MONITORING REPORT:

VASPET-II AND VASPET-III WIND POWER PROJECT, MAHARASHTRA

ReNew Wind Energy (Shivpur) Private Limited

Project Title	Vaspet-II and Vaspet-III Wind Power Project, Maharashtra
Version	02.0
Report ID	RENEW/VCS/MR 01
Date of Issue	14TH March 2015
Project ID	PL1404
Monitoring Period	03-April-2013 to 03-August-2014
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Table of Contents

1 Project Details 3
1.1 Summary Description of the Implementation Status of the Project 3
1.2 Sectoral Scope and Project Type 4
1.3 Project Proponent 4
1.4 Other Entities Involved in the Project 4
1.5 Project Start Date 4
1.6 Project Crediting Period 4
1.7 Project Location 4
1.8 Title and Reference of Methodology 5
1.9 Other Programs 5
2 Implementation Status 5
2.1 Implementation Status of the Project Activity 5
2.2 Deviations 5
2.2.1 Methodology Deviations 5
2.2.2 Project Description Deviations 6
2.3 Grouped Project 6
3 Data and Parameters 6
3.1 Data and Parameters Available at Validation 6
3.2 Data and Parameters Monitored 7
3.3 Monitoring Plan 7
4 Quantification of GHG Emission Reductions and Removals 9
4.1 Baseline Emissions 9
4.2 Project Emissions 10
4.3 Leakage 10
4.4 Net GHG Emission Reductions and Removals 10
APPENDIX 1: UNIQUE IDENTIFICATION OF GEOGRAPHICAL COORDINATES OF WEG 11
APPENDIX 2: Calibration details 12

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The VCS project activity is implementation and operation of new grid-connected wind power project in Sangli district of Maharashtra, India. The project activity comprises of installation of 33 numbers of WEG of 1.5MW capacity each. The project has been completely commissioned by 30-August-2013. Since then, the project has been in continuous operation. The typical specification of wind turbine model has been detailed below:

PARAMETER	SPECIFICATION/ VALUE (WITH UNIT)
Manufacturer	ReGen Powertech Private Limited
Rated Power	1500kW
Rotor Diameter	82 m
Hub Height	85 m
Turbine Type	Direct drive horizontal axis with variable rotor speed
Power Regulation	Independent electromechanical pitch system for each blade
Cut-in wind speed	3 m/s
Rated wind speed	13 m/s
Cut-out wind speed	22 m/s
Operational range of rot. Speed	9 – 17.3 rpm
Orientation	Upwind
No. of blades	3
Blade Material	Glass fibre reinforced plastic
Gear box type	Gearless
Generator type	Synchronous, variable speed
Braking	Aerodynamic
Output voltage	620V
Tower height	85 m
Useful life	20 years

The purchase order for the project activity was issued dated 26-November-2012. The commissioning details of all the WEGs installed under the project activity has been detailed below:

LOCATION NO.	AGG. CAPACITY (MW)	DISTRICT	STATE	COMMISSIONING DATE
VASP-35 VASP-49 VASP-64 VASP-09 VASP-510 VASP-564 VASP-637 VASP-29 VASP-72 VASP-142 VASP-15	16.50	Sangli	Maharashtra	03-April-2013
VASP III-388	1.50			19-April-2013
VASP-696	1.50			24-June-2013
VASP III-384v VASP III-397 VASP III-440	12.00			26-June-2013

VASP III-26 VASP III-698 VASP-237 VASP-450 VASP-394				
VASP III-387 VASP III-58	3.00			01-August-2013
VASP III-700 VASP III-424 VASP III-108 VASP III-424 VASP III-525 VASP III-689	9.00			21-August-2013
VASP III-105 VASP III-355	3.00			29-August-2013
VASP-92 VASP-21	3.00			30-August-2013

The total GHG emission reductions for the current monitoring period [03-April-2013 to 03-August-2014 (both days included)] is **102,835.00** tCO_2e.

1.2 Sectoral Scope and Project Type

Sectoral Scope : 01 [Energy Industries (Renewable - / Non-renewable sources)
Project Type : Renewable type (wind)

1.3 Project Proponent

Organization name	ReNew Wind Energy (Shivpur) Private Limited
Contact person	Mr. Parag Sharma
Title	Chief Operating Officer
Address	6th floor, Tower 4A, DLF Corporate Park, Gurgaon 122002
Telephone	+9112444896670
Email	info@renewpower.in

1.4 Other Entities Involved in the Project

There is no other project participant(s) involved with the VCS project activity.

1.5 Project Start Date

As per §3.7.1 of VCS Standard, v3.4; the project start date is 03-April-2013 (Date of commissioning of first WEG).

1.6 Project Crediting Period

Project Crediting Period : 03 Apr 2013 – 02 Apr 2020
Number of years : 7 years

1.7 Project Location

The VCS project activity is located in Shedyal, Salekeri and Valsang village of Sangli district, Maharashtra. The uniques geographical coordinates of individual WEGs are presented in Appendix 1 of VCS Monitoring Report.

1.8 Title and Reference of Methodology

Details of Methodology applied

Name : ACM0002
Title : Consolidated baseline methodology for grid-connected electricity generation from renewable sources
Version : 13
Reference : EB67 Annex13
https://cdm.unfccc.int/methodologies/DB/MPY3HVJIMTKE5P0UNTYE827D6Q7EHB

Details of Methodology Tools applied

Name : Tool for the demonstration and assessment of additionality
Version : 07.0.0
Reference : EB70 Annex08
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
Name : Tool to calculate emission factor for an electricity system
Version : 04.0.0
Reference : EB75 Annex15
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

1.9 Other Programs

The VCS project activity has been registered with UNFCCC under Clean Development Mechanism (CDM). The project is a component project activity and Programme of Activities (PoA). The details are provided below:

Unique Reference No. of PoA : 9416
Name of the PoA : Promotion of renewable energy generation in India-Programme of Activities
Date of Registration : 31-December-2012
Name of the project : Vaspet-II and Vaspet III Wind Power Project, Maharashtra
Unique Reference No. of CPA : 9416-0003
Date of Inclusion : 04-August-2014

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The Project Activity envisages implementation of a 49.50MW wind power project consisting of 33 Wind Electric Generators (WEGs) of individual capacity 1.5MW in Sangli district, Maharashtra by ReNew Wind Energy (Shivpur) Private Limited. The project is completely commissioned and connected to NEWNE regional grid. A comprehensive list of WEGs commissioning dates are provided in §1.1 of VCS Monitoring report.

The project has been under operation since commissioning without any major breakdowns. Though normal breakdowns due to O&M measures are continuously being worked upon by the dedicated O&M contractor for the projects WEGs. There has been no events that may have an impact on the GHG emissions or removals during the current monitoring period.

Further, there are no changes to the project participant for the project activity during the monitoring period.

2.2 Deviations

2.2.1 Methodology Deviations

There has not been any methodology deviation during the aforesaid monitoring period (03-April-2013 to 03-August-2014).

2.2.2 Project Description Deviations

There has not been any project description deviation during the aforesaid monitoring period (03-April-2013 to 03-August-2014).

2.3 Grouped Project

The project is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/ MWh
Description	Build Margin emission factor of NEWNE grid
Source of data	CO_2 baseline database for Indian power sector, v7.0
Value applied:	0.8588
Justification of choice of data or description of measurement methods and procedures applied	The values are taken from the database developed by Central Electricity Authority (CO_2 Baseline database for the Indian power sector, v7.0). The database is Government of India's official publication based on the 'Tool to calculate the emission factor for an electricity system'.
Purpose of the data	Calculation of baseline emissions
Comments	Parameter was determined ex-ante and would not be monitored during the crediting period.

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/ MWh
Description	Operating Margin emission factor of NEWNE grid
Source of data	CO_2 baseline database for Indian power sector, v7.0
Value applied:	0.9842
Justification of choice of data or description of measurement methods and procedures applied	The values are taken from the database developed by Central Electricity Authority (CO_2 Baseline database for the Indian power sector, v7.0). The database is Government of India's official publication based on the 'Tool to calculate the emission factor for an electricity system'.
Purpose of the data	Calculation of baseline emissions
Comments	Parameter was determined ex-ante and would not be monitored during the crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/ MWh
Description	Combined Margin emission factor of NEWNE grid
Source of data	CO_2 baseline database for Indian power sector, v7.0
Value applied:	0.9528
Justification of choice of data or description of measurement methods and procedures applied	The values are taken from the database developed by Central Electricity Authority (CO_2 Baseline database for the Indian power sector, v7.0). The database is Government of India's official publication based on the 'Tool to calculate the emission factor for an electricity system'.

Purpose of the data	Calculation of baseline emissions
Comments	Parameter was determined ex-ante and would not be monitored during the crediting period.

3.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data	Joint meter reading or Credit Note provided by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL)
Description of measurement methods and procedures to be applied	The JMR is usually taken once in month for the bulk/ revenue meter at the common substation. Also with the individual WEG controller reading (LCS data), the JMR also gives (where applicable – apportioned) electricity import of each WTG and losses till metering point. By using these data, net export by the WEGs will be calculated (as in some case net export is not explicitly reported in JMR). Measuring equipment: 3-phase, 4-wire bi-directional tri-vector meters Recording: Electronic and paper Recording Frequency: Continuous measurement and monthly recording Responsibility: The operators/ O&M team will be responsible for measurement of electricity Calibration/ Testing Frequency: Annually Accuracy class of meters: 0.2s/ 0.5s (as per state regulation) Archiving: Crediting Period + 2 years
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored:	114,370
Monitoring equipment	Equipment used: Electronic meters Type: 3-phase, 4-wire, bi-directional Accuracy class: 0.2s/ 0.5 Serial Numbers: 13813551 (Main), 15687853 (Check), 15687854 (Main), 14953662 (Check), 13769363 (Main), 13813547 (Check), 13813570 (Main), 5269309 (Check)
QA/QC procedures to be applied	Cross check measurement results with records for sold electricity
Purpose of the data	Calculation of baseline emissions
Calculation method	O&M contractor apportioned the electricity export and import data based on individual WEGs controller reading, summation of all controller reading of WEGs connected under the common feeder and joint meter reading (based on billing meter).
Comments	The data will be archived both in electronic and paper format for crediting period + 2 years.

3.3 Monitoring Plan

The only parameter to be monitored, in-line with the applied methodology ACM0002, v13.0.0 is Quantity of net electricity generation supplied by the project plant/unit to the grid.

General Description: Meter readings will be taken jointly at the appointed date by PP's representative, Regen Powertech Pvt. Ltd. official and Maharashtra State Electricity Distribution Company Limited (MSEDCL) official. The same is reported as Joint Meter Reports (JMR). The same will be reported to the O&M team and the complied reports will be generated in the form of Credit Notes.
Net electricity supplied by the project activity to the grid shall be cross-checked with records for sold electricity by invoices raised for the payment purpose.
The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure as set in the power purchase agreement. The project will adhere to all mandatory regulatory and statutory requirements at the state as well as national level. The energy meters installed are tri-vector meters of 0.2s/ 0.5 accuracy class.

Organizational Structure and Roles & Responsibilities: The operational and management structure designed for the project activity includes representatives of PP and O&M Contractor. The detailed roles and responsibilities is presented in the table below:

ROLE	ORGANIZATION	RESPONSIBILITY
CDM Coordinator		↳ Cross – checking of the data collected by O&M Team (Site In-charge, Supervisor, Technician); ↳ Review of the collected data; ↳ Forwarding monitored data to corporate office; ↳ Forwarding the data to CDM Advisor for calculation and reporting of emission reductions.
O&M Team	Regen Powertech Pvt. Ltd.	↳ Primary collection of data; ↳ Facilitating timely periodic testing and calibration of monitoring equipment; ↳ Monitoring, recording, reporting and archiving of data.
Operator at site		

Apportionment Procedure: In some cases, if a particular feeder/ substation has non-project WEGs connected through same electricity meter, apportioning is used. Even otherwise, to determine WEG-wise electricity supplied to grid, apportioning is carried out.
Apportioning of net electricity supplied is done with reference to the electricity generated from individual WEGs. The MSEDCL will issue a monthly Joint Energy Meter Readings sheet for net electricity exported from the wind farm to the grid. Apportioning of net electricity supplied, as per the Joint Energy Meter Readings sheet, by each project owner is done based on the individual energy generated by each WEG. The Credit Notes with electricity buyer will be used to calculate net electricity supplied to the grid and on the basis of which, GHG emission reductions by the project activity will be calculated.

$$\text{Net Generation of a WEG @ sub-station end} = \text{kWh individual generation @ WEG controller} \times \frac{\text{Total electricity supplied to the grid as recorded in meter @ sub-station end connected to feeder}}{\text{Total controller reading of all WEGs connected to the feeder}}$$

Procedure for handling data uncertainty:

➲ In case main meter is faulty: In the event that the main metering system is not in the service as result of maintenance, repairs or testing, then the back metering system shall be used

during the period the main metering system is not in service and the provisions above shall apply to the reading of the backup metering system.

- In case both the meters are faulty: When the Main Metering System and/or Backup Metering System and/or any component thereof is found to be outside the acceptable limit of accuracy or otherwise not functioning properly, it shall be repaired, recalibrated or replaced as soon as possible by the MSEDCL. The error observed during this calibration will be applied to all readings from last correct JMR / last meter calibration. MSEDCL will ensure that metering system is tested for accuracy at least once in year and report furnished along with joint meter reading.
- Any meter seal(s) shall be broken only by the authorized officer of MSEDCL in the presence of representative of Power Producers/ Developers, whenever the Main Metering System or the backup metering system is to be inspected, tested, adjusted, repaired or replaced.
- In case, the monitoring period starts mid- month, the reading for that month will be apportioned based on the daily electricity export data give by the O&M contractor. This will be also checked with the average daily export arrived from that month's JMR and the conservative of the two will be used for the emission reduction calculation.

Calibration Details: Calibration details of all the meters are included in Appendix 2 of the monitoring report.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

In-line with equation no. 6 of applied methodology, ACM0002, v13.0.0; baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

BE_y	=	Baseline emissions in year y (tCO_2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	=	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)

In-line with equation 7 of applied methodology, ACM0002, v13.0.0 and considering the fact that the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

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

Where:

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

During the course of verification, it has been observed that there has been delay in the calibration and therefore, PP applied the error factor appropriately in-line with the provisions outlined in Appendix 1 of CDM Validation & Verification Standard, v07.0. Since, the outcome of the delayed

calibration is within the permissible limit of error, PP applied the error factor in – line with para 2 of Appendix 1 of CDM Validation & Verification Standard, v07.0.

Therefore,
BEy = 107, 922 MWh × 0.9528 tCO_2/ MWh = **102, 835** tCO_2e

The detailed calculation has been presented in associated ER Spreadsheet. Please refer to workbook <Generation> and <Emission Reductions>.

4.2 Project Emissions

In-line with applied methodology ACM0002, v13.0.0; for most renewable power generation project activity, PE_y = 0. Considering the fact that the project activity utilizes wind in order to generate electricity, no fossil fuel is used on-site and therefore, project emissions is nil.
Therefore, **PE_y = 0.**

4.3 Leakage

In-line with applied methodology ACM0002, v14.0.0; no leakage emissions are considered. Therefore, **LE_y = 0**.

4.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2013	46,851	0	0	46,851
2014	55,984	0	0	55,984
Total	102, 835	0	0	102, 835

APPENDIX 1: UNIQUE IDENTIFICATION OF GEOGRAPHICAL COORDINATES OF WEG

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.

S. No.	Location No.	Village	Geographical Coordinates	
			Longitude	Latitude
1	VASP-237	Shedyal	75.349014	17.020735
2	VASP-15	Shedyal	75.325371	17.048208
3	VASP-72	Shedyal	75.335732	17.050913
4	VASP-142	Shedyal	75.334518	17.041018
5	VASP-29	Shedyal	75.318893	17.046827
6	VASP-64	Salekiri	75.309723	17.036627
7	VASP-35	Salekiri	75.311081	17.04476
8	VASP-394	Salekiri	75.305176	17.052109
9	VASP-09	Salekiri	75.312446	17.050634
10	VASP-49	Salekiri	75.303299	17.041645
11	VASP-450	Shedyal	75.315186	17.040342
12	VASP-564	Valsang	75.335457	17.068613
13	VASP-510	Valsang	75.337708	17.057283
14	VASP-637	Valsang	75.349586	17.062027
15	VASP-696	Valsang	75.346336	17.058496
16	VASP-92	Shedyal	75.361488	17.050245
17	VASP-21	Valsang	75.307396	17.058651
18	VAPS III 397	Shedyal	75.314384	17.028946
19	VAPS III 26	Valsang	75.306488	17.055532
20	VAPS III 58	Salekiri	75.304634	17.038271
21	VAPS III 525	Valsang	75.33876	17.066185
22	VAPS III 384V	Valsang	75.317703	17.07345
23	VAPS III 387	Valsang	75.318108	17.077499
24	VAPS III 388	Valsang	75.319496	17.084095
25	VAPS III 700/1	Valsang	75.343796	17.054434
26	VAPS III 689	Valsang	75.355079	17.060282
27	VAPS III 355	Shedyal	75.329117	17.0168
28	VAPS III 698	Valsang	75.350258	17.055481
29	VAPS III 108	Salekiri	75.3041	17.028555
30	VAPS III 440	Valsang	75.318535	17.063026
31	VAPS III 463	Valsang	75.321266	17.060102
32	VAPS III 105	Shedyal	75.356155	17.046394
33	VAPS III 424	Shedyal	75.312675	17.024509

APPENDIX 2: CALIBRATION DETAILS

FEEDER#	STATUS	S. NO.	ACCURACY CLASS	DOC *2012*	VALIDITY	DOC *2013*	VALIDITY	DOC *2014*	VALIDITY
01	Main	13813563	0.2s	09-April-2012	08-April-2013				
	REPLACED BY								
	Main	13769363	0.2s			29-January-2013	28-January-2014	15-January-2014	14-January-2015
	Check	13813547	0.2s	28-November-2012	27-November-2013	-	-	15-January-2014	14-January-2015
02	Main	13813570	0.2s	28-March-2012	27-March-2013	-	-	15-January-2014	14-January-2015
	Check	13813568	0.2s	09-April-2012	08-April-2013	-	-	-	-
	REPLACED BY								
	Check	05269309	0.2s			09-August-2013	08-August-2014	14-February-2014	13-February-2015
06	Main	13813551	0.2s	-	-	12-November-2013	11-November-2013	-	-
	Check	15687853	0.2s	-	-	12-November-2013	11-November-2013	-	-
07	Main	15687854	0.2s	-	-	12-November-2013	11-November-2013	-	-
	Check	14953662	0.2s	-	-	12-November-2013	11-November-2013	-	-

Please note that Feeder#6 and Feeder#7 were charged after April-2013.