

BUNDLED WIND POWER PROJECT BY KMSPL, BANGALORE

Submitted by

Kanaka Management Services Pvt. Ltd.

**#271, SFS 407, 4th Phase, Yelahanka New Town,
Bangalore 560 064, Karnataka State,
India.**

Project Title	Bundled wind power project by KMSPL, Bangalore
Version	02
Report ID	KMSPL 2 nd Monitoring Report
Date of Issue	25/02/2015
Project ID	324
Monitoring Period	01/01/2010 to 31/12/2014
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project is bundled by Kanaka Management Services Pvt. Ltd. (KMSPL) Bangalore. It is established to harness the available wind power potential with 52 numbers of WTGS in Tamilnadu & Karnataka, aggregating to a total installed capacity of 38.275 MW. The project will generate approximately 89.92 million units of electricity per annum, which is sold to the grid or wheeled for captive consumption. The generation of power using wind energy i.e. renewable source leads to reduced emission of greenhouse gases and displaces electricity from fossil fuel based electricity generation to the grid

1.2 Sectoral Scope and Project Type

Project Type : Renewable Energy Project

Project Category : Grid connected electricity generation from Renewable sources

Scope Number : 01

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

1.3 Project Proponent

Contact information of the project proponent

Organization name	Kanaka Management Services Pvt. Ltd.
Contact person	Mr. Nandagopal P
Title	Senior Consultant
Address	# 271, SFS 407, 4th Phase, Yelahanka New Town, Bangalore-560 064,, Karnataka,India
Telephone	+919008167850
Email	nandagopal@kms-group.com , nandagopal.kmspl@gmail.com

1.4 Other Entities Involved in the Project

All the individual WTG owners have given the emission related rights to the KMSPL. The Contact information of the project proponent is provided in section 1.3.

1.5 Project Start Date

Project start date 22 March 2005

1.6 Project Crediting Period

1 April 2006- 31 March 2016 total number of crediting period is 10 years.

1.7 Project Location

The project activity is located in the districts of Tirunelveli, Coimbatore and Erode in the State of Tamil Nadu and in the districts of Hassan and Davangere in the State of Karnataka, India.

Unique identification of each WTG under each sponsor:

S.no	Client name	WTG size	HTSC no	State /District/Place	Geographical coordinates
1.	Madras Hydraulic Hose (P)Ltd	0.75	1162	Tirunelveli, Tamilnadu	N8 58 0.01, E77 23 59.99
2.	Shanthi Gears Ltd.	1.25	1624/TIN	Tirunelveli, Tamilnadu	N8 59 28.0, E77 32 41.8
		1.5	2417	Tirunelveli, Tamilnadu	E 77 3156.1 N 8 59 35.6
		2.5	56; 2020	Tirunelveli, Tamilnadu	E 77 33 30.5 N 9 01 11.3; E 77 45 41.0 N 8 14 14.0
3.	Raj Ranga Textile Pvt. Ltd.	1.25	294	Coimbatore, Tamilnadu	N10 48 09.5 E77 08 42.9
4	Suueera Alloys Global Pvt. Ltd	1.25	989	Coimbatore, Tamilnadu	N10 48 23.2 E77 08 50.8
5	Cotton Blossom India Pvt. Ltd.	0.75	1416	Tirunelveli Tamilnadu	N8 57.436 E77 30.01
		0.75	2048	Tirunelveli Tamilnadu	N8 55.923 E77 38.140
6	Ambica Agarbathis and Aroma Industries Ltd.	0.75	1198	Tirunelveli Tamilnadu	N8 58 21.7 E77 26 53.2
7.	Tirupur Export Knitwear Industrial Complex	0.5 x 8	1269, 1270, 1271	Tirunelveli Tamilnadu/	N8 18 09.1 E77 41 28.5, N8 18 00.9 E77 41 28.6, N8 18 12.6 E 77 41 38.6, N8 1804.9 E77 41 39.1, N8 18 15.7 E77 41 49.2, N8 18 7.2 E77 41 49.5, N8 18 17.2 E77 421.7, N8 18 9.7 E77 41 59.9

8.	Ansan Textile	0.225	609	Coimbatore Tamilnadu	N10 55.473, E77 17.439
9.	Sree Santhosh Garments	0.225	473	Coimbatore Tamilnadu	N10 55.214 E77 17.391
10.	Mod Forge Pvt. Ltd.	0.75	1952	Tirunelveli Tamilnadu	8.7° N , 77.8° E.
11	Sri Kumaran Wind Energy (P) Ltd	3.75	1739, 1725, 1726	Tirunelveli Tamilnadu	8° 58'54.25", 77°27'31.63"
12	Eskay Design	1.25	1982	Tirunelveli Tamilnadu	N8 59 50.9 E77 32 54.4
13	Nutech Associates	1.25	1198	Erode, Tamilnadu	N10 39 42.9 E77 24 47.3
		0.75	1412	Tirunelveli Tamilnadu	N 8 15 51.6 E77 37 59.4
		1.5	H-21	Hassan, Karnataka	13° 10.6' 32" N 76° 11.6' 93" E
14	Oriental Extractions Pvt. Ltd.	0.7	1201, 1206	Coimbatore, Tamilnadu	N10 35 43.9 E77 18 07.0, N10 36 12.3 E77 19 20.4
15	Nagammal Mills Pvt. Ltd.	1.5	1626, 2126	Tirunelveli Tamilnadu	8°58'54.25", 77°27'31.63" 9°00'54.37", 77°24'29.37"
16.	Best Engineers Pumps Pvt. Ltd .	1.25	1939	Tirunelveli Tamilnadu	N8 59 19.4, E77 33 40.2
17	Premier Carbonic Pvt. Ltd.	0.35	1145	Coimbatore, Tamilnadu	N103622.7, E771828.0
18	Pure Carbo Gases	0.25	580	Coimbatore, Tamilnadu	N10.94104 E077.31165
19	Popular Carbonic Pvt. Ltd	0.35	1144	Coimbatore, Tamilnadu	N103551.7, E771802
20.	Royal Classic Mills Pvt. Ltd	0.75	1937	Tirunelveli Tamilnadu	N85805.8, E77 29 54.7
21	Saranya Garments Pvt. Ltd	0.75	2124	Tirunelveli Tamilnadu	N8 56 400, E7738 403
22	Cethar Vessels Ltd	1.25	1648	Tirunelveli Tamilnadu	N8 55 36.7, E77 36 20.6
23.	VT Switch gears & Transformers	0.6	PS 52	Davangere, Karnataka	N14 13 59.8, E75 47 3.1
24.	Shri Santhosh	2.45 (0.5)	624; 542,	Coimbatore, Tamilnadu	N10 54.342, E77 10.271,

	Meenakshi Textiles Pvt. Ltd.	MW x 4 No. + 0.225 MW* 2 No.)	543, 628; 420; 421		N10 55.178, E77 08.773, N10 55.466, E77 09.031, N10 55.441, E77 08.748, N10 54.290 E77 10.419
25	Lakshmi Exports	0.35	637	Coimbatore, Tamilnadu	N10 56 28.9, E77 20 42.2
		0.225	474	Coimbatore, Tamilnadu	N10 56 27.72, E77 20 42.27
26.	Adtech Systems Ltd	0.6	D 126	Dindigul, Tamilnadu	N10 32 09.9, E77 24 42.5
27	Nutech Prasiddhi Consortium	1.5	H20	Hassan, Karnataka	76° 11.7' 75" E, 13°10.5' 30"N
28.	Sri Ramaiah Spinners Ltd.	0.35	2390	Tirunelveli Tamilnadu	N8 1807.1, E77 37 54.9
29.	Jayashree Cables & Conductors Pvt Ltd.	0.6	D.127	Dindigul, Tamilnadu	N10 32 38.8, E77 24 52.4

1.8 Title and Reference of Methodology

Approved baseline and monitoring methodology applied for the project is:

Title of the methodology: Consolidated baseline methodology for grid connected electricity generation from renewable sources.

VCS Methodology details

Methodology applicable	ACM0002
Version	10
Sectoral scope	01
Reference	http://cdm.unfccc.int/methodologies/Amethodologies/approved.html

1.9 Other Programs

The project activity has never been rejected or applied under any other GHG program.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The project has been undertaken to harness the available wind power potential. The project has established 52 number of WTGs aggregating to a total installed capacity of 38.275 MW. The project will generate approximately 89.92 million units of electricity per annum, which will be entirely sold to the State Electricity Boards or wheeled for captive consumption. The project will help in greenhouse gas emission reduction by using renewable energy resource for generating power which otherwise would have been generated using non-renewable, carbon intensive fuel common in the grid. The project is a green field project aimed at utilizing wind energy to produce power.

The implementation of project will achieve approximately 83,350 tCO₂e emission reduction per annum by replacing grid based electricity which is predominately generated by fossil fuel based thermal power plant in Sothern Grid.

Implementation of this wind based project will reduce the pollution levels from the burning of fossil fuels and release GHG into the atmosphere and displace the electricity purchase from southern regional grid, which in turn reduce the CO₂ emissions from fossil fuel based thermal power plants of southern regional grid.

For the state of Tamilnadu

Metering equipment:

The Project has individual main meter at each WTG installed and owned by the State electricity board. These meters are tri-vector meters of 0.5s accuracy class. The reading of these individual main meters is used for arriving at the monthly generation of the respective WTG.

Calibration of equipment:

The energy meter owned by the state electricity board will be calibrated by TNEB officials, according to the frequency and the maintenance schedule as per the TNEB procedures and the PPA signed with the PP or as per the UNFCCC guidelines.

Measuring & recording details:

The daily generation details of individual WTG will be maintained at the wind farms in respective wind farm's electricity meter log books by the O&M team. Net electricity supplied to grid will be measured through meter readings of this two-way export/import meter installed by TNEB. The reading from the main meter (JMR) is recorded on monthly basis by the official from the state electricity board in the presence of a representative of the PP. The Joint Meter Readings (JMR) taken will be sent to individual PP every month. Each PP will then raise an invoice to the Tamil nadu Electricity Board with respect to the electricity exported to the grid by the WTG(s). The same data will be used for the emission reduction calculation.

Operation & Maintenance:

The project proponents have undertaken an operation and maintenance agreement with the supplier of the wind turbines i.e. Suzlon and Vestas. So the authority and responsibility of O&M lies with the contractor. The WTGs of Suzlon make are monitored continuously by M/s. Suzlon Infrastructure Services Ltd with the help of the Central Monitoring System (CMS) and the total generated values obtained are cross checked with the invoices raised for the particular month. Archiving of data: The monitoring records will be archived for whole crediting period + 2 years.

For the state of Karnataka

Metering equipment

The metering equipment is electronic trivector system. For the WTGs in Karnataka, there is one common meter installed at metering site. For each WTG, main meter & check meter are installed at each metering point. The JMR taken at any one metering point will give readings of both main meter and check meter.

Calibration of equipment:

The monitoring instruments owned by the state electricity board will be calibrated by KPTCL officials, according to the frequency and the maintenance schedule as per the KPTCL procedures and the PPA signed with the PP or as per the UNFCCC guidelines.

In case of failure/error in the main meter, readings of check meter will be considered and the main meter will be replaced/calibrated immediately by CESC Mysore /HESCOM officials.

Measuring & recording details:

The JMR taken at any one metering point will give readings of both main meter and check meter. However, it is reading of the main meter which is considered for calculations after cross-checked against the check meter reading. Both Main & Check meter monitor all possible electrical parameter such as export, import etc. The meters monitor & record these parameters independently. The meters also display an initial reading and a final reading for each parameter that is being monitored. The difference between initial and final readings will give the net export to the grid. Bulk meter installed at sub-station is mainly for determining transmission loss (or line loss). It also gives the total electricity exported and imported by all the wind turbines connected to the sub-station. Net electricity supplied to the regional electricity grid will be calculated using the formula: $EGy = TEGy - EGI - EGT-E - EGT-I$

TEGy = Total electricity generated by the project activity (i.e. Export)

EGI = Electricity imported by the project activity

EGT-E = Transmission loss (or line loss) incurred by the project activity during export of electricity.

EGT-I = Transmission loss (or line loss) incurred by the project activity during import of electricity.

Invoices are raised based on the joint meter readings taken at each metering point as well as at the respective sub-stations.

Operation & Maintenance:

M/s. Suzlon Infrastructure Services Ltd., the service provider for the Suzlon make WTGs have their support office at project sites in Tamil Nadu and Karnataka which includes Customer Relations Manager, Technical Staff, Supervisors, Security Staff, etc. The Monitoring Team is headed by the Site Manager with a team of staff working in three shifts (24x7) to effectively control and monitor the wind power generation.

Archiving of data:

Data is archived both electronically & on paper. Log records will be maintained for two years from the end of the crediting period.

2.2 Deviations

2.2.1 Methodology Deviations

There is no deviation for this monitoring period.

2.2.2 Project Description Deviations

The last calibration dates for all energy meters in the project activity are considered as the initial calibration dates for the second verification, which is in line with the monitoring plan. Further, these meters are certified as factory calibrated by the manufacturer and are installed by the regulatory authority as per the requirements in the power purchase agreements. The project deviation relates that calibration was done by the regulatory authority, the validity of the calibration up to a period of five years in the subsequent monitoring periods can be cross checked by verification of the monthly invoices raised by the PP, which is indicative of the accurate functioning of the energy meters as the invoices are based on the joint meter readings, agreed by the PP and the regulatory authority. The validity of calibration for a period of five years is in line with the monitoring plan and CEA guidelines, 2006.

2.3 Grouped Project

The project activity is a not a grouped project

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EGy
Data unit	MWh
Description	Total net electricity supplied by the project activity to the grid in year y
Source of data	Total of the readings from the main meter installed by State Electricity Board at individual WTGs under this project activity
Value applied:	376157 MWh
Justification of choice of data or description of measurement methods and procedures applied	The energy exported and imported is measured using energy meters at grid interconnection point (i.e. EB yard) which is under the control of TNEB & KEB. The readings are taken every month by TNEB & KEB officials in the presence of Site engineer. In accordance with electricity standards electronic tri-vector meters, having accuracy class not inferior to that of 0.5s, capable of recording export and import has been installed. The meters are maintained and owned by TNEB and KEB.
Purpose of the data	Calculation of baseline emissions
Comments	Nil

3.2 Data and Parameters Monitored

In Tamil Nadu, all the WTGs have individual main meter from the electricity board. The net electricity supplied from the WTGs is arrived directly from this import/ export meter (main meter) by the electricity board and this can be directly read from the invoice of electricity board. Thus, there is only a single monitoring parameter used in the monitoring.

Data / Parameter	EGy																
Data unit	MWh																
Description	Total net electricity supplied by the project activity to the grid in year y.																
Source of data	Generation Statement/Meter Card of the each WTGs issued by TNEB.																
Description of measurement methods and procedures to be applied	The energy exported and imported is measured using energy meters at grid interconnection point (i.e. EB yard) which is under the control of TNEB. The readings are taken every month by TNEB officials in the presence of Site engineer. In accordance with electricity standards electronic tri-vector meters, having accuracy class not inferior to that of 0.5s, capable of recording export and import has been installed. The meters are maintained and owned by TNEB.																
Frequency of monitoring/recording	Continuous measurement and monthly recording																
Value monitored:	<table><tr><th>Year</th><th>Value in MWh</th></tr><tr><td>2010</td><td>66696</td></tr><tr><td>2011</td><td>62504</td></tr><tr><td>2012</td><td>64013</td></tr><tr><td>2013</td><td>71712</td></tr><tr><td>2014</td><td>66306</td></tr><tr><td>Total</td><td>331231</td></tr></table>	Year	Value in MWh	2010	66696	2011	62504	2012	64013	2013	71712	2014	66306	Total	331231		
Year	Value in MWh																
2010	66696																
2011	62504																
2012	64013																
2013	71712																
2014	66306																
Total	331231																
Monitoring equipment	Measured by Energy Meters (Electronic meter) this is not inferior to that of 0.5S accuracy Class.																
QA/QC procedures to be applied	The project activity consists of 49 WTGs. The Periodical calibration of all the meters is undertaken at required intervals as per TNERC/CEA norms (at least once in five years). The calibrated meter has installed for measuring the electricity and next calibration will be done after five years from the date of previous calibration of the WTG. The same procedure will be followed for each WTG. Since no wind mill is due for calibration in this monitoring period, no calibration certificate is required to be shown the verifying DOE. In the absence of the implementation of periodic calibration, the energy meters are subjected to CEA guidelines applicable to India, dated 17-03-2006 which state that “All interface meters shall be tested at least once in five years. These meters shall also be tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters. Whenever there is unreasonable difference between the quantity recorded by interface meter and the corresponding value monitored at the																

	billing center via communication network, the communication system and terminal equipment shall be tested and rectified.”
Purpose of the data	Calculation of baseline emissions
Calculation method	Net generation = (Total Export – Total Import)
Comments	Nil

For Karnataka Data and parameters monitored

Data / Parameter	EGy																
Data unit	MWh																
Description	Total net electricity supplied by the project activity to the grid in year y.																
Source of data	Generation Statement/Meter Card of the each WTGs issued by KEB.																
Description of measurement methods and procedures to be applied	The energy exported and imported is measured using energy meters at grid interconnection point (i.e. EB yard) which is under the control of KEB. The readings are taken every month by KEB officials in the presence of Site engineer. In accordance with electricity standards electronic tri-vector meters, having accuracy class not inferior to that of 0.5s, capable of recording export and import has been installed. The meters are maintained and owned by KEB.																
Frequency of monitoring/recording	Continuous measurement and monthly recording																
Value monitored:	<table><tr><th>Year</th><th>Value in MWh</th></tr><tr><td>2010</td><td>7718</td></tr><tr><td>2011</td><td>10044</td></tr><tr><td>2012</td><td>9007</td></tr><tr><td>2013</td><td>9230</td></tr><tr><td>2014</td><td>8927</td></tr><tr><td>Total</td><td>44926</td></tr></table>	Year	Value in MWh	2010	7718	2011	10044	2012	9007	2013	9230	2014	8927	Total	44926		
Year	Value in MWh																
2010	7718																
2011	10044																
2012	9007																
2013	9230																
2014	8927																
Total	44926																
Monitoring equipment	Measured by Energy Meters (Electronic meter) this is not inferior to that of 0.5S accuracy Class.																
QA/QC procedures to be applied	The project activity consists of 3 WTGs with 3 separate energy meters. The Periodical calibration of all the meters is undertaken at required intervals as per KERC/CEA norms (at least once in five years). The calibrated meter has installed for measuring the electricity and next calibration will be done after five years from the date of previous calibration of the WTG. The same procedure will be followed for each WTG. Since no wind mill is due for calibration in this monitoring period, no calibration certificate is required to be shown the verifying DOE.																

	In the absence of the implementation of periodic calibration, the energy meters are subjected to CEA guidelines applicable to India, dated 17-03-2006 which state that "All interface meters shall be tested at least once in five years. These meters shall also be tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters. Whenever there is unreasonable difference between the quantity recorded by interface meter and the corresponding value monitored at the billing center via communication network, the communication system and terminal equipment shall be tested and rectified."
Purpose of the data	Calculation of baseline emissions
Calculation method	Net generation = (Total Export – Total Import)
Comments	Nil

3.3 Monitoring Plan

Monitoring plan for the state of Tamil Nadu

The data to be monitored is the net generation of electricity supplied to the grid. The Project has individual main meter at each WTG installed and owned by the State electricity board. These meters are tri-vector meters of 0.5s accuracy class. The meters are sealed by the electricity board and meet the Indian and regional electricity authority's standards. The reading of these individual main meters is used for arriving at the monthly generation of the respective WTG. The main meter owned by the state electricity board will be calibrated by TNEB officials, according to the frequency and the maintenance schedule as per the TNEB procedures and the PPA signed with the PP or as per the UNFCCC guidelines (paragraph 12.c, EB- 41 Annex- 20). The daily generation details of individual WTG will be maintained at the wind farms in respective wind farm's electricity meter log books by the O&M team. The reading from the main meter (JMR) is recorded on monthly basis by the official from the state electricity board in the presence of a representative of the PP. The receipt of the sales to grid is cross-checked with the data recorded by the central monitoring system for each individual meter to avoid any differences. The Joint Meter Readings (JMR) taken will be sent to individual PP every month. Each PP will then raise an invoice to the Tamil Nadu Electricity Board with respect to the electricity exported to the grid by the WTG(s). The same data will be used for the emission reduction calculation.

The project proponents have undertaken an operation and maintenance agreement with the supplier of the wind turbines i.e. Suzlon and Vestas. The performance of the mills, safety in operation and scheduled /breakdown maintenances are organized and monitored by the contractor. So the authority and responsibility of O&M lies with the contractor. The entire operations of the WTGs of Suzlon make are monitored continuously with the help of the Central Monitoring System (CMS) for each WTG by M/s. Suzlon Infrastructure Services Ltd. The total electricity generation will also be cross checked with the invoices raised for the particular month.

All the relevant data & reports for maintaining accuracy in future monitoring and reporting of GHGs emission reduction is with Sapthagiri Distilleries Private Limited (SDPL).

Monitoring Plan for the state of Karnataka

For the WTGs in Karnataka, there is one common meter installed at metering site (at the electricity board sub-station, for metering electricity dispatch from project activity WTGs along with a group of WTGs at the site). The metering equipment is electronic trivector system.

Procedure for Monitoring and Recording

The JMR taken at one metering point will give the readings of each WEG connected to that metering point. With a main meter & a check meter installed at each metering point, the JMR taken at any one metering point will give readings of both main meter and check meter. However, it is reading of the main meter which is considered for calculations. The readings of main meter are cross-checked against the readings of check meter. In case of failure/error in the main meter, readings of check meter will be considered and the main meter will be replaced/ calibrated immediately by electricity board officials.

Both Main & Check meter monitor all possible electrical parameter such as export, import etc. The meters monitor & record these parameters independently. The meters also display an initial reading and a final reading for each parameter that is being monitored. For example, if we need to calculate the amount of electricity supplied/exported by all WTGs connected to a particular metering point for the month of September 2008, the initial reading of 'Export' displayed by the main meter should be subtracted from the final reading of the meter. With initial reading being the meter reading of 'Export' as on 1 Sept 08 at 0:00 hrs. and the final reading being the meter reading of 'Export' as on 1 Oct 08 at 0.00hrs, the difference between initial and final reading will give the exact units exported during the month of September 2008. Bulk meter installed at sub-station is mainly for determining transmission loss (or line loss). It also gives the total electricity exported and imported by all the wind turbines connected to the sub-station.

Invoices are raised based on the joint meter readings taken at each metering point as well as at the respective sub-stations. Invoice copy thus provides details of export, import, transmission loss & net generation. However, payments are made on the basis of the net electricity supplied to the grid.

The monitoring instruments owned by the state electricity board will be calibrated by KPTCL officials, according to the frequency and the maintenance schedule as per the KPTCL procedures and the PPA signed with the PP or as per the UNFCCC guidelines (paragraph 12.c, EB- 41 Annex- 20).

Purpose of monitoring: The purpose of an efficient monitoring procedure is to record the real and measurable emission reduction as a result of the project and to avail the revenues they accrue. The project team is also responsible for calculation of actual creditable emission reduction in the most transparent and relevant manner.

Roles and responsibilities: The roles and responsibilities of various officials at the plant site are explained in detail under section 3.4.

Parameter to be monitored: With respect to the project the only parameters that requires a continuous monitoring is the amount of electricity (EGy in GWh) that is supplied by the project to the grid. Metering system for the project consists of one main (trivector) meter of accuracy class 0.5. Net electricity supplied to grid will be measured through meter readings of the two-way export/ import meter installed by TNEB and KSEB. The procedures for metering and meter

reading will be as per the provisions of the power purchase agreement (weekly meter readings will be taken by the WTG operator and monthly Net electricity dispatch reports will be collected at the individual client's Head offices).

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to the approved methodology ACM0002 (Version 10)

Emission Reductions are calculated as:

$$ER_y = BE_y - PE_y - L_y$$

Where:

BE_y: Baseline Emissions in year y (t CO₂e/yr)

PE_y: Project Emissions in year y (t CO₂e/yr)

L_y: Leakage Emissions in year y (t CO₂e/yr)

Estimation of Baseline Emissions

Baseline emissions (BE_y in tCO₂) due to displacement of grid electricity is calculated as the product of the Baseline Emissions Factor (EF_y in tCO₂/MWh) calculated as described below, times the electricity supplied by the project to the grid (EG_y - EG_{baseline} in MWh), over the crediting period.

$$BE_y = EGPJ, y \times EF, Grid, CM, y$$

Where:

BE_y: Baseline emissions in year y (tCO₂/yr.)

EG_y: Electricity supplied by the project to the grid (MWh)

EG_{baseline}: Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero. As this is a new power plant this is zero for the project.

EF_y: 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"

According to the tool the baseline emission coefficient determination is detailed in section 2.4

Details of Baseline data:

Data of Operating and Build Margin for the three financial years from 2005-06 to 2007-08 has been obtained from – The CO₂ Baseline Database for the Indian Power Sector Ministry of Power: Central Electricity Authority (CEA) Version 4 Dated: October 2008

The detailed excel sheet is available at:

<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

Parameter	Description	Value	Unit
EGPJ,y	Electricity supplied by the project to the grid	376157	MWh
EFgrid,CM,y	Combined margin CO2 emission factor for grid connected power generation	0.9269	tCO2e/MWh
BEy	Baseline emissions	348658	tCO2e

4.2 Project Emissions

The project involves harnessing of wind energy and its conversion to electricity. Hence according to ACM0002, there will be no project emissions in the project (PEy = 0).

4.3 Leakage

As per ACM0002, no leakage has been considered for the calculation of emission factor (LEy = 0).

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)
2010	68,974	0	0	68,974
2011	67,244	0	0	67,244
2012	67,682	0	0	67,682
2013	75,025	0	0	75,025
2014	69,733	0	0	69,733
Total	348,658	0	0	348,658

Comparison between estimated and actual emission reduction

As per the registered VCS-PD estimated reduction for the period of 1/ 01/ 2010 to 31/12/2014 is 416750 tCO₂e whereas, the actual emission reduction achieved during the period 1/ 01/ 2010 to 31/12/2014, which is 348,658 tCO₂e and this is lower than expected. This is because the actual PLF achieved by the WTGs during this monitoring period is lower than expected PLF mentioned in the registered VCS-PD. Therefore, the actual generation is lower than estimated generation which has resulted in lower emission reductions.