WIND POWER PROJECT AT ANTHIYUR, TAMIL NADU

(VCS Project ID 682 – Renewal of Crediting Period)

Document Prepared By Windage Power Company Private Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The 14.85 MW (9 x 1.65 MW) wind farm is located near Anthiyur Village of Udumalpet and Pollachi Talukas of Coimbatore District in Tamil Nadu. The 1.65 MW capacity turbine is of M/s. Vestas Wind Technology (formerly, NEG Micon India Pvt. Ltd) make. The project activity involves implementation of WTGs as a voluntary measure to strengthen the regional grid of India through wind power generation potential available to India. The project activity is implemented in the Anthiyur village in the state of Tamil Nadu. The generated electricity shall be fed into the Tamil Nadu Electricity Board (TNEB). There are no GHG emissions from the project activity since wind energy (a zero emission source) is harnessed for electricity generation. However, in the baseline scenario, in the absence of the project activity the electricity would have been generated from the power stations operating in the grid.

Pre-project scenario: No project activity

The regional grid is dominated by conventional fossil fuel based sources of energy. In the absence of the project activity 14.85 MW of electricity would have been generated from grid-connected conventional power plants.

Project Scenario: Implementation of Project

The project activity has been undertaken to generate 14.85 MW power through the installation of WTG. The EPC (Engineering, Procurement & Construction) contractor for the project is Vestas (India) Pvt. Ltd. The VCS project activity has implemented 9 nos. of 1.65 MW WTG. The project activity has been connected to Indian Grid (previously it was as Southern Grid[1]) through locally available sub-stations owned and maintained by the state electricity utility.

The Project WTGs are currently operational and had successfully completed 10 years of crediting period under VCS (end date of first crediting period was 31/03/2016). The net total emission reductions achieved by the project activity since the start date of crediting period is around 293,210 tCO_2e. It is estimated that project will generate an annual avg. of 30,928 tCO_2e and a total of 309,280 tCO_2e emission reductions over a period of 10 years of 2nd crediting period.

As the project's WTGs have sufficient operational life time and the operation of the project activity has significantly contributed to sustainable development in the region, hence project activity is being submitted for Renewal of Crediting period for another 10 years of crediting.

1.2 Sectoral Scope and Project Type

Sectoral scope : 01, Energy Industries (renewable-/non renewable sources)
Project Type : I, Renewable energy project.

[1] As per CEA database version 11 (released in April 2016), in previous years the Indian electricity system was divided into two grids, the NEWNE and Southern Grid (SR). These are now integrated as a single Indian Grid covering all the states. Thus, the project activity earlier was considered under Southern Grid which is now referred as Indian Grid.

1.3 Project Proponent

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1.4 Other Entities Involved in the Project

Not Applicable.

1.5 Project Start Date

26 March 2005 (Date on which the project began reducing or removing GHG emissions i.e. the commissioning date of the project). As per VCS standard, "the project start date is the date on which the project began generating GHG emission reductions or removals". Hence, it is considered as the start date of the project activity.

1.6 Project Crediting Period

As per VCS Standard (v3.6, 19 Oct 2016), section 3.8.1 the crediting period (for non-AFOLU projects and ALM projects) will be renewed twice for the duration of ten year each. The first crediting period of the project activity was considered from 1-April-2006 to 31-March-2016. Hence, the project has been applied for Renewal Crediting period for a period of 10 years.

The duration of the 2nd Crediting Period is as follows:

Start date : 1st April 2016

End date : 31st March 2026.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	NA

Year	Estimated GHG emission reductions or removals (tCO_2e)
Year 1 (1st April 2016 to 31st March 2017)	30,928
Year 2 (1st April 2017 to 31st March 2018)	30,928
Year 3 (1st April 2018 to 31st March 2019)	30,928
Year 4 (1st April 2019 to 31st March 2020)	30,928
Year 5 (1st April 2020 to 31st March 2021)	30,928
Year 6 (1st April 2021 to 31st March 2022)	30,928
Year 7 (1st April 2022 to 31st March 2023)	30,928
Year 8 (1st April 2023 to 31st March 2024)	30,928
Year 9 (1st April 2024 to 31st March 2015)	30,928
Year 10 (1st April 2025 to 31st March 2026)	30,928
Total estimated ERs	309,280
Total number of crediting years	10
Average annual ERs	30,928

1.8 Description of the Project Activity

The project activity is a 14.85 MW wind farm consisting of 9 Vestas (India) Pvt. Ltd. WTGs of NM82/1650 kW capacity each. The project activity is implemented in the Anthiyur Village of Udumalpet and Pollachi Talukas of Coimbatore District in state of Tamil Nadu. The project activity involves implementation of WTGs as a voluntary measure to strengthen the regional grid of India through wind power generation potential available to India. The generated electricity shall be fed into the Tamil Nadu Electricity Board (TNEB).

Expected level of activity:

There are 9 Nos. Vestas (India) Pvt. Ltd. machines of 1650 kW WTGs. The estimated Plant Load Factor as provided by an independent third party Micro siting study is 25.20%. Each WTG consists of

- Nacelle assembly consisting of gear box, generator and other accessories
- Three bladed active stall rotor of 82 m diameter
- WTG microprocessor control unit and control panels
- 75.5 m conical steel painted tower
- Civil Foundation

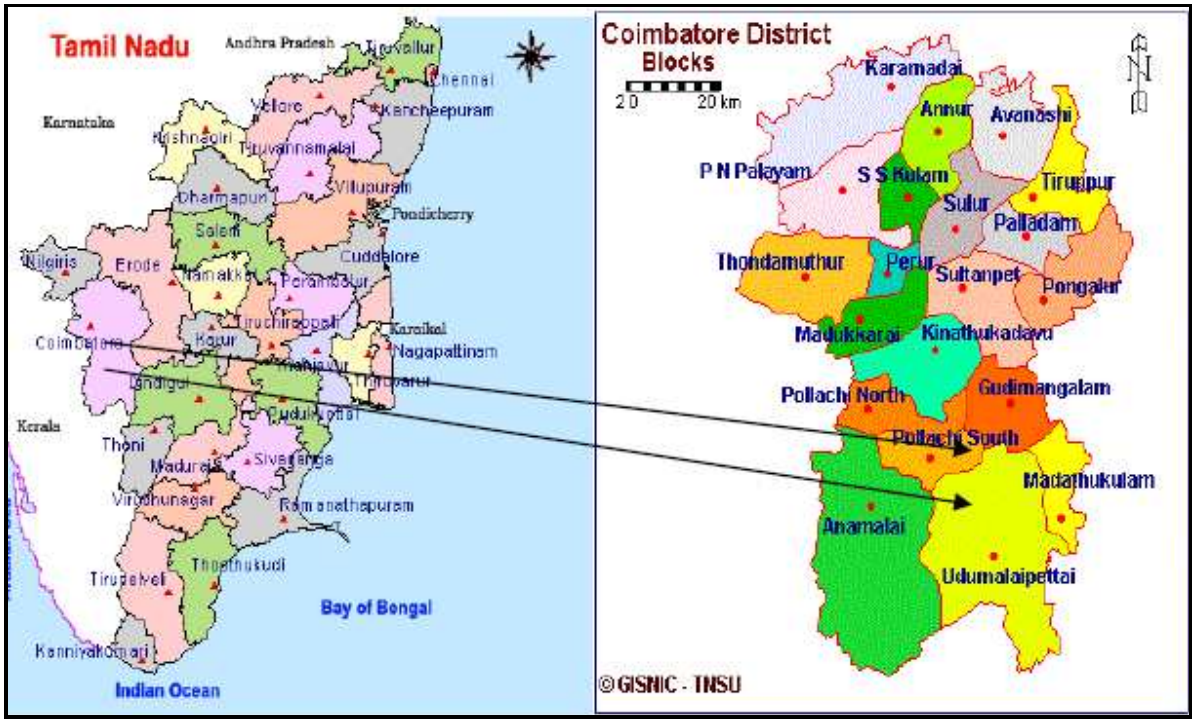
- Transformers and related electricals including circuit breakers and Metering units

The salient features of the WTG are further detailed as below;

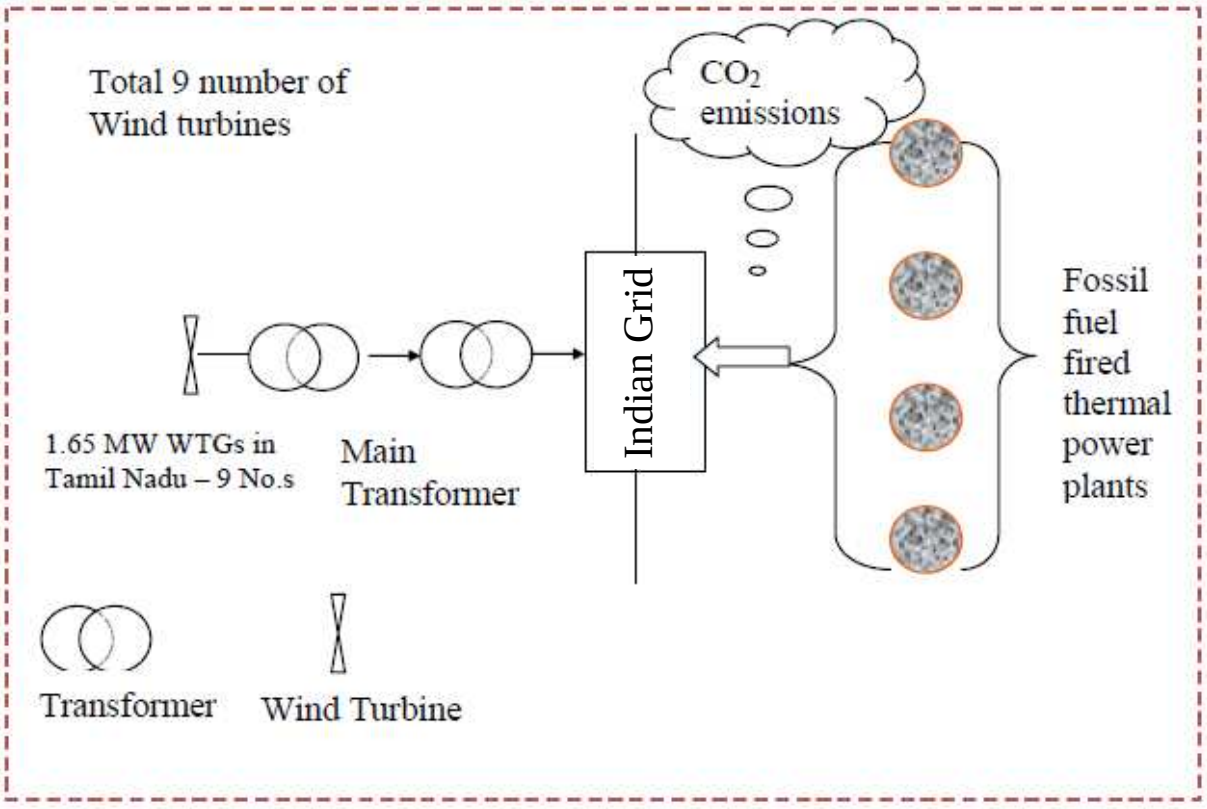
Operational conditions	
Calculated lifetime	20 years
Cut in wind speed	3.5 m/s
Cut out wind speed	20m/s
Maximum rotational speed	14.4 rpm
Main specification	
Rotor Diameter	82 m
Number of Blades	3
Rotational speed (synchronous)	14.4 rpm
Rotor	
Rotor Diameter	82 m
Tilt angle	5°
Swept area	5281 m^2
Generator	
Nominal Power	1650 kW
Rotational Speed	1012 rpm at rated power
Control system	
Manufacture	VESTAS control systems
Type	Microprocessor based

1.9 Project Location

The 14.85 MW wind farm is located near Anthiyur Village of Udumalpet and Pollachi Talukas of Coimbatore District in Tamil Nadu. This wind farm is located 60 Km south – east of Coimbatore, Tamil Nadu. The altitude of wind farm is 380 m.



The schematic diagram of project boundary is as follows:



The information allowing for the unique identification of the WTGs is as follows;

S. No	Location Name	S.F. Nos	Village Name	Taluk Name	Co-ordinates			HT. Service Number
					North	East	Altitude in metres	
1	NSL1	38&39/3	Koolanayakan Patti	Pollachi	10˚36' 49.6˝	77˚09' 15.3˝	385	751
2	NSL2	150/3A2,150/3B,158/1	Gomangalam Puthoor	Pollachi	10˚37' 21.4˝	77˚09' 30.0˝	380	752
3	NSL3	104/1& 109/1	Gomangalam Puthoor	Pollachi	10˚36' 48.2˝	77˚09' 51.0˝	386	754

4	NSL4	56/1C,47/8 &56/1B	Gomangalam Puthoor	Pollachi	10˚37' 01.2˝	77˚09' 45.6˝	383	788
5	NSL5	431/3	Gomangalam	Pollachi	10˚37' 15.5˝	77˚09' 52.9˝	379	753
6	NSL6	95/2,95/3 &95/4	Gomangalam Puthoor	Pollachi	10˚36' 39.6˝	77˚10' 07.7˝	385	808
7	NSL7	17&18	Venasa Patti	Udumal pet	10˚37' 11.7˝	77˚11' 25.2˝	383	728
8	NSL8	.2/1	Venasa Patti	Udumal pet	10˚37' 27.5˝	77˚11' 21.0˝	379	755
9	NSL9	254/A1, 255/2B, 255/2C	Pannai Kinaru	Udumal pet	10˚38' 33.8˝	77˚11' 02.9˝	364	690

1.10 Conditions Prior to Project Initiation

The Project activity was a Greenfield initiative. The project generates electricity and supplies it to the TNEB that comes under the Indian Grid. The project uses the supplied electricity for their captive consumption. In the absence of the project activity, the captive utility would have continued to draw grid electricity which is carbon intensive due to the fossil fuel dominated power generation.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project activity is compliant to the relevant local laws and regulations and is not prohibited by any of the national/state level sectoral policies. Further, the consent to operate the plant has been received from statutory authorities.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

The ownership of the project is referred to the section 8.1. of the registered VCS PD. Also, the project had been successfully commissioned and is currently operational under valid Power Purchase and Wheeling Agreement (PPA). Both commissioning certificates and PPAs are submitted as a proof project ownership.

1.12.2 Emissions Trading Programs and Other Binding Limits

The project activity is not a part of any Emission Trading Programs and Other Binding Limits or any Other Forms of Environmental Credit. A letter of undertaking has been submitted by PP.

1.12.3 Other Forms of Environmental Credit

The project activity has not been applied for any other form of Environmental Credit. Project activity is only registered with VCS mechanism and have been availing VCUs without any double accounting of emission reductions. A letter of undertaking has been submitted by PP.

1.12.4 Participation under Other GHG Programs

The project activity has not been applied for or participated under any other GHG Programs. Project activity is only registered with VCS mechanism and have been availing VCUs without any double accounting of emission reductions.

The VCS project ID is VCS-682.

1.12.5 Projects Rejected by Other GHG Programs

The project activity has not been applied under any other GHG Programs. Hence, it is not rejected by any programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

As per the section 3.4.9 of the VCS standard (v3.6), Eligibility Criteria shall be demonstrated for grouped projects. The current project activity is not a grouped project; hence no specific set of eligibility criteria has been included.

Leakage Management

The project activity involves harnessing of wind energy and its conversion to electricity. The project activity has been registered with the methodology “AMS I.D version 14” and the renewal of crediting period is assessed with the latest version of the methodology, i.e. 18; which confirms that there is no project emission for the project activity.

Thus, project activity does not lead to any leakage; hence there is no leakage management plan or risk mitigation measures are required.

Commercially Sensitive Information

There is no commercially sensitive information that has been excluded from the public version of the project description. PP would like to confirm that all information related to Baseline and Additionality of the project had been demonstrated in the registered VCS PD.

Sustainable Development

The National CDM Authority (NCDMA), the Designated National Authority (DNA) for Government of India (GoI), has stipulated four indicators of sustainable development in pursuant to their approval guidelines for Clean Development Mechanism (CDM) projects from India. This project activity under VCS also contributes towards these sustainable development indicators, as follows:

Social well-being:

- ✓ The project activity has been contributing to socio-economic development in the region through improving the infrastructure for road network and other mode of communications in the remote part of the state during both the construction and operational phases.

- ✓ The project activity has been supporting to alleviate poverty by means of direct and indirect benefits through employment generation and improved economic activities by strengthening of local grid of the state electricity utility. Thus, contributes to the livelihood of the society.

Environmental well-being:

- ✓ The project activity utilizes renewable energy source for electricity generation instead of fossil fuel based electricity generation which would have emitted gaseous, liquid and/or solid effluents/wastes. Thus, the project causes no negative impact on the surrounding environment and contributes to environmental well-being.

- ✓ The project activity contributes towards reduction of the GHG emissions as well as emission of pollutants like SOx, Suspended Particulate Matters (SPMs) etc. as in absence of the project an equivalent amount of power (for captive consumption) would have been drawn from Grid which is pre-dominantly supplied by fossil fuel based power plants associated with high level of SOx, NOx, SPMs etc.

Economic well-being:

- ✓ The project generates electricity utilizing renewable source, i.e. wind. Thus it will increase the contribution of renewable based power generation in the region and will also help in reducing the demand - supply gap of the respective grid.

- ✓ The project activity involves substantial amount of investment, manpower, operational amenities etc. Thus it contributes towards generation of direct and indirect employment opportunities as per the requirement of the skilled and semi-skilled manpower, both during construction and operational phase.

- ✓ Use of a renewable source of energy reduces the dependence on imported fossil fuels and associated price variation, which leads to economic stability of the nation. Also, it leads to increased energy security.

Technological well-being:

- ✓ Increased interest in wind energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future.

- ✓ Clean energy development is a national need. The project activity promoting a clean energy technology which encourages govt. to adopt more and more technically advance practices and thus lead to an overall technological wellbeing.

Further Information

No additional information is discussed under the section 1.16 of the registered VCS PD.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The project was registered under the CDM approved methodology for small-scale, **AMS I.D, Version 14.0** (as approved by VCS 2007.1).

However, as per VCS standard (v3.6) the renewal of crediting period is now assessed with the latest version of the methodology, i.e. **AMS I.D. version 18.**

The title of this baseline and monitoring methodology:
"Grid connected renewable electricity generation"

Reference to tools:

- ✓ "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period." Version 03.0.1

- ✓ 'Tool to calculate the emission factor for an electricity system (Version 06.0)

2.2 Applicability of Methodology

As per the approved small scale methodology AMS ID, version 18 "this category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit."

The identified project is a Wind power project of 14.85 MW (< 15 MW) capacity and there is no non-renewable components linked with it. The project will displace electricity in the Indian grid via southern regional grid which is mostly thermal intensive.

The justification pertaining to the applicable measures of the methodology are demonstrated below:

Justification of the category:

Sl. No	Technology /Measure as per AMS-I.D, version 18	Measure of project activity

Sl. No	Technology /Measure as per AMS-I.D, version 18	Measure of project activity
1.	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass : (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity is a renewable energy generation unit based on wind source. The generated energy is supplied to Tamil Nadu Electricity Board (TNEB) grid. The regional grid of Tamil Nadu is a part of 'Indian grid' of India which is dominated by fossil fuel based power generating sources. The project activity therefore meets this applicability requirement (a), i.e. supplying electricity to a national or a regional grid.
2.	As per Appendix table 1 of AMS.I D version 18 is applicable for following project types: a) Project supplies electricity to a national/regional grid b) Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)	The project activity is a renewable energy generation unit based on wind energy. The generated energy is supplied to TNEB grid, which is a part of Indian grid which is dominated by fossil fuel based power generating sources. The project activity therefore meets this applicability requirement (a).
3.	This methodology is applicable to project activities that (a) install a Greenfield plant); (b) involve a capacity addition in (an) existing plant(s); (c) involve a retrofit of (an) existing plant(s); or (d) Involve a rehabilitation of (an) existing plants(s)/unit(s); or (e) involve a replacement of (an) existing plant (s).	This project activity is a green field project. Hence the project activity is applicable to the point (a), i.e. install a Green Field plant.
4.	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project emissions section, is greater than 4 W/m^2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.	The project activity involved only Wind Power generation, hence not applicable.
5.	If the new unit has both; renewable and non- renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable	There is no non-renewable component in this project activity and the total installed capacity of the project activity is 14.85 MW which is less than the eligibility limit of 15 MW for a small scale CDM project activity. Hence, the

Sl. No	Technology /Measure as per AMS-I.D, version 18	Measure of project activity
	component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	project activity meets this applicability criterion.
6.	Combined heat and power (co-generation) systems are not eligible under this category.	The project activity is a small wind power project and not a co-generation system. Hence, this applicability requirement is not relevant.
7.	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct[2] from the existing units.	This is not relevant to the project activity as it does not involve any addition of renewable energy generation units at existing renewable energy power generation facility.
8.	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement unit shall not exceed the limit of 15 MW.	Project is a Greenfield activity. Hence not applicable.
9.	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	This is not relevant to the project activity since the activity is a wind power project.
10.	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	This is not relevant to the project activity since the project activity is a wind power project.

From the above table, it is evident that the project activity meets all the applicability conditions of the approved small scale methodology AMS I.D (version 18) - Grid connected renewable electricity generation.

[2]Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

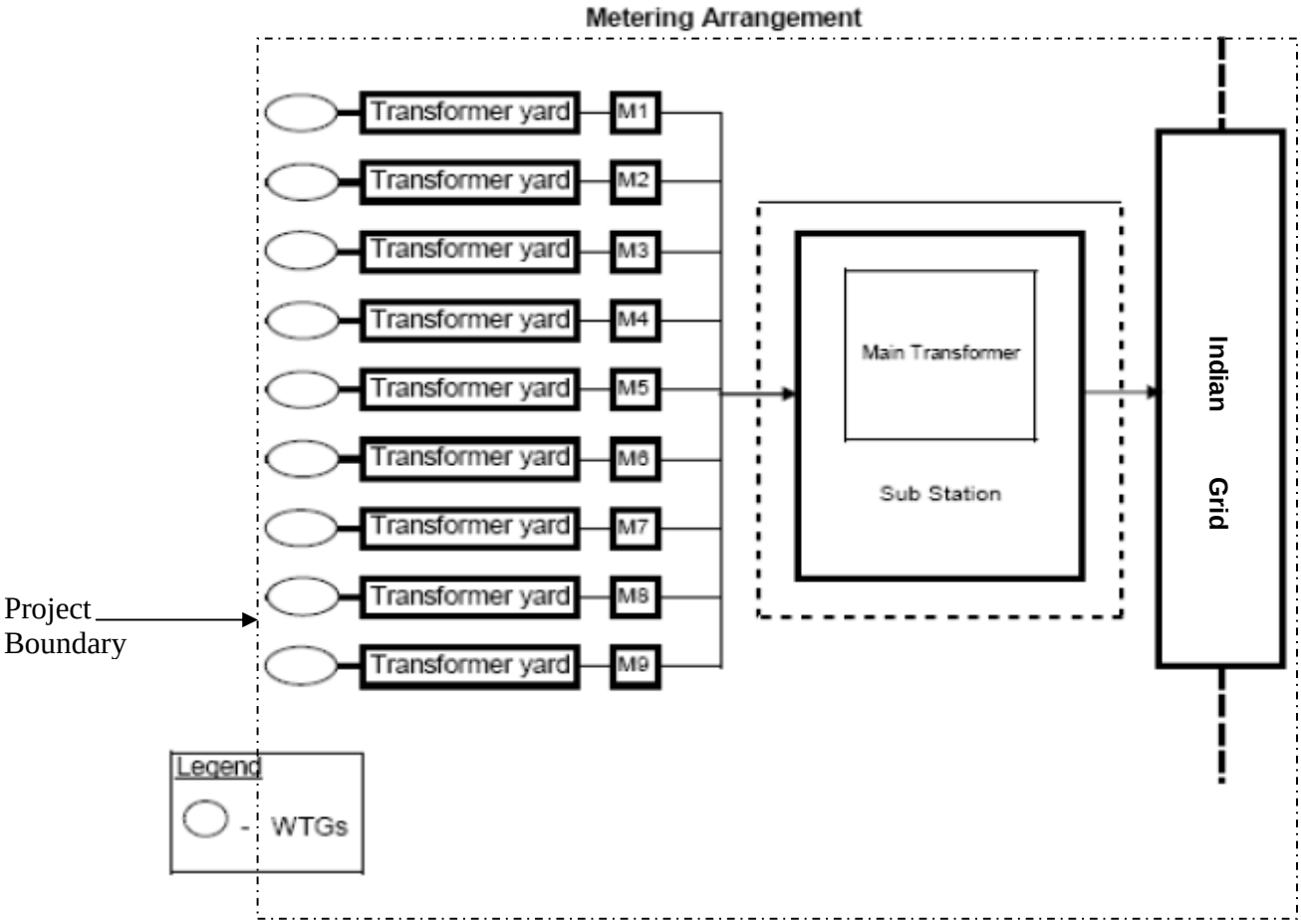
2.3 Project Boundary

- ✓ The sources, sinks and reservoir would be the mitigation of CO_2 which would have otherwise been liberated from the fossil fuel based power plants.
- ✓ There are no sources sinks and reservoir related to the GHG project.
- ✓ There are no sources sinks and reservoir affected by the GHG project.

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in the Table below:

Source		Gas	Included?	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	In the baseline scenario the electricity would have been sourced from the Indian grid, which in turn would be connected to fossil fuel fired power plants that emit CO_2.
		CH_4	No	No methane emission is expected
		N_2O	No	No Nitrous Oxide emission is expected
		Other	No	No other GHG emission is expected.
Project	Source 1	CO_2	No	Zero-emissions grid connected electricity generation from renewable energy
		CH_4	No	Project does not lead to any methane generation
		N_2O	No	Project does not lead to any Nitrous Oxide generation.
		Other	No	Project does not lead to any other GHG emissions

As per the methodology, the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the project power plant is connected to. Therefore, the project boundary for the project activity has been considered by inclusion of project WTGs, all common metering point and interconnection to Grid. Also, the project boundary includes all other power plants attached to the grid as CO_2 emissions would have been emanated from the operation of fossil fuel based power plants in the grid in absence of the project activity.



2.4 Baseline Scenario

Baseline scenario for the second crediting period has been assessed in line with the methodological tool **"Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period." Version 03.0.1.**

This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 300 of Project Standard & 49 (a) of the modalities and procedures of the Clean Development Mechanism.

The tool stipulates the following steps to be carried out.

Step 1: *Assess the validity of the current baseline for the next crediting period*
Step 1.1: *Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies*

There is no legal and regulatory requirement that mandates the production of energy by the chosen technology. Investment in wind energy projects in the State of Tamil Nadu and the southern regional electricity grid is not mandatory. There are no national or local laws or regulations that require this investment to be undertaken, i.e. setting up of wind power project. The setting up of wind energy projects is a voluntary activity. Baseline for the project activity is in compliance with relevant mandatory national and sectoral policies. **Hence, it remains unchanged in the current situation also, i.e. in the next crediting period.**

Step 1.2: *Assess the impact of circumstances*

The baseline scenario identified at the validation of the project activity was grid i.e. the electricity delivered to the grid by the project activity which would have otherwise been taken directly from grid where power is generated predominantly by the operation of fossil fuel based power (which was also evident from the Combined Margin Emission factor calculated and detailed in the registered PD). The baseline scenario for the project activity in the current context remains same i.e. grid and the grid still supplies primarily fossil fuel based electricity as reflected in the Combined Margin emission factor (as detailed in the Appendix 1).
Hence, circumstances and the externalities for determining the baseline for the project activity are same. **Therefore, there is no change in baseline scenario for the next crediting period.**

Step 1.3: *Assess whether the continuation of the use of current baseline equipment(s)* ***or an investment is the most likely scenario for the crediting period for which renewal is requested***

This sub-step has to be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment. Since this is not the case with the project activity under consideration, **hence this condition is not applicable.**

Step 1.4: *Assessment of the validity of the data and parameters*

This step stipulates that *"Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the project activity."*

In the context of the present project activity the emission factor has been updated along with the approach used to calculate the emission factor.

Step 2: Update the current baseline and the data and parameters
As evident from the explanation provided above the baseline scenario remains unchanged. Only the approach used to calculate the baseline emission factor is updated as per the latest version of CEA database available at the time of PD submission for renewal.

The approved consolidated baseline methodology, AMS-I.D., (Version 18), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology "Tool to calculate the emission factor for an electricity system" (version 06.0) has been used to determine continued validity of the baseline based on combined margin (CM) calculations.

The details of CM Emission Factor calculation are reported under the Appendix I of this report. The values of the parameters are also reported under the section 4.1.

2.5 Additionality

The project additionality has been demonstrated and established under the registered VCS PD.

The section 2.5 of the registered PD version 02, dated 27th October 2009, has demonstrated additionality using the relevant guidelines which confirms that project activity is additional.

As per section 3.8.5 of the VCS Standard (v3.6, 19th October 2016): "a full reassessment of additionality is not required when renewing the project crediting period. However, regulatory surplus shall be demonstrated in accordance with Section 4.6.3) and the project description shall be updated accordingly".

Now as per section 4.6.3: "the project shall not be mandated by any law, statute or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework. For UNFCCC non-Annex I countries, laws, statutes, regulatory frameworks or policies implemented since 11 November 2001 that give comparative advantage to less emissions intensive technologies or activities relative to more emissions-intensive technologies or activities need not be taken into account. For all countries, laws, statutes, regulatory frameworks or policies implemented since 11 December 1997 that give comparative advantage to more emissions-intensive technologies or activities relative to less emissions-intensive technologies or activities shall not be taken into account."

As per the registered PD, section 2.5, Step 1 (Regulatory Surplus):

"There is no legal or regulatory requirement for the project activity considered. Hence any enforced law, statute or other regulatory framework, cannot mandate the project."

At current scenario also the project activity is not a legal or regulatory requirement. Thus, project activity is additional.

2.6 Methodology Deviations

There is no methodological deviation is applied to the project activity.

Project activity is applicable under the same methodology, i.e. AMS I.D; however for renewal of crediting period latest version of the methodology has been applied. The demonstration has already been included under the section 2.4 above. .

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

The Baseline emissions are calculated based on methodology version 18, AMS I.D.

According to the para 43 of AMS-I.D. (version 18), the Emission Reductions for the project activity will be calculated using the following formula:

$$ER_y = BE_y - PE_y - LE_y \quad \text{.....(2)}$$

Where,
ER_y = Emission Reductions during the year y in tCO_2e
BE_y = Baseline Emissions during the year y in tCO_2e
PE_y = Project Emissions during the year y in tCO_2e
LE_y = Leakage Emissions during the year y in tCO_2e

Calculation of Baseline Emissions

As per para 22 of AMS-I.D. (version 18), baseline emissions (BE_y in tCO_2e) are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor ($EF_{CO2,grid,y}$).

$$BE_y = EG_{BL,y} * EF_{CO2,grid,y} \quad \text{.....(3)}$$

Where,
BE_y : Baseline Emissions in year y (tCO_2).

As per para 26 of AMS-I D ver 18,

$EG_{BL,y}$ = $EG_{PJ,facility,y}$ = Quantity of net electricity supplied by the project plant/unit to the grid in year y(MWh).

Thus,
$EG_{BL,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{CO2,grid,y}$: CO_2 emission factor of the Indian grid in year y (t CO_2/MWh)[3]

Thus,

BE_y = 31,634 *0.9777 (Value of $EG_{BL,y}$ = 31,634 MWh from Registered PD, page 34)

BE_y= 30,928 tCO_2e

The Emission Factor calculation is demonstrated as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

[3]The emission factor has been calculated using the latest version of the CEA database, i.e. CEA Database version 11, dated April 2016 (http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf).The calculation details are reported in the ER sheet and source of values are also reported under the Appendix I.

(b) The weighted average emissions (in tCO_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used."

The approach proposed in the "Option (a)" i.e. "Combined Margin" has been used for ascertaining Baseline Emission Reductions. The operating margin and the build margin emission factor have been considered from the information (Baseline Carbon Dioxide Emission Database -Version 11, April 2016) [4] published by the Central Electricity Authority (CEA), Ministry of Power, Govt. of India which have been computed according to the procedures prescribed in 'Tool to calculate the emission factor for an electricity system" version 06.0.

The baseline scenario has been identified as per the combined margin (CM) approaches which consists of operating margin (OM) and build margin (BM) factors as described in this section.

STEP 1. Identify the relevant electricity System:

Historically, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states (see Table below).Since August 2006; however, all regional grids except the Southern Grid had been integrated and were operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids were treated as a single grid named as NEWNE grid from FY2007-08 onwards for the purpose of this CO_2 Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. For the unified grid, the main emission factors are calculated in accordance with the relevant CDM methodologies.

The project activity is located in the state of Tamil Nadu, which comes under southern grid of unified Indian Grid. In the proposed baseline, therefore calculation pertaining to the Unified Indian Grid has been used as the reference grid system for estimating the baseline emission.

GRID	Indian Grid				
	Northern	**Eastern**	**Western**	**North-Eastern**	**Southern**
STATES	Chandigarh Delhi Haryana Himachal Pradesh Jammu & Kashmir Punjab Rajasthan Uttar Pradesh Uttarakhand	Bihar Jharkhand Orissa West Bengal Sikkim Andaman-Nicobar	Chhattisgarh Gujarat Daman & Diu Dadar & Nagar Haveli Madhya Pradesh **Maharashtra** Goa	Arunachal Pradesh Assam Manipur Meghalaya Mizoram Nagaland Tripura	Andhra Pradesh Karnataka Kerala Tamil Nadu Pondicherry Lakshadweep

[4] Reference: http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

STEP 2. Choose Whether to Include Off-Grid Power Plants in the Project Electricity System (Optional):

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation

Project participant has chosen **Option I** to include only grid power plants in the calculation.

STEP 3. Select a method to Determine the Operating Margin (OM)

As per the "tool to calculate the emission factor for an electricity system", version 06.0.0,""the operating margin refers to a cohort of power plants that reflect the existing power plants whose electricity generation would be affected by the proposed CDM project activity."

Further, the OM is to be determined based upon the following methods
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

The simple OM method (option a) can only be used if low cost/must run resources[5] constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

In the context of the present project activity simple OM has been considered since the contribution of low cost must run resources in the unified Indian grid mix amongst the five most recent years generation of the Indian grid mix is less than 50% of total grid generation. Hence, the statistics provided in the table above quite evidently demonstrate the fact that power generation from the low cost must run resources within the Indian grid is less than 50 % of the total generation. Hence, the use of simple operating margin method towards formulation the baseline scenario remains justified.

Further as per Step 3, the emission factor can be calculated using either of the two data vintages:

- ***Ex-ante option***: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the five most recent calendar years prior to the time of submission of the CDM-PDD for validation.

- ***Ex post option***: If the *ex post* option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year *y* is usually only available later than six months after the end of year *y*, alternatively the emission factor of the previous year *y-1* may be used. If the data is

[5] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

usually only available 18 months after the end of year *y*, the emission factor of the year proceeding the previous year *y-2* may be used. The same data vintage (*y*, *y-1* or *y-2*) should be used throughout all crediting periods.

For the project activity, the Ex-ante option is chosen for emission factor estimation.

The Simple OM factor is calculated as under in Step 4.

STEP 4: Calculate the Operating Margin Emission Factor According to the Selected Method

As per Step 3 of the 'tool to determine the emission factor of an electricity system', the simple OM emission factor can be calculated using the ex-ante option which states that for calculation of OM '*A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period'.*

In this regard, the simple OM emission factor has been sourced from the most recent data available at the time of submission of the PDD for renewal and has **therefore been fixed for this 2nd crediting period** (see Appendix 1 for data related to operating margin in Indian grid).

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit;

OR

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The CO_2 Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system, Version 06.0.0". We have, therefore, used the Combined Margin data published in the CEA database, for calculating the Baseline Emission Factor.

As per 'Tool to calculate the emission factor for an electricity system' **Option A** (i.e. "Based on the net electricity generation and a CO_2 emission factor of each power unit") is used to calculate simple OM emission factor. Where Option A is used, the simple OM emission factor is calculated based on the electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OMsimple,y} = \Sigma (EG_{m,y} \times EF_{EL,m,y}) / \Sigma EG_{m,y}$$

Where:

$EF_{grid,OMsimple,y}$ Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)

$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	All power units serving the grid in year y except low-cost / must-run power units y The relevant year as per the data vintage chosen in STEP 3

The CO_2 emission factor ($EF_{EL,m,y}$) data for simple OM, available under the CEA database[6] (Version 11.0, April 2016) for the last three years is as follows.

CO_2 emission factor for simple OM (tCO_2/MWh) (incl. Imports)			
Indian Grid	**2012-13**	**2013-14**	**2014-15**
	0.9922	1.0002	0.9903

Net Generation Total (MWh)			
Indian Grid	**2012-13**	**2013-14**	**2014-15**
	697.187	721.632	808.417

The net electricity generation ($EG_{m,y}$) data, available under the CEA database[7] (Version 11) , of all generating power plants (not including low-cost / must-run power plants / units) for the last three year has been taken from the database.

Thus, as can be seen from the above tables, the 3 years generation-weighted OM average for the most recent three years available at the time of PD for validation, i.e. 2012-13, 2013-14 and 2014-15 for Indian grid is:

The ex-ante OM value obtained is 0.9941 tCO_2/MWh

STEP 5: Calculate the Build Margin (BM) Emission Factor

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of PD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third

[6] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

[7] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

crediting period, the build margin emission factor calculated for the second crediting period should be used.

The project participant has chosen Option 1 for vintage of the data.

Therefore BM for the 2nd crediting period is considered as the build margin data of the most recent available period, i.e. year 2014-15. Thus, $EF_{grid, BM,y}$= 0.9285 tCO_2e/MWh[8].

STEP 6: Calculate the Combined Margin Emissions Factor

Combined Margin has been used for ascertaining Baseline Emission Reductions. The combined margin emission factor consists of two components i.e. the operating margin and the build margin. The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the simple operating margin and build margin emission factor for the unified Indian grid. According to 'Tool to calculate the emission factor an electricity system' version -06, the combined margin emission factor is calculated as follows:

The weighted average CM method (option A) is preferred for calculation of combined margin emission factor.

$$EF_{grid,CM,y} = EF_{grid,OM,y} x\ W_{OM} + EF_{grid,BM,y} x\ W_{BM}$$

Where:

$EF_{grid,OM,y}$: Operating Margin CO_2 emission factor in the year *y* (tCO_2/MWh)
W_{OM} : Weighting of operating margin emission factor (%)
$EF_{grid,BM,y}$: Build Margin CO_2 emission factor in the year *y* (tCO_2/MWh)
W_{BM} : Weighting of build margin emission factor (%)

The combined margin emission factor has been derived from the simple operating margin and build margin emission factors after considering/ factoring the weights of 0.75 and 0.25 for operating margin (OM) and build margin (BM) emission factors respectively relevant to the hydro power generation project activities as per the 'Tool to calculate the emission factor for an electricity system (Version 06)

Combined Margin (CM) in tCO_2/MWh for grid is

$EF_{CO2,grid, y}$ **=** 0.75 x Wt. avg. of OM for last 3 years + 0.25 x BM
= 0.9777 tCO_2/MWh

3.2 Project Emissions

According to para 39 of AMS-I.D. (version 18), for most renewable energy project activities, PE_y = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM0002.

- ✓ Emissions related to the operation of geothermal power plants (e.g. non-condensable gases, electricity/fossil fuel consumption)
- ✓ Emissions from water reservoirs of hydro power plants"

[8]Refer ER sheet for detailed calculation, and also referred in Appendix I.

The project activity is not a biomass project, neither a geothermal application and nor it is a hydro power project. The project activity involves the operation of a zero-emission wind farm; therefore no project emissions are applicable to the proposed project activity.

Thus, $PE_y = 0$

3.3 Leakage

According to the AMS-I.D, para 42, guidance on leakage is provided for biomass project only but the project activity involves a zero-emission wind farm. Hence, no leakage emission from this project activity has been considered. Thus, **$LE_y = 0$.**

3.4 Net GHG Emission Reductions and Removals

According to equation no 9 as per paragraph 43 of AMS I.D. (version 18), the Emission Reduction is calculated by subtracting the project emissions from the baseline emissions.

Thus $ER_y = BE_y – PE_y – LE_y$

As described under section 3.2 and 3.3, the Project emission and Leakage emissions are zero for the project activity, therefore,

$ER_y = (BE_y – 0 – 0) = BE_y$

The summary of ex ante estimates of emission reductions are tabulated below:

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
Year 1 (1st April 2016 to 31st March 2017)	30,928	0	0	30,928
Year 2 (1st April 2017 to 31st March 2018)	30,928	0	0	30,928
Year 3 (1st April 2018 to 31st March 2019)	30,928	0	0	30,928
Year 4 (1st April 2019 to 31st March 2020)	30,928	0	0	30,928
Year 5 (1st April 2020 to 31st March 2021)	30,928	0	0	30,928
Year 6 (1st April 2021 to 31st March 2022)	30,928	0	0	30,928
Year 7 (1st April 2022 to 31st March 2023)	30,928	0	0	30,928
Year 8 (1st April 2023 to 31st March 2024)	30,928	0	0	30,928
Year 9 (1st April 2024 to 31st March 2025)	30,928	0	0	30,928
Year 10 (1st April 2025 to 31st March 2026)	30,928	0	0	30,928

Total	309,280	0	0	309,280

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	**$EF_{grid, y}$**
Data unit	tCO_2 / MWh
Description	Combined margin emission factor of Indian grid
Source of data	Calculated from operating and built margin, using 75%-25% weights used (Source: CEA database, Version 11,April 2016 http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)
Value applied	0.9777
Justification of choice of data or description of measurement methods and procedures applied	CEA has estimated the simple operating margin and build margin emission factors for the regional grids. For calculating the CO_2 emission factor as per combined margin method for the second crediting period, the weights of 0.75 for operating margin and 0.25 for build margin for Indian grid are considered as per 'Tool to calculate the emission factor for an electricity system (Version 06.0)
Purpose of Data	Calculation of baseline emissions
Comments	This value is calculated on ex-ante basis and will remain fixed for the entire crediting period.

Data / Parameter	**$EF_{OM,y}$**
Data unit	tCO_2 / MWh
Description	Simple Operating margin emission factor of Indian grid
Source of data	Calculated from CEA database, Version 11,April 2016 (http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)
Value applied	0.9941
Justification of choice of data or description of measurement methods and procedures applied	CEA has estimated the simple operating margin and build margin emission factors for the regional grids. For calculating the CO_2 emission factor as per combined margin method for the second crediting period, the weighted average value of simple operating margin pertaining to Indian grid has been considered, as per 'Tool to calculate the emission factor for an electricity system (Version 06.0)
Purpose of Data	Calculation of baseline emissions
Comments	This value is calculated on ex-ante basis and will remain fixed for the entire crediting period.

Data / Parameter	**$EF_{BM,y}$**
Data unit	tCO_2 / MWh
Description	Build margin emission factor of Indian grid
Source of data	Calculated from CEA database, Version 11, April 2016 (http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)
Value applied	0.9285
Justification of choice of data or description of measurement methods and procedures applied	CEA has estimated the build margin emission factors for the regional grids. For calculating the CO_2 emission factor as per combined margin method for the second crediting period, the build margin value for the most recent year (i.e. 2014-15) pertaining to the Indian grid has been considered, as per 'Tool to calculate the emission factor for an electricity system (Version 06.0)
Purpose of Data	Calculation of baseline emissions
Comments	This value is calculated on ex-ante basis and will remain fixed for the entire crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{Gross,y}$
Data unit	kWh
Description	Gross Electricity export to the grid by the project during the year y
Source of data	From the certified joint meter readings
Description of measurement methods and procedures to be applied	Gross electricity generated by each WTG is recorded with the aid of energy meter for that WTG. The procedures for metering and meter reading will be as per the provisions of the power purchase Agreement
Frequency of monitoring/recording	Continuous monitoring and monthly reporting
Value applied	Gross electricity generated by the WTGs. Annual electricity supplied to the grid by the Project (A) = 14.85 MW (Capacity) x 25.20% (PLF) x 8760 (hours) / 1000 GWh - Transmission losses computed by Tamil Nadu Electricity Board (TNEB) (assumed transmission losses as zero for the purpose of calculation) = 31,640,000kWh
Monitoring equipment	Energy Meter
QA/QC procedures to be applied	QA/QC procedures will be as implemented by TNEB – state government utility. The meters used are calibrated annually to ensure accuracy of data.
Purpose of data	Calculation of baseline emissions
Calculation method	Described in Section 4.3

Comments	All records relating to the project are kept in a secure and retrievable manner for atleast two years after the end of the project crediting period.

Data / Parameter	$EG_{net,y}$
Data unit	MWh/year
Description	Net electricity supplied to the grid
Source of data	Monthly joint Energy Meter Reading Reports of 9 energy meters covering 9 numbers of WTG
Description of measurement methods and procedures to be applied	Continuous measurement and monthly recording. The monitoring of 'net Electricity supplied to the grid' would be as per the details provided in Power Purchase Agreement signed between the TNEB and NSL. The HTSC No. for the individual or group of turbines represents the unique identification of the joint meter. The net electricity supplied to the grid is calculated by the summation of the net electricity export figures of individual WTGs.
Frequency of monitoring/recording	Continuous monitoring and monthly reporting
Value applied	To be applied on actual
Monitoring equipment	Energy Meter
QA/QC procedures to be applied	Every month these meter readings will be recorded by TNEB representative and plant personnel. The meters at the substation will be two-way meters and will be in the custody of TNEB. The quantity of net electricity supplied will be cross-verified from the invoice raised on TNEB by the project proponent
Purpose of data	Calculation of baseline emissions
Calculation method	Described in Section 4.3
Comments	All records relating to the project are kept in a secure and retrievable manner for atleast two years after the end of the project crediting period.

Data / Parameter	$EG_{import,y}$
Data unit	kWh
Description	Electricity imported from the grid by the project during the year y
Source of data	From the certified joint meter readings
Description of	Calculated as measurement from the energy meters available at

measurement methods and procedures to be applied	the generation points.
Frequency of monitoring/recording	Continuous monitoring and monthly reporting
Value applied	To be applied on actual
Monitoring equipment	Energy Meter
QA/QC procedures to be applied	The electricity imported by the individual WTG is recorded. The electricity imported is adjusted against the gross export by the project activity to the grid. To be cross-checked with monthly invoices or receipts of payments
Purpose of data	Calculation of baseline emissions
Calculation method	Described in Section 4.3
Comments	All records relating to the project are kept in a secure and retrievable manner for atleast two years after the end of the project crediting period.

4.3 Monitoring Plan

Monitoring Plan has been proposed as prescribed under the registered PD (with the consideration of deviations as described under the section 2.4 above). Also, as the renewal crediting period applies the latest version of the Methodology (i.e. AMS I.D. version 18), hence monitoring of emission reductions are also comply with the requirements of the methodology.

This approved monitoring methodology requires monitoring of the following:
Electricity generation from the project activity; Operating margin emission factor and build margin emission factor of the grid, where ex post determination of grid emission factor has been chosen. Since the baseline methodology is based on ex ante determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required.

Purpose of monitoring

The purpose of monitoring is to measure the gross electricity exported, net electricity supplied to the grid and the electricity imported from the project activity to verify the emission reductions.

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

The approved monitoring methodology (AMS-1.D version 18) requires monitoring of the gross electricity exported, net electricity supplied to the grid and the electricity imported from the project activity.

Origin of the data

The source of the data on monitoring parameters is certified joint meter readings.

Metering Equipment

Metering system - Energy Meter for each WTG for metering the exported electricity to the grid and imported electricity from grid system

Data Monitoring:

The data is monitored at the main meter of each WTG.

1. Equipment:

The main meter is an Energy Meter of accuracy class (0.5%). The meters will have capability of recording half-hourly and monthly readings.

2. Meter readings:

The monthly meter readings at the project site and receiving station are taken simultaneously by the site personnel and electricity board personnel every month. A document indicating number of kilo-watt-hours indicated by meter will be prepared and signed by officials of the electricity board and operating Office.

a) Accuracy:

All meters installed at the project site are of 0.5% accuracy class. Each meter is jointly inspected and sealed in the presence of both the parties. The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure as described in the QA/QC procedures described for each parameter in Section 3.3 below. The project will adhere to all the mandatory regulatory and statutory requirements at the state as well as national level. The data will be archived for a period of 2 years after the end of the crediting period in the hard copy format.

b) Testing:

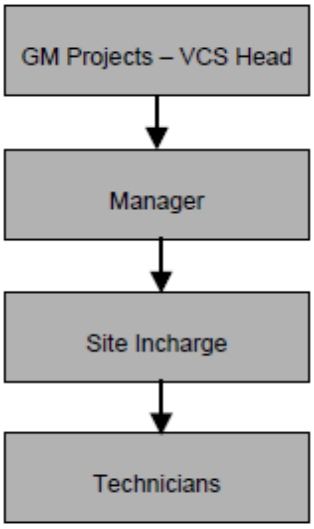
All meters are tested for accuracy every year in accordance with the electricity standards. The consumption by equipments / electricity exported to the grid registered by main meters hold good for purpose of billing as long as errors in main meters are within the permissible limits.

3. Billing:

A daily generation report is prepared by site personnel. As discussed the meters are capable of storing readings, which is submitted to the state electricity board along with the cumulative meter reading for the wind farm. This is maintained by the state authorities. These readings are used to determine line losses as well as power exported to the grid.

Monitoring roles and responsibilities

The operational and management structure implemented by NSL is as follows:



The General Manager (GM) manager is the head of the VCS team and would be responsible for coordinating with the manager and ensures that the monitoring is carried out in a transparent and accurate manner. The manager coordinates with the site in charge and the technicians and takes care of all the day to day activities of the plant and is responsible for testing the equipment, billing and archiving the data. The site in charge and the technicians are responsible for recording the operation and downtime hours of the project activity.

The monitoring team is also responsible for the following:

- Overall maintenance of the WTGs
- Calculation of actual creditable emission reduction in the most transparent and relevant manner
- For claims and settlement of electricity payment from the state utility every month
- Renewal of contracts with OEMs, insurance etc
- Periodical meter checking, calibration etc
- Meet the training needs of the personnel other than from the O&M contract at site
- Extracting, checking and Maintenance of data both manual and electronic form and preservation for the entire crediting period
- The authority and responsibility of project overall project coordination in relation to the VCS validation would be with the project proponent.

Procedures for internal audit and Management review:

An internal audit of the project activity would be done on an annual basis by a special audit team. The audit team would comprise competitive persons who would be appointed by the General Manager in charge.
The audit team after the audit would submit their observations to the Manager for his review and necessary action. The Manager would instruct the VCS team to take the required corrective action if any, suggested by the audit team.

Procedures for corrective actions for better future monitoring and reporting:

Errors or deviations will be identified during the annual internal audits. The VCS team Head (i.e., General Manager in charge) would take up these matters during the annual VCS team meetings (that normally would happen a few days after internal audit reports are prepared and submitted).

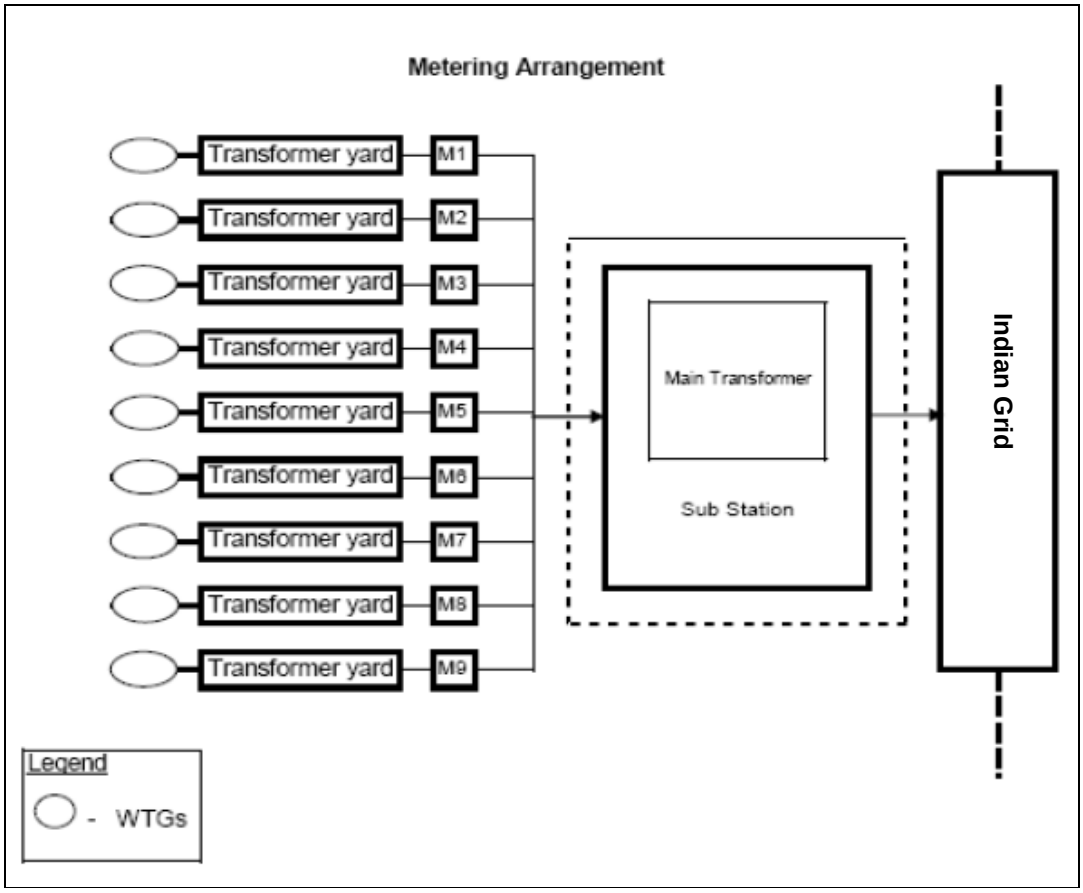
The root cause of these errors would be discussed and appropriate action would be taken for better future monitoring and reporting. The corrective actions may include:

- Training of monitoring personnel where ever required
- Replacement or repair of equipments

Procedures for maintenance of monitoring equipments:

- The Site Engineer would conduct a physical inspection of all the energy meters once a month
- Any maintenance requirements would be immediately attended
- The energy meters will undergo a preventive maintenance one a year
- The responsibility of maintenance will be with the Site Engineer
- Maintenance history card would be maintained for all energy meters

The schematic diagram of the project activity is as given below:



5 SAFEGUARDS

5.1 No Net Harm

As demonstrated in the registered VCS PD, there is no negative impact to any socio economic conditions of the region due to the project activity. The WECs are installed for generation of power using wind which is a clean source of energy. Hence no mitigation measures are required.

5.2 Environmental Impact

As demonstrated in the registered VCS PD, as per the Schedule 1 of the EIA notification dated 14th September 2006 (http://envfor.nic.in/legis/eia/eia-2006.htm), given by the Ministry of Environment and Forests (Government of India) under the Environment (Protection) Act 1986, EIA is not a regulatory requirement in India for wind energy projects.

Thus the project activity doesn't fall under the list of activities requiring EIA. Also, the project has been successfully running from the date of its commissioning and regular monitoring and verification have been conducted. There is no any event observed that indicates negative environmental impacts due to the project activity.

5.3 Local Stakeholder Consultation

Before starting of the VCS project activity, a stakeholders' consultation had been conducted in the project site. There were no negative comments or resistance to the project activity, whereas project activity was supported by the local people.

The details of local stakeholders' consultation had been already reported in the section 6 of the registered PD.

5.4 Public Comments

The details of public comments are already reported in the Registered VCS PD.

APPENDIX I: BASELINE EMISSION FACTOR

Baseline Emission factor has been calculated as combined margin emission factor of Indian grid.

CEA database, Version 11, April 2016 has been used for calculation. CEA has estimated the simple operating margin and build margin emission factors unified Indian grid. For calculating the CO_2 emission factor as per combined margin method for the second crediting period, the weights of 0.75 for operating margin and 0.25 for build margin are considered as per 'Tool to calculate the emission factor for an electricity system (Version 06.0). The details are provided below:

Simple Operating Margin (tCO2/MWh) (incl. Imports) (1) (2)			
	2012-13	2013-14	2014-15
Indian Grid	0.9922	1.0002	0.9903

Net Generation in Operating Margin (MWh)			
	2012-13	2013-14	2014-15
Indian Grid	697.187	721.632	808.417

Build Margin (tCO2/MWh) (not adjusted for imports)			
	2012-13	2013-14	2014-15
Indian Grid	0.9739	0.9521	0.9285

Operating Margin (OM) - weighted average	
Indian	0.9941

Combined Margin EF		
		Indian Grid
	Weights	**tCO_2 e/MWh**
Operating Margin	0.75	0.9941
Build Margin	0.25	0.9285
Combined Margin		**0.9777**