

WIND ENERGY PROJECT IN SAMANA, GUJARAT AND SAUNDATTI, KARNATAKA



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1 PROJECT DETAILS

1.1 Summary Description of Project

The project activity is a green-field project and includes two sub-projects i.e. installation of 12 Wind Turbine Generators (WTGs) at Samana site in the state of Gujarat and 55 WTGs at Saundatti site in the state of Karnataka. The project has been implemented by CLP Wind Farms (India) Private Limited ("CLP") and is the Project Proponent (PP) of this project activity. The project activity involves generation of electric power using wind energy from the two wind farms which is supplied 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 WTGs have an individual capacity of 800 kW and are supplied by Enercon (India) Ltd. As per the Supply and Services agreement signed between CLP and Enercon, later is responsible for technology and equipment supply, as well as the operation and maintenance of the WTGs.

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	-

1.2 Sectoral Scope and Project Type

According to the VCS list of sectoral scopes¹, the project activity is categorized under:

Scope Number: 1, Sectoral Scope: Energy (renewable/non-renewable)

Project type: Project

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

The project activity is not a grouped project.

1.3 Project Proponent

Organization:	CLP Wind Farms (India) Private Limited
Street/P.O.Box:	Off Western Express Highway, Goregaon (East),
Building:	15th Floor, Oberoi Commerz,
City:	Mumbai
State/Region:	Maharashtra.
Postfix/ZIP:	400 063
Country:	India

¹ <http://v-c-s.org/how-it-works/policy-areas-sectors>

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CLPWFPL is the only entity responsible for the implementation of the project. It is responsible for monitoring of relevant parameters and calculation of emission reductions.

1.4 Other Entities Involved in the Project

There are no other entities involved in the development of the project.

1.5 Project Start Date

23-June-2010

The project start date is 23-June-2010 when a set of 20 WTGs in the project activity were commissioned on the same day at Saundatti site in Karnataka.

1.6 Project Crediting Period

Start date of the crediting period: 23-June-2010
 End date of the crediting period: 22-June-2020
 Project crediting period: 10 years 0 months (renewable twice)

The project proponents is undertaking the same project activity under CDM² however VCU's shall be claimed only till the day before the date of registration of the project under CDM.

² <http://cdm.unfccc.int/Projects/Validation/DB/QEJVYBH36RERGA2GCQSJDVCZH1DK8/view.html>

1.7 Project Location

The first sub-project consisting of 12 WTGs is located at the Samana site in Gujarat.

Site: Samana
 Taluk: Kalavad, Jamjodhpar, Upleta
 District: Jamnagar, 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 are stated 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
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

The second sub-project consisting of 55 WTGs is located at the Saundatti site in Karnataka.

Site: 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 are stated below:**

Sr. No.	Unique Identification No.	CEIG Ref. No.	Latitude	Longitude	Date of Commissioning
1	CLPSN-36	CLP – 59	15° 47' 40.6" N	75° 09' 56.9" E	23-Jun-10
2	CLPSN-37	CLP – 60	15° 47' 46.2" N	75° 09' 54.9" E	23-Jun-10
3	CLPSN-38	CLP – 61	15° 48' 01.1" N	75° 09' 57.5" E	23-Jun-10
4	CLPSN-39	CLP – 62	15° 49' 56.4" N	75° 11' 29.8" E	23-Jun-10

5	CLPSN-40	CLP – 63	15° 50' 04.2" N	75° 11' 30.6" E	23-Jun-10
6	CLPSN-41	CLP – 64	15° 50' 11.7" N	75° 11' 31.6" E	23-Jun-10
7	CLPSN-42	CLP – 66	15° 50' 19.2" N	75° 11' 34.2" E	23-Jun-10
8	CLPSN-43	CLP – 67	15° 50' 26.5" N	75° 11' 35.6" E	23-Jun-10
9	CLPSN-44	CLP – 68	15° 50' 35.7" N	75° 11' 40.9" E	23-Jun-10
10	CLPSN-45	CLP – 69	15° 50' 42.6" N	75° 11' 32.3" E	23-Jun-10
11	CLPSN-46	CLP – 40	15° 50' 48.6" N	75° 11' 32.8" E	23-Jun-10
12	CLPSN-47	CLP – 41	15° 50' 55.9" N	75° 11' 29.8" E	23-Jun-10
13	CLPSN-48	CLP – 43	15° 51' 02.2" N	75° 11' 28.6" E	23-Jun-10
14	CLPSN-49	CLP – 51	15° 51' 08.8" N	75° 11' 27.2" E	23-Jun-10
15	CLPSN-50	CLP – 52	15° 50' 58.8" N	75° 11' 45.5" E	23-Jun-10
16	CLPSN-51	CLP – 53	15° 51' 04.7" N	75° 11' 44.1" E	23-Jun-10
17	CLPSN-52	CLP – 54	15° 51' 09.9" N	75° 11' 41.7" E	23-Jun-10
18	CLPSN-53	CLP – 55	15° 51' 19.1" N	75° 11' 47.5" E	23-Jun-10
19	CLPSN-54	CLP – 56	15° 51' 27.9" N	75° 11' 53.0" E	23-Jun-10
20	CLPSN-55	CLP – 65	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
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 – 90	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 – 92	15° 52' 13.4" N	75° 13' 51.8" E	03-Aug-10
41	CLPSN-76	CLP – 57	15° 52' 42.3" N	75° 13' 42.6" E	15-Sep-10
42	CLPSN-77	CLP – 95	15° 52' 51.0" N	75° 13' 44.7" E	15-Sep-10
43	CLPSN-78	CLP – 96	15° 52' 56.5" N	75° 13' 44.3" E	15-Sep-10
44	CLPSN-79	CLP – 97	15° 53' 03.1" N	75° 13' 46.0" E	15-Sep-10
45	CLPSN-80	CLP – 98	15° 53' 10.3" N	75° 13' 46.1" E	15-Sep-10

46	CLPSN-81	CLP – 99	15° 50' 45.3" N	75° 11' 49.2" E	15-Sep-10
47	CLPSN-82	CLP – 2	15° 53' 19.3" N	75° 14' 02.9" E	03-Dec-10
48	CLPSN-83	CLP – 3	15° 53' 12.6" N	75° 14' 05.0" E	03-Dec-10
49	CLPSN-84	CLP – 4	15° 49' 15.8" N	75° 06' 31.1" E	03-Dec-10
50	CLPSN-85	CLP – 5	15° 49' 23.5" N	75° 06' 47.8" E	03-Dec-10
51	CLPSN-86	CLP – 8	15° 49' 17.1" N	75° 06' 49.1" E	03-Dec-10
52	CLPSN-87	CLP – 9	15° 49' 10.4" N	75° 06' 49.8" E	03-Dec-10
53	CLPSN-88	CLP – 10	15° 48' 50.9" N	75° 06' 48.4" E	03-Dec-10
54	CLPSN-89	CLP – 102	15° 48' 43.7" N	75° 06' 46.6" E	03-Dec-10
55	CLPSN-90	CLP – 103	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:

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

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

- **Implementation Status:** All the WTGs of the project activity are commissioned. The first WTG was commissioned on 23-June-2010 and the last WEG was commissioned on 31-Jan-2011. The commissioning dates of the individual WTGs have been provided in section 1.7.
- **Operation of the project activity including Specific 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 Project Description Deviations

No deviation from the monitoring plan has been taken.

2.3 Grouped Project

The project activity is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Samana, Gujarat:

Data Unit / 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 tCO ₂ e/MWh
Purpose of the data:	Baseline emission calculations
Any comment:	This value has been determined and fixed ex-ante.

Data Unit / 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 tCO ₂ e/MWh
Purpose of the data:	Baseline emission calculations
Any comment:	This value has been determined and fixed ex-ante.

Data Unit / 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:	Estimated figure based on 75% of OM and 25% of BM values
Value applied:	0.9528 tCO ₂ e/MWh

Purpose of the data:	Baseline emission calculations
Any comment:	This value has been determined and fixed ex-ante.

Saundatti, Karnataka:

Data Unit / 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 tCO ₂ e/MWh
Purpose of the data:	Baseline emission calculations
Any comment:	This value has been determined and fixed ex-ante.

Data Unit / 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 tCO ₂ e/MWh
Purpose of the data:	Baseline emission calculations
Any comment:	This value has been determined and fixed ex-ante.

Data Unit / 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:	Estimated figure based on 75% of OM and 25% of BM values
Value applied:	0.8969 tCO ₂ e/MWh
Purpose of the data:	Baseline emission calculations
Any comment:	This value has been determined and fixed ex-ante.

3.2 Data and Parameters Monitored

Data and Parameters Monitored for Samana site:

Data Unit / 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 data
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:	Refer ER calculation sheet
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.
Calculation method:	Not applicable
Any comment:	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 Unit / 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 <i>y</i>
Source of data:	Share Certificate by 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 the recording frequency for this data is monthly.
Value monitored:	33,065.304 MWh
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 0.2 s.
QA/QC procedures to be applied:	Calibration of the main meter shall be done once every three years, and faulty meters will be duly calibrated immediately if found to be outside the permissible limits. Meters are tested annually.
Calculation method:	$EG_{\text{NEWNE, facility, y}} = \text{Net wind farm generation} * (\text{Electricity generation by project WTGs} / \text{Electricity generation by wind farm WTGs})$
Any comment:	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 and Parameters Monitored for Saundatti site:

Data Unit / Parameter:	$EG_{\text{Saundatti, WTG, i}}$
Data unit:	MWh
Description:	Quantity of electricity generated by <i>i</i> th WTG at Saundatti site
Source of data:	LCS meter data
Description of measurement methods and procedures to be applied:	The quantity of electricity generated by <i>i</i> th 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:	Refer ER calculation sheet
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.
Calculation method:	Not applicable
Any comment:	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 Unit / 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 prorata 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:	153,653.002
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 0.2 s.
QA/QC procedures to be applied:	Calibration of the main and check meters shall be done once every three years.
Calculation method:	$EG_{\text{South, facility, y}} = \text{Net wind farm generation}^*$ (Electricity generation by project WTGs / Electricity generation by wind farm WTGs)
Any comment:	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 Description of the Monitoring Plan

Description of the Monitoring Plan

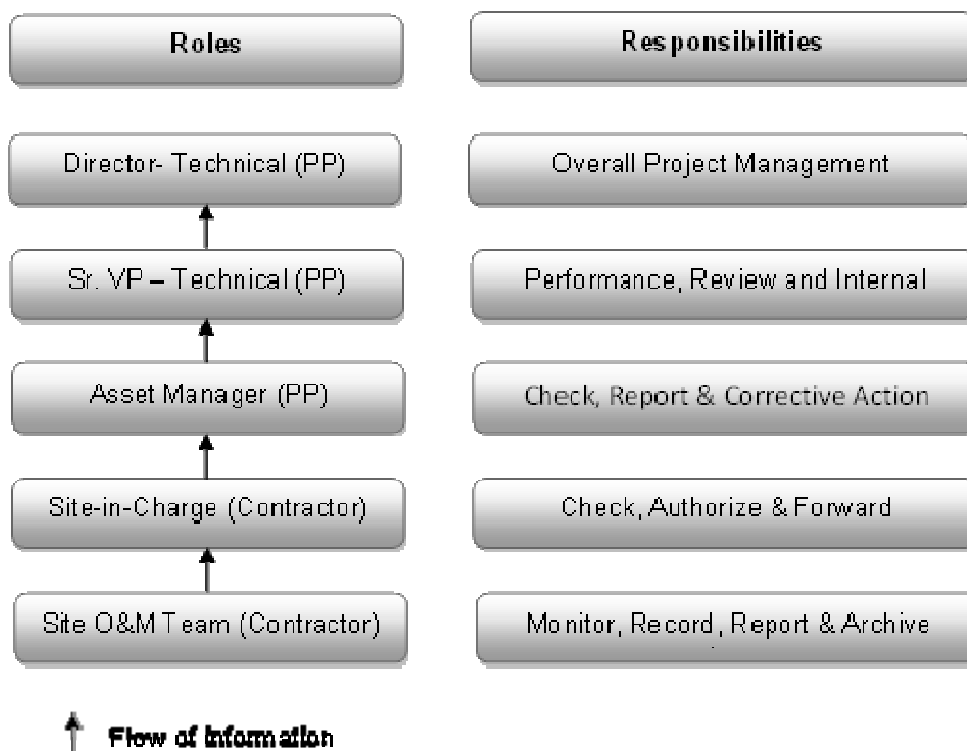
The monitoring plan has being devised as per approved consolidated monitoring methodology ACM0002 Version 13.0.0 - "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".

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, CLPWFPL has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines. The contractor, Enercon (India) Limited (EIL), under the O&M contract with CLPWFPL would be responsible for the operation and maintenance of the project activity for the entire crediting period.

The responsibility of project management as well as registration, monitoring, measurement and reporting lies with CLPWFPL. CLPWFPL has envisaged a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power. The same has been outlined as follows:

Organizational structure, responsibilities and competencies



The O&M personnel are qualified engineers and are trained at the WTG manufacturing facility of Enercon (India) Limited at Daman for operating and ensuring best performance of the WTGs.

Generating, recording, storing, aggregating, collating and reporting data

Metering Equipment: Metering equipment consists of bidirectional electronic meters of accuracy class 0.2s required for the Project (both main and check meter).

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

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 Enercon maintains an accurate and up-to-date operating log at the wind farm. 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 Enercon (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 for meters installed in current monitoring period:

All meters at both sites are 0.2 s class, and were tested by GUVNL/GEDA for Samana and KPTCL for Saundatti

Samana site:

Sr. No.	Meter No.	Type	Accuracy Class	Calibration Dates		
1	GJU 01470	Main Meter	0.2	3-Mar-09	22-Jan-10	17-Jan-12
2	GJU 04175	Main Meter	0.2	3-Mar-09	22-Jan-10	17-Jan-12
3	GJU 04176	Main Meter	0.2	3-Mar-09	22-Jan-10	17-Jan-12
4	KAB 11082	Main Meter	0.2	Not Installed	29-May-10	17-Jan-12

Saundatti site:

Sr. No.	Meter No.	Type	Accuracy Class	Calibration Dates				
1	9141842	Main Meter	0.2	4-Mar-10	29-May-10	31-Jan-11	5-Aug-11	10-Feb-12
2	9141846	Check Meter	0.2	4-Mar-10	29-May-10	31-Jan-11	5-Aug-11	10-Feb-12
3	9141848	Main Meter	0.2	4-Mar-10	29-May-10	31-Jan-11	5-Aug-11	10-Feb-12
4	9141852	Check Meter	0.2	4-Mar-10	29-May-10	31-Jan-11	5-Aug-11	10-Feb-12

Procedures for handling data uncertainty (internal auditing and non-conformities):

- In case main meter is faulty, the load is switched to the other operational meters so that there is no lapse in recording of electricity generation data. Check meter is used to calculate the electricity exported to the grid. Main meter is immediately replaced by a new meter and meter reading from the replaced meter is used thereafter.
- In case the check meter is faulty- The check meter is immediately replaced. The emission reduction calculation would not be affected as reading from main meter is used to calculate the net electricity exported to the grid.

- c. In case error is identified during annual accuracy testing- If during the annual tests, the meter is found to be beyond the permissible limits of error, the meter shall be immediately calibrated and replaced, if necessary. The error that is identified in the annual accuracy testing would be applied to all the readings of electricity exported as indicated in the credit note from the state utility from the date of last accuracy testing. Billing for the period thereafter shall be as per the calibrated meter.

The Project Management team of CLP receives the data from both the sources and keeps track of project activity which reduces the carbon emission reductions.

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)

Baseline emissions (BE_y) are calculated as follows:

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

Period	Samana site, Gujarat			Saundatti site, Karnataka			TOTAL
	Net electricity generation by all Samana project activity WTGs (MWh)	Emission Factor - NEWNE Grid (tCO ₂ e/MWh)	Baseline emissions - Samana site (tCO ₂ e)	Net electricity generation by all Saundatti project activity WTGs (MWh)	Emission Factor - Southern Grid (tCO ₂ e/MWh)	Baseline emissions - Saundatti site (tCO ₂ e)	Baseline emissions (tCO ₂ e)
	EG _{NEWNE,facility,y}	EF _{NEWNE,grid,CM,y}	BE _{NEWNE,y}	EG _{South,facility,y}	EF _{South,grid,CM,y}	BE _{South,y}	BE _y
23-Jun-10 to 30-Jun-10	0	0.9528	0	270.905	0.8969	243	243
1-Jul-10 to 31-Jul-10	165.459	0.9528	158	3,242.821	0.8969	2,908	3,066
1-Aug-10 to 31-Aug-10	199.417	0.9528	190	6,170.053	0.8969	5,534	5,724
1-Sep-10 to 30-Sep-10	157.290	0.9528	150	5,427.396	0.8969	4,868	5,018
1-Oct-10 to 31-Oct-10	162.154	0.9528	155	4,090.223	0.8969	3,669	3,823
1-Nov-10 to 30-Nov-10	202.016	0.9528	192	3,797.126	0.8969	3,406	3,598
1-Dec-10 to 31-Dec-10	232.870	0.9528	222	4,596.169	0.8969	4,122	4,344
1-Jan-11 to 31-Jan-11	397.111	0.9528	378	3,905.976	0.8969	3,503	3,882
1-Feb-11 to 28-Feb-11	1,013.782	0.9528	966	4,055.873	0.8969	3,638	4,604
1-Mar-11 to 31-Mar-11	1,644.133	0.9528	1,567	4,049.571	0.8969	3,632	5,199
1-Apr-11 to 30-Apr-11	1,803.087	0.9528	1,718	4,057.455	0.8969	3,639	5,357
1-May-11 to 31-May-11	2,989.350	0.9528	2,848	7,687.559	0.8969	6,895	9,743
1-Jun-11 to 30-Jun-11	2,667.174	0.9528	2,541	14,816.394	0.8969	13,289	15,830
1-Jul-11 to 31-Jul-11	2,060.978	0.9528	1,964	14,480.673	0.8969	12,988	14,951
1-Aug-11 to 31-Aug-11	1,824.035	0.9528	1,738	11,848.552	0.8969	10,627	12,365
1-Sep-11 to 30-Sep-11	1,109.526	0.9528	1,057	8,882.980	0.8969	7,967	9,024
1-Oct-11 to 31-Oct-11	852.304	0.9528	812	4,283.050	0.8969	3,841	4,654
1-Nov-11 to 30-Nov-11	1,031.050	0.9528	982	6,953.652	0.8969	6,237	7,219
1-Dec-11 to 31-Dec-11	1,662.236	0.9528	1,584	4,618.392	0.8969	4,142	5,726
1-Jan-12 to 31-Jan-12	1,634.136	0.9528	1,557	3,028.352	0.8969	2,716	4,273
1-Feb-12 to 29-Feb-12	1,775.978	0.9528	1,692	3,312.194	0.8969	2,971	4,663
1-Mar-12 to 31-Mar-12	1,727.363	0.9528	1,646	3,308.864	0.8969	2,968	4,614
1-Apr-12 to	1,932.325	0.9528	1,841	4,167.193	0.8969	3,738	5,579

30-Apr-12							
1-May-12 to 31-May-12	2,634.244	0.9528	2,510	8,735.240	0.8969	7,835	10,345
1-Jun-12 to 30-Jun-12	3,187.286	0.9528	3,037	13,866.339	0.8969	12,437	15,474
TOTAL	33,065.304		31,505	153,653.002		137,811	169,316

Thus from the above table,

$$\text{BE}_y = 169,316 \text{ tCO}_2\text{e}$$

4.2 Project Emissions

According to the chosen baseline methodology ACM0002 Version 13.0.0, project emissions are accounted for as follows:

$$\text{PE}_y = \text{PE}_{\text{FF},y} + \text{PE}_{\text{GP},y} + \text{PE}_{\text{HP},y}$$

Where:

- PE_y = Project emissions in year y (tCO_2e)
- $\text{PE}_{\text{FF},y}$ = Project emissions from fossil fuel consumption in year y (tCO_2)
- $\text{PE}_{\text{GP},y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO_2e)
- $\text{PE}_{\text{HP},y}$ = Project emissions from reservoirs of hydro power plants in year y (tCO_2e)

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, $\text{PE}_y = 0$

According to the approved methodology ACM0002 (Version 13.0.0) Emission Reductions are calculated as

$$\text{ER}_y = \text{BE}_y - \text{PE}_y \text{ Equation 11 of ACM0002}$$

Where:

- ER_y Emission reductions in year y ($\text{tCO}_2\text{e/yr}$)
- BE_y Baseline Emissions in year y ($\text{tCO}_2\text{e/yr}$)
- PE_y Project Emissions in year y ($\text{tCO}_2\text{e/yr}$)

Thus,

$$\text{ER}_y = 169,316 - 0 = 169,316 \text{ tCO}_2\text{e}$$

4.3 Leakage

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

4.4 Summary of GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

- ER_y = Emission reductions in year y (t CO₂e)
- BE_y = Baseline emissions in year y (t CO₂)
- PE_y = Project emissions in year y (t CO₂e)

The net GHG emission reductions from the Project Activity during this monitoring period is 169,316 tCO₂e.

Year	Period	Baseline emissions (tCO ₂ e)	Project Emissions (tCO ₂ e)	Emission reductions (tCO ₂ e)
		BE _y	PE _y	ER _y
2010	23-Jun-10 to 30-Jun-10	243	0	243
	1-Jul-10 to 31-Jul-10	3,066	0	3,066
	1-Aug-10 to 31-Aug-10	5,724	0	5,724
	1-Sep-10 to 30-Sep-10	5,018	0	5,018
	1-Oct-10 to 31-Oct-10	3,823	0	3,823
	1-Nov-10 to 30-Nov-10	3,598	0	3,598
	1-Dec-10 to 31-Dec-10	4,344	0	4,344
2011	1-Jan-11 to 31-Jan-11	3,882	0	3,882
	1-Feb-11 to 28-Feb-11	4,604	0	4,604
	1-Mar-11 to 31-Mar-11	5,199	0	5,199
	1-Apr-11 to 30-Apr-11	5,357	0	5,357
	1-May-11 to 31-May-11	9,743	0	9,743
	1-Jun-11 to 30-Jun-11	15,830	0	15,830
	1-Jul-11 to 31-Jul-11	14,951	0	14,951
	1-Aug-11 to 31-Aug-11	12,365	0	12,365
	1-Sep-11 to 30-Sep-11	9,024	0	9,024
	1-Oct-11 to 31-Oct-11	4,654	0	4,654
	1-Nov-11 to 30-Nov-11	7,219	0	7,219
	1-Dec-11 to 31-Dec-11	5,726	0	5,726
2012	1-Jan-12 to 31-Jan-12	4,273	0	4,273
	1-Feb-12 to 29-Feb-12	4,663	0	4,663
	1-Mar-12 to 31-Mar-12	4,614	0	4,614
	1-Apr-12 to 30-Apr-12	5,579	0	5,579
	1-May-12 to 31-May-12	10,345	0	10,345
	1-Jun-12 to 30-Jun-12	15,474	0	15,474

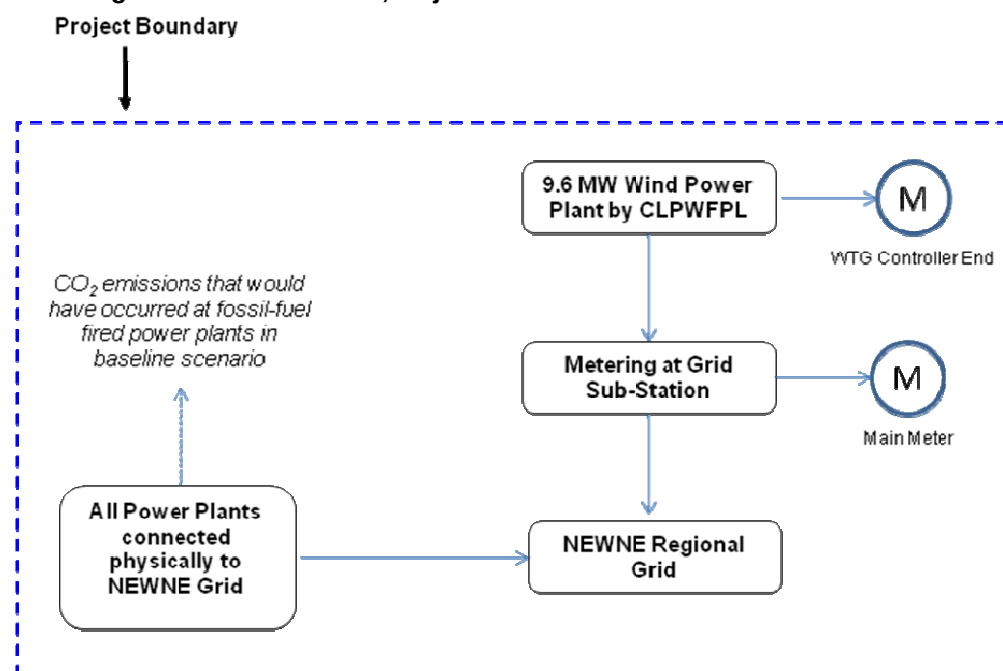
	TOTAL	169,316	0	169,316
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Vintage wise breakdown of the net GHG emission reductions are as follows,

Year	Months considered in year	EG _{PJ,y} (Net Generation in MWh)	Baseline Emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions (tCO ₂ e)
2010	June 2010 to December 2010	28713.90	25816	0	0	25816
2011	January 2011 to December 2011	108694.90	98554	0	0	98554
2012	January 2012 to June 2012	49309.51	44946	0	0	44946
Total						169316

5 ADDITIONAL INFORMATION

Line diagram for Samana site, Gujarat:



Line diagram for Saundatti site, Karnataka:

