WIND POWER PROJECT IN GUJARAT

Document Prepared By Mytrah Energy (India) Limited

Project Title	Wind Power Project in Gujarat
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Monitoring Period	06th August 2011 to 25th-December-2012
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1. PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Mytrah Energy (India) Limited (MEIL), formerly Caparo Energy (India) Limited is entering into the renewable energy sector with an objective to build wind power assets in India. MEIL has set up 25.20 MW wind power project in Rajkot District and Surendranagar District of Gujarat State. The project activity comprises of 12 Wind Turbine Generators (WEGs) of Suzlon Energy Limited's (SEL) S88 model, with a capacity of 2.1 MW each.

The project activity will help to reduce the supply demand gap in the state and also helps in contributing to the sustainable development by using wind energy as the source of power generation and reduction of GHG Emissions. In the project site, there are other wind projects owned by other customers connected to the same substation. There is an apportioning procedure which is approved by the state nodal agency for apportioning the electricity to each and every customer.

The start date of current monitoring period is 06th August 2011. This is because the first WEG was commissioned as on the said date and last machine under the project activity was commissioned on 01st October-2011.

The total GHG emission reductions or removals generated in this monitoring period is 66,495 tCO_{2e}.

1.2 Sectoral Scope and Project Type

As per the categorization by UNFCCC, the project activity falls under 'Scope 1, Sectoral Scope: Energy industries (renewable/non-renewable).

Methodology applied is ACM 0002 version 12.3.0

The project is not a grouped project activity.

1.3 Project Proponent

Organization name	M/s Mytrah Energy (India) Limited
Contact person	Mr. Vikram Kailas
Title	Managing Director
Address	8001, Q-City, S.No: 109,Nanakramguda, Gachibowli, Hyderabad, Andhra Pradesh-500032
Telephone	+91-40- 3376 0100
Email	Vikram.Kailas@mytrah.com

1.4 Other Entities Involved in the Project

Not Applicable.

1.5 Project Start Date

The project start date is 06th August 2011. This is because the first WEG was commissioned as on the said date.

1.6 Project Crediting Period

The crediting period for the project activity is considered from 06th August 2011 to 5th August 2021, for 10 years.

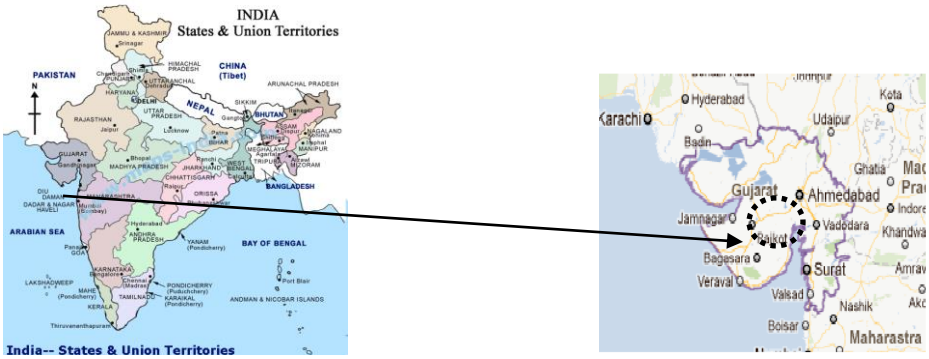
1.7 Project Location

The wind power project is located in Rajkot and Surendranagar district, Gujarat, India. The location of WEGs is as given below:-

Sl No	Location	Village	District	Latitude (N)	Longitude (E)	Model
1	JSD 038	Bhadla	Rajkot	22° 11' 41.9"	71° 05' 44.4"	S88
2	JSD 041	Dahisara	Rajkot	22° 11' 41.4"	71° 08' 7.5"	S88
3	JSD 042	Dahisara,	Rajkot	22° 11' 31.3"	71° 08' 28.3"	S88
4	MAH013	Bhojpari	Surendranagar	22° 17' 48.5"	71° 10' 15.8"	S88
5	MAH014	Bhojpari	Surendranagar	22° 17' 1.3"	71° 10' 19.1"	S88
6	MAH015	Bhojpari	Surendranagar	22° 16' 46.2"	71° 10' 21.3"	S88
7	MAH016	Chobari	Surendranagar	22° 15' 39.8"	71° 11' 42.3"	S88
8	MAH018	Chobari	Surendranagar	22° 15' 29.2"	71° 11' 27.5"	S88
9	MAH021	Tajpar	Surendranagar	22° 14' 53.6"	71° 10' 39.8"	S88

10	MAH022	Sakhpar	Surendranagar	22° 14' 56.6"	71° 11' 13"	S88
11	MAH041	Bhojpari	Surendranagar	22° 17' 27.5"	71° 10' 9.9"	S88
12	MDW 021	Kabran	Surendranagar	22° 17' 48.0"	71° 08' 24.1"	S88

The geographical location of the project site is as shown below:



1.8 Title and Reference of Methodology

Title: "Consolidated baseline methodology for Grid-Connected electricity generation from renewable source".

Reference: ACM0002, (Version 12.3.0, EB66)

The methodology also refers to the latest approved versions of the following tools:
• Tool to calculate the emission factor for an electricity system (Version 02.2.1, Approved in EB 63);
• Tool for the demonstration and assessment of additionally (Version 6.0.0, Approved in EB 63)

1.9 Other Programs

The project is registered under Clean Development Mechanism (CDM) of UNFCCC with 10 years crediting period (UNFCCC Reference No: **8823**)[1].

Crediting period of the project under CDM starts on 26th December 2012 and ends on 25th December 2022.

[1] http://cdm.unfccc.int/Projects/DB/SGS-UKL1355741006.12/view

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The first machine under the project activity was commissioned on 06/08/2011 and last machine under the project activity was commissioned on 01/10/2011. The project activity consists of 12 machines (2.1 MW each) of Suzlon make S-88-2.1 MW, totaling to a capacity of 25.20 MW.

The commissioning schedule of the project activity is shown below:-

S.No	Make	Location No.	WEG-HTSC No.	Commissioned on
1	Suzlon	MAH41	SEL/2100/11-12/2212	06/08/2011
2	Suzlon	MAH14	SEL/2100/11-12/2213	06/08/2011
3	Suzlon	MAH15	SEL/2100/11-12/2214	06/08/2011
4	Suzlon	MAH-21	SEL/2100/11-12/2215	06/08/2011
5	Suzlon	MAH13	SEL/2100/11-12/2211	10/08/2011
6	Suzlon	MAH16	SEL/2100/11-12/2207	12/08/2011
7	Suzlon	MAH-18	SEL/2100/11-12/2208	31/08/2011
8	Suzlon	MDW-21	SEL/2100/11-12/2209	31/08/2011
9	Suzlon	MAH-22	SEL/2100/11-12/2210	31/08/2011
10	Suzlon	JSD38	SEL/2100/11-12/2216	01/10/2011
11	Suzlon	JSD41	SEL/2100/11-12/2217	28/09/2011
12	Suzlon	JSD42	SEL/2100/11-12/2218	28/09/2011

The technical parameters of the WEGs are as listed below:

MODEL	S88 – 2.1MW
Operating Data	
Rated power	2.1MW
Cut-in wind speed	4 m/s
Rated wind speed	14 m/s
Cut-out wind speed	25 m/s
50 years gust wind speed	59.5 m.s
Hub height	79m (Foundation top equal to ground level)
Wind Class	IEC - IIA
Rotational Speed	15 to 17.6 rpm
Rotor	
Pitch system	Pitch regulated, electrical
Diameter	88 m
Swept area	6082 m^2
Blade material type	Epoxy bounded fibre glass
Generator	
Type	Asynchronous slip ring type induction generator
Rated power	2100 kW
Rated voltage	690/600 V
Frequency	50/60 Hz
Protection	IP 54, IP23 for slip ring unit
Cooling system	Air cooled
Insulation	Class H
Slip control	Unique Flexi-Slip providing slip up to 16.67%

Braking System	
Aerodynamic brake	3 independent systems with blade pitching mechanism
Mechanical brake	Hydraulic fail-safe disc brake system
Gearbox	
Type	3 stages (One planetary & Two helical)
Ratio	1:98.8 / 1:118.1
Nominal load	2200 kW
Yaw System	
Type	Driven by 3 electrical driven planetary drives
Bearings	Polyamide slide
Tower	
Type	Tubular Tower (4 sections)
Corrosion protection	Epoxy/ PU coated

The project has supplied 69,789.09 MWh of electricity to the grid in the monitoring period, which indicates that the project has performed reasonably well during the monitoring period. Referring to the data available, it can be inferred that there has not been any major event that may impact the GHG emission reductions or removals and monitoring of the project activity. There is no other change in the project activity.

As a part of regular maintenance, the machines are stopped for mechanical and electrical maintenance and for visual inspection in the current monitoring period. The shutdown details have been included under Appendix 1.

2.2 Deviations

2.2.1 Methodology Deviations

There is no methodology deviation for the project activity.

2.2.2 Project Description Deviations

There have been no deviations from the description of the project activity

2.3 Grouped Project

Not Applicable.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OMsimple,y}$
Data unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor of NEWNE Grid

Source of data	Central Electricity Authority:CO2 Emission Database CEA CO_2 Baseline database Version 07
Value applied:	0.9842
Justification of choice of data or description of measurement methods and procedures applied	The operating margin emission factor data has been deduced from CO_2 database. CEA CO_2 Baseline database Version 07
Purpose of the data	Calculation of baseline emission.
Comments	The operating margin emission factor is a 3-year generation-weighted average (2008-11) data calculated to be 0.9842. The operating Margin is calculated ex ante and fixed during the crediting period

Data Unit / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/MWh
Description:	Build margin CO2 emission factor of NEWNE grid
Source of data:	Central Electricity Authority:CO2 Emission Database CEA CO2 Baseline database Version 07
Value applied:	0.8588
Justification of choice of data or description of measurement methods and procedures applied	The Build margin emission factor data has been deduced from CO_2 database. CEA CO_2 Baseline database Version 07
Purpose of the data:	Calculation of baseline emission.
Comments:	The Build Margin would be calculated ex ante and fixed during the crediting period. For ex ante calculation the most recent data available has been used and the build margin thus calculated is 0.8588.

Data Unit / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO2 emission factor of NEWNE grid
Source of data:	Central Electricity Authority:CO2 Emission Database CEA CO2 Baseline database Version 07

Value applied:	0.9528
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per the procedures in "Tool to calculate the emission factor for an electricity system" based on CEA data.
Purpose of the data:	Calculation of baseline emission.
Comments:	The combined margin would be calculated ex-ante and fixed for the entire crediting period and the combined margin thus calculated is 0.9528.

3.2 Data and Parameters Monitored

Data / Parameter	$\mathbf{EG_{PJ,y}}$
Data unit	MWh
Description	Quantity of net electricity exported to the grid during the year y.
Source of data	Certificate for share of electricity generated by Wind Farm.
Description of measurement methods and procedures to be applied	This parameter is calculated by using measured parameter. Measured parameters are continuously monitored and monthly recorded. The net electricity supplied by individual wind turbines is determined by a process of sharing the net electricity recorded at the ABT meter in proportion of the electricity generation recorded by the energy meters at the individual wind turbines. The Sharing of energy is done as per PPA by GETCO.
Frequency of monitoring/recording	Recording frequency: Monthly.
Value monitored:	69,789.09 MWh
Monitoring equipment	The details of energy meters used have been provided in table 3.
QA/QC procedures to be applied	All the meters of accuracy class 0.2s are under the purview of GETCO and will be calibrated by GETCO every 3 years as per section 7.2 (iv) of the PPA .The net electricity exported can be cross checked with the sales receipts. Also, the generation from each WEG in the wind farm is recorded by an energy meter installed near each machine. The energy meter provides monthly generation data from individual WEG and also records the power consumed by the individual WEG (as explained below).

	Thus, to cross check; the net electricity supplied to the grid by the project activity WEGs is lesser than summation of net electricity generated by WEGs of project activity, as measured at the individual energy meter and controller (LCS) of each WEG due to the accounted transmission losses.
Purpose of the data	Baseline emission Calculation
Calculation method	The machines of the project activity and machines of other project developers are connected to the Substation The common metering point comprises one main meter & check meter (jointly certified by GUVNL i.e. GETCO and the service provider i.e. Suzlon/ its representative every month) and one ABT meter (ABT meter readings are not certified jointly, although GUVNL, GEDA and GETCO consider this reading as the total energy for billing purpose and used for the calculation of sharing of the energy of the individual developers). Consequently, the ABT meter reading reflects the net electricity supplied by the wind farm (both export and import), including the project activity. The net electricity supplied by individual wind turbines is determined by a process of sharing the net electricity recorded at the ABT meter in proportion of the electricity generation recorded by the energy meters at the individual wind turbines. The Sharing of energy is done as per PPA by GETCO. Sharing plan for calculating net electricity exported to the grid is given in section 3.3. Taking all of the above parameters into consideration the authorized state agency (GETCO) releases a monthly Share Certificate for the net energy exports. This certificate will be used for determining the emission reductions and also for the billing and payment of net sale of electricity from the project
Comments	The data will archived for two years after the end of the last monitoring period Or till the last issuance of VERs for the project activity, whichever is later. The ABT meter readings at the substation are recorded GETCO representative every month. These ABT meters are fully under the jurisdiction of GETCO. The readings of net electricity supplied to the grid by each customer are made available on the website of SLDC-Gujarat (GETCO)

Data Unit / Parameter:	E,exp
Data unit:	MWh/year
Description:	Electricity exported from each WEG of the project activity

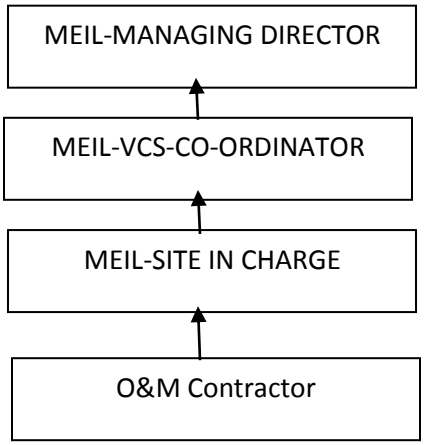
	during the year y.
Source of data:	Monthly Generation Report prepared by O&M service provider and endorsed by GEDA.
Description of measurement methods and procedures to be applied:	The electricity export from each WEG in the wind farm is recorded by an energy meter installed near each machine. The energy meter provides monthly electricity export data from individual WEG
Frequency of monitoring/recording:	Recording frequency: Monthly. Continuous measurement
Value applied:	71,572.73 MWh
Monitoring equipment:	The details of energy meters used have been provided in table 3.
QA/QC procedures to be applied:	All the energy meters of accuracy class 0.2S are under the purview of GETCO and will be calibrated by GETCO every 3 years as per section 7.2 (iv) of the PPA.
Purpose of the data	Baseline emission Calculation
Calculation method:	Not applicable Electricity exported by the project is the summation of export from individual meters.
Comments:	-

Data Unit / Parameter:	E,imp
Data unit:	MWh/year
Description:	Electricity imported from each WEG of the project activity during the year y.
Source of data:	Monthly Generation Report prepared by O&M service provider and endorsed by GEDA.
Description of measurement methods and procedures to be applied:	Electricity imported will be measured using electricity meter installed at each WEG. Electricity imported by the project is calculated as the sum of values of electricity imported by all WTGs
Frequency of monitoring/recording:	Recording frequency: Monthly Continuous measurement
Value applied:	369.51 MWh
Monitoring equipment:	The details of energy meters used have been provided in table 3.
QA/QC procedures to be applied:	All the energy meters of accuracy class 0.2S are under the purview of GETCO and will be calibrated by GETCO every 3 years as per section 7.2 (iv) of the PPA
Purpose of the data	Baseline emission Calculation

Calculation method:	Not applicable
Comments:	-

3.3 Monitoring Plan

The organizational structure of this CDM project activity is as follows:-



The Operation & Maintenance of the project will be done by Suzlon Energy Limited. The individual turbine electricity generation is recorded by the LCS meter (controller) at the individual wind turbine. Also, Every WEG has an individual energy meter connected to it. This meter can measure both import and export of electricity by the individual WEGs. This meter is under the purview of GETCO and will be calibrated by GETCO officials at least once in 3 years. Every month officials from Suzlon measures the electricity export and import from each WEG and issue the monthly generation report to the project proponent which is also endorsed by the GEDA.

There are 2 feeders to which all the 12 WEGs of MEIL are connected. These two feeders also contain WEGs of other customers. The two feeder meters are connected to a single Main and Check Meter at the substation. The Main meter can measure both electricity import and electricity export. Every month Joint Meter Reading is taken at the Main Meter, by GETCO officials in the presence of officials from Suzlon. There is an Availability Based tariff meter installed at the substation. The reading of ABT meter are not certified jointly although GUVNL/GEDA, SLDC consider this reading as the total energy for billing purpose.

Working model for sharing of energy (considered by GETCO)

The model evolved by the state utility (GEDA) and the generating company and the steps involved in this are as follows.

1. Each WEG will have separate metering point which will be read jointly by the representative of the company and the state utility personals (Gujarat Energy Development Agency).Both import and export of electricity by each WEG will be measured by these meters. This will be certified by both the representatives.

2. Considering the total No of WEG in the Project by various investors and the energy recorded in the each WEG meter shall be consolidated and considered as net energy generated from the Wind farm.

3. For calculating the net electricity supplied by the project to the grid the following formula may be considered for understanding.

Share of PP's Net Electricity supplied to grid = (C×Y) / (C+C1+C2+...Cn)

Where:
C = Net generation by 12 WEGs owned by Mytrah Energy (India) Limited
C+C1+C2+C3…….Cn = Total energy generated from the Wind farm from different companies including Mytrah Energy (India) Limited.

Y= The Meter reading by GETCO at the S/s metering point (ABT)

All the above calculations are in accordance with the PPA.

Using the above sharing approach, The SLDC-GETCO will provide the certificate of generation through their web site. This will be considered for raising invoice accordingly payment will be received from GUVNL. This Certificate of Share forms the basis of billing and also emission reduction calculation. The value of net electricity delivered can be cross checked with the monthly invoices.

In case the ABT Meter is not functioning there is a Main and Check Meter located at the substation which also calculates electricity import and export by all customers (whole wind farm). In case the meter located at the individual WEGs fail, the controller readings (LCS) of each WEG that are recorded by the Central monitoring System of Suzlon, shall be used for measuring electricity generation by individual WEGs.

All the data items monitored under the monitoring plan will be kept for 2 years after the end of crediting period or till the last issuance of VERs for this project activity whichever occurs later.

NOTE: The net electricity supplied to the grid by the project activity is a calculated value which is arrived by using the value of electricity generation by project WEGs, non-project WEGs at individual energy meters and the cumulative value of electricity import and export of the entire number of WEGs connected to substation (i.e. including project and non-project WEGs) as measured at the pooling substation. Since the measurement of electricity generation of non-project WEGs at energy meter is non- feasible for PP and The main meter & check meter reading at the substation and ABT meter are under the jurisdiction of GETCO only and are not shared with the individual project developers.

The monitoring arrangement, metering system under project boundary has been illustrated in schematic diagram below:

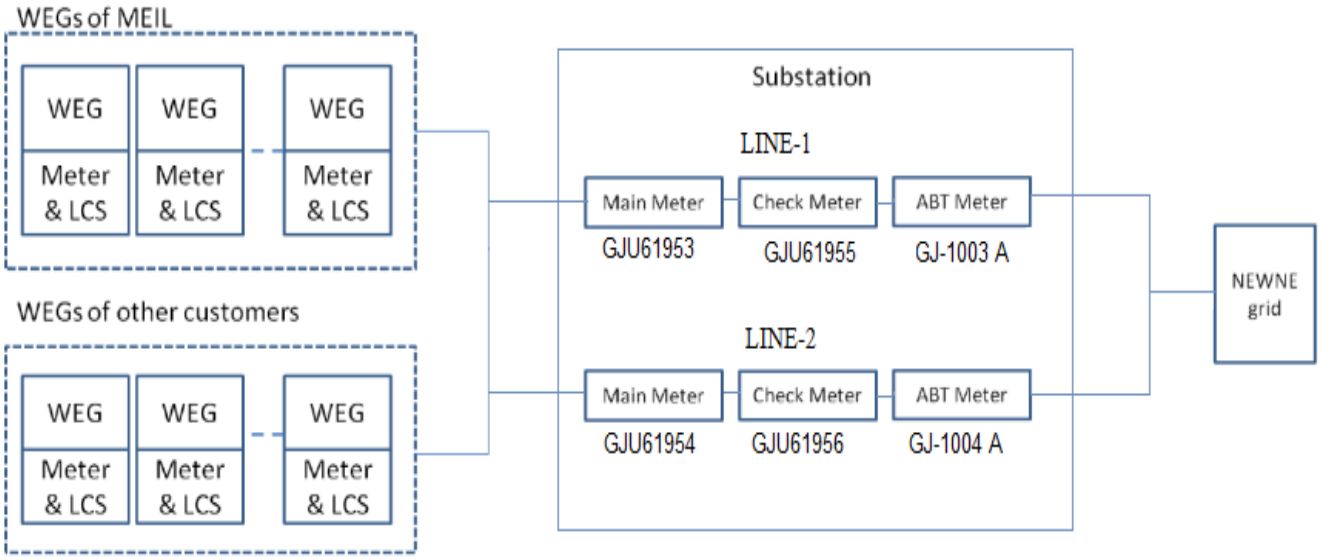


Table3: Calibration details of energy meters

S. No	Location No.	WEG	Make	Serial No	Accuracy class	Calibration date	Calibration due date
1	MAH41	SEL/2100/11-12/2212	Secure Meter	GJU62220	0.2S	09/06/2011	09/06/2014
2	MAH14	SEL/2100/11-12/2213	Secure Meter	GJU62223	0.2S	09/06/2011	09/06/2014
3	MAH15	SEL/2100/11-12/2214	Secure Meter	GJU62222	0.2S	09/06/2011	09/06/2014
4	MAH-21	SEL/2100/11-12/2215	Secure Meter	GJU-62217	0.2S	09/06/2011	09/06/2014
5	MAH13	SEL/2100/11-12/2211	Secure Meter	GJU62216	0.2S	09/06/2011	09/06/2014
6	MAH16	SEL/2100/11-12/2207	Secure Meter	GJU62219	0.2S	09/06/2011	09/06/2014
7	MAH-18	SEL/2100/11-12/2208	Secure Meter	GJU-62225	0.2S	09/06/2011	09/06/2014
8	MDW-21	SEL/2100/11-12/2209	Secure Meter	GJU62221	0.2S	09/06/2011	09/06/2014
9	MAH-22	SEL/2100/11-12/2210	Secure Meter	GJU-62218	0.2S	09/06/2011	09/06/2014
10	JSD38	SEL/2100/11-12/2216	Secure Meter	GJU-62215	0.2S	09/06/2011	09/06/2014
11	JSD41	SEL/2100/11-12/2217	Secure Meter	GJU-62226	0.2S	09/06/2011	09/06/2014
12	JSD42	SEL/2100/11-12/2218	Secure Meter	GJU-62227	0.2S	09/06/2011	09/06/2014

Calibration details of ABT Meters:-

S.No	Line No.	Make	Meter	Serial No	Accuracy class	Calibration date	Calibration due date
1.	Line-1	L & T	ABT	GJ-1003 A	0.2S	14/05/2011	14/05/2014
2.	Line-1	Secure	Main Meter	GJU61953	0.2S	18/05/2011	18/05/2014
3.	Line-1	Secure	Check Meter	GJU61955	0.2S	18/05/2011	18/05/2014
4.	Line-2	L & T	ABT	GJ-1004 A	0.2S	14/05/2011	14/05/2014
5.	Line-2	Secure	Main Meter	GJU61954	0.2S	18/05/2011	18/05/2014
6.	Line-2	Secure	Check Meter	GJU61956	0.2S	18/05/2011	18/05/2014

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The baseline emissions are the product of electrical energy baseline EGBL, y expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor. Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors.

$BE_y = EG_{BL,y} * EF\ CO_{2,grid,y}$

Where:

BE_y : Baseline Emissions in year y; t CO_2

$EG_{BL,y}$:Energy baseline in year y; kWh

EF_{CO2} :Emission Factor in year y; t CO_2e/kWh

As per the registered PDD, combined margin emission factor is 0.9528 tCO_2 /MWh. Hence the baseline emissions for the project activity for the current monitoring period are as follows.

$BE_y = EG_{BL,y} * EF_{CO2}$ = 69789.09*0.9528 = 66,495 tCO2. .

4.2 Project Emissions

The proposed project activity is a wind power project and there are no emissions associated with the project. Hence the Project Emissions for the project activity is zero.

4.3 Leakage

The project activity is a Greenfield wind power project and there is no technology transfer with respect to this project activity. Hence the Leakage emissions for the project are zero.

4.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or baseline net GHG removals by sinks (t CO2e)	Project emissions or actual net GHG removals by sinks (t CO2e)	Leakage (t CO2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO2e)
6th August 2011 - 25th December 2012	66,495	0	0	66,495

Year wise VCUs details are as follow*:*

Vintage Period	VCUs
06/08/2011 to 31/12/2011	10,429
01/01/2012 to 25/12/2012	56,066
Total VCUs	**66,495**

APPENDIX 1: SHUTDOWN DETAILS FOR THE MONITORING PERIOD:

S.No	Location No	WEG No	Total Shutdown Hours (6th August 2011 to 31st March 2012)	Total Shutdown Hours (1st April 2012 to 25th December 2012)
1	MAH15	SEL/2100/11-12/2214	254.7	310
2	MAH41	SEL/2100/11-12/2212	383.9	156.9
3	MAH14	SEL/2100/11-12/2213	256.3	185.7
4	MDW-21	SEL/2100/11-12/2209	243.7	175.7
5	MAH13	SEL/2100/11-12/2211	308.4	182.7
6	MAH16	SEL/2100/11-12/2207	802.1	208.8
7	MAH-18	SEL/2100/11-12/2208	662.5	214.7
8	MAH-21	SEL/2100/11-12/2215	638.6	232.5
9	MAH-22	SEL/2100/11-12/2210	658.4	214.6
10	JSD41	SEL/2100/11-12/2217	819.5	202.9
11	JSD42	SEL/2100/11-12/2218	684.9	277.3
12	JSD38	SEL/2100/11-12/2216	783.4	293.8