of this bundled wind power project activity is to generate electricity by utilizing the renewable energy (wind) potential available at the Kita and Bhu village, in Jaisalmer District in Rajasthan state of India. The generated electricity is exported to the Rajasthan state electricity grid of India. Thus, project activity, by supplying cleaner power to NEWNE grid has led to the reduction in GHG emissions, which would have otherwise been generated by the generation of equivalent amount of electricity from fossil fuel based sources in the regional grid. This project activity therefore has global environmental benefits in terms of reduction in GHG emissions and by conserving fossil fuel reserves (national energy security) ultimately leading to sustainable social & economic development as well.

Description of the installed technology and equipment's:

This bundled project activity involves installation of 31 Wind Energy Converters (WEGs) of WWIL make (800 kW E-48) 0.8MW capacity each, aggregating to the capacity of 24.8MW. The WEGs generates 3-phase power at 400V, which is stepped up to 33 KV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%.

Wind World (India) Ltd ("WWIL") is the equipment supplier and the operations and maintenance contractor for the Project activity. The details of the sub-projects comprising the Project are as under:

SN	Name of the Customer	Capacity of M/C	No. of M/C	Capacity (MW)
1	CEPCO	0.8	15	12.00
2	Ushdev International	0.8	3	2.40
3	Brindavan Agro Industries	0.8	2	1.60
4	Amrit Bottlers Ltd.	0.8	1	0.80
5	Deedee Enterprises	0.8	1	0.80
6	JN Investment	0.8	1	0.80
7	Metalfab Hightech Private Limited	0.8	1	0.80
8	SE Investment	0.8	1	0.80
9	Brindavan Bottlers Ltd.	0.8	1	0.80
10	Delta Enterprises	0.8	3	2.40
11	Sankalp International	0.8	1	0.80
12	Malani Impex Inc.	0.8	1	0.80
		Total Capacity (MW)	**31**	**24.80**

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 Enercon GmbH, has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured.

Relevant dates for the project activity:
The first machine under the project activity was commissioned on 25/03/2006 and the last machine under the project activity was commissioned on 13/05/2006. The expected operational lifetime of the project activity is 20 years. Project activity has registration under CDM on 30/10/2008. The fixed crediting period of the project activity started from 30/10/2008. This is the sixth monitoring report. The details of issuance of CERs for the previous monitoring periods are as follows:

Monitoring Period No.	Monitoring Period (Inclusive of both days)	CERs issued	Date of Issuance
First	30/10/2008 to 30/11/2009	33,322	08/04/2011
Second	01/12/2009 to 31/08/2010	22,731	05/05/2011
Third	01/09/2010 to 31/08/2011	24,255	22/03/2012
Fourth	01/09/2011 to 30/09/2012	31,454	05/04/2013
Fifth	01/10/2012 to 30/04/2014	31,336	12/12/2014

Total emission reductions achieved in this monitoring period
This is the sixth monitoring report for the project activity. The total emission reductions achieved under this monitoring period 01/05/2014 to 31/07/2017 (including first and last day) is 73,535 tCO_{2e}.

A.2. Location of project activity

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The Project is located at Kita and Bhu village, in Jaisalmer District of Rajasthan that forms part of the Northern regional electricity grid of India. The project area extends between latitude 26^{o} 41' & 26^{o} 46.5' North and longitude 70^{o} 57.5' & 71^{o} 4' East. The Project is connected to the RRVPNL 33/132/220 kV substation at Amarsagar. The sites are located at a distance of 25 km from Jaisalmer by road. The nearest railway station is at Jaisalmer.

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

			Latitude			Longitude		
Sr. No.	**Unique Identification No.**	**Location No**	**Degree**	**Minute**	**Second**	**Degree**	**Minute**	**Second**
1	Cepco-01	207	26	44	23.9	71	0	4.9
2	Cepco-02	208	26	44	18.7	71	0	13.4
3	Cepco-03	209	26	44	10.1	71	0	15.1
4	Cepco-04	210	26	44	1.6	71	0	15.4
5	Cepco-05	171	26	43	16.6	70	58	53.6
6	Cepco-06	172	26	43	28.0	70	58	47.8
7	Cepco-07	173	26	43	36.5	70	58	48.8
8	Cepco-08	175	26	43	35.9	70	59	8.1
9	Cepco-09	187	26	43	35.1	70	59	34.0
10	Cepco-10	166	26	42	33.7	70	59	4.1
11	Cepco-11	165	26	42	29.2	70	59	7.9
12	Cepco-12	164	26	42	24.6	70	59	11.8
13	Cepco-13	163	26	42	20.0	70	59	15.6
14	Cepco-14	162	26	42	15.4	70	59	19.5
15	Cepco-15	189	26	43	31.6	70	59	46.1
16	DE-01	202	26	44	8.3	70	59	55.9
17	DE-02	201	26	44	2.0	70	59	59.0
18	DE-03	200	26	43	56.5	71	0	2.5
19	UIL-01	206	26	44	28.4	70	59	41.2
20	UIL-02	205	26	44	22.1	70	59	44.3
21	UIL-03	204	26	44	16.2	70	59	47.4
22	BAIL-01	199	26	43	51.0	71	0	6.0
23	BAIL-02	198	26	43	46.4	71	0	9.8
24	ABL-01	216	26	45	41.9	70	59	34.6
25	BBL-01	217	26	45	46.2	70	59	31.7
26	DDE-01	203	26	44	12.9	70	59	52.0
27	JNI-01	214	26	45	13.7	70	59	19.8
28	MII-01	212	26	45	6.9	70	59	35.1
29	MHPL-01	188	26	43	40.4	70	59	29.5
30	SI-01	211	26	45	4.2	70	59	19.8
31	SE-01	291	26	45	38.0	70	59	38.7

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)	M/s Wind World (India) Limited (Private entity)	No

A.4. Reference to applied methodologies and standardized baselines

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Baseline and Monitoring Methodology: ACM0002 / Version 06, Sectoral Scope: 01,

Title: “Consolidate monitoring methodology for grid-connected electricity generation from renewable sources”

The tool used for the project is as follows: “Tool for the demonstration and assessment of additionality” version 2.0

References:
http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT/view.html

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v2.pdf

A.5. Crediting period type and duration

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Fixed Crediting Period: 30/10/2008 to 29/10/2018

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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The first machine under the project activity was commissioned on 25/03/2006 and the last machine under the project activity was commissioned on 13/05/2006. The project activity consists of 31 machines (800 kW) of WWIL make E-48. The commissioning date for all the machines included in the project activity is given in the table below.

Serial No	Capacity	Unique Identification No.	Location No	Date of Commissioning
1	0.8	Cepco-01	207	29-Mar-06
2	0.8	Cepco-02	208	29-Mar-06
3	0.8	Cepco-03	209	29-Mar-06
4	0.8	Cepco-04	210	29-Mar-06
5	0.8	Cepco-05	171	29-Mar-06
6	0.8	Cepco-06	172	29-Mar-06
7	0.8	Cepco-07	173	31-Mar-06
8	0.8	Cepco-08	175	31-Mar-06
9	0.8	Cepco-09	187	30-Mar-06
10	0.8	Cepco-10	166	30-Mar-06
11	0.8	Cepco-11	165	30-Mar-06
12	0.8	Cepco-12	164	30-Mar-06
13	0.8	Cepco-13	163	13-May-06
14	0.8	Cepco-14	162	13-May-06
15	0.8	Cepco-15	189	13-May-06
16	0.8	DE-01	202	29-Mar-06
17	0.8	DE-02	201	29-Mar-06
18	0.8	DE-03	200	29-Mar-06
19	0.8	UIL-01	206	29-Mar-06
20	0.8	UIL-02	205	29-Mar-06
21	0.8	UIL-03	204	29-Mar-06
22	0.8	BAIL-01	199	29-Mar-06
23	0.8	BAIL-02	198	29-Mar-06
24	0.8	ABL-01	216	25-Mar-06
25	0.8	BBL-01	217	25-Mar-06
26	0.8	DDE-01	203	25-Mar-06
27	0.8	JNI-01	214	29-Mar-06
28	0.8	MII-01	212	29-Mar-06
29	0.8	MHPL-01	188	31-Mar-06
30	0.8	SI-01	211	29-Mar-06
31	0.8	SE-01	291	25-Mar-06

WWIL operation and maintenance activities are ISO 9001:2000 certified and all the events are recorded in the log book available at the project site. Referring to the data available it can be inferred that there have not been any major special events of breakdown for any of the machines of the project activity occurred during the monitoring period, which may impact the applicability of

the methodology. 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.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

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There is no deviation from registered monitoring plan or applied methodology during this monitoring period.

B.2.2. Corrections

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Not Applicable.

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

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Not Applicable.

B.2.4. Inclusion of monitoring plan

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Not Applicable, as there was no inclusion of a monitoring plan to the registered PDD that was not included at registration.

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

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The monitoring plan of the project activity has been revised. The revision for monitoring plan was approved by UNFCCC on 02/08/2010 (Link: http://cdm.unfccc.int/Projects/DB/SGS-UKL1181723770.26/view). The revision in monitoring plan was done to describe the allocation plan transparently.

B.2.6. Changes to project design

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There are no changes to project design of the registered project activity.

SECTION C. Description of monitoring system

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Approved monitoring methodology ACM0002 / Version 06 Sectoral Scope: 1, "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources", by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

The electricity supplied to the grid will be metered at the 33/132/220 kV level at the RRVPNL substation at Amarsagar. Representatives of RRVPNL/Jodhpur Discom and WWIL jointly take the main reading and sign the meter reading on the first day of every month. Simultaneously, the joint meter reading at 33/132/220 kV level of the backup metering system at Temdarai substation will also be taken by representatives of RRVPN/Jodhpur Discom and WWIL. The meter reading is recorded during the daytime and hence leads to the overlapping of end/start dates of monthly measured data as is seen in the joint meter reading records (JMR). Hence there will be overlapping of end/start dates of joint reading record but there is no double counting of electricity import & export figures.

The meters used are Tri-vector and the manufacturer is the Secure Meter. 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. Error correction will be applied to the meter reading. Whenever a main meter goes defective, the consumption recorded by the backup meter will be referred. 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 assessed accordingly.

If main as well as back up metering system becomes defective, the assessment of energy consumption for the outage period will be done from the backup meters by the concerned parties as mutually agreed or at the level of Metering Committee set up under the Metering Code. The main and the backup metering systems will be sealed in presence of representatives of WWIL and RRVPN/Jodhpur Discom.

The main meter readings are apportioned based upon the LCS meter readings from the individual WEGs to compute net electricity supplied from individual WEGs. The LCS meter readings are archived electronically on continuous basis. Joint meter reading at the EB substation and at the pooling substation of WWIL is noted each month. Therefore, cumulative LCS meter reading for each month is used for purpose of allocation of net electricity supplied to the grid from the project activity.

The LCS meters are 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 LCS 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 calibrate the meter immediately and correction factor will be determined.

EG_y for the project activity is derived as follows:-

The project activity is located in Bhu and is connected to Amarsagar substation. In addition to the project activity, the wind farms located at Temdarai, Sodabandhan, Korwan, Asloi and other wind turbines at Bhu are also connected to the Amarsagar substation. Electricity delivered by all these wind farms is metered at a common metering point. The common metering point comprises two main meters i.e. Main meter 1 and Main meter 2 that are installed at 132 kV metering point at the Amarsagar substation. Consequently, the main meter readings reflect the aggregate electricity supplied by all these wind farms, including the project activity. The net electricity supplied by individual wind turbines is determined by following a process of allocating the total electricity

(recorded at the main meters M1 and M2) to the individual turbines in proportion of the electricity generation recorded by the LCS meters at the individual wind turbines. The procedure for allocation is detailed below:

$E_{JMR, Export}$ = Electricity exported, as recorded by the main meter at the substation

$E_{JMR, Import}$ = Electricity imported, as recorded by the main meter at the substation

$E_{Controller, Export}$ = Electricity exported by a WEG, as measured at the controller

$\Sigma E_{Controller, Export}$ = Electricity exported by all the WEGs connected to the main meter at the substation, measured at the controller of each WEG

$E_{WEG, Export}$ = Electricity exported by a WEG to the grid, calculated

$E_{WEG, Import}$ = Electricity imported by a WEG from the grid, calculated

Electricity exported by each WEG is apportioned on the basis of electricity exported recorded at the controller of each WEG and the electricity exported at the main meter and mentioned in the JMR. The export multiplication factor is calculated as follows-

$$\text{Export Multiplication factor} = E_{JMR, Export} / \Sigma E_{Controller, Export} \quad \ldots\ldots (1)$$

Thus, the energy exported by a WEG to the grid is given by the equation-

$$E_{WEG, Export} = \text{Export Multiplication factor} \times E_{Controller, Export} \quad \ldots\ldots (2)$$

As the controller meter doesn't record import, the apportioning of energy imported by each WEG is also done on the basis of electricity exported recorded at the controller of each WEG and the electricity imported at the main meter and mentioned in the JMR. The import multiplication factor is calculated as follows-

$$\text{Import Multiplication factor} = E_{JMR, Import} / \Sigma E_{Controller, Export} \quad \ldots\ldots (3)$$

Thus, the energy imported by a WEG to the grid is given by the equation-

$$E_{WEG, Import} = \text{Import Multiplication factor} \times E_{Controller, Export} \quad \ldots\ldots (4)$$

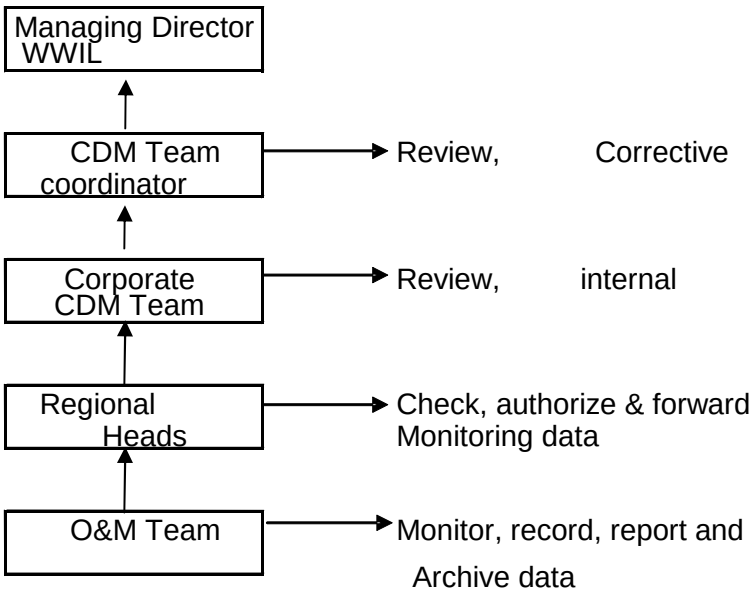
The net electricity exported by the WEGs of the project is given by the equation-

$$\mathbf{EGy = \Sigma_{Project} E_{WEG, Export} - \Sigma_{Project} E_{WEG, Import}} \quad \ldots\ldots (5)$$

The summation is done on the WEGs belonging to the project activity.

The operational and management structure implemented by Wind World is as follows:

STRUCTURE **RESPONSIBILITYTY**



Training and maintenance:

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

Calibration Details:

The metering equipment were inspected & calibrated by state utility. Meter details for all the main and backup meters are as follows:-

Details of the meters					**Calibration Dates**				
Meter description	**Serial No.**	**Make**	**Accuracy class**	**Metering point**	**2013**	**2014**	**2015**	**2016**	**New Meter[2]**
Main meter (Line I)	TNU00946	Secure	0.2	Amarsagar Substation	26/12/2013	NIL	13/02/2015	Meter Replaced and new meter calibrated on 13/04/2016	13195563
Backup meter (Line I)	RJB00052	Secure	0.2	Temdarai Substation	28/12/2013	NIL	14/02/2015	13/04/2016	NA

[2] Only Line I & Line II Main meter (Make: Secure and Accuracy: 0.2) had been replaced on 13/04/2016, by new calibrated energy meter (Make: L&T and Accuracy: 0.2) due to display was not clear though old meter was working correctly. Meter replacement MOM is being submitted to the DOE.

Main meter (Line II)	TNU00945	Secure	0.2	Amarsagar Substation	26/12/2013	NIL	13/02/2015	Meter Replaced and new meter calibrated on 13/04/2016	13195562
Backup meter (Line II)	ABB00691	Secure	0.2	Temdarai Substation	28/12/2013	NIL	14/02/2015	13/04/2016	NA

Details of the meters					**2017**
Meter description	**Serial No.**	**Make**	**Accuracy class**	**Metering point**	**Calibration Dates**
Main meter (Line I)	13195563	L&T	0.2	Amarsagar Substation	29/05/2017
Backup meter (Line I)	RJB00052	Secure	0.2	Temdarai Substation	30/05/2017
Main meter (Line II)	13195563	L&T	0.2	Amarsagar Substation	29/05/2017
Backup meter (Line II)	ABB00691	Secure	0.2	Temdarai Substation	30/05/2017

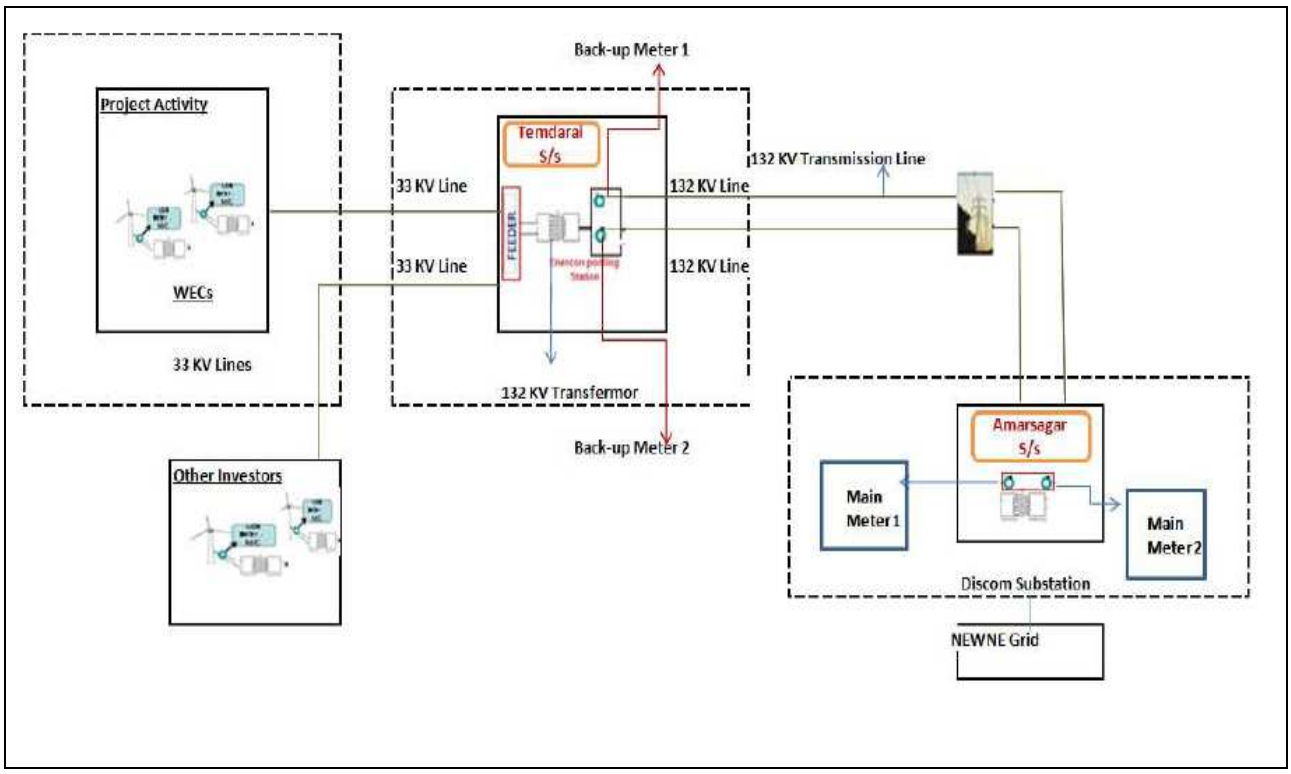
It is evident that there were delay in calibration has happened in the year 2014, 2016 & 2017. Therefore, as per guideline VVS (CDM-EB93-A05-STAN) para 369 (a) & APPENDIX – CALIBRATION para 2 Table 1, PP has applied maximum permissible error conservatively in ER calculation for the delayed period mentioned in above para.

As detailed in the above table, the scheduled date of meter calibration was 26th & 28th Dec 2014 but meter calibration was done on 13th & 14th Feb 2015. The monthly billing cycle starts from the 00.00 hrs of 1st day of the month to last day of the month i.e. 30th or 31st. JMR value represents the total net energy exported to the grid for the whole month. Therefore, being conservative PP has considered the whole month of Dec 14, Jan – Feb 15 to apply the maximum permissible error of "0.2%" to all measured values of "$EG_{Export,y}$" & "$EG_{Import,y}$" taken during this period.

In addition, delay in meter calibration has been observed in Feb 2016 as well as the scheduled date of meter calibration was 13th & 14th Feb 2016 & meter calibrated on 13th Apr 2016. Similarly, in 2017, scheduled date of meter calibration was 13 Apr 2016 but meter calibration has done on 29th & 30th May 2017. So, following the same approach PP has considered delay for the month of Feb to April 2016 and April to May 2017 respectively to apply the maximum permissible error of "0.2%" to all measured values of "$EG_{Export,y}$" & "$EG_{Import,y}$".

Please refer Sheet "ER calculation sheet" for detailed calculation.

The main and the backup meters are calibrated once each year. The LCS meters are 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 LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. Therefore, there is no data uncertainty. The line diagram showing all relevant monitoring points is provided below:


Back-up Meter 1
Project Activity
Temdaral S/s
132 KV Transmission Line
33 KV Line
132 KV Line
33 KV Line
132 KV Line
WECs
33 KV Lines
132 KV Transfermor
Back-up Meter 2
Other Investors
Amarsagar S/s
Main Meter 1
Main Meter 2
Discom Substation
NEWNE Grid

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/parameter:	$EF_{OM,y}$
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 1.1 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" version 1.1 is available at http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver1.pdf
Value(s) applied)	2002 – 03: 0.9993 2003 – 04: 0.9869 2004 – 05: 0.9756
Choice of data or measurement methods and procedures	CEA Database "CO_2 Baseline Database for Indian Power Sector", version 1.1
Purpose of data	Calculation of baseline emission
Additional comments	None

Data/parameter:	$EF_{BM,y}$
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 1.1 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" version 1.1 is available at http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver1.pdf
Value(s) applied)	0.5335
Choice of data or measurement methods and procedures	CEA Database "CO_2 Baseline Database for Indian Power Sector" version 1.1
Purpose of data	Calculation of baseline emission
Additional comments	None

Data/parameter:	$EF_{CM,y}$
Unit	tCO_{2e}/MWh
Description	Combined Margin Emission Factor of North East West North-east (NEWNE)
Source of data	"CO_2 Baseline Database for Indian Power Sector" version 1.1 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" version 1.1 is available at http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver1.pdf
Value(s) applied)	0.87387
Choice of data or measurement methods and procedures	CEA Database "CO_2 Baseline Database for Indian Power Sector" version 1.1

Purpose of data	Calculation of baseline emission
Additional comments	None

D.2. Data and parameters monitored

Data/parameter:	**EG_y**
Unit	MWh (Mega-Watt hour)
Description	Net electricity supplied to the grid by the Project
Measured/calculated/default	Calculated by applying apportioning procedure as described in section C
Source of data	Electricity supplied to the grid as per the tariff invoices raised on RRVPNL /Jodhpur Discom
Value(s) of monitored parameter	84148.556
Monitoring equipment	Calculated as per the procedures described in section C.
Measuring/reading/recording frequency:	Monthly; The apportioning is done as per the procedure described in section C
Calculation method (if applicable):	**$EGy = \Sigma_{Project} E_{WEG, Export} - \Sigma_{Project} E_{WEG, Import}$** Refer section C for details and description of the above variables
QA/QC procedures:	QA/QC procedures will be as implemented by state utility (Discom) pursuant to the provisions of the power purchase agreement and the Metering Code of Rajasthan and there will be no additional QA/QC procedures. Refer Section C for an illustration of the provisions for QA/QC procedures. The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Calculation of Baseline Emissions
Additional comments:	None

Data/parameter:	**$E_{JMR, Export}$**
Unit	MWh (Mega-Watt hour)
Description	Electricity exported, as recorded by the main meter at the EB substation
Measured/calculated/default	Measured: The Export reading is jointly noted from the main meter installed at the EB substation.
Source of data	Export value from Joint meter reading taken at Substation in the presence of representatives of WWIL and state utility.

Value(s) of monitored parameter	443808.542
Monitoring equipment	Line I Type- Tri-vector Meter Accuracy Class-0.2 Serial Number of Main Meter: TNU00946[3] - Post 2016 (13195563) Serial Number of Backup Meter: RJB00052 Line II Type- Tri-vector Meter Accuracy Class-0.2 Serial Number of Main Meter: TNU00945 - Post 2016 (13195562) Serial Number of Backup Meter: ABB00691 Frequency of Calibration- Annual
Measuring/reading/recording frequency:	Measured in continuous basis and recorded on Monthly basis. The reading is jointly noted by the representatives of state utility and WWIL.
Calculation method (if applicable):	Not Applicable
QA/QC procedures:	The meters will be calibrated once each year by the state utility. Refer Section C for an illustration of the provisions for QA/QC procedures. The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Calculation of Baseline emissions
Additional comments:	None

Data/parameter:	**$E_{JMR, Import}$**
Unit	MWh (Mega-Watt hour)
Description	Electricity imported, as recorded by the main meter at the EB substation
Measured/calculated/default	Measured: The import reading is jointly noted from the main meter installed at the EB substation.
Source of data	Import value from Joint meter reading taken at Substation in the presence of representatives of WWIL and state utility.
Value(s) of monitored parameter	19705.718
Monitoring equipment	Line I Type- Tri-vector Meter Accuracy Class-0.2 Serial Number of Main Meter: TNU00946[4] – Post 2016 (13195563) Serial Number of Backup Meter: RJB00052 Line II Type- Tri-vector Meter Accuracy Class-0.2 Serial Number of Main Meter: TNU00945 Post 2016 (13195562) Serial Number of Backup Meter: ABB00691 Frequency of Calibration- Annual
Measuring/reading/recording frequency:	Measured in continuous basis and recorded on Monthly basis. The reading is jointly noted by the representatives of state utility and WWIL.

[3] Note: Line I & Line II main meter has been replaced in April2016, Details has been provided in Section C.

[4] Note: Line I & Line II main meter has been replaced in April2016, Details has been provided in Section C.

Calculation method (if applicable):	Not Applicable
QA/QC procedures:	The meters will be calibrated once each year by the state utility. Refer Section C for an illustration of the provisions for QA/QC procedures. The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Calculation of Baseline emissions
Additional comments:	None

Data/parameter:	**$E_{Controller, Export}$**
Unit	MWh (Mega-Watt hour)
Description	Electricity exported by a WEG, as measured at the controller (LCS).
Measured/calculated/default	Measured: The value is recorded continuously by the online monitoring station. This value can also be checked from the electronic panel installed inside the WTG tower.
Source of data	This reading is monitored continuously by the online monitoring station at the project site. This reading can also be seen in the electronic panel installed inside the WTG tower.
Value(s) of monitored parameter	Monthly Values of all the individual project WEGs has been provided in ER Sheet transparently.
Monitoring equipment	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 LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. Therefore, there is no data uncertainty.
Measuring/reading/recording frequency:	Monthly: The value is recorded continuously by the online monitoring station. This value can also be checked from the electronic panel installed inside the WTG tower.
Calculation method (if applicable):	Not applicable
QA/QC procedures:	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 LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. Therefore, there is no data uncertainty. The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Calculation of Baseline emissions
Additional comments:	None

Data/parameter:	**$E_{WEG, Export}$**
Unit	MWh (Mega-Watt hour)
Description	Electricity exported by a WEG to the grid
Measured/calculated/default	Calculated: $E_{WEG\ Export}$ denotes the electricity exported by a WEG to the grid. The value is calculated based on the formula mentioned in Section C
Source of data	Calculated using formula mentioned in Section C.

Value(s) of monitored parameter	Monthly Values of all the individual project WEGs has been provided in ER Sheet transparently.
Monitoring equipment	Calculated as per the procedures shown in section C.
Measuring/reading/recording frequency:	Monthly basis: Calculated using the formulas better described under section C.
Calculation method (if applicable):	$E_{WEG, Export}$ = Export Multiplication factor x $E_{Controller, Export}$ Refer to Section C for details and description of the above variables.
QA/QC procedures:	The value is calculated. Please refer Section C for QA/QC procedures. The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Calculation of Baseline emissions
Additional comments:	None

Data/parameter:	**$E_{WEG, Import}$**
Unit	MWh (Mega-Watt hour)
Description	Electricity imported by a WEG from the grid.
Measured/calculated/default	Calculated: **$E_{WEG\ Import}$** denotes the electricity imported by a WEG to the grid. The value is calculated based on the formula mentioned in Section C
Source of data	Calculated as per the procedures shown in section C.
Value(s) of monitored parameter	Monthly Values of all the individual project WEGs has been provided in ER Sheet transparently.
Monitoring equipment	Calculated as per the procedures shown in section C.
Measuring/reading/recording frequency:	Monthly basis: Calculated using the formulas better described under section C.
Calculation method (if applicable):	$E_{WEG, Import}$ = Import Multiplication factor x $E_{Controller, Export}$ Refer to Section C for details and description of the above variables.
QA/QC procedures:	The value is calculated. Please refer Section C for QA/QC procedures. The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Calculation of Baseline emissions
Additional comments:	None

Data/parameter:	**$\Sigma_{Project} E_{WEG, Export}$**
Unit	MWh (Mega-Watt hour)
Description	Summation of electricity exported to the grid by all the WEGs included in the project activity.
Measured/calculated/default	**$\Sigma_{Project} E_{WEG, Export}$** denotes summation of the electricity exported to the grid by a WEGs included in the project activity. The value is calculated based on the formula mentioned in section C.
Source of data	Summation of data values of **$E_{WEG, Export}$** for all the WEGs included in the project activity.
Value(s) of monitored parameter	84,386.617[5]

[5] This is a corrected value after applying the error factor due to delay in meter calibration as explained in Section C. Please refer ER calculation excel sheet for detailed calculation

Monitoring equipment	Calculated as per the procedures shown in section C.
Measuring/reading/recording frequency:	Monthly basis: Calculated using the formulas better described under section C.
Calculation method (if applicable):	$\Sigma_{Project} E_{WEG, Export}$ denotes summation of the electricity exported to the grid by a WEGs included in the project activity. Refer to Section C for details and description.
QA/QC procedures:	The value is calculated and can be crosschecked from the invoices raised on the state utility. Please refer Section C for QA/QC procedures. The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Calculation of Baseline emissions
Additional comments:	None

Data/parameter:	$\Sigma_{Project} E_{WEG, Import}$
Unit	MWh (Mega-Watt hour)
Description	Summation of electricity imported from the grid by all the WEGs included in the project activity.
Measured/calculated/default	$\Sigma_{Project} E_{WEG, Import}$ denotes the summation of electricity imported from the grid by a WEGs included in the project activity. The value is calculated based on the formula mentioned in section C.
Source of data	Summation of data values of $E_{WEG, Import}$ for all the WEGs included in the project activity.
Value(s) of monitored parameter	238.061[6]
Monitoring equipment	Calculated as per the procedures shown in section C.
Measuring/reading/recording frequency:	Monthly basis: Calculated using the formulas better described under section C.
Calculation method (if applicable):	$\Sigma_{Project} E_{WEG, Import}$ denotes the summation of electricity imported from the grid by a WEGs included in the project activity. Refer to Section C for details and description.
QA/QC procedures:	The value is calculated and can be crosschecked from the invoices raised on the state utility. Please refer Section C for QA/QC procedures. The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
Purpose of data:	Calculation of Baseline emissions
Additional comments:	None

D.3. Implementation of sampling plan

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Not applicable to the project activity.

[6] This is a corrected value after applying the error factor due to delay in meter calibration as explained in Section C. Please refer ER calculation excel sheet for detailed calculation

SECTION E. Calculation of emission reductions or net anthropogenic removals

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

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"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 registered PDD.

$BE_y = EG_y * EF_y$

Where,

BE is baseline emissions in year y, tCO_2e

EGy is the net electricity supplied to the grid in year y and is applied directly from JMR certified by state utility. This value can also be cross checked from the invoice.

EFy *is* the CO_2 emission factor of the grid (0.87387 tCO_2e/MWh fixed ex-ante).

Baseline Emission Reductions (BEy) = 84148.556 (MWh) * 0.87387 (tCO2e/MWh)

= 73,535 tCO_{2e}

Therefore, total baseline emissions are 73,535 tCO_{2e}.

Total project emissions: Zero

Total leakages: Zero

Total Emission reductions, ER = Baseline Emissions - Project Emissions - Leakages

= 73,535 – 0 - 0

= 73,535 tCO_{2e}

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

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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

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

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
Total	73,535	0	0	0	73,535	73,535

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 (t CO_2e)
73,535	135,939

E.6. Remarks on increase in achieved emission reductions

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The annual estimated volume of CERs as per registered PDD is 41,766 tCO_{2e}. The total nos. of days included in this mentoring period (i.e. 01/05/2014 to 31/07/2017, inclusive of both the days) = 1188. Thus, to calculate the ex-ante estimated value corresponds to this monitoring period, the value has been apportioned and made equivalent to 1188 days, which results in 1,35,939 tCO_{2e}.The same has been referred under CER comparison workbook within ER excel sheet.

There is change of 45.91% (decrease) in actual achieved ERs than the ERs expected for the same duration as per registered PDD. This has happened mainly due to two reasons one is the low wind availability during the current monitoring period leading to low plant load factor in comparison to the PLF considered (22%) in the registered PDD and also due to the technical failure of machine for particular clients caused the reduction in total generation of emission reduction. (eg: Malani Impex Inc.– no generation for 3 months, Deedee Enterprises – no generation for 7 months, JN Investment– no generation for 8 months, Metalfab Hightech Private Limited – no generation for 2 months). Please refer ER calculation excel sheet for detailed calculation.

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Document information

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

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