



# Verified Carbon Standard

## 4.5 MW BUNDLED WIND POWER PROJECT



Document Prepared by EKI Energy Services Limited.

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# 1 PROJECT DETAILS

## 1.1 Summary Description of the Implementation Status of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable wind energy source. The project involves installation of 4.5 MW wind project in Tirunelveli & Tenkasi taluks of Tirunelveli district, Tamil Nadu.

The project activity consists of 6 numbers of WEGs of 0.75 MW capacity each accounting to a total of 4.5 MW installed in Tirunelveli & Tenkasi taluks of Tirunelveli district, Tamil Nadu. The project activity to generate approximately 9.5 Million Units of power every year and thereby resulting in emission reduction of approximately 88,200 tCO<sub>2</sub>e over the entire crediting period of ten years. The first four WEGs of 0.75 MW capacity turbine are of NEG Micon India Pvt. Ltd make and remaining two WEGs of 0.75 MW capacity are of M/s. Vestas Wind Technology (formerly, NEG Micon India Pvt. Ltd)

The purpose of the project proponent in promoting this project is to generate electricity through tapping of clean and renewable wind energy available in the state of Tamil Nadu which is power deficit and to augment power supply during peak energy requirement periods, thereby also contributing to GHG reductions.

The scenario existing prior to the implementation of the project activity, is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of fossil-fuel dominated grid connected power plants and by the addition of new generation sources.

The total actual GHG Emission reductions achieved in current monitoring period of 17-September-2014 to 14-April-2016 are 5,103 tCO<sub>2</sub>e through displacing 5,506 MWh of electricity from fossil-fuel dominated electricity grid with electricity generation using wind energy resources.

## 1.2 Sectoral Scope and Project Type

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

Project type: Renewable energy project

The project activity is not a grouped project.

## 1.3 Project Proponent

<b>Organization name</b>	VVD AND SONS PRIVATE LIMITED
<b>Contact person</b>	Mr. D Kabilan
<b>Title</b>	Executive Director
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<b>Email</b>	<a href="mailto:vvdwind@vvd.in">vvdwind@vvd.in</a> , <a href="mailto:vvdwind@vvdgold.in">vvdwind@vvdgold.in</a>

## 1.4 Other Entities Involved in the Project

<b>Organization name</b>	EKI Energy Services Limited
<b>Role in the Project</b>	Project Consultant
<b>Contact person</b>	Mr. Manish Dabkara
<b>Title</b>	MD & CEO
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## 1.5 Project Start Date

Start date of the project activity is the earliest date of commissioning of the WEGs i.e. 16-March-2006 and hence it is considered as the project start date.

Project Start Date: 16-March-2006

## 1.6 Project Crediting Period

Crediting Period Start date: 15-April-2006

Crediting Period End date: 14-April-2016

Type of Crediting Period: Expired

Total Number of Crediting Period: 10 Years 00 months

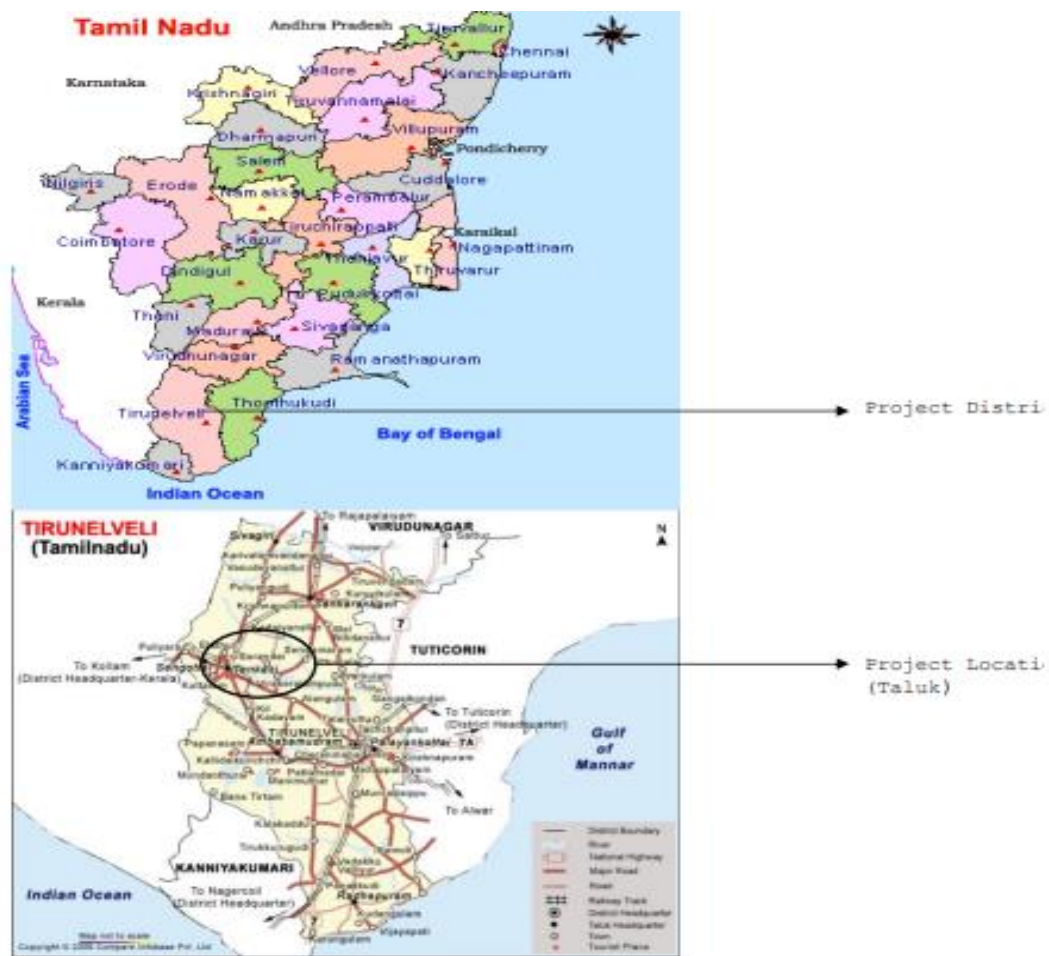
## 1.7 Project Location

The 4.5 MW wind farm is located in Achankuttam, Ayyansurandai, Sambavar Vadakarai and Kulayaneri villages of Tirunelveli district, Tamil Nadu. The unique identification details in terms of the latitude and longitude details of each the WEGs are shown below

HT.SC. No.	Location (Village)	S. F. No.	Commissioning Date	Latitude	Longitude
1608	Ayan Surandai	474(P) & 510/2	16-March-2006	N 8°59'07.3"	E 77°27'01.9"
1690	Achankuttam	201	26-March-2006	N 8°57'44.9"	E 77°28'45.0"
2122	Sambavar Vadakarai	285/3 (P)	28-December-2006	N 9°01'00.6"	E 77°24'05.5"

2123	Sambavar Vadakarai	188/7(P),8,9(P)	28-December-2006	N 9°00'42.6"	E 77°24'16.7"
2227	Sambavar Vadakarai	200/11,12,13,14,15,16B(P)	26-March-2007	N 9°01'12.5"	E 77°24'05.2"
2245	Kulayaneri	187/4(P)&356/1A(P)	27-March-2007	N 9°00'30.4"	E 77°26'21.7"

The details of the project locations are mentioned in the table below



## 1.8 Title and Reference of Methodology

**Title:** “Grid Connected Renewable Electricity Generation”.

**Reference:** This is an UNFCCC approved small scale methodology AMS I.D, Version 14.

As the project is a grid connected renewable wind power project, the above methodology as applicable for VCS 2007.1 has been chosen.

Tool referenced in this methodology is Version 1.1 of “Tool to calculate the emission factor for an electricity system”

## 1.9 Participation under other GHG Programs

The project activity has not been registered and is not seeking registration at moment under any other GHG programs. The project proponent has provided undertaking that it will not claim any GHG credits under any GHG program other than that under VERRA during the current monitoring period.

## 1.10 Other Forms of Credit

India is non-annex1 country and there is no compliance with an emission trading program or to meet binding limits on GHG emissions for this project activity.

The Project is not used for compliance with an emission trading program or to meet binding limits on GHG emissions.

PP has submitted undertaking that it would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions. PP has also submitted undertaking for not availing any other forms of environmental credits e.g. REC for the monitoring period under consideration.

Also, the project is not claiming any benefits from the REC mechanism of India which can be confirmed from the link below –

[https://www.recregistryindia.nic.in/index.php/publics/accredited\\_regens](https://www.recregistryindia.nic.in/index.php/publics/accredited_regens)

## 1.11 Sustainable Development Contributions

The project primarily assists the region as a whole in stimulating and accelerating the commercialization of grid connected renewable energy technologies.

The project activity contributes to the sustainable development in the following way:

### **Social well-being:**

- Enhancing local employment of rural area around the project.
- Capacity building and empowerment of vulnerable sections of the rural community dwelling in the project area

### **Economical well-being:**

- During the construction and operation phases, the project activity would generate small business opportunities for local stakeholders such as bankers, suppliers, manufacturers, contractors and land owners.

### **Environmental well-being:**

This project activity contributes to sustainable development through generation of eco-friendly power resulting in the increase of the share of renewable energy power generation

in the regional and national grid. It would aid in strengthening India's rural electrification coverage. Wind power projects also aid in reducing GHG emissions and other pollutants (SOx, NOx, and Particulates etc).

**Technological well-being:**

The Project activity helps in increasing the share of renewable energy power generation in the regional and national grid the project activity also, encourage clean, renewable and efficient technologies.

**Table 1: Sustainable Development Contributions**

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Not Applicable	Not Applicable	Not Applicable
2)	8.5	Average hourly earnings of female and male employees by occupation, age and persons with disabilities	Not Applicable	Not Applicable	Not Applicable
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Not Applicable	Not Applicable	Not Applicable

## 2 SAFEGUARDS

### 2.1 No Net Harm

The project activity and the initial project activity instance being wind power project, it does not involve any potential negative environmental and socio-economic impacts.

### 2.2 Local Stakeholder Consultation

Concerns and responses as recorded during the meeting at the sites of the wind farm area:

All the stakeholders were happy in knowing that a project activity in their locality is contributing to a global cause and they commended the project proponent management for their initiatives in the areas of climate change and sustainable development. In particular, the stakeholders lauded the project promoters for the environment friendly power generation using wind.

#### **Summary of the comments received**

The stakeholder meeting was conducted at the project proponent's plant site at Tirunelveli and was attended by the residents of the nearby villages, the employees of the project proponent and representative of relevant Electricity Board. Summary of the comments received from the stakeholders

Local Population: The villagers expressed their pleasure with the setting up of the power project as it had provided the rural population with permanent employment opportunities. Indirect employment generated as result of the project activity was highlighted by the villagers. The increase in the land prices subsequent to the setting up of the project was a welcome boon for the villagers.

Employees: The local population hired for the project activity are pleased with the employment opportunity available to them which was absent in the region prior to the commissioning of the plant.

### 2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

## 3 IMPLEMENTATION STATUS

### 3.1 Implementation Status of the Project Activity

There are 6 Nos. of 750 kW WEGs and each WEG consists of

- Nacelle assembly consisting of gear box, generator and other accessories

- Three bladed active stall rotor of 48.2 m diameter
- WEG microprocessor control unit and control panels
- 55 m conical steel painted tower
- Civil foundation

Transformers and related electrical including circuit breakers and Metering units

The salient features of the project are further detailed as below:

<b>Operational conditions</b>	
Calculated lifetime	20 years
Cut in wind speed	<3.5 m/s
Cut out wind speed	25 m/s
Maximum rotational speed	22/15 rpm
<b>Main specification</b>	
Rotor Diameter	48.2 m
Number of Blades	3
Rotational speed (synchronous)	22.2/14.8 rpm
Hub height	55 m
Tower type	Conical modular tower
Rotor position	Upwind
<b>Blade</b>	
Blade length	23.5 m
Blade profile	NACA 63 Series
Air Brake	Turn able blade tips,hydraulic
<b>Generator</b>	
Nominal Power	750/200 kW
Rotational Speed	1500/1000 rpm
<b>Yawing System</b>	
Yaw bearing, type	Ball bearing
Motor	4 No's 3Φ Induction Motor,0.37 kW
Gearing ratio	1:2716
Brake	Hydraulic disc, 3 pieces
<b>Mechanical Brake</b>	
Type	Disc brake
Position	Output shaft on gear box

<b>Control system</b>	
Manufacture	DAN CONTROL / VESTAS
Type	Microprocessor based

## 3.2 Deviations

### 3.2.1 Methodology Deviations

Not Applicable as there is no methodology deviation applied during this monitoring period.

### 3.2.2 Project Description Deviations

The registered VCS PD mentioned that the energy meters of 0.5s accuracy class are to be installed to measure the generation from all six WTGs that are part of this project activity.

But in actuality, the energy meters of the 0.2s accuracy class have been installed for all six WTGs that are part of the project activity.

Hence according to para 3.19 of the VCS standard v4.3, PP requests for the Project Description Deviation i.e., the deviation doesn't result in any impact on the applicability of the methodology, additionality or the appropriateness of the baseline scenario & on the Emission Reductions from the project activity.

All the supporting documents viz., commissioning certificates, calibration certificates & photographs of the meters installed at the site are provided for DOE perusal.

Also, it is to be noted that the Energy Meter pertaining to the WTG with HTSC number 2227 has been replaced due to the error (Energy Meter RTC found in drifted condition) on 29/05/2016. In support of the same, PP provided the meter change certificate issued by TANGEDCO (Tamil Nadu Generation and Distribution Corporation Limited).

Hence, a project description deviation is requested to change the accuracy class of the Energy Meters of all six WTGs & it is to confirm that this deviation shall also be described in all subsequent monitoring reports.

## 3.3 Grouped Projects

Not Applicable as it is not a grouped project.

# 4 DATA AND PARAMETERS

## 4.1 Data and Parameters Available at Validation

<b>Data / Parameter</b>	<b>EF<sub>OM</sub></b>
<b>Data unit</b>	tCO <sub>2</sub> / MWh

Description	Generation Weighted Average Operating Margin
Source of data	CO <sub>2</sub> baseline database for Indian Power Sector provided by the Central Electricity Authority (CEA, version 4, September 2008) <a href="http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm">http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm</a>
Value applied	0.9981
Justification of choice of data or description of measurement methods and procedures applied	Data used from CEA database, version 4, September, 2008, which accounts for data from various plant
Purpose of Data	Baseline Emission calculation.
Comments	Fixed ex-ante for entire crediting period

Data / Parameter	<b>EF<sub>BM</sub></b>
Data unit	tCO <sub>2</sub> / MWh
Description	Build Margin
Source of data	CO <sub>2</sub> baseline database for Indian Power Sector provided by the Central Electricity Authority (CEA, version 4, September 2008) <a href="http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm">http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm</a>
Value applied	0.7133
Justification of choice of data or description of measurement methods and procedures applied	The build margin BM is calculated by CEA and is the generation weighted average emission factor of the most recent power plants consisting of the capacity additions that represent 20% of the system generation (in MWh) and that have been built most recently. This option is considered for calculation as it represents the larger sample. The data pertaining to the units thus identified are detailed in the Version 4.0 of the Baseline Carbon Dioxide Baseline database of the CEA.
Purpose of Data	Baseline Emission calculation.
Comments	Fixed ex-ante for entire crediting period

Data / Parameter	<b>EF<sub>grid,CM,y</sub></b>
Data unit	tCO <sub>2</sub> / MWh
Description	Combined Margin
Source of data	CO <sub>2</sub> baseline database for Indian Power Sector provided by the Central Electricity Authority (CEA, version 4, September 2008) <a href="http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm">http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm</a>

Value applied	0.9269
Justification of choice of data or description of measurement methods and procedures applied	The fixed ex-ante combined margin emission factor from CEA database is used in the calculation of emission factor. This has been calculated as per ACM002 with 3 years vintage data and option of ex-ante based on 75% of OM and 25% of BM values approach. The same is computed once during PDD finalization.
Purpose of Data	Baseline Emission calculation.
Comments	Fixed ex-ante for entire crediting period

## 4.2 Data and Parameters Monitored

Data / Parameter	<b>E<sub>Gen</sub></b>
Data unit	kWh
Description	Net Electricity Generated
Source of data	Energy Meter
Description of measurement methods and procedures to be applied	The net electricity generated is the net electricity pumped into the southern grid. This parameter is calculated using measured exported and imported electricity parameters.
Frequency of monitoring/recording	The data is captured on a monthly basis
Value monitored	5,505,932 kWh
Monitoring equipment	Energy meter is used for monitoring the generated electricity. It is already mention in the Appendix 1 Meter Details.
QA/QC procedures to be applied	Calibration: As per CEA metering regulations, EB meters are to be calibrated once in every five years. However, the prevailing practice with respect to Calibration of energy meters in the region is once in every year. All EB meters were calibrated by TNEB during the monitoring period and found to be operating in the required accuracy range. The metering equipment is maintained in accordance with Central Electricity Authority (CEA) standards. All the meters are calibrated with reference to a portable standard meter of class 0.2.
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	Data monitored is to be kept for two years after the end of the crediting period or the last issuance of VCUs for the project whichever occurs later

Data / Parameter	$E_{Imp}$
Data unit	kWh
Description	Electricity Imported
Source of data	Energy Meter
Description of measurement methods and procedures to be applied	This parameter is monitored and measured using TNEB energy meter installed by the government of Tamil Nadu in the transformer yard. The meter reading is noted down once in a month by the TNEB personnel in the presence of the O&M personnel. The PP is raise an invoice to the TNEB called as form B for the supply based on the generation report provided.
Frequency of monitoring/recording	The data is captured on a monthly basis
Value monitored	123,250 kWh
Monitoring equipment	Energy meter is used for monitoring the generated electricity. It is already mention in the Appendix 1 Meter Details.
QA/QC procedures to be applied	<p>Calibration:</p> <p>Refer <math>E_{Gen}</math> Table</p> <p>Reporting: On a daily basis, a compilation of the energy data from each WEG controller panel is uploaded on the O&amp;M Contractor's website. This data is accessible to the Manager-Wind at the project promoter's administration office. The Manager-Wind takes regular print- outs of the daily reports from the website and archives the same. A monthly consolidated report of the WEG controller data is uploaded at the end of each month this report is archived along with the TNEB's monthly report. The Manager-Wind forwards the monthly reports, bills in paper to the Director for review and approval.</p> <p>Data Archiving:</p> <p>Once the monthly reports are approved by the Director, they are archived in paper at the respective administrative office by the Manager- Wind. Electronic copies of monthly reports are archived by the Manager-Wind.</p>
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	Data monitored is to be kept for two years after the end of the crediting period or the last issuance of VCU for the project whichever occurs later

Data / Parameter	$E_{Exp}$
Data unit	kWh
Description	Electricity Exported
Source of data	Energy Meter
Description of measurement methods and procedures to be applied	This parameter is monitored using TNEB energy meter installed by the government of Tamil Nadu in the transformer yard. The meter reading is noted down every month by the TNEB personnel in the presence of the O&M personnel. The project proponent is raise a invoice to the TNEB called as form B for the supply based on the generation report provided. These reports would be archived by the wind farm manager.
Frequency of monitoring/recording	The data is captured on a monthly basis
Value monitored	5,629,182 kWh
Monitoring equipment	Energy meter is used for monitoring the generated electricity. It is already mention in the Appendix 1 Meter Details.
QA/QC procedures to be applied	<p>Calibration:</p> <p>Refer <math>E_{Gen}</math> Table</p> <p>Reporting:</p> <p>On a daily basis, a compilation of the energy data from each WEG controller panel is uploaded on the O&amp;M Contractor's website. This data is accessible to the Manager-Wind at the project promoter's administration office. The Manager-Wind takes regular print- outs of the daily reports from the website and archives the same. A monthly consolidated report of the WEG controller data uploaded at the end of each month this report is archived along with the TNEB's monthly report. The Manager-Wind forwards the monthly reports, bills in paper to the Director for review and approval.</p> <p>Data Archiving:</p> <p>Once the monthly reports are approved by the Director, they are archived in paper at the respective administrative office by the Manager- Wind. Electronic copies of monthly reports are archived by the Manager-Wind.</p>
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	Data monitored is to be kept for two years after the end of the crediting period or the last issuance of VCUs for the project whichever occurs later

### 4.3 Monitoring Plan

To obtain reliable data, to check the functioning / performance of the WEG and the authentic metering of the energy exported to the grid.

Types of data and information to be reported, including units of measurement:

**Electricity exported:** The generated electricity by all the WEGs is exported to Southern Grid. It is measured by a dedicated energy meter installed by TNEB. The unit of measurement is in kilo watt hour (kWh).

**Electricity Imported:** The electricity imported from the Indian Grid. It is measured by the same energy meter installed by TNEB. The measurement is in kilo watt hour (kWh).

**Net electricity generated:** The imported electricity from the grid is subtracted from the electricity exported resulting in net electricity generated by the WEG. The electricity sales realization is based on net electricity generated. Hence this component is used for the calculation of emission reductions and for the IRR calculations. Please refer section 4.2 for detailed explanation of each monitored parameters.

**Origin of the data:** The generation data is taken from the TNEB energy meters.

**Monitoring, including estimation, modelling, measurement or calculation approaches:**

As per the AMS I.D version 14, para 14, "If the energy generating equipment is transferred from another activity, leakage is to be considered". The project does not involve any transfer of energy generating equipment from another activity. The generated electricity from the project exported to the TNEB, which is an integral part of the Southern Grid of India (now called as unified Indian grid). Throughout the VCS crediting period and beyond, the electricity generated from the project is monitored by both the project proponent (PP) and the State utility namely TNEB. The PP has hired the Services of M/s Vestas Wind Technology for the O&M of the project activity at Tirunelveli district, Tamil Nadu of the wind farm under a contract. The delivered energy metered by the PP and TNEB at each HTSC (High Tension Service Connection). The metering equipment is located at transformer yard of each WEG. The data is accurately measured with 0.5 accuracy class energy meters. The energy meters installed at transformer yard is used to measure variables like export energy (in kWh), running hours, error stoppage and TNEB export (in kWh), import energy (in kWh) & reactive power utilised (in kVARh) on continuous basis.

The energy meters at the transformer yard are two-way meters and in custody of TNEB. The TNEB officials take readings of the meter and the same readings is used to determine the net power exported to the Indian Grid. The readings of the individual meters of each WEG are taken on a monthly basis by the TNEB personnel. The net energy exported to the grid is calculated and issued by TNEB as a "Monthly statement". The meter jointly inspected and readings noted down and then sealed on behalf of the PP & TNEB in the presence of its authorised representatives.

The metering equipment is maintained in accordance with Central Electricity Authority (CEA) standards. All the meters is calibrated every year with reference to a portable standard meter of class 0.2. As the instruments are calibrated and marked at regular intervals, the accuracy of measurement can be assured at all times.

The measurement of electricity is carried out as per the prevailing guidelines of the State Electricity Regulatory Commission, which mandates implementation of 0.5 accuracy class meters at grid interconnection point for measurement of generated electricity.

In exceptional circumstances of failures of metering system, immediate replacement is carried out on 24 x 7 hour basis. The turbines continue to generate electricity even during the failure hours and no payment is made to the PP for such duration. The faulty meter is replaced by the new meter within 48 hours from the fault detection.

Meter and Relay Test (MRT) Laboratory/ TNEB tested spare energy meter is kept at the TNEB/MRT office. As per TNEB procedures, the defective energy meter is always replaced by a spare energy meter and is done by TNEB representative in the presence of company's personnel, readily available at TNEB/MRT Office.

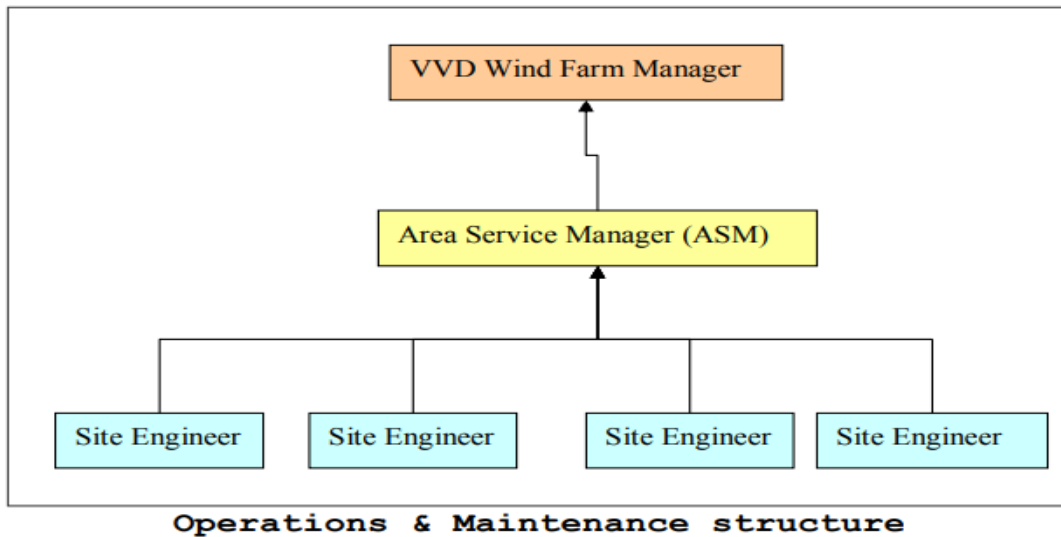
The working condition of the TNEB energy meter is daily verified by the site engineer of O&M team. This data is used for the calculation of emission reductions. The continuous monitoring of data is done by the O&M personnel; this ensures the proper working of the WEG and this data is used to compare with the TNEB energy meter data, in case of large differences between these two-meter readings O&M team inform the wind farm manager of the PP. The PP request TNEB to change or calibrate the faulty energy meter.

**Monitoring times and periods, considering the needs of intended users:**

The PP had been appointed WEG suppliers for the O&M of the WEGs. The O&M personnel appoint a site engineer to physically verify the working condition of the WEG and TNEB energy meter as well. The TNEB energy meter readings are noted down monthly in the presence of the site engineer and the TNEB personnel.

**Monitoring roles and responsibilities:**

As part of the reporting structure of the O&M / Supplier, respective site in charge of various sites report respective site data to the Area Service Manager (ASM) who in turn is makes it available to the PP.



Roles & responsibilities: Site Engineer:

Role: Monitors the WEGs at the site.

Responsibility: Reports to ASM on working condition of the WEG and the TNEB energy meter.

**Area Service Operator:**

**Role:** Manages the wind farm data of each machine **Responsibility:** Replacement of TNEB energy meter in case of failure. Identifies the WEGs which are not working and escalating it to the wind farm manager. Uploads the generation data in their (WEG Supplier) respective website to make the same available for the PP.

**VVD Wind Farm Manager:**

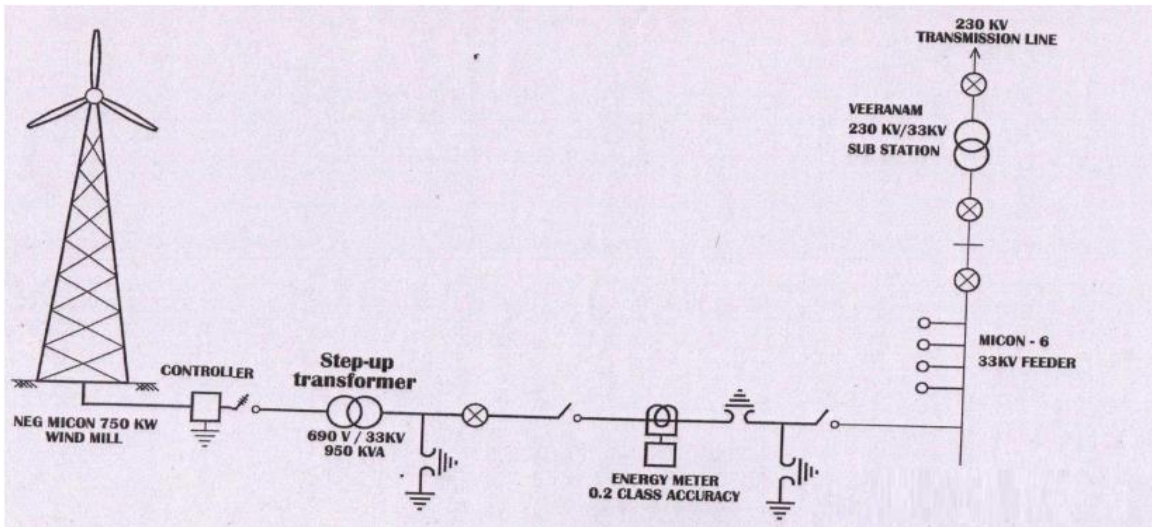
**Role:** Manages the wind farm data and raises the invoice.

**Responsibility:** Verifies the monitoring data submitted by the O&M team and TNEB energy meter data. In case of any discrepancies between them, then the he escalates it to VVD's management.

**Managing Data Quality:**

The amount of emission reduction units is proportional to the net energy export to the grid. The same has been measured by the TNEB energy meter. Since the reliability of the monitoring system is governed by the accuracy of the measurement system and the quality of the equipment to produce the result, all power measuring instruments are calibrated once in every two years for ensuring reliability of the system. Therefore, the system ensures the final generation data which is used for the emission reduction calculations is conservative and highly reliable.

The single diagram mentioning all the monitoring points is provided below:



## 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 5.1 Baseline Emissions

Baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants connected to the Indian Grid that are displaced by the project activity.

The Baseline Emissions would be calculated using the formula

$$BE_y = E_{Gen} \times EF_{grid, CM}$$

Where,

$BE_y$  is the baseline emission in the year  $y$ .

$EF_{grid, CM}$  = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year  $y$  (MWh)

$E_{Gen}$  is the amount of electricity exported to the grid in the year  $y$ .

$$BE_y = 5,506 \text{ (MWh)} \times 0.9269 \text{ (tCO}_2\text{e/MWh)}$$

$$BE_y = 5,103 \text{ tCO}_2\text{e (Round down value)}$$

## 5.2 Project Emissions

As per the methodology, there are no project related emissions for wind power projects. Please refer section 4.3 for detailed explanation

$$PE_y = 0$$

## 5.3 Leakage

As per the methodology, no leakage is considered from the project activity.

$$LE_y = 0$$

## 5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO <sub>2</sub> e)	Project emissions or removals (tCO <sub>2</sub> e)	Leakage emissions (tCO <sub>2</sub> e)	Net GHG emission reductions or removals (tCO <sub>2</sub> e)
2014	695	0	0	695
2015	4,217	0	0	4,217
2016	191	0	0	191
<b>Total</b>	<b>5,103</b>	<b>0</b>	<b>0</b>	<b>5,103</b>

The actual amount of GHG emission reductions achieved is 63.34% lesser than the amount based on the ex-ante estimation in the registered PD. It was due to grid unavailability during the years 2015 & 2016, which was not in control of PP. Also due to this decrease in PLF, there is no impact on the eligibility of the project activity under VCS.

## APPENDIX 1: METER DETAILS

HTSC No	Meter Serial No	Make	Accuracy class	Year	Date of calibration	Validity of calibration
1608	21009412	L&T	0.2s	2014	05-December-2014 <sup>1</sup>	04-December-2015
1690	HT2170281	EDMI	0.2s	2015	12-May-2015 <sup>2</sup>	11-May-2016
2122	HT2170565	EDMI	0.2s	2015	16-February-2015 <sup>3</sup>	15-February-2016
2123	HT2170537	EDMI	0.2s	2014	06-August-2014 <sup>4</sup>	05-August-2015
2227	HT2160523 <sup>5</sup>	L&T	0.2s	2015	29-March-2015 <sup>6</sup>	28-March-2016
2245	21009410	EDMI	0.2s	2014	15-May-2014 <sup>7</sup>	14-May-2015

<sup>1</sup> Due to delay in calibration error factor has been applied from the month of September 2014 to December 2014 and December 2015 to April 2016

<sup>2</sup> Due to delay in calibration error factor has been applied from the month of September 2014 to May 2015.

<sup>3</sup> Due to delay in calibration error factor has been applied from the month of September 2014 to February 2015 and February 2016 to April 2016.

<sup>4</sup> Due to delay in calibration error factor has been applied from the month of August 2015 to April 2016.

<sup>5</sup> In the year 2016 the main meter having the serial number HT5110160 having the accuracy class 0.5s was replaced with the main meter having the serial number HT2160523 having the accuracy class 0.2s

<sup>6</sup> Due to delay in calibration error factor has been applied from the month of September 2014 to March 2015 and March 2016 to April 2016

<sup>7</sup> Due to delay in calibration error factor has been applied from the month of May 2015 to April 2016