

WIND ENERGY PROJECT IN SAMANA, GUJARAT AND SAUNDATTI, KARNATAKA



Document Prepared By CLP Wind Farms (India) Private Limited

Project Title	Wind energy project in Samana, Gujarat and Saundatti, Karnataka
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity being undertaken by CLP Wind Farms (India) Private Limited (CLPWFPL), is a greenfield project that involves the utilization of kinetic energy of wind for generation of electricity and supply to the North-East-West-North East (NEWNE) and Southern Regional grids.

The project activity includes two sub-projects i.e. installation of 12 Wind Turbine Generators (WTGs) at Samana site in Gujarat and 55 WTGs at Saundatti site in Karnataka. The WTG has an individual capacity of 800 kW and are supplied by Wind World (India) Limited (formerly known as Enercon (India) Ltd.). The WTGs are of E-53 WWIL make and each individual WTG has a rating of 800 kW. The project activity involves installation of 53.6 MW WTGs in Gujarat and Karnataka site.

Site	No. of WTGs	Capacity of each WTG (MW)	Total Installed capacity (MW)	Grid
Samana	12	0.8 MW	9.6	NEWNE
Saundatti	55	0.8 MW	44	South
TOTAL	67	-	53.6	-

Salient features of the E-53 turbine are as follows:

- Gearless construction
- Continuous variable wind speed operation in sync with varying wind speeds
- Continuous variable pitch regulation of blades
- Three independent braking and lighting systems for blades
- Ability to withstand voltage fluctuations of -20% to +20% of nominal voltage
- Synchronous generator directly connected to turbine rotor
- Optimum adaptation to many grid voltages at different locations
- Maximum utilization of grid connection capacity for feeding in power.

E-53 Technical Specifications

- Rated capacity : 800 kW
- Rotor diameter : 52.9 m
- Tower height : 72-74 m (consists of both concrete and steel sections)
- Turbine concept : Gearless, variable speed, variable pitch control

The project activity utilises wind power to generate clean power with a view to bring in greenhouse gas emission reductions. The power generated from this project activity is being supplied to the state electricity grid which is a part of NEWNE regional grid of India. The Project is fully commissioned and is supplying electricity to NEWNE Grid.

The Project activity is a new facility (Greenfield) and the purpose of the project activity is to generate energy electricity by the utilization of wind velocity power and further selling the generated energy to the Indian Grid. In this process there is no consumption of any fossil fuel and hence the project does not lead to any greenhouse gas emissions. Thus, electricity would be generated through sustainable means without causing any negative impact on the environment.

The Project activity helps to reduce the demand- supply gap in the country and also helps in contributing to the sustainable development by using wind energy as the source of power generation and reduction of GHG emissions.

The first machine under this project activity was commissioned on 23-06-2010 and last machine was commissioned on 31-Jan-11.

During this monitoring period the project activity has exported 194.324 GWh of net energy to the Indian grid system. The total emission reductions achieved during the monitoring period from 01-01-2014 to 31-03-2018 (both days inclusive) is 179,207 tCO₂.

1.2 Sectoral Scope and Project Type

Sectoral scope : 1 Energy Industries (renewable -/ non renewable sources)

Project Type : I, Renewable energy project

Methodology : ACM0002 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version 13.0.0)

The project is not a grouped project.

1.3 Project Proponent

Organization name	CLP Wind Farms (India) Private Limited
Contact person	Mr. Dipjay Sanchania
Title	Head – CDM
Address	15 th Floor, Oberoi Commerz, Off. Western Express Highway, Goregaon (E), Mumbai, Maharashtra 400 063
Telephone	+ 91 22 6758 8888
Email	carbon@clpindia.in

1.4 Other Entities Involved in the Project

Organization name	Not Applicable
Role in the project	Not Applicable
Contact person	Not Applicable
Title	Not Applicable
Address	Not Applicable
Telephone	Not Applicable
Email	Not Applicable

1.5 Project Start Date

The project start date is 23-06-2010 which is the date of commissioning of the first WTG installed under the project activity.

1.6 Project Crediting Period

The length of the Crediting period of the project activity is 10 years (Renewable twice) starting from 23-06-2010 to 22-06-2020.

1.7 Project Location

Project is spread across two sites – Samana and Saundatti. Location details of these sites are as follows

Site 1: Samana

Taluk : Kalavad, Jamjodhpar, Upleta

District : Jamnagar and Rajkot

State : Gujarat

Host Party : India

The nearest airport and railway station are at Jamnagar city which is located at a distance of approximately 60 kms from the project activity site. The coordinates of individual WTGs of this site are as below:

Sr. No.	Unique Identification No.	GEDA Ref No.	Latitude	Longitude	Date of Commissioning
1	CLPSM-38	EIL/800/09-10/1615	22° 06' 20.1" N	70° 20' 13.1" E	12-Jul-10
2	CLPSM-39	EIL/800/09-10/1616	22° 03' 00.8" N	70° 04' 21.9" E	12-Jul-10
3	CLPSM-40	EIL/800/09-10/1695	22° 05' 45.4" N	70° 05' 46.2" E	28-Jan-11
4	CLPSM-44	EIL/800/09-10/1696	22° 05' 35.8" N	70° 05' 53.6" E	28-Jan-11
5	CLPSM-45	EIL/800/09-10/1697	22° 05' 27.8" N	70° 05' 46.6" E	28-Jan-11
6	CLPSM-47	EIL/800/09-10/1699	22° 05' 13.5" N	70° 05' 44.2" E	28-Jan-11
7	CLPSM-48	EIL/800/09-10/1700	22° 05' 04.8" N	70° 05' 40.8" E	28-Jan-11
8	CLPSM-49	EIL/800/09-10/1701	22° 04' 57.9" N	70° 05' 42.1" E	28-Jan-11
9	CLPSM-46	EIL/800/09-10/1698	22° 05' 22.0" N	70° 05' 44.3" E	31-Jan-11

Sr. No.	Unique Identification No.	GEDA Ref No.	Latitude	Longitude	Date of Commissioning
10	CLPSM-50	EIL/800/09-10/1702	22° 05' 05.5" N	70° 05' 09.2" E	31-Jan-11
11	CLPSM-51	EIL/800/09-10/1703	22° 05' 00.0" N	70° 05' 06.9" E	31-Jan-11
12	CLPSM-53	EIL/800/09-10/1704	22° 04' 51.6" N	70° 05' 04.3" E	31-Jan-11

Site 2: Saundatti

Villages : Katamalli, Hooli, Vatnal, Gorbala, Basidoni, Mallapur, Goravanakolla, Haletorgal
District : Belgaum
State : Karnataka
Host Party : India

The nearest airport and railway station are in Hubli city which is located at a distance of approximately 67 kms from the project activity site. The coordinates of individual WTGs of this site are as below:

Sr. No.	Unique Identification No.	CEIG Ref. No.	Latitude	Longitude	Date of Commissioning
1	CLPSN-36	CLP-40	15° 47' 40.6" N	75° 09' 56.9" E	23-Jun-10
2	CLPSN-37	CLP-41	15° 47' 46.2" N	75° 09' 54.9" E	23-Jun-10
3	CLPSN-38	CLP-43	15° 48' 01.1" N	75° 09' 57.5" E	23-Jun-10
4	CLPSN-39	CLP-51	15° 49' 56.4" N	75° 11' 29.8" E	23-Jun-10
5	CLPSN-40	CLP-52	15° 50' 04.2" N	75° 11' 30.6" E	23-Jun-10
6	CLPSN-41	CLP-53	15° 50' 11.7" N	75° 11' 31.6" E	23-Jun-10
7	CLPSN-42	CLP-54	15° 50' 19.2" N	75° 11' 34.2" E	23-Jun-10
8	CLPSN-43	CLP-55	15° 50' 26.5" N	75° 11' 35.6" E	23-Jun-10
9	CLPSN-44	CLP-56	15° 50' 35.7" N	75° 11' 40.9" E	23-Jun-10
10	CLPSN-45	CLP-65	15° 50' 42.6" N	75° 11' 32.3" E	23-Jun-10

Sr. No.	Unique Identification No.	CEIG Ref. No.	Latitude	Longitude	Date of Commissioning
11	CLPSN-46	CLP-66	15° 50' 48.6" N	75° 11' 32.8" E	23-Jun-10
12	CLPSN-47	CLP-67	15° 50' 55.9" N	75° 11' 29.8" E	23-Jun-10
13	CLPSN-48	CLP-68	15° 51' 02.2" N	75° 11' 28.6" E	23-Jun-10
14	CLPSN-49	CLP-69	15° 51' 08.8" N	75° 11' 27.2" E	23-Jun-10
15	CLPSN-50	CLP-59	15° 50' 58.8" N	75° 11' 45.5" E	23-Jun-10
16	CLPSN-51	CLP-60	15° 51' 04.7" N	75° 11' 44.1" E	23-Jun-10
17	CLPSN-52	CLP-61	15° 51' 09.9" N	75° 11' 41.7" E	23-Jun-10
18	CLPSN-53	CLP-62	15° 51' 19.1" N	75° 11' 47.5" E	23-Jun-10
19	CLPSN-54	CLP-63	15° 51' 27.9" N	75° 11' 53.0" E	23-Jun-10
20	CLPSN-55	CLP-64	15° 51' 34.7" N	75° 11' 52.0" E	23-Jun-10
21	CLPSN-56	CLP – 58	15° 50' 51.7" N	75° 11' 47.4" E	03-Aug-10
22	CLPSN-57	CLP – 70	15° 51' 24.3" N	75° 12' 21.2" E	03-Aug-10
23	CLPSN-58	CLP – 71	15° 51' 17.9" N	75° 12' 34.6" E	03-Aug-10
24	CLPSN-59	CLP – 72	15° 51' 25.7" N	75° 12' 35.4" E	03-Aug-10
25	CLPSN-60	CLP – 73	15° 51' 32.0" N	75° 12' 34.2" E	03-Aug-10
26	CLPSN-61	CLP – 74	15° 51' 38.2" N	75° 12' 31.3" E	03-Aug-10
27	CLPSN-62	CLP – 75	15° 51' 46.8" N	75° 12' 36.6" E	03-Aug-10
28	CLPSN-63	CLP – 76	15° 51' 55.1" N	75° 12' 39.8" E	03-Aug-10
29	CLPSN-64	CLP – 77	15° 52' 03.0" N	75° 12' 42.8" E	03-Aug-10
30	CLPSN-65	CLP – 79	15° 51' 31.9" N	75° 13' 42.2" E	03-Aug-10
31	CLPSN-66	CLP – 80	15° 51' 38.3" N	75° 13' 40.6" E	03-Aug-10
32	CLPSN-67	CLP – 81	15° 51' 44.0" N	75° 13' 37.6" E	03-Aug-10

Sr. No.	Unique Identification No.	CEIG Ref. No.	Latitude	Longitude	Date of Commissioning
33	CLPSN-68	CLP – 82	15° 51' 50.3" N	75° 13' 35.1" E	03-Aug-10
34	CLPSN-69	CLP – 83	15° 51' 56.6" N	75° 13' 34.2" E	03-Aug-10
35	CLPSN-70	CLP – 84	15° 52' 02.1" N	75° 13' 29.8" E	03-Aug-10
36	CLPSN-71	CLP – 85	15° 52' 08.5" N	75° 13' 29.0" E	03-Aug-10
37	CLPSN-72	CLP – 86	15° 52' 15.4" N	75° 13' 29.2" E	03-Aug-10
38	CLPSN-73	CLP-92	15° 52' 22.9" N	75° 13' 40.0" E	03-Aug-10
39	CLPSN-74	CLP-91	15° 52' 18.3" N	75° 13' 46.5" E	03-Aug-10
40	CLPSN-75	CLP-90	15° 52' 13.4" N	75° 13' 51.8" E	03-Aug-10
41	CLPSN-76	CLP-95	15° 52' 42.3" N	75° 13' 42.6" E	15-Sep-10
42	CLPSN-77	CLP-96	15° 52' 51.0" N	75° 13' 44.7" E	15-Sep-10
43	CLPSN-78	CLP-97	15° 52' 56.5" N	75° 13' 44.3" E	15-Sep-10
44	CLPSN-79	CLP-98	15° 53' 03.1" N	75° 13' 46.0" E	15-Sep-10
45	CLPSN-80	CLP-99	15° 53' 10.3" N	75° 13' 46.1" E	15-Sep-10
46	CLPSN-81	CLP-57	15° 50' 45.3" N	75° 11' 49.2" E	15-Sep-10
47	CLPSN-82	CLP-103	15° 53' 19.3" N	75° 14' 02.9" E	03-Dec-10
48	CLPSN-83	CLP-102	15° 53' 12.6" N	75° 14' 05.0" E	03-Dec-10
49	CLPSN-84	CLP-02	15° 49' 15.8" N	75° 06' 31.1" E	03-Dec-10
50	CLPSN-85	CLP-03	15° 49' 23.5" N	75° 06' 47.8" E	03-Dec-10
51	CLPSN-86	CLP-04	15° 49' 17.1" N	75° 06' 49.1" E	03-Dec-10
52	CLPSN-87	CLP-05	15° 49' 10.4" N	75° 06' 49.8" E	03-Dec-10
53	CLPSN-88	CLP-08	15° 48' 50.9" N	75° 06' 48.4" E	03-Dec-10
54	CLPSN-89	CLP-09	15° 48' 43.7" N	75° 06' 46.6" E	03-Dec-10

Sr. No.	Unique Identification No.	CEIG Ref. No.	Latitude	Longitude	Date of Commissioning
55	CLPSN-90	CLP-10	15° 48' 46.3" N	75° 06' 40.2" E	03-Dec-10

1.8 Title and Reference of Methodology

Title of the baseline and monitoring methodology: "Consolidated Baseline Methodology for grid connected electricity generation from renewable sources"

Reference: ACM0002, Version 13.0.0 (EB 67, Annex 13), Sectoral scope: 1

It has been referred from the list of approved methodologies for CDM project activities on the UNFCCC CDM website (<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>).

The approved methodology also draws upon:

1. Version 06.0.0 (EB 65, Annex 21, 25th November 2011) of the "Tool for the demonstration and assessment of additionality"; and
2. Version 02.2.1 (EB 63, Annex 19, 29th September 2011) of the "Tool to calculate the emission factor for an electricity system"
3. Version 04.0.0 (EB 66, Annex 48, 2nd March 2012) of the "Combined tool to identify the baseline scenario and demonstrate additionality"
4. Version 02 (EB 41, Annex 11, 02nd August 2008) of the "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion"

1.9 Other Programs

- **Emission Trading Programs and Other Binding Limits:** The project has not participated in any Emissions Trading Programs other than VCS scheme. The related emission reductions have not and will not be claimed under any other GHG programs.
- **Other Forms of Environmental Credit:** The project has been exclusively taken up as VCS and CDM project and has not been applied for any other form of environmental credit.
- **Participation under Other GHG Programs:** Both sites of the Project are also registered as a separate CDM Project activity. Details of these CDM projects are as follows:

Site 1: Samana Site

Project Title: Wind based renewable energy project by CLP Wind Farms India Private Limited in Gujarat¹

UNFCCC Registration Number: 8955

Crediting period start date: 01/01/2013

¹ <http://cdm.unfccc.int/Projects/DB/RWTUV1355987533.33/view>

Site 2: Saundatti Site

Project Title: Wind Energy Project in Saundatti, Karnataka²

CDM Registration Number: 6794

Crediting Period Start Date: 24/09/2012

Further, the net GHG Emission reductions or removals generated by the project activity will not be used for compliance with an emission trading program or to meet binding limits on GHG Emissions.

1.10 Sustainable Development

Ministry of Environment and Forests, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

- **Social well-being:** The project would help in generating employment opportunities during the construction and operation phases. The project activity will lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.
- **Economic well-being:** The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity will also help to reduce the demand supply gap in the state. The project activity will generate power using zero emissions wind based power generation which helps to reduce GHG emissions and specific pollutants like SO_x, NO_x, and SPM associated with the conventional thermal power generation facilities.
- **Technological well-being:** The successful operation of project activity would lead to promotion of wind based power generation and would encourage other entrepreneurs to participate in similar projects
- **Environmental well-being:** Wind being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the Project activity also helps in avoiding significant amount of GHG emissions.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Implementation Status: All the WTGs of the Project are commissioned and the Project is fully implemented. The commissioning dates of the individual WTGs have been provided in section 1.7.

² <http://cdm.unfccc.int/Projects/DB/BVQI1343049611.03/view>

Events that may impact the GHG emission reductions or removals and monitoring: No such events took place during the monitoring period that may impact the GHG emission reductions for the project activity. The project activity has been exporting electricity continuously since commissioning. There were neither major breakdowns nor other events for the project activity during the monitoring period that may impact the GHG emission reductions for the project activity.

2.2 Deviations

2.2.1 Methodology Deviations

There are no deviations related to methodology.

2.2.2 Project Description Deviations

In Samana project, the meters installed at the project metering point are under the custody of state DISCOM. State DISCOM is altering the metering position time to time as per latest requirement and all project developers connected to the same substation have to follow the same system. From commissioning of this project, WTGs under Sadodar substation previously connected to 5 feeders where 5 main meters were installed respectively. However, on 11/11/2015, DISCOM changed the electrical connectivity and installed two new main meters as billing meters and subsequently previous meters are now considered as check meters.

Similarly, in Saundatti project, during meter calibration it was found that meter display were not working properly. Thus, Hubli Electricity Supply Company Limited has replaced the billing meters on 14/08/2014 and on 10/04/2015 for Line -1 and on 14/08/2014 and on 15/04/2015 for Line -2 to maintain the appropriateness in electricity monitoring in line with section 4.3 of registered PD.

Thus, same change in energy meters have been accounted as Project Description deviations in line with section 3.6.1 of VCS standard version 3.6. However, this project deviation doesn't have an adverse impact in the applicability of the methodology, additionally or the appropriateness of the baseline scenario.

2.3 Grouped Project

The project activity is not a grouped project.

2.4 Safeguards

2.4.1 No Net Harm

Project does not have any negative environmental and socio-economic impacts.

2.4.2 Local Stakeholder Consultation

Since this is a third period verification of the project activity, hence, local stakeholders' consultation details are not applicable in this project activity.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Site-1: Samana

Data / Parameter	EF _{NEWNE,grid,OM,y}
Data unit	tCO ₂ e/MWh
Description	Operating Margin emission factor for NEWNE grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority Version 7.0.
Value applied	0.9842
Justification of choice of data or description of measurement methods and procedures applied	Calculated it as CEA sourced data 3 years vintage data (2008-09, 2009-10 and 2010-11) and option of ex ante calculation based on Simple Operating Margin Method.
Purpose of the data	Baseline Emission calculation
Comments	Operating margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	EF _{NEWNE,grid,BM,y}
Data unit	tCO ₂ e/MWh
Description	Build Margin emission factor for NEWNE grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority Version 7.0.
Value applied:	0.8587
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per CEA sourced data for the year 2010-11. The build margin is calculated in this database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation and option of ex ante calculation.
Purpose of the data	Baseline emission calculations
Comments	Build margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	EF _{NEWNE,grid,CM,y}
Data unit	tCO ₂ e/MWh
Description	Combined Margin CO ₂ emission factor for NEWNE grid
Source of data	Calculated based on 75% of EF _{NEWNE,grid,OM,y} and 25% of EF _{NEWNE,grid,BM,y} values
Value applied:	0.9528

Justification of choice of data or description of measurement methods and procedures applied	CEA has calculated it as per ACM0002 with 3 years vintage data and option of ex ante calculation based on 75% of OM and 25% of BM values approach.
Purpose of the data	Baseline emission calculations
Comments	Combined margin emission factor is fixed ex-ante throughout the crediting period.

Site 2: Saundatti

Data / Parameter	EF _{South,grid,OM,y}
Data unit	tCO ₂ e/MWh
Description	Operating Margin emission factor for Southern grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority Version 7.0.
Value applied	0.9513
Justification of choice of data or description of measurement methods and procedures applied	Calculated it as CEA sourced data 3 years vintage data (2008-09, 2009-10 and 2010-11) and option of ex ante calculation based on Simple Operating Margin Method.
Purpose of the data	Baseline emission calculations
Comments	Operating margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	EF _{South,grid,BM,y}
Data unit	tCO ₂ e/MWh
Description	Build Margin emission factor for Southern grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority Version 7.0.
Value applied:	0.7339
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per CEA sourced data for the year 2010-11. The build margin is calculated in this database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation and option of ex-ante calculation.
Purpose of the data	Baseline emission calculations
Comments	Build margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	EF _{South,grid,CM,y}
Data unit	tCO ₂ e/MWh
Description	Combined Margin CO ₂ emission factor for Southern grid

Source of data	Calculated based on 75% of $EF_{NEWNE,grid,OM,y}$ and 25% of $EF_{NEWNE,grid,BM,y}$ values
Value applied:	0.8969
Justification of choice of data or description of measurement methods and procedures applied	CEA has calculated it as per ACM0002 with 3 years vintage data and option of ex ante calculation based on 75% of OM and 25% of BM values approach.
Purpose of the data	Baseline emission calculations
Comments	Combined margin emission factor is fixed ex-ante throughout the crediting period.

3.2 Data and Parameters Monitored

Data / Parameter	EG _{Samana,WTG,i}															
Data unit	MWh															
Description	Quantity of electricity generated by <i>ith</i> WTG at Samana site															
Source of data	LCS meter reading															
Description of measurement methods and procedures to be applied	The quantity of electricity generated by <i>ith</i> WTG at Samana site is measured and recorded by the LCS meter at the WTG controller end.															
Frequency of monitoring/recording	Measured continuously and recorded daily															
Value monitored	<table><tr><th>Year</th><th>Value (MWh)</th></tr><tr><td>2014 (01-Jan-14 to 31-Dec-14)</td><td>20,893.487</td></tr><tr><td>2015 (01-Jan-15 to 31-Dec-15)</td><td>23,442.425</td></tr><tr><td>2016 (01-Jan-16 to 31-Dec-16)</td><td>20,934.291</td></tr><tr><td>2017 (01-Jan-17 to 31-Dec-17)</td><td>21,865.661</td></tr><tr><td>2018 (01-Jan-18 to 31-Mar-18)</td><td>3,774.840</td></tr><tr><td>Total</td><td>90,910.704</td></tr></table>		Year	Value (MWh)	2014 (01-Jan-14 to 31-Dec-14)	20,893.487	2015 (01-Jan-15 to 31-Dec-15)	23,442.425	2016 (01-Jan-16 to 31-Dec-16)	20,934.291	2017 (01-Jan-17 to 31-Dec-17)	21,865.661	2018 (01-Jan-18 to 31-Mar-18)	3,774.840	Total	90,910.704
Year	Value (MWh)															
2014 (01-Jan-14 to 31-Dec-14)	20,893.487															
2015 (01-Jan-15 to 31-Dec-15)	23,442.425															
2016 (01-Jan-16 to 31-Dec-16)	20,934.291															
2017 (01-Jan-17 to 31-Dec-17)	21,865.661															
2018 (01-Jan-18 to 31-Mar-18)	3,774.840															
Total	90,910.704															
Monitoring equipment	LCS meter at the WTG controller end has been used for monitoring.															
QA/QC procedures to be applied	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 WTGs. 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.															
Purpose of the data	To calculate Baseline Emissions calculation															
Calculation method	Not applicable															

Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VCUs for this project activity, whichever occurs later.
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Data / Parameter	EG _{NEWNE, facility, y}															
Data unit	MWh															
Description	Quantity of net electricity generation supplied by the project activity to the NEWNE grid in year y															
Source of data	Share Certificate by State Load Despatch Centre (SLDC) obtained through Joint Meter Reading and WTG Controller End Data															
Description of measurement methods and procedures to be applied	Net electricity generated by the wind farm is monitored using a main meter at the grid interconnection point in the substation maintained by Enercon (India) Limited. There are numerous WTGs apart from those included in this project that are connected to the main meter. The net electricity delivered by the Samana sub-project has been calculated by proportionally dividing the metered net generation among the connected WTGs on the basis of the prorata readings taken at the WTG controller end. The net electricity supplied by the wind farm to the NEWNE grid is determined as the difference between the quantity of electricity supplied by the wind farm to the grid and the quantity of electricity delivered to the wind farm from the grid. Joint meter readings for the net energy generation by the wind farm is done on monthly basis and are taken in the presence of Enercon (India) Limited and grid/ GETCO officials every month.															
Frequency of monitoring/recording	Measured continuously and recorded monthly															
Value monitored	<table><tr><th>Year</th><th>Value (MWh)</th></tr><tr><td>2014 (01-Jan-14 to 31-Dec-14)</td><td>20,253.218</td></tr><tr><td>2015 (01-Jan-15 to 31-Dec-15)</td><td>22,755.738</td></tr><tr><td>2016 (01-Jan-16 to 31-Dec-16)</td><td>20,171.962</td></tr><tr><td>2017 (01-Jan-17 to 31-Dec-17)</td><td>21,193.468</td></tr><tr><td>2018 (01-Jan-18 to 31-Mar-18)</td><td>3,668.571</td></tr><tr><td>Total</td><td>88,042.957</td></tr></table>		Year	Value (MWh)	2014 (01-Jan-14 to 31-Dec-14)	20,253.218	2015 (01-Jan-15 to 31-Dec-15)	22,755.738	2016 (01-Jan-16 to 31-Dec-16)	20,171.962	2017 (01-Jan-17 to 31-Dec-17)	21,193.468	2018 (01-Jan-18 to 31-Mar-18)	3,668.571	Total	88,042.957
Year	Value (MWh)															
2014 (01-Jan-14 to 31-Dec-14)	20,253.218															
2015 (01-Jan-15 to 31-Dec-15)	22,755.738															
2016 (01-Jan-16 to 31-Dec-16)	20,171.962															
2017 (01-Jan-17 to 31-Dec-17)	21,193.468															
2018 (01-Jan-18 to 31-Mar-18)	3,668.571															
Total	88,042.957															
Monitoring equipment	Main meter is installed at the grid interconnection point in the substation maintained by Enercon (India) Limited. The meter is bi-directional with an accuracy class of 0.2s.															
QA/QC procedures to	Calibration of the main meter has been done once every three															

be applied	years, and faulty meters will be duly calibrated immediately if found to be outside the permissible limits. Meters are tested annually.
Purpose of the data	To calculate Baseline Emissions calculation
Calculation method	$EG_{\text{NEWNE}, \text{facility}, y} = \text{Net wind farm generation} * (\text{Electricity generation by project WTGs} / \text{Electricity generation by wind farm WTGs})$
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VCUs for this project activity, whichever occurs later.

Site 2: Saundatti

Data / Parameter	EG _{Saundatti,WTG,i}															
Data unit	MWh															
Description	Quantity of electricity generated by <i>ith</i> WTG at Saundatti site															
Source of data	LCS meter reading															
Description of measurement methods and procedures to be applied	The quantity of electricity generated by <i>ith</i> WTG at Saundatti site is measured and recorded by the LCS meter at the WTG controller end.															
Frequency of monitoring/recording	Measured continuously and recorded daily															
Value monitored	<table><tr><th>Year</th><th>Value³ (MWh)</th></tr><tr><td>2014 (01-Jan-14 to 31-Dec-14)</td><td>0.000</td></tr><tr><td>2015 (01-Jan-15 to 31-Dec-15)</td><td>0.000</td></tr><tr><td>2016 (01-Jan-16 to 31-Dec-16)</td><td>14,334.720</td></tr><tr><td>2017 (01-Jan-17 to 31-Dec-17)</td><td>83,615.925</td></tr><tr><td>2018 (01-Jan-18 to 31-Mar-18)</td><td>11,024.790</td></tr><tr><td>Total</td><td>108,975.435</td></tr></table>		Year	Value ³ (MWh)	2014 (01-Jan-14 to 31-Dec-14)	0.000	2015 (01-Jan-15 to 31-Dec-15)	0.000	2016 (01-Jan-16 to 31-Dec-16)	14,334.720	2017 (01-Jan-17 to 31-Dec-17)	83,615.925	2018 (01-Jan-18 to 31-Mar-18)	11,024.790	Total	108,975.435
Year	Value ³ (MWh)															
2014 (01-Jan-14 to 31-Dec-14)	0.000															
2015 (01-Jan-15 to 31-Dec-15)	0.000															
2016 (01-Jan-16 to 31-Dec-16)	14,334.720															
2017 (01-Jan-17 to 31-Dec-17)	83,615.925															
2018 (01-Jan-18 to 31-Mar-18)	11,024.790															
Total	108,975.435															
Monitoring equipment	LCS meter at the WTG controller end has been used for monitoring.															
QA/QC procedures to be applied	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 WTGs. 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															

³ Saundatti wind project has claimed emission reduction from CDM scheme for entire 72 MW capacity for the duration from January-2014 to September-2016. Thus, to avoid double counting, electricity generation for the same duration has not been considered in this periodic verification.

	report.
Purpose of the data	To calculate Baseline Emissions calculation
Calculation method	Not applicable
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VCUs for this project activity, whichever occurs later.

Data / Parameter	EG _{South, facility, y}														
Data unit	MWh														
Description	Quantity of net electricity generation supplied by the project activity to the Southern grid in year y														
Source of data	Joint Meter Reading Sheets and WTG Controller End Data														
Description of measurement methods and procedures to be applied	Net electricity generated by the wind farm is monitored using a main meter at the grid interconnection point in the substation maintained by Enercon (India) Limited. There are numerous WTGs apart from those included in this project that are connected to the main meter. The net electricity delivered by the Saundatti sub-project has been calculated by proportionally dividing the metered net generation among the connected WTGs on the basis of the pro-rata readings taken at the WTG controller end. The net electricity supplied by the wind farm to the Southern grid is determined as the difference between the quantity of electricity supplied by the wind farm to the grid and the quantity of electricity delivered to the wind farm from the grid. Joint meter readings for the net energy generation by the wind farm are taken in the presence of Enercon (India) Limited and grid officials every month.														
Frequency of monitoring/recording	Measured continuously and the recording frequency for this data is monthly.														
Value monitored	<table> <tr> <th>Year</th><th>Value⁴ (MWh)</th></tr> <tr> <td>2014 (01-Jan-14 to 31-Dec-14)</td><td>0.000</td></tr> <tr> <td>2015 (01-Jan-15 to 31-Dec-15)</td><td>0.000</td></tr> <tr> <td>2016 (01-Jan-16 to 31-Dec-16)</td><td>13,968.214</td></tr> <tr> <td>2017 (01-Jan-17 to 31-Dec-17)</td><td>81,547.176</td></tr> <tr> <td>2018 (01-Jan-18 to 31-Mar-18)</td><td>10,765.671</td></tr> <tr> <td>Total</td><td>106,281.062</td></tr> </table>	Year	Value ⁴ (MWh)	2014 (01-Jan-14 to 31-Dec-14)	0.000	2015 (01-Jan-15 to 31-Dec-15)	0.000	2016 (01-Jan-16 to 31-Dec-16)	13,968.214	2017 (01-Jan-17 to 31-Dec-17)	81,547.176	2018 (01-Jan-18 to 31-Mar-18)	10,765.671	Total	106,281.062
Year	Value ⁴ (MWh)														
2014 (01-Jan-14 to 31-Dec-14)	0.000														
2015 (01-Jan-15 to 31-Dec-15)	0.000														
2016 (01-Jan-16 to 31-Dec-16)	13,968.214														
2017 (01-Jan-17 to 31-Dec-17)	81,547.176														
2018 (01-Jan-18 to 31-Mar-18)	10,765.671														
Total	106,281.062														

⁴ Saundatti wind project has claimed emission reduction from CDM scheme for entire 72 MW capacity for the duration from January-2014 to September-2016. Thus, to avoid double counting, electricity generation for the same duration has not been considered in this periodic verification.

Monitoring equipment	Main and check meters are installed at the grid interconnection point in the substation maintained by Enercon (India) Limited. The meters are bi-directional with an accuracy class of 0.2s.
QA/QC procedures to be applied	Calibration of the main and check meters shall be done once every three years.
Purpose of the data	To calculate baseline emissions reductions from the Project
Calculation method	$EG_{\text{South, facility, y}} = \text{Net wind farm generation} * (\text{Electricity generation by project WTGs} / \text{Electricity generation by wind farm WTGs})$
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VCUs for this project activity, whichever occurs later.

3.3 Monitoring Plan

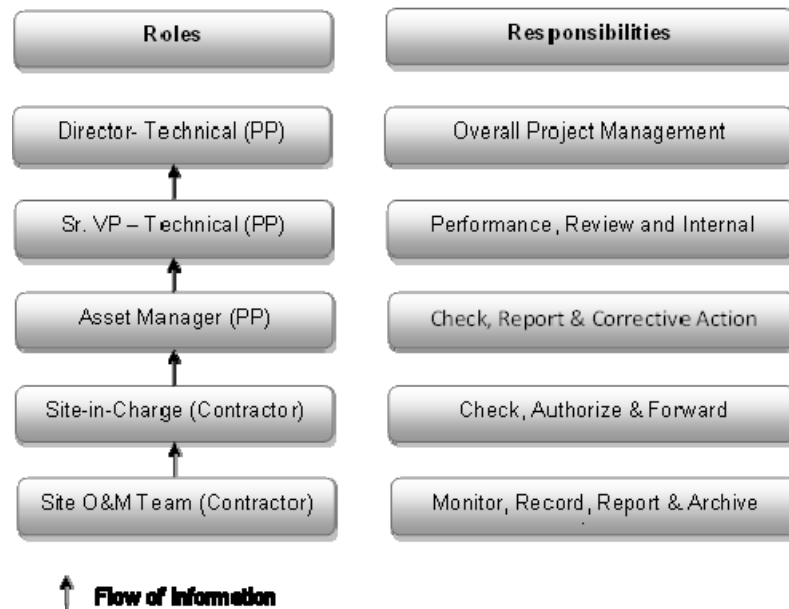
The monitoring plan has being devised as per approved consolidated monitoring methodology ACM0002 Version 13.0.0 - “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

The electricity exported to and imported from the grid is being measured using bi-directional main and check meters of accuracy class 0.2s installed at the sub-station.

To ensure trouble free operations and efficient generations through all the wind turbines, CLP has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines. The contractor, Wind World (India) Limited, under the O&M contract with CLP, would be responsible for the operation and maintenance of the Projectfor the entire crediting period.

The responsibility of project management as well as registration, monitoring, measurement and reporting lies with CLP and it has a team to ensure proper and continuous monitoring of the Project. The same has been outlined as follows:

Organizational structure, responsibilities and competencies



The O&M team consist of qualified engineers and technicians. They are trained at the WTG manufacturing facility and other relevant training locations of Wind World (India) Limited at Daman for operating and ensuring best performance of the WTGs.

Generating, Recording, Storing, Aggregating, Collating and Reporting of Data:

Metering Equipment: Two identical bidirectional electronic energy meters are installed as main and check meter to monitor energy imported and exported by the Project. These meters are of 0.2s accuracy class and comply with the requirement local regulatory requirement.

Meter Readings: The monthly meter readings (both main and check meters) at the sub-station are taken jointly by the grid authority and O&M team.

Meter Test Checking: Main and check meters are tested for accuracy once every three years. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2s accuracy class.

Records: O&M Contractor maintains an accurate and up-to-date operating log at the Project. All the records are preserved for 2 years beyond the crediting period.

Emergency procedures: The Samana site has four main meters installed at the grid interconnection point in the substation maintained by Wind World (India) Limited. In case any meter becomes defective, the load is switched to the other operational meters so that there is no lapse in recording of electricity generation data. The Saundatti site has two main and two check meters installed at the grid interconnection point in the substation. In case a main meter becomes defective, the readings of the check meter are used for the purpose of billing and calculation of emission reductions.

Apportioning of electricity: In case dates of monitoring period do not match with the dates of Joint Meter Readings the following apportioning formula would be used to estimate the electricity generation for calculating emission reductions:

X = Electricity generation recorded at LCS Meter by project activity WTGs between start/end date of monitoring period and date of billing cycle

Y = Electricity generation recorded at LCS Meter by project activity WTGs in the particular month for which Joint Meter Reading has been taken

Z = Net energy exported from project activity WTGs

Electricity Generation = $(X/Y) * Z$

Calibration Details of Meters for Current Monitoring Period:

Samana Site:

Sl. No.	Meter Type	Meter Identification No	Meter Make	Accuracy Class	Calibration Date	Calibration Expiry Date
01	Main Meter	GJU 01475	Secure	0.2s	06/09/2013	05/09/2016
02		GJU 04176	Secure	0.2s	06/09/2013	05/09/2016
03		GJU 01470	Secure	0.2s	06/09/2013	05/09/2016
04		KAB 11082	Secure	0.2s	06/09/2013	05/09/2016
05		GJU 67589	Secure	0.2s	06/09/2013	05/09/2016
06		GJ-2458-A*	L&T	0.2s	11/11/2015	10/11/2018
07		GJ-2459-A	L&T	0.2s	11/11/2015	10/11/2018
01	Check Meter	GJU 01475	Secure	0.2s	30/09/2016	29/09/2019
02		GJU 04176	Secure	0.2s	30/09/2016	29/09/2019
03		GJU 01470	Secure	0.2s	30/09/2016	29/09/2019
04		KAB 11082	Secure	0.2s	30/09/2016	29/09/2019
05		GJU 67589	Secure	0.2s	30/09/2016	29/09/2019

* From commissioning of the Sadodar substation, all WTGs under this substation were connected to five feeders and each feeder had individual TOD metering system (viz. GJU 01475 was connected to Feeder-1, GJU 04176 was connected to Feeder-2, GJU 01470 was connected to Feeder-3, KAB 11082 was connected to Feeder-4 and GJU 67589 was connected to Feeder-5). However, in 11/11/2015 GETCO had installed two ABT meters into upstream of five TOD meter to enhance accuracy of metering system. Post installation, old TOD meters (which were previously used as main meters) are now considered check meters.

Saundatti Site:

Sl. No.	Transformer No	Meter Type	Meter Identification No	Meter Make	Accuracy Class	Calibration Date	Calibration Expiry Date
1	Transformer - 1	Main Meter	09141842 (Main Meter)	L&T	0.2s	09/11/2012	08/11/2015
			13196460 ⁵ (Main Meter)	L&T	0.2s	14/08/2014	13/08/2017
			14194656 ⁶ (Main Meter)	L&T	0.2s	10/04/2015	09/04/2018
		Check Meter	09141846 (Check Meter)	L&T	0.2s	09/11/2012	08/11/2015
			13196467 (Check Meter)	L&T	0.2s	14/08/2014	13/08/2017
			14194675 (Check Meter)	L&T	0.2s	10/04/2015	09/04/2018
2	Transformer - 2	Main Meter	09141848 (Main Meter)	L&T	0.2s	09/11/2012	08/11/2015
			13195786 ⁷ (Main Meter)	L&T	0.2s	14/08/2014	13/08/2017
			14194483 ⁸ (Main Meter)	L&T	0.2s	15/04/2015	14/04/2018
		Check Meter	09141852 (Check Meter)	L&T	0.2s	09/11/2012	08/11/2015
			13195795 (Check Meter)	L&T	0.2s	14/08/2014	13/08/2017
			14194487 (Check Meter)	L&T	0.2s	15/04/2015	14/04/2018

⁵ 09141842 (Main meter) and 09141846 (check meter) were replaced by 13196460 and 13196467 respectively on 14/08/2014 due to display issue

⁶ 13196460 (Main meter) and 13196467 (check meter) were replaced by 14194656 and 14194675 respectively on 14/08/2014 due to display issue

⁷ 09141848 (Main meter) and 09141852 (check meter) were replaced by 13195786 and 13195795 respectively on 14/08/2014 due to display issue

⁸ 13195786 (Main meter) and 13195795 (check meter) were replaced by 14194483 and 14194487 respectively on 14/08/2014 due to display issue

Calibration frequency of the meters are once in three years. There was not any significant period of shut-down or break-down period during this monitoring period.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The baseline emissions are calculated as follows:

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

Where:

BE_y	=	Baseline emissions in year y (tCO ₂)
$EG_{PJ,y}$	=	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)
$EF_{grid,CM,y}$	=	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”

Since 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, therefore:

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

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

Month	Net Export by Samana Wind Project ($EG_{NEWNE,facility,y}$) MWh	Net Export by Saundatti Wind Project ($EG_{South,facility,y}$) MWh	Total Net Electricity Export from Project MWh
January-14	1,765.963	0.000*	1,765.963
February-14	1,179.634	0.000*	1,179.634
March-14	1,330.640	0.000*	1,330.640
April-14	1,452.814	0.000*	1,452.814

Month	Net Export by Samana Wind Project (EG _{NEWNE, facility, y}) MWh	Net Export by Saundatti Wind Project (EG _{South, facility, y}) MWh	Total Net Electricity Export from Project MWh
May-14	2,225.762	0.000*	2,225.762
June-14	3,282.440	0.000*	3,282.440
July-14	2,751.809	0.000*	2,751.809
August-14	1,817.518	0.000*	1,817.518
September-14	1,018.833	0.000*	1,018.833
October-14	572.111	0.000*	572.111
November-14	694.593	0.000*	694.593
December-14	2,161.100	0.000*	2,161.100
January-15	1,747.118	0.000*	1,747.118
February-15	1,449.895	0.000*	1,449.895
March-15	1,516.817	0.000*	1,516.817
April-15	2,081.430	0.000*	2,081.430
May-15	2,521.482	0.000*	2,521.482
June-15	2,240.772	0.000*	2,240.772
July-15	3,918.421	0.000*	3,918.421
August-15	2,212.649	0.000*	2,212.649
September-15	1,029.024	0.000*	1,029.024
October-15	975.188	0.000*	975.188
November-15	1,283.468	0.000*	1,283.468
December-15	1,779.474	0.000*	1,779.474
January-16	943.791	0.000*	943.791
February-16	1,219.374	0.000*	1,219.374
March-16	1,346.527	0.000*	1,346.527
April-16	1,542.711	0.000*	1,542.711
May-16	2,721.385	0.000*	2,721.385
June-16	2,654.307	0.000*	2,654.307
July-16	2,818.228	0.000*	2,818.228
August-16	2,364.920	0.000*	2,364.920
September-16	1,615.168	0.000*	1,615.168
October-16	795.965	4,331.111	5,127.076

Month	Net Export by Samana Wind Project (EG _{NEWNE,facility,y}) MWh	Net Export by Saundatti Wind Project (EG _{South,facility,y}) MWh	Total Net Electricity Export from Project MWh
November-16	812.673	4,160.827	4,973.500
December-16	1,336.914	5,476.277	6,813.190
January-17	1,622.763	4,586.880	6,209.643
February-17	1,512.390	4,319.733	5,832.124
March-17	1,682.715	4,121.622	5,804.338
April-17	2,315.521	5,491.971	7,807.491
May-17	2,299.513	8,025.507	10,325.021
June-17	2,075.072	12,494.113	14,569.185
July-17	3,322.127	15,553.635	18,875.762
August-17	2,045.728	9,718.280	11,764.008
September-17	717.220	4,930.241	5,647.462
October-17	869.629	2,530.223	3,399.853
November-17	1,065.093	3,997.405	5,062.497
December-17	1,665.696	5,777.565	7,443.260
January-18	1,025.911	2,948.893	3,974.804
February-18	1,080.596	4,066.005	5,146.601
March-18	1,562.064	3,750.773	5,312.838
Total	88,042.957	106,281.062	194,324.019

* Saundatti wind project has claimed emission reduction from CDM scheme for entire 72 MW capacity for the duration from January-2014 to September-2016. Thus, to avoid double counting, electricity generation for the same duration has not been considered in this periodic verification.

Baseline emissions (BE_y) are calculated as follows:

$$BE_y = EG_{NEWNE,facility,y} \times EF_{NEWNE,grid,CM,y} + EG_{South,facility,y} \times EF_{South,grid,CM,y}$$

Baseline emissions for Samana Site:

Vintage Period	Net Electricity Export (MWh)	Emission Factor (tCO ₂ /MWh)	Baseline Emissions (tCO ₂)
2014 (01-Jan-14 to 31-Dec-14)	20,253.218	0.9528	19,297.000
2015 (01-Jan-15 to 31-Dec-15)	22,755.738	0.9528	21,681.000
2016 (01-Jan-16 to 31-Dec-16)	20,171.962	0.9528	19,219.000

Vintage Period	Net Electricity Export (MWh)	Emission Factor (tCO ₂ /MWh)	Baseline Emissions (tCO ₂)
2017 (01-Jan-17 to 31-Dec-17)	21,193.468	0.9528	20,193.000
2018 (01-Jan-18 to 31-Mar-18)	3,668.571	0.9528	3,495.000
	88,042.957		83,885.000

Baseline emissions for Saundatti Site:

Vintage Period	Net Electricity Export (MWh)	Emission Factor (tCO ₂ /MWh)	Baseline Emissions (tCO ₂)
2014 (01-Jan-14 to 31-Dec-14)	0.000	0.8969	0.000
2015 (01-Jan-15 to 31-Dec-15)	0.000	0.8969	0.000
2016 (01-Jan-16 to 31-Dec-16)	13,968.214	0.8969	12,528.000
2017 (01-Jan-17 to 31-Dec-17)	81,547.176	0.8969	73,139.000
2018 (01-Jan-18 to 31-Mar-18)	10,765.671	0.8969	9,655.000
	106,281.062		95,322.000

Baseline emissions for Project activity:

Vintage Period	Baseline Emissions (tCO ₂)
2014 (01-Jan-14 to 31-Dec-14)	19,297.000
2015 (01-Jan-15 to 31-Dec-15)	21,681.000
2016 (01-Jan-16 to 31-Dec-16)	31,747.000
2017 (01-Jan-17 to 31-Dec-17)	93,332.000
2018 (01-Jan-18 to 31-Mar-18)	13,150.000
	179,207.000

4.2 Project Emissions

Since, the project activity is a wind power project, there are no project emissions from fossil fuel consumption, release of non-condensable gases or water reservoirs.

Hence, PE y = 0

4.3 Leakage

As per ACM0002 Version 13.0.0, no leakage has been considered for the calculation of emission factor.

4.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2014 (01-Jan-14 to 31-Dec-14)	19,297.00	0.00	0.00	19,297.00
2015 (01-Jan-15 to 31-Dec-15)	21,681.00	0.00	0.00	21,681.00
2016 (01-Jan-16 to 31-Dec-16)	31,747.00	0.00	0.00	31,747.00
2017 (01-Jan-17 to 31-Dec-17)	93,332.00	0.00	0.00	93,332.00
2018 (01-Jan-18 to 31-Mar-18)	13,150.00	0.00	0.00	13,150.00
Total	179,207.00	0.00	0.00	179,207.00