

2ND VERIFICATION OF CLP THENI – II



Document Prepared By CLP Wind Farms (Theni – Project II) Private Limited

Project Title	Grid Connected Wind Energy Project in Tamil Nadu
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Report ID	
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Project ID	911
Monitoring Period	11-May-2012 to 03-Oct-2012
Prepared By	CLP Wind Farms (Theni – Project II) Private Limited
Contact	15 th floor, Oberoi Commerz, Off. Western Express Highway, Goregaon (East), Mumbai 400 063 INDIA Ph: +91 22 6758 8888 Email: carbon@clpindia.in Website: www.clpindia.in

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Project uses wind energy to generate electricity using 1.65 MW Wind Turbine Generators (WTGs). Total 30 numbers 1.65 MW of Vestas make WTGs are installed as part of this Project by CLP Wind Farms (Theni – Project II) Private Limited (CLP).

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 101,981 tonnes CO₂e.

1.2 Sectoral Scope and Project Type

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 (Theni – Project II) 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

Organization name	Nil
Role in the project	Nil
Contact person	Nil
Title	Nil
Address	Nil
Telephone	Nil
Email	Nil

1.5 Project Start Date

25 – June – 2010 (date of commissioning of first WTG)

1.6 Project Crediting Period

Crediting Period: 10 years 0 months (renewable twice)

Start Date of Crediting Period: 25 – June – 2010

End Date of Crediting Period: 24 – June – 2020

The Project Proponent confirms that the Project is also registered under CDM 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.

1.7 Project Location

Villages : G.Usulampatti, Mottanoothu, Kothapatti, Shanmuga Sundara Puram, Marikundu
District : Theni
State : Tamil Nadu
Host Party : 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 WTGs of this site are as below:

Sr. No.	Unique Identification No.	HTSC. No.	Longitude	Latitude	Date of Commissioning
1	1165	T 90	E77°34'23.87"	N9°55'55.31"	25-Jun-10
2	1202	T 91	E77°34'05.23"	N9°55'46.90"	25-Jun-10
3	488	T 92	E77°34'40.75"	N9°56'43.03"	25-Jun-10
4	473	T 93	E77°34'49.98"	N9°56'32.52"	25-Jun-10
5	443	T 94	E77°34'59.07"	N9°56'20.61"	25-Jun-10
6	526	T 95	E77°35'02.04"	N9°57'07.75"	25-Jun-10
7	197	T 96	E77°35'29.19"	N9°57'27.12"	25-Jun-10
8	63	T 97	E77°35'26.08"	N9°56'46.16"	25-Jun-10
9	542	T 98	E77°34'53.27"	N9°57'24.12"	25-Jun-10
10	1143	T 99	E77°34'28.19"	N9°56'19.93"	25-Jun-10
11	1131	T 100	E77°34'20.08"	N9°56'30.83"	25-Jun-10
12	645	T 101	E77°34'59.71"	N9°58'14.94"	25-Jun-10
13	1064	T 102	E77°34'34.83"	N9°56'58.04"	25-Jun-10
14	1050	T 103	E77°34'14.52"	N9°57'20.06"	25-Jun-10
15	781	T 104	E77°34'06.37"	N9°58'33.47"	25-Jun-10

Sr. No.	Unique Identification No.	HTSC. No.	Longitude	Latitude	Date of Commissioning
16	1149	T 105	E77°33'35.52"	N9°59'27.51"	25-Jun-10
17	1422	T 106	E77°33'04.40"	N9°59'00.59"	25-Jun-10
18	195	T 107	E77°32'41.36"	N9°57'57.56"	25-Jun-10
19	177	T 108	E77°33'20.37"	N9°57'39.66"	25-Jun-10
20	292	T 109	E77°32'53.88"	N9°57'21.68"	25-Jun-10
21	1194	T 113	E77°34'03.96"	N9°56'04.90"	2-Jul-10
22	293	T 114	E77°35'06.63"	N9°56'50.57"	2-Jul-10
23	274	T 115	E77°35'24.86"	N9°57'01.23"	2-Jul-10
24	1087	T 116	E77°34'11.23"	N9°56'45.05"	2-Jul-10
25	35	T 117	E77°33'53.78"	N9°57'02.06"	2-Jul-10
26	64	T 118	E77°33'41.62"	N9°56'30.64"	25-Jun-10
27	185	T 119	E77°33'00.32"	N9°57'56.24"	2-Jul-10
28	763	T 120	E77°33'40.54"	N9°58'45.28"	2-Jul-10
29	694	T 121	E77°34'53.77"	N9°58'36.03"	2-Jul-10
30	26	T 122	E77°35'19.41"	N9°58'53.99"	2-Jul-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”

1.9 Other Programs

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

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

CDM Registration Number: 7416

Crediting Period Start Date: 04 – Oct – 2012

Emission Reduction Claimed Till Date: 0

Apart from CDM project activity is not part of any Emission Trading Programs, Environmental Credit, GHG Programs or other Binding Limits.

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.

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

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><tr><td>Year</td><td>Simple operating margin of Southern regional grid (tCO₂e/MWh)</td><td>Net electricity generation in the year (MWh)</td></tr><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></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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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	This value has been determined and fixed ex-ante.																	

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	This value has been determined and fixed ex-ante.

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:	Computed using the following formula $EF_{grid,y} = W_{OM} * EF_{grid,OM,y} + W_{BM} * EF_{grid,BM,y}$ $EF_{grid,y} = 0.75 * 0.9513 + 0.25 * 0.7339 = 0.8970$ Combined margin CO₂ 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”
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	This value has been determined and fixed ex-ante.
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3.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ,y}
Data unit	MWh
Description	Sum of Net Electricity Generation by Project WTGs during the period y
Source of data	Joint Meter Reading Report issued by TNEB
Description of measurement methods and procedures to be applied	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 WTG. These meters monitor import, export and net electricity. TNEB and O&M team takes reading of the meters on monthly basis to record – import, export and net generation of electricity from the WTG. EG_{PJ,y} is the total of net generation of by all 30 WTG of the Project..
Frequency of monitoring/recording	Monitoring continuously and recording monthly.
Value monitored:	113,691,369 MWh
Monitoring equipment	The project proponent has installed two identical 0.5s accuracy class Trivector Meters, referred as main and check meters. These meters are located at the foot of the turbine on 33kv outgoing feeders.
QA/QC procedures to be applied	Reading of main meter and check meters are compared to check for errors. The quantity of net electricity supplied will be cross verified from the invoice raised to TNEB by the project proponent.

	The TNEB carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of O&M team. The frequency of meter testing is once in 3 year. All meters are tested at the Metering Point.
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 30 WTGs considered in the Project has Main and Check meters installed on the 33kV outgoing feeder for metering of electricity produced/ consumed by the WTGs 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 WTG. The primary function of the LCS is to ensure that all the components of the WTG 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 WTG 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 WTG. 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 WTG) and auxiliary consumption.

Apportioning of electricity

In case dates of monitoring period do not match with the dates of Joint Meter Reading Sheets / Generation reports issued by TNEB Apportioning will be carried out based on ratio of generation data recorded using LCS meters installed at the WTG. 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.

The emission reductions of that particular period (from the date of registration of the project till the end of the month) will be calculated based on percentage generation of that particular period at WTG using LCS data multiplied with the total units generated in the month as per the Joint Meter Reading Sheets / Generation report issued by TNEB.

The sample calculation is furnished below:

- Generation from CLPWF WTGs for the monitoring period = A (From LCS data)
- Generation from CLPWF WTGs for the billing period = B (From LCS data)
- Net energy exported from CLPWF WTGs for the billing period = C (JMR/Generation share report by MSEDCL)

Net energy export used for calculation of emission reduction for the monitoring period = $(C * A / B)$

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 WTGs. The primary recording of the electricity fed to the electricity grid will be carried out jointly at the TNEB meter located near each WTG. 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):

- 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.
- 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.
- 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.	Sr. No.	Calibration Dt.
T-90	TNB04329	13-Mar-10	TNB04333	13-Mar-10
T-91	TNB02959	15-Feb-10	TNB02958	15-Feb-10
T-92	TNB04384	1-Jun-10	TNB04383	1-Jun-10
T-93	TNB04389	1-Jun-10	TNB04390	1-Jun-10
T-94	TNB04385	1-Jun-10	TNB04386	1-Jun-10
T-95	TNB02951	16-Feb-10	TNB04056	15-Dec-09
T-96	TNB04326	25-May-10	TNB04327	25-May-10
T-97	TNB04328	13-Mar-10	TNB04332	13-Mar-10
T-98	TNB04387	1-Jun-10	TNB04388	1-Jun-10
T-99	TNB04331	13-Mar-10	TNB04335	13-Mar-10
T-100	TNB04077	6-Jan-10	TNB04063	31-Oct-09
T-101	TNB04318	25-May-10	TNB04319	25-May-10
T-102	TNB04047	6-Jan-10	TNB04062	31-Oct-09
T-103	TNB02950	17-Feb-10	TNB04055	15-Dec-09
T-104	TNB02947	17-Feb-10	TNB04091	12-Nov-09
T-105	TNB04420	3-Jun-10	TNB04448	3-Jun-10
T-106	TNB02952	16-Feb-10	TNB04057	15-Dec-09
T-107	TNB04320	25-May-10	TNB04321	25-May-10
T-108	TNB02949	17-Feb-10	TNB04054	15-Dec-09
T-109	TNB04325	25-May-10	TNB04324	25-May-10
T-113	TNB04330	13-Mar-10	TNB04334	13-Mar-10
T-114	TNB04417	3-Jun-10	TNB04416	3-Jun-10
T-115	TNB04391	1-Jun-10	TNB04392	3-Jun-10
T-116	TNB04418	3-Jun-10	TNB04419	3-Jun-10
T-117	TNB04058	15-Dec-09	TNB02953	16-Feb-10
T-118	TNB02948	17-Feb-10	TNB04092	12-Nov-09
T-119	TNB04322	25-May-10	TNB04323	25-May-10
T-120	TNB02954	16-Feb-10	TNB02955	16-Feb-10
T-121	TNB04368	3-Jun-10	TNB04369	3-Jun-10
T-122	TNB02956	15-Feb-10	TNB02957	15-Feb-10

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,

$$\begin{aligned} BE_y &= 113,691,369 \cdot 0.8970 \\ &= 101,981 \text{ tCO}_2\text{e} \end{aligned}$$

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 (tCO ₂ e/yr)
BE _y	Baseline Emissions in year y (tCO ₂ e/yr)
PE _y	Project Emissions in year y (tCO ₂ e/yr)

Thus,

$$\begin{aligned} ER_y &= 101,981 - 0 \\ &= 101,981 \text{ tCO}_2\text{e} \end{aligned}$$

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	101,981	0	0	101,981

(11-May-2012 to 03-Oct-2012)				
Total	101,981	0	0	101,981

APPENDIX X: <TITLE OF APPENDIX>

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