

2ND PERIODIC MONITORING REPORT OF GRID CONNECTED WIND POWER PROJECT IN TAMIL NADU



Document Prepared By CLP Wind Farms (India) Private Limited

Project Title	Grid Connected Wind Power Project in Tamil Nadu
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project has been implemented by CLP Wind Farms (India) Private Limited (“CLP”) in the state of Tamil Nadu. The Wind Turbine Generators (“WEG”) have been supplied by Vestas Wind Technology India Private Limited (“Vestas”). As per the Supply and Services agreement signed between CLP and Vestas, later is responsible for technology and equipment supply, as well as the operation and maintenance of the WEGs. The Project uses wind energy to generate electricity using 1.65 MW Wind Turbine Generators (WEGs) in the Tamil Nadu state in India. Total 15 numbers 1.65 MW of Vestas make WEGs are installed as part of this Project by CLP Wind Farms (India) Private Limited (CLP). The power generated from this project activity will be supplied to the state electricity grid which is a part of Southern regional grid of India.

The Project is fully commissioned and is supplying electricity to Southern Regional Grid. Detailed locations and commissioning dates of the Project are provided in section 1.7 of this report. Total emissions reductions generated by the Project during this monitoring period are 44,303 tCO₂ e.

1.2 Sectoral Scope and Project Type

The project activity is considered under ‘grid-connected electricity generation from renewable sources’ (Sectoral Scope) that generates electricity in excess of 15 MW (limit for small scale project). Therefore as per the scope of the project activity enlisted in the ‘list of sectoral scopes and related approved baseline and monitoring methodologies’, the project activity is categorized in Scope Number 1. Details of the same are listed below:

Scope Number : 1

Sectoral Scope : Energy industries (renewable/non-renewable sources)

Project Type : Project

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

The Project is neither a grouped nor an AFOUL project.

1.3 Project Proponent

Organization name	CLP Wind Farms (India) Private Limited
Contact person	Dipjay Sanchania
Title	Head – CDM

Address	15 th floor, Oberoi Commerz, Off. Western Express Highway, Goregaon (East), Mumbai 400 063 India
Telephone	+91 22 6758 8888
Email	carbon@clpindia.in

1.4 Other Entities Involved in the Project

No other entity is involved in this project activity.

<i>Organization name</i>	<i>Nil</i>
<i>Role in the project</i>	<i>Nil</i>
<i>Contact person</i>	<i>Nil</i>
<i>Title</i>	<i>Nil</i>
<i>Address</i>	<i>Nil</i>
<i>Telephone</i>	<i>Nil</i>
<i>Email</i>	<i>Nil</i>

1.5 Project Start Date

02 – July – 2010, being the date of commissioning of first WEG installed under the project activity.

1.6 Project Crediting Period

Crediting Period: 10 years 0 months (renewable twice)

Start Date of Crediting Period: 02 – July – 2010

End Date of Crediting Period: 01 – July – 2020

The project proponents is undertaking the same project activity under CDM¹ however VCU's shall be claimed only till the day before the date of registration of the project under CDM. The Project Proponent confirms that the Project is also registered under CDM² on 04/10/2012 and they will claim emissions reductions from the Project only in one mechanism for a particular period to avoid double counting.

All days considered under this monitoring period are not part of Project's CDM monitoring period, which start from 04/10/2012.

¹<http://cdm.unfccc.int/Projects/Validation/DB/QEJVYBH36RERGDA2GCQSDVCZH1DK8/view.html>

²<http://cdm.unfccc.int/Projects/DB/RWTUV1348481875.12/view>

1.7 Project Location

Villages : Jangalpatti, Poomalaikundu, &Seepalakottai

District : Theni

State : Tamil Nadu

Host Party : India

The Project is spread across Jangalpatti, Poomalaikundu, & Seepalakottai villages in Theni & Uttamaplayamtaluka of Theni district of Tamil Nadu state in India. The nearest airport and railway station are in Madurai city which is located at a distance of approximately 75 km from the project activity site. The coordinates of individual WEGs of this site are as below:

Sr. No.	Unique Identification No.	HTSC. No.	Latitude	Longitude	Date of Commissioning
1	TPK 221	T 110	N9°52'46.15"	E77°26'10.50"	2-Jul-2010
2	TPK 130	T 129	N9°53'52.07"	E77°25'37.12"	29-Jul-2010
3	TPK 58	T 127	N9°54'52.23"	E77°26'16.84"	29-Jul-2010
4	TJP 247	T 135	N9°53'19.14"	E77°28'54.39"	29-Jul-2010
5	TJP 391	T 133	N9°52'32.08"	E77°28'35.14"	29-Jul-2010
6	TPK 520	T 124	N9°54'45.33"	E77°27'59.91"	29-Jul-2010
7	TPK 603	T 126	N9°54'29.73"	E77°27'00.05"	29-Jul-2010
8	TSK 447	T 131	N9°52'36.71"	E77°27'22.31"	29-Jul-2010
9	TPK 108	T 128	N9°54'07.38"	E77°25'34.54"	29-Jul-2010
10	TPK 529	T 125	N9°54'30.80"	E77°27'31.72"	29-Jul-2010
11	TJP 78	T 123	N9°54'08.24"	E77°28'35.82"	29-Jul-2010
12	TJP 198	T 136	N9°53'23.69"	E77°29'16.57"	29-Jul-2010
13	TJP 324	T 134	N9°52'56.42"	E77°28'51.89"	29-Jul-2010
14	TSK 470	T 132	N9°52'32.26"	E77°28'10.93"	29-Jul-2010
15	TPK 228	T 130	N9°52'59.62"	E77°26'27.69"	29-Jul-2010

1.8 Title and Reference of Methodology

The approved consolidated baseline and monitoring methodology ACM0002 (Version 13.0.0, EB67), has been used to determine the baseline emissions and emission reduction due to the project activity. The details of the methodology are mentioned below:

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”
- Guidance on assessment of investment analysis (05, EB 62)

1.9 Other Programs

The Project is a CDM registered Project activity and its CDM details are as follows,

Project Title: Grid Connected Wind Power Project in Tamil Nadu.

CDM Registration Number: 7415

Crediting Period Start Date: 04 – Oct – 2012

Emission Reduction Claimed Till Date: No claim made till date

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.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

- **Implementation Status:**

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

- **Events that may impact the GHG emission reductions or removals and monitoring:**

No such events took place during this 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

There are no deviations related to Project Description.

2.3 Grouped Project

Not Applicable

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$																	
Data unit	tCO ₂ e/MWh																	
Description	Operating Margin (OM) Emission Factor of Southern Grid																	
Source of data	The CO ₂ Baseline Database for the Indian Power Sector - Ministry of Power: Central Electricity Authority (CEA) Version 7.																	
Value applied:	<table border="1"> <thead> <tr> <th>Year</th> <th>Simple operating margin of Southern regional grid (tCO₂e/MWh)</th> <th>Net electricity generation in the year (MWh)</th> </tr> </thead> <tbody> <tr> <td>2008-09</td> <td>0.9729</td> <td>121471.25</td> </tr> <tr> <td>2009-10</td> <td>0.9415</td> <td>134716.87</td> </tr> <tr> <td>2010-11</td> <td>0.9419</td> <td>137387.26</td> </tr> <tr> <td colspan="2">Generation weighted average Operating Margin emission factor in the last three years</td> <td>0.9513</td> </tr> </tbody> </table>			Year	Simple operating margin of Southern regional grid (tCO ₂ e/MWh)	Net electricity generation in the year (MWh)	2008-09	0.9729	121471.25	2009-10	0.9415	134716.87	2010-11	0.9419	137387.26	Generation weighted average Operating Margin emission factor in the last three years		0.9513
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Generation weighted average Operating Margin emission factor in the last three years		0.9513																
Justification of choice of	Data is taken as per the methodology, guidelines and tools																	

data or description of measurement methods and procedures applied	mentioned in section 1.8 of this monitoring report.
Purpose of the data	Baseline emission calculations
Comments	Operating margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	EF_{grid,BM,y}
Data unit	tCO ₂ e/MWh
Description	Build Margin (BM) Emission Factor of Southern Grid
Source of data	The CO ₂ Baseline Database for the Indian Power Sector - Ministry of Power: Central Electricity Authority (CEA) Version 7.
Value applied:	0.7339 tCO ₂ /MWh for the year 2010-11
Justification of choice of data or description of measurement methods and procedures applied	Data is taken as per the methodology, guidelines and tools mentioned in section 1.8 of this monitoring report.
Purpose of the data	Baseline emission calculations
Comments	Build margin emission factor is fixed ex-ante throughout the crediting period.

Data / Parameter	EF_{grid,CM,y}
Data unit	tCO ₂ e/MWh
Description	Combined Margin (CM) Emission Factor of Southern Grid
Source of data	The CO ₂ Baseline Database for the Indian Power Sector - Ministry of Power: Central Electricity Authority (CEA) Version 7.
Value applied:	<p>Computed using the following formula</p> $EF_{grid,y} = W_{OM} * EF_{grid,OM,y} + W_{BM} * EF_{grid, BM,y}$ $EF_{grid,y} = 0.75 * 0.9513 + 0.25 * 0.7339 = 0.8969$ <p>Combined margin CO₂ emission factor for grid connected power</p>

	generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”
Justification of choice of data or description of measurement methods and procedures applied	Data is taken as per the methodology, guidelines and tools mentioned in section 1.8 of this monitoring report.
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	$EG_{P,J,y}$
Data unit	MWh (Mega-watt hour)
Description	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity during the period y
Source of data	The electricity supplied to the grid would be taken from the Joint Meter Reading Report carried out at the TNEB meter located near each WEG.
Description of measurement methods and procedures to be applied	<p>The Net Electricity Generated and exported to the grid is measured by the main meters (or by check meter in case of error in main meter installed). These meters are installed by TNEB at the metering point near each WEG.</p> <p>The Total Net Electricity supplied to TNEB grid by the project activity is the summation of Net Electricity supplied by individual 15 WEGs of the project activity</p>
Frequency of monitoring/recording	<p>The main meter and check meters, located near the foot of the turbine, continuously monitors export, import and net export of energy from each turbine.</p> <p>The readings at the Metering Point are undertaken every month jointly by the representatives of the State Grid/ TNEB and</p>

	<p>CLP/Vestas representative.</p> <p>Based on these meter readings, TNEB issues generation record/ JMR that contains export, import and net export of each WEGs of the project activity. Thus the recording frequency for this data is monthly.</p>
Value monitored:	49,396
Monitoring equipment	<p>The project proponent has installed two identical 0.5s accuracy class Trivector Meters, referred as main and check meters.</p> <p>These meters are located at the foot of the turbine on 33kv outgoing feeders. (Metering Point)</p> <p>Reading of the main meter is taken for the billing purpose, while the same is getting cross checked using the check meter.</p> <p>The metering equipments (main and check) are duly approved, tested and sealed by TNEB in the presence of the parties involved (TNEB and Vestas).</p>
QA/QC procedures to be applied	<p>The quantity of net electricity supplied will be cross-verified from the invoice raised to TNEB by the project proponent.</p> <p>The TNEB carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of Vestas representative. The frequency of meter testing is once in 3 year. All meters are tested at the Metering Point.</p>
Purpose of the data	To calculate emissions reductions from the Project
Calculation method	Measured quantity
Comments	The data will be archived for crediting period + 2 years.

3.3 Monitoring Plan

The approved large scale methodology ACM0002 (Version 13.0.0), stipulates the monitoring of the net electricity generation supplied by the project plant/unit to the grid.

Description of the Monitoring Plan

Each of the 15 WEGs considered in the Project has Main and Check meters installed on the 33 kV outgoing feeder for metering of electricity produced/ consumed by the WEGs Both of these Main and Check meters are identical in terms of technical specification.

The TNEB carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of Vestas representative. The frequency of meter testing is once in 3 year. All meters are tested at the Metering Point.

Metering procedure

The generated electricity is measured through a two steps procedure wherein the first metering is carried out at the micro-processor based controller (Local Control System) specially designed to control the WEG. The primary function of the LCS is to ensure that all the components of the WEG remain fully operational under all conditions. In order to meet this requirement, it is necessary to monitor wind speed, wind direction, temperature, rotational speeds, electricity generated, voltage etc. The LCS display and keyboard enable control of all WEG functions. The electricity generation details will be displayed in the LCS. The monitoring of all these wind turbines is done from a common monitoring station as a part of central monitoring system. The system consists of a state- of- the- art controlling and monitoring and well trained staff personnel of O&M contractor, Vestas, are always present on site to monitor various parameters of power generation and deal with any problems related to generation, transmission or maintenance.

The second metering is carried out at TNEB meter located near each WEG. This is the metering point wherein the Joint Meter Reading (JMR) is carried out every month in presence of the representatives of the project proponent & the state electricity utility (TNEB). This JMR is used for calculation of the amount of electricity supplied to the grid against which the utility makes the payment to the project proponent. The JMR gives both the “export” and “import” of the electricity to/ from the Southern grid. There is a single meter which gives both the export and import values, this metered reading would give value net of line losses (negligible since metering/JMR point is very close to the WEG) and auxiliary consumption.

Organizational structure, responsibilities and competencies

The representatives of Operations and Maintenance contractor (Vestas) will record the readings and prepare daily generation reports of all the WEGs. The primary recording of the electricity fed to the electricity grid will be carried out jointly at the TNEB meter located near each WEG. The operations and maintenance structure for the project activity is as follows:



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

The meter readings at the Metering Point (main meter and check meter) are undertaken every month jointly by the representatives of the TNEB and Vestas representative for the previous month and it is certified by representatives of TNEB. The reporting structure has been presented in the preceding section. The monthly data is recorded and stored by the project proponent.

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

- a. In case main meter is faulty- 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.
- b. 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.

Calibration Details of Meters for Current Monitoring Period:

HTSC Number	Main Meter			Check Meter		
	Sr. No.	Calibration Dt.	Due Dt.	Sr. No.	Calibration Dt.	Due Dt.
T-110	TNB04059	31-Oct-09	30-Oct-12	TNB04075	6-Jan-10	5-Jan-13
T-123	TNB04086	31-Oct-09	20-Oct-12	TNB04070	6-Jan-10	5-Jan-13
T-124	TNB04074	6-Jan-10	5-Jan-13	TNB04028	2-Nov-09	1-Nov-12
T-125	TNB02942	17-Feb-10	16-Feb-13	TNB04052	15-Dec-09	14-Dec-12
T-126	TNB04089	17-Dec-09	16-Dec-12	TNB02945	17-Feb-10	16-Feb-13
T-127	TNB04073	6-Jan-10	5-Jan-13	TNB04025	2-Nov-09	1-Nov-12
T-128	TNB04093	17-Dec-09	13-Dec-12	TNB04078	6-Jan-10	5-Jan-13
T-129	TNB02941	17-Feb-10	16-Feb-13	TNB04053	15-Dec-09	14-Dec-12
T-130	TNB04050	15-Dec-09	14-Dec-12	TNB02944	17-Aug-09	14-Dec-12
T-131	TNB04048	6-Jan-10	5-Jan-13	TNB04084	31-Oct-09	30-Oct-12
T-132	TNB04051	15-Dec-09	14-Dec-12	TNB04049	15-Dec-09	14-Dec-12
T-133	TNB02946	17-Feb-10	16-Feb-13	TNB04090	17-Dec-09	16-Dec-12
T-134	TNB04071	6-Jan-10	5-Jan-13	TNB04023	31-Oct-09	30-Oct-12
T-135	TNB04061	31-Oct-09	30-Oct-12	TNB04076	6-Jan-10	5-Jan-13
T-136	TNB04060	31-Oct-09	30-Oct-12	TNB02943	17-Feb-10	16-Feb-13

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The baseline emissions for the monitoring period are calculated as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} \text{-----Equation 6 of ACM0002}$$

Thus,

$$\begin{aligned}
 BE_y &= 49,396 * 0.8969 \text{ tCO}_2\text{e} \\
 &= 44,303 \text{ tCO}_2\text{e}
 \end{aligned}$$

4.2 Project Emissions

The project activity involves harnessing of wind energy and its conversion to electricity. Hence according to ACM0002 Version 13.0.0, there will be no project emissions in the project activity

$$PE_y = 0$$

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

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

$$ER_y = BE_y - PE_y \text{ Equation 11 of ACM0002}$$

Where:

- ER_y Emission reductions in year y (tCO₂e/yr)
- BE_y Baseline Emissions in year y (tCO₂e/yr)
- PE_y Project Emissions in year y (tCO₂e/yr)

Thus,

$$ER_y = 44,303 - 0$$

$$= 44,303 \text{ tCO}_2\text{e}$$

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)
2012 (11-Jun- 2012 to 03-Oct-2012) (Both days inclusive)	44,303	0	0	44,303
Total	44,303	0	0	44,303