13.75 MW WIND POWER PROJECT IN DAVANGERE, KARNATAKA, INDIA

Document Prepared By EKI Energy Services Limited

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Project Title	13.75 MW wind power project in Davangere, Karnataka, India
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1 PROJECT DETAILS

1.1 Summary Description of the Project

The project activity is an initiative by Sargam Retails Private Limited (SRPL), towards clean electricity generation using wind energy resources in the state of Karnataka. SRPL is engaged in Trading and Marketing Packaged Tea & Tobacco.

The project activity leads to the installation of 10 Wind Turbine Generators (WTGs) of total generating capacity of 13.75 MW (5 nos of Suzlon make S 82 WTGs each having generating capacity of 1500 kW &5 nos of Suzlon make S 64 WTGs each having generating capacity of 1250 kW). There locations is in Davangere district of Karnataka state of India.

The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources, to utilize the generated output for supply to Karnataka Power Transmission Company Limited (KPTCL) and to contribute to climate change mitigation efforts. This renewable energy produced partially contributes to the electricity provided by the KPTCL.

The project is utilizing wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely - fossil fuel) based power plants thus, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions. Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. SRPL has developed this project keeping in consideration the funding available under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change. The project activity is also responsible for sustainable economic growth and conservation of environment through use of wind as a renewable source. The Project activity would generate 13.75 MW of electricity with efficient utilization of the available wind energy through adoption of the latest, efficient and modern technology. The generated electricity displaces equivalent electricity (generated from fossil sources) that may have been supplied to KPTCL.

The estimate of annual average and total GHG emission reductions for the chosen crediting period is 26,900 t CO_2e per year and 269,000 t CO_2e for 10 years of crediting period.

1.2 Sectoral Scope and Project Type

Project Type: Renewable energy project
Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)

This project is not grouped project because there is no addition other project activity.

This is non-AFLOU type of project.

1.3 Project Eligibility

The project activity involves installation and generation of electricity using wind energy resources i.e. by using the renewable sources replacing electricity supply from a fossil-fuel dominated electricity, thus leads to reductions of anthropogenic GHG emissions from

atmosphere. Hence the project activity is eligible Sectoral scope 1 i.e. energy industries (renewable/ non-renewable sources) under the scope of the VCS Program.

1.4 Project Design

The project involves setting up a wind farm of 13.75 MW ("Project) in the state of Karnataka, India. Hence, the project has been designed to include a single installation of an activity and is not a grouped activity

Eligibility Criteria

Not applicable to this project activity as this is not a grouped project.

1.5 Project Proponent

Organization name	Sargam Retails Pvt. Limited
Contact person	Mr. Prafulla Premchand Khinvasara
Title	Head- Wind Power Projects
Address	Malpani House, Indira Gandhi Marg, Sangamner, Maharashtra – 422605, India
Telephone	+91- 9822322145
Email	prafulla@malpani.com

1.6 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Barun Sharma
Title	DGM- Operations
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India
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1.7 Ownership

As per VCS Program Definitions version 4, the project ownership is the legal right to control and operate the project activities.

Sargam Retails Pvt. Limited is the project proponent (PP) of project activity and they have the legal right to control and operate the project activities.

The project ownership has been demonstrated through below supporting document:

Power Purchase Agreement (PPA) – The Power Purchase Agreement (PPA) indicates that PP have the legal right to control and operate the project activities.

Based on above evidences, the project ownership is demonstrated and Sargam Retails Pvt. Limited is authorized project owner.

1.8 Project Start Date

The start date of the project activity is 31-March-2009 being the date of commissioning of the first wind turbine installed under the project activity.

1.9 Project Crediting Period

The crediting period of the project activity is for 10 years (Renewable for maximum 2 times).

The length of the second crediting period is 31-March-2019 to 30-March-2029 (both dates inclusive).

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	-

Year	Estimated GHG emission reductions or removals (tCO_2e)
2019-20	26,900
2020-21	26,900
2021-22	26,900
2022-23	26,900
2023-24	26,900
2024-25	26,900
2025-26	26,900
2026-27	26,900
2027-28	26,900
2028-29	26,900
Total estimated ERs	269,000
Total number of crediting years	10
Average annual ERs	26,900

1.11 Description of the Project Activity

The project activity leads to the installation of 10 Wind Turbine Generators (WTGs) of total generating capacity of 13.75 MW (5 nos of Suzlon make S 82 WTGs each having generating capacity of 1500 kW &5 nos of Suzlon make S 64 WTGs each having generating capacity of 1250 kW). There locations is in Davangere district of Karnataka state of India.

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind turbines capture wind's energy with two or three propeller-like blades, which are mounted on a rotor to generate electricity. The turbines sit high atop towers, taking advantage of the stronger and less turbulent wind as the wind blows through the blades of windmill, a pocket of low pressure forms on the downwind side of the blade. The low-pressure pocket then pulls the blade towards it, causing the rotor to spin. The rotor turns the shaft that further spins the connected generator. The spinning of this generator produces the required electricity.

For the project activity, SRPL has placed the purchase order to procure Wind Turbine Generators(WTGs) from M/S Suzlon Energy Limited (SEL) and it's associate companies for supply of 5 nos S 821500 kW capacity and 5 nos S 64 1250 kW capacity.

PLF (Plant Load Factor) = [Guaranteed generation/WTG (Lacs unit) - estimation x 105 / Installed Capacity (MW) x103x24x365] * 100.

PLF = [(36 x 5 + 26 x 5) x 105/13.75 x 103 x 24 x 365] * 100 = **25.74%.**

PLF for 1.25 MW WTG: PLF = [(26 x 5) x 105/6.25 x 103 x 24 x 365] * 100 = **23.74%.**

PLF for 1. 5 MW WTG: PLF = [36 x 5) x 105/7.5 x 103 x 24 x 365] * 100 = **27.39%.**

Technical Specifications of the WTGs:

S 82 1.5 MW 50 Hz[1]:-

Rated Power	1,500 kW
Rotor diameter	82 m
Swept area	5,281 m^2
No. of blades	3
Cut in wind speed	4 m/s
Cut out wind Speed	20 m/s
Rotor Speed	20.3 rpm
Regulation	Pitch
Hub Height	78.5 m
Generator Type	Class 'H'
Insulation	Asynchronous

S 64 1.25 MW 50Hz:-

Rated Power	1,250 kW
Rotor diameter	64 m
Swept area	3,217 m^2
No. of blades	3
Cut in wind speed	3.5 m/s
Cut out wind Speed	25 m/s
Rotor Speed	20.3 rpm
Regulation	Pitch
Hub Height	74.5 m

[1] http://www.suzlon.com/pdf/product/Suzlon-S82-product-brochure.pdf

Generator Type	Class 'H'
Insulation	Asynchronous

The technical life of the project activity is 20-25 years as per supplier.

1.12 Project Location

The project activity is located at Davengere in the state of Karnataka.
Geographical Location Details of the project site of M/s Sargam Retails

Capacity (MW)	Location No.	R.S. No.	Village	Taluka	District	Latitude (N)	Longitude (E)
1.5	K-543	111	Yaraganal	Honnali	Davangere	14°09'17.4"	75°30'11.9"
1.5	K-544	111	Yaraganal	Honnali	Davangere	14°09'10.4"	75°30'17.6"
1.5	K-549	28	Kudurekonda	Honnali	Davangere	14°09'03.2"	75°30'23.1"
1.5	K-550	28	Kudurekonda	Honnali	Davangere	14°08'57.2"	75°30'29.9"
1.5	K-551	28	Kudurekonda	Honnali	Davangere	14°08'51.2"	75°30'36.7"
1.25	W K-538	111	Yaraganal	Honnali	Davangere	14°08'45.3'	75°30'43.7"
1.25	W K-539	111	Yaraganal	Honnali	Davangere	14°08'39.5"	75°30'50.9"
1.25	W K-540	111	Yaraganal	Honnali	Davangere	14°08'13.3"	75°31'32.4"
1.25	W K-541	111	Yaraganal	Honnali	Davangere	14°08'07.4"	75°31'38.8"
1.25	W K-542	111	Yaraganal	Honnali	Davangere	14°07'59.5"	75°31'44.1"

1.13 Conditions Prior to Project Initiation

The project activity is a Greenfield activity that is the installation of WTGs for generating electricity. In the absence of the project activity taken up by the Project Proponent, the renewable energy source from the wind power would not have been generated. This would have resulted in equivalent power generation from the fossil fuel based Indian Grid, India. Therefore the energy base line is the electrical energy displaced by the wind mill installed by the project proponent in the India Grid that would have continued without implementation of project activity.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The Project has received all the necessary approvals for development and commissioning for the project from the respective State Nodal Agencies and is in compliance to the local laws and regulations.

The relevant national laws and regulations pertaining to generation of energy in India are:

- Electricity Act 2003
- National Electricity Policy 2005
- Tariff Policy 2006

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

Project has been registered with UNFCCC under Clean Development Mechanism program, Registration reference number is 3700.

The Web-link for the same has been mentioned below:

https://cdm.unfccc.int/Projects/DB/SGS-UKL1273659698.37/view

1.15.2 Projects Rejected by Other GHG Programs

The Project is not rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

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 registered under CDM with registration ID 3700. Project Proponent has submitted undertaking that they will not claim same GHG emission reductions of the project from CDM and VCS. PP would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions.

1.16.2 Other Forms of Environmental Credit

Project has been registered with UNFCCC under Clean Development Mechanism program. Registration reference number is 3700. Project Proponent has submitted undertaking for not

availing other forms of environmental credit for the same crediting period under consideration.

1.17 Additional Information Relevant to the Project

Leakage Management

The project activity has use the new equipments and there is not be any transfer of equipment, which can cause leakage. Hence, leakage management is not required.

Commercially Sensitive Information

The documents that we have provided to the DoE do not contain commercially sensitive information.

Sustainable Development

The following criteria have been considered for demonstrating sustainable development.

- Social well being
- Economic well being
- Environmental well being
- Technological well being

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

Social well being

The project activity leads to alleviation of poverty by establishing direct and indirect employment benefits. Such benefits are, for example, be accrued out during maintenance operations of the project activity or as generation of permanent labour in the form of security services. The infrastructure in and around the project area also improved due to project activities. This includes development of road network and improvement of electricity quality, frequency and availability.

Economic Prosperity

The project activity leads to an investment of about INR 786 million to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is fed into the Southern Regional Grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants). This attracts new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development. The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.

Environmental Well-being

The project utilizes wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely - fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions. Being a renewable resource, using wind energy to generate electricity contributes to resource

conservation. Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.

Technological Up-gradation

The project activity involves the installation of state-of–art technology. The wind turbine generators used for the project activity are of the latest technology. This project therefore motivates other proponents in the surrounding area to put up high-efficiency techniques.

Thus, it is ensured that the project activity meets all the criteria for Sustainable development.

Further Information

There are no information or incidents that will have bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

According to Indian regulation, the implementation of the wind park does not require an environmental impact assessment. The Ministry of Environment and Forests (MoEF), Government of India notification dated September 14, 2006 regarding the requirement of Environment Impact Assessment (EIA) studies as per the Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) MINISTRY OF ENVIRONMENT AND FORESTS) states that any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) Wind parks are not included in this list and thus an EIA is not required. Thus, there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity.

2.2 Local Stakeholder Consultation

The stakeholders identified for the project activity were as under:

1) Gram Sarpanch
2) Contract employees
3) Suzlon employees
4) Vendors
5) Local people

The identified stakeholders were invited by sending one to one invitation letters. The stakeholder consultation meeting was held on 10th December, 2008 at wind mill site of (SRPL) situated at Davangere (District). The minutes of the meeting was provided to the DOE during validation.

Summary of comments received:

SRPL has received all necessary approvals / clearances / permissions from various local bodies which represent the local stakeholders.

The local people are direct beneficiaries of the project. The construction and continuous operation of the wind mill constitutes local manpower. The project does not require any major displacement of any local population. Also, the installation of transmission lines would not create any inconvenience to the local population. In summing up, the project activity has received complete support from the local populace.

The Agenda for the meeting was:
Item:

- Introduction of members
- Introduction and presentation of the details of the project activity
- Concept of CDM
- Invite members to give comments/ views on the project activity
- Open House/ Discussion
- Vote of Thanks

Minutes of the Meeting: (Kudurekonda/ Israpura) 10th December 2008

- Mr. Prafulla Khinvasara (Head – Wind Power Projects, SRPL) opened the meeting with welcome address to the audience.
- Mr. Vinay Nisal (Regional Sales Manager, SRPL) – briefed the audience about SRPL as a company and its operations. He also touched upon the level of importance environment within SRPL
- Mr. Shivaji Lalage (Asst. Sales Manager, SRPL) gave an introductory presentation on Climate Change issues covering topics like Kyoto Protocol,
- Greenhouse Gas Effect, and Clean Development Mechanism (CDM) by SRPL.
- The attendees walked through the construction site. Mr Kaushik Patel (Asst. Manager – Marketing, Suzlon Energy Limited) explained them the concepts of wind mill erection and its functioning & its environmental benefits.
- After the site visit the session was opened for discussions and comments. All stakeholders highly appreciated the project taken up by SRPL and requested the company to continue taking steps in area of environment and energy.
- Mr Prafulla Khinvasara (Head – Wind Power Projects, SRPL) concluded the meeting with Vote of thanks.

The following table summarises all the question /comments raised during the stakeholder's meeting and SRPL's response in each case:

Sr. No.	Name	Question/Comments	Project Proponent Response
1	Mr. Gajanan B. Patil (Junior Engineer)	What are the benefits of wind power project?	Mr. Khinvasara explained clean & green way of power generation and utilizing the renewable resources effectively rather consuming the fossil fuel. He further explained the concept of Sustainability.
2	Chandrakant Hase (Sales Executive)	What is CDM?	• A scope for industrialized (Annex 1) countries with a greenhouse gas reduction commitment to invest in

Sr. No.	Name	Question/Comments	Project Proponent Response
			emission reducing projects in a developing (non-Annex I) country. • A Central body (UNFCCC) issues one Certified Emission Reduction (CER) to a project when it saves one tonne of CO2 equivalent • Financially attractive to both parties as developed countries achieve emission reduction at a lower cost while developing country gets money by selling the CERs and also gets cleaner technology
3	S. Gopinath (Junior Engineer)	Gave Mr Khinvasara, word of appreciation for the project and concluded that the project will contribute to the improvement of the local environment.	
4	V. H. Shahajan (President, Gram Panchayat)	How does this project benefit local people?	The project has employed several local peoples both contractual & permanent
5	Mr. P. Rengaswamy (Dy. Manager)	Gave his word of appreciation for the project	
6	Mr. D. V. Shanker (Field Asst.)	Quantum of GHG emission reductions that will be taking place?	Mr. Khinvasara briefed about GHG emissions and its accounting.
7	Mr. Puriya Naik (Member, Gram Panchayat)	Gave his word of appreciation for the project	

The Government of India, through Ministry of New and Renewable Energy (MNRE), has been promoting energy conservation, demand side management and renewable energy projects including wind, small hydro and bio-mass power. The Ministry of Environment & Forests is the Designated National Authority in India. The Government of India, through Ministry of Environment and Forests (MoEF) is encouraging project participants to take up such environment-friendly initiatives.

Report on consideration of comments received

SRPL has taken care of all the conditions stipulated in the relevant clearances and no adverse comment has been raised. In summing up, the project has not received any negative

or discouraging feedback from the stakeholders concerned. All the stakeholders have appreciated and encouraged the project proponent for taking up this project activity. In view of various direct and indirect benefits (social, economical, and environmental), all the stakeholders have supported the project activity. The documents supporting the stakeholder consultation was submitted to the DOE.

2.3 Environmental Impact

According to Indian regulation, the implementation of the wind park does not require an environmental impact assessment. The Ministry of Environment and Forests (MoEF), Government of India notification dated September 14, 2006 regarding the requirement of Environment Impact Assessment (EIA) studies as per the Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) MINISTRY OF ENVIRONMENT AND FORESTS) states that any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the project is listed in a predefined list. Wind parks are not included in this list and thus an EIA is not required. The project activity has no significant impact on the environment. However, certain foreseen impacts due to the project activity are discussed below: Also, in the redefined EIA notification i.e. S.O. 153312, dated 14th September 2006, Ministry of Environment & Forests (MoEF), Govt. of India, the wind projects are not included in the list of projects that has to get Prior Environmental Clearance (EC) either from State or Central Govt. authorities and hence no EIA study was conducted.

The project does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. However due weightage has been given to environmental aspects.

During construction

Impact on air
Movement of construction material during construction had some impact on the air. As the transportation is quite less for the project activity, the impacts were negligible.

Impact on Land use
The land on which the project activity takes place is largely unproductive. Prior to the project activity, most of the land had no beneficial use. The project proponents had bought the land for a worthwhile application and obtained necessary approvals for installation of windmills. No dislocation of people is involved in the course of the project activity.
The magnitude of the impacts during the construction phase is negligible and exists for a temporary period of time till the end of construction phase. Therefore, it would not affect the environment considerably. The impacts on the environment due to construction activities of wind turbines are negligible.

Operation and Maintenance Phase
Suzlon maintains highest level of safety standards. Systematic and scientific maintenance of all equipments has been undertaken to ensure the best safety standards.

Impact on air
Wind energy plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation.

Impact on water

There is absolutely no effluent discharge during operation of wind turbine generators.

Impact on ecology
There are no known migratory birds/endangered species in the region of project activity. Therefore no harm on the ecological environment is envisaged.

Socio-Economic Impacts
There is no inconvenience to the local community due to the transmission lines. The project activity helps up-liftment of skilled and unskilled manpower in the region. The project has provided employment opportunities not only during the construction phase, but also during its operational lifetime. The project activity improves employment rate and livelihood of local populace in the vicinity of the project. Moreover, the project generates eco-friendly, GHG free power which contributes to sustainable development of the region.

Conclusion
The net impact under environmental pollution category would be positive as all necessary abatement measures would be adopted and periodically monitored. The project activity does not have any major adverse impacts on environment during its construction or operational phase. The human interest parameters would show positive impacts due to increased job opportunities at the facility as well as other ancillary units coming up.

As discussed above, the project activity would not have any adverse environmental impacts. The project activity does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. Hence EIA is not required to be under taken by the host party.

2.4 Public Comments

The Global Stakeholder Consultation commenting period had been completed before first crediting period. No comments had been received in the commenting period.

2.5 AFOLU-Specific Safeguards

Not Applicable

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Title: "Grid Connected Renewable Electricity Generation" Version 18.0[2]
Reference: AMS I. D.: Small-scale Consolidated Methodology

The methodology AMS I.D. refers to the latest approved versions of the following tools:
Tool to calculate the emission factor for an electricity system, Version 07.0 (EB 100, Annex 04)[3]
Tool for the demonstration and assessment of additionality, Version 7.0[4]

[2] https://cdm.unfccc.int/UserManagement/FileStorage/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC
[3] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

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)[5]

3.2 Applicability of Methodology

Applicability Criterion	Project Case
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. 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 Project i.e. Wind Power Project which falls under applicability criteria option 1(a) i.e., "Supplying electricity to a national or a regional grid". Hence the project activity meets the given applicability criterion.

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

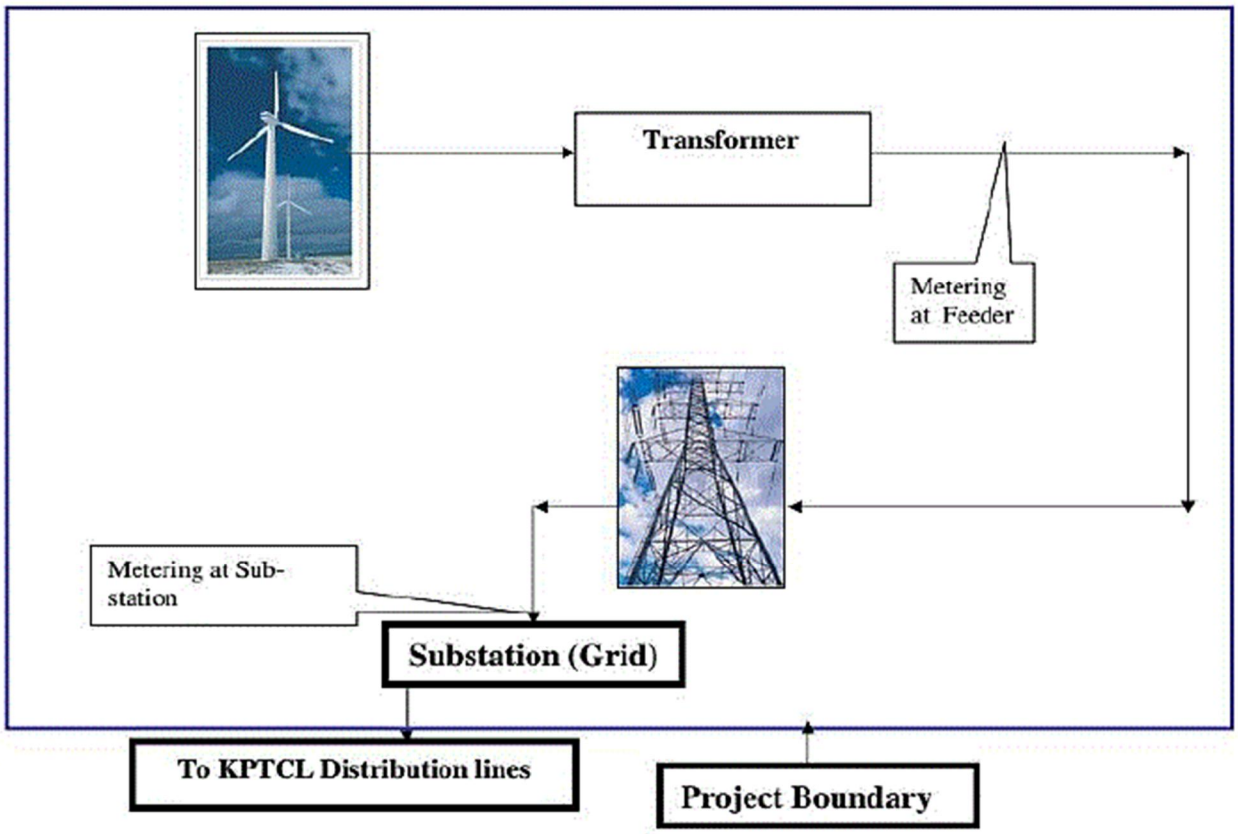
<table>
<tr><th>Applicability Criterion</th><th>Project Case</th></tr>
<tr><td>2. Illustration of respective situations under which each of the methodology (i.e. “AMS-I.D.: Grid connected renewable electricity generation”, “AMS-I.F.: Renewable electricity generation for captive use and mini-grid” and “AMS-I.A.: Electricity generation by the user) applies is included below
<table>
<tr><th></th><th>Project Type</th><th>AMS-I.A</th><th>AMS-I.D</th><th>AMS-I.C</th></tr>
<tr><td>1</td><td>Project supplies electricity to a national/regional grid</td><td></td><td>√</td><td></td></tr>
<tr><td>2</td><td>Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)</td><td></td><td>√</td><td></td></tr>
<tr><td>4</td><td>Project supplies electricity to a mini grid1 System where in the baseline all generators use exclusively fuel oil and/or diesel fuel</td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>Project supplies electricity to household users (included in the project boundary) located in off grid areas</td><td></td><td></td><td></td></tr>
</table>
</td><td>The 1st option of Table 1 “Scope of AMS-I.D., AMS-I.F. and AMS-I.A. based on project types” of AMS I.D. Version 18, EB 61 is applicable.</td></tr>
<tr><td>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);
b) Involve a rehabilitation of (an) existing plant(s)/unit(s); or
c) Involve a replacement of (an) existing plant(s).</td><td>The project is installation of new wind based electricity generation plants (not addition to existing system). Option (a) is applicable.</td></tr>
<tr><td>4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:
a. The project activity is implemented in an existing reservoir with no change in the volume of reservoir;</td><td>The project is wind power project and thus the criterion is not applicable to this project activity.</td></tr>
</table>

Applicability Criterion	Project Case
b. 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 ; c. 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.	
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 component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity is a 13.75 MW wind electricity generation. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category	The Project activity is a renewable wind energy project and is not a combined heat and power system. Hence the criteria is not applicable to the project activity
7. In the case of project activities that involve the capacity 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 distinct1 from the existing units.	The project activity is Greenfield and there is no existing power generation facility at the site. Hence the criteria is not applicable to the project activity
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 power plant/unit shall not exceed the limit of 15 MW.	Not applicable, the wind project is a Green field project activity and this project is not the enhancement or up gradation project.
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.	The Project activity is a renewable wind power project and is not a landfill gas, waste gas, wastewater treatment and agro-industries projects or recovered methane emissions project. Hence the criteria is not applicable to the project activity
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply	The Project activity is a renewable wind power project and is not a biomass project. Hence the criteria is not applicable to the project activity.

3.3 Project Boundary

Project boundary has ascertained using para 18 of AMS I.D (Version 18.0, EB 81) - "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.".

The project boundary includes the wind turbine generator, sub-stations, grid and all power plants connected to grid. The project activity evacuates power to the INDIAN grid. Therefore the entire INDIAN grid and all connected power plants have been considered in the project boundary for the project activity.



Baseline and project emission sources:

Source		Gas	Included?	Justification/Explanation
Baseline scenario	Electricity generation from power plants connected to the Indian grid	CO_2	Included	Main emission source
		CH_4	Excluded	This source is not required to be estimated for wind energy projects under AMS I.D. version 18
		N_2O	Excluded	This source is not required to be estimated for wind energy projects under AMS I.D. version 18

Source		Gas	Included?	Justification/Explanation
Project scenario	Electricity generation from the project activity	CO_2	Excluded	Wind energy generation does not have any indirect GHG emissions
		CH_4	Excluded	
		N_2O	Excluded	

3.4 Baseline Scenario

Baseline scenario for the second crediting period in line with the "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[6].

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

The baseline scenario remains unchanged and is in compliance with all the relevant mandatory national and/or Sectoral policies.

Step 1.2: Assess the impact of circumstances

The baseline scenario identified at the validation of the project activity was the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid connected power plants and by the addition of new generation sources into the grid. Thus this project activity was a voluntary investment which intends to replace equivalent amount of electricity at grid from renewable source. PP was not bound to incur this investment; hence absence of project activity (i.e. the investment) does not lead to any continued baseline practice for PP within their scope whereas the continued operation of the project activity would continue to replace equivalent amount of electricity at grid. Hence, the same baseline as identified in the previous crediting period is still valid for the project. Therefore, the assessment of the changes in market characteristics is not required for the renewal of the project's crediting period under VCS.

Nevertheless, there is an impressive growth attained by the Indian Power Sector within the recent years, the installed capacity has grown from mere 1,713 MW in 1950 to 356,100.20 MW as on 31.03.2018, consisting of 226,279.34 MW Thermal, 77,641.63 MW Renew and 6,780 MW Nuclear. Sector-wise details of installed capacity are shown in Table 1. However, it is evident from Table 17 that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO_2 emissions in the country by increased use of renewable energy sources.

[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf
[7] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

Furthermore, project participant has considered the latest available CO_2 Baseline Database (CEA database, version 15) at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which itself considered all the new circumstances. Hence, the new circumstances do not have an impact on the baseline emission. As per below table, the fossil fuel based thermal power generation is dominant over the renewable based power generation, thus baseline scenario remains same as original.

Table 1: Sector- wise installed capacity (MW) as on 31/03/2019 (CEA Database version 15)

Sector	Thermal				Nuclear	Hydro	RES	Total
	Coal	Gas	Diesel	Total				
State	65366.50	7118.71	363.93	72849.14	0.00	29878.80	2347.93	105075.86
Central	58820.00	7237.91	0.00	66057.91	6780.00	12126.42	1632.30	86596.63
Private	76518.00	10580.60	273.70	87372.30	0.00	3394.00	73661.40	164427.70
All India	200704.50	24937.22	637.63	226279.34	6780.00	45399.22	77641.63	356100.19

It is evident from Table 1 that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO_2 emissions in the country by way of fuel substitution, increased use of renewable energy sources, and also by improving the thermal efficiency of power generation.

Thus, current baseline remain same and there is no impact if circumstances, existing at the time of requesting renewal of 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

As explained in step 1.2, the baseline scenario was the electricity import/generation from the power plants connected to the electricity grid. The project activity in green field project and there is no any baseline equipment or investment involved in project activity. Therefore this condition is not applicable to the project activity.

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 VCS 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 PDD submission for renewal.

In line with the project standard version 02.0, the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period; and the correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period

Impact of the national and/or sectoral policies and circumstances upon the baseline scenario of the project activity

The Government of India enacted the Electricity Act in the year 2003 to harmonize and rationalize the provisions in the existing laws. The Act consolidated the laws relating to generation, transmission, distribution, trading and use of electricity. With the Enactment of the act, the then existing laws viz, The Indian Electricity Act 1910, The Electricity Supply Act, 1948 and The Electricity Regulatory Commissions Act, 1998 were repealed. The Electricity Act 2003 was in force at the time of the completion of the baseline study for the registered PDD.

Section 3 of the said act required the Central Government to prepare the national electricity policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy. In accordance with the section 3 of the Electricity Act 2003, the Central Government notified the National Electricity Policy[8] on 12th February 2005 which was in force at the time of completion of the baseline study as stated in the registered PDD of the project activity. This policy has not been revised since then and is currently in force as well.

In addition to the above policies, State Electricity Regulatory Commissions (SERCs) have announced preferential tariffs and Indian Renewable Energy Development Agency (IREDA) provides term loan assistance towards establishing biomass power projects. All these fiscal and financial incentives were in force at the time of completion of the baseline study for the registered PDD of the project activity and still continue to exist.

The state electricity regulatory commission issues tariff order in respect of procurement of power generated wind generators and there is no mandatory national and/or sectoral policies have come into effect that would affect the compliance of the current baseline. Hence, it can be concluded the current baseline complies with all relevant mandatory national and/or sectoral policies that have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period.

However, in spite of the financial incentives given by the government to renewable power projects in India the generation from the low cost must run resources connected to the Southern Grid has not increased to such an extent that this would lead to more than 50% contribution from the low cost must run resources towards the total generation from the Indian Grid.

[8] http://www.cercind.gov.in/Act-with-amendment.pdf

The approved consolidated baseline methodology, AMS I.D. (Version 18.0), 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 07.0) has been used to determine continued validity of the baseline based on combined margin (CM) calculations.

As per CEA database version 15, the fossil fuel dominated electricity is more than renewable sector and is continuing with same pattern. In light of the above discussion it is to be concluded that in accordance with relevant guidelines stipulated in the Project Standard version 02.0, national and/or sectoral policies and circumstances had been considered towards formulating the OM & BM baseline scenario. Hence the baseline scenario as applied for the present project activity remains justified.

As per the approved consolidated Methodology AMS I.D. (Version 18.0) para 19: "If the project activity is the installation of a Greenfield power plant, the baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

The project activity involves setting up of wind power project to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants.

In the absence of the project activity, the equivalent amount of power would have been drawn from the Indian grid. Hence, the baseline for the project activity is the equivalent amount of power from the Indian grid.

The combined margin ($EF_{grid,CM,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM). Calculations for this combined margin must be based on data from an official source (where available) and made publically available. The CEA database version 15 is the latest available data at the time of PD submission to DOE for validation, hence same is considered for emission factor calculations.

The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9419 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.25) & build margin (0.75) values, sourced from Baseline CO_2 Emission Database, Version 15.0, Dec 2019[9] published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9622 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2016-17, 2017-18, 2018-19) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 15.0, Dec 2019 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8811 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 15.0, May 2019 published by Central Electricity Authority (CEA), Government of India

3.5 Additionality

Please refer section B.5 of CDM PDD for "Additionality"[10]

In India, there is no any regulation to install the wind projects and the project activity is a voluntary step taken by PP. In India, the fossil fuel based thermal power generation is dominant over the renewable based power generation, thus baseline scenario remains same as original. As discussed in section 3.4 of VCS PD, there is no any Impact of the national and/or sectoral policies and circumstances upon the baseline scenario of the project activity and project activity is additional as per CDM Tool for the demonstration and assessment of additionality and as per VCS Program rules.

3.6 Methodology Deviations

There is no any methodology deviation applicable for the project activity.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

As per the approved consolidated Methodology AMS I.D. (Version 18.0) para 22:

Baseline emissions include only CO2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

[9] https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_15.zip
[10] https://cdm.unfccc.int/UserManagement/FileStorage/HF3XRWIA1N6PTUG0C2VE5SO49MZDKL

$$BE_y = EG_{PJ,y} \times EF_{grid,y}$$

Where:

BE_y	=	Baseline emissions in year y (tCO_2)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{grid,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

As per methodology, combined grid emission factor as per the "Tool to calculate the emission factor for an electricity system" version 07 is calculated as below.

CO_2 Baseline Database for the Indian Power Sector, Version 15, Dec 2019[11] published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per Methodological tool: Tool to calculate the emission factor for an electricity system (Version 07.0, EB 100, Annex 4), following six steps have been followed:

(a) Step 1: Identify the relevant electricity systems;
(b) Step 2: Choose whether to include off-grid power plants in the project electricity system (optional);
(c) Step 3: Select a method to determine the operating margin (OM);
(d) Step 4: Calculate the operating margin emission factor according to the selected method;
(e) Step 5: Calculate the build margin (BM) emission factor;
(f) Step 6: Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electricity systems

As described in tool "For determining the electricity emission factors, identify the relevant project electricity system. Similarly, identify any connected electricity systems". It also states that "If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used". Keeping this into consideration, the Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into five regional grids viz. Northern, Eastern, Western, North-eastern and Southern.

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 Indian grid from FY 2007-08 onwards for the purpose of this CO_2 Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the Indian grid, hence forming one unified Indian Grid. Since the project supplies electricity to the Indian grid, emissions generated due to the electricity generated by the Indian grid as per CM calculations will serve as the baseline for this project.

Table: Geographical Scope of Indian Electricity Grid

[11] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

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

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.

The Project Participant has chosen **Option I:** only grid power plants in the calculation.

Step 3: Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch data analysis OM; or
(d) Average OM.

The data required to calculate Simple adjusted OM and Dispatch data analysis OM is not possible due to lack of availability of data to project developers. The choice of other two options for calculating operating margin emission factor depends on generation of electricity from low-cost/ must-run sources. In the context of the methodology low cost/must run resources typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation.

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

	2014-15	2015-16	2016-17	2017-18	2018-19
India	16.8%	15.1%	14.6%	14.3%	14.5%

Data Source: Central Electricity Authority (CEA) database Version 15, Dec'2019[12]

[12] https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_15.zip

The above data clearly shows that the percentage of total grid generation by low-cost/ must-run plants (on the basis of average of five most recent years) for the Indian grid is less than 50 % of the total generation. Thus the Average OM method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

(a) **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.

OR

(b) **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.

PP has chosen ex-ante option for calculation of Simple OM emission factor using a 3-year generation-weighted average, based on the most recent data available at the time of submission of the PD to the DOE for validation.

OM determined at validation stage will be the same throughout the crediting period. There will be no requirement to monitor & recalculate the emission factor during the crediting period.

Step 4: Calculate the operating margin emission factor ($EF_{grid,OMSimple,y}$) according to the selected method

The operating margin emission factor has been calculated using a 3 year data vintage:

Net Generation in Operating Margin (GWh) (excl. Imports)			
	2016-17	2017-18	2018-19
INDIAN Grid	916,278	960,693	995,957
Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2016-17	2017-18	2018-19
INDIAN Grid	0.9636	0.9543	0.9685

Weighted Generation Operating Margin	
INDIAN Grid	**0.9622**

Step 5: Calculate the build margin (BM) emission factor ($EF_{grid,BM,y}$)

As per Methodological tool: “Tool to calculate the emission factor for an electricity system” (Version 07.0, EB 100, Annex 4) para 72:

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

(a) **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.

(b) **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

Option 1 as described above is chosen by PP to calculate the build margin emission factor for the project activity. BM is calculated ex-ante based on the most recent information available at the time of submission of PD and is fixed for the entire crediting period.

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2018-19
INDIAN Grid	0.8811

Step 6: Calculate the combined margin (CM) emission factor ($EF_{grid,CM,y}$)

As per Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex 4) para 81:

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM.

PP has chosen option (a) i.e. weighted average CM to calculate the combined margin emission factor for the project activity.

The combined margin emissions factor is calculated as follows:

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

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (t CO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y (t CO_2/MWh)
W_{OM}	=	Weighting of operating margin emissions factor (per cent)
W_{BM}	=	Weighting of build margin emissions factor (per cent)

The following default values should be used for W_{OM} and W_{BM}:

Wind and solar power generation project activities: W_{OM}= 0.75 and W_{BM}= 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent

crediting periods. Since project activity is of wind power generation, the above weightage has been considered for OM and BM.

Therefore, $EF_{grid,CM,y}$ = 0.9622 * 0.75 + 0.8811 * 0.25
= 0.9419 t CO_2/MWh

Net electricity supplied to the grid by the project activity

= Capacity X CUF X 8760 (running hours) X 5% (Grid availability correction factor 5%) X 3% Transmission losses

Investor Name	Capacity (MW)	PLF	Generation with Grid availability correction factor 5%	Loss 3% transmission loss	Net generation from project after losses	Net Generation (MWh/year)
Sargam Retails Private Limited (SRPL)	6.25	23.74%	12347.77	370.43	11977.33	11,977
	7.5	27.39%	17095.47	512.86	16582.60	16,583
Total	**13.75**					**28,559.94**

Baseline Emissions

BE_y = $EG_{PJ,y}$ x $EF_{grid,CM,y}$
= 28,559.94 MWh * 0.9419 tCO_2e/MWh
= 26,900 tCO_2e/year

4.2 Project Emissions

For most renewable energy power generation project activities, PE_y = 0.

4.3 Leakage

No other leakage emissions are considered. LE_y = 0

4.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$ER_y = BE_y – PE_y – LE_y$

Where

ER_y = Emission reductions in year y (t CO_2)
BE_y = Baseline emissions in year y (t CO_2)
PE_y = Project emissions in year y (t CO_2)
LE_y = Leakage emissions in year y (t CO_2)

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)
2019-20	26,900	0	0	26,900

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)
2020-21	26,900	0	0	26,900
2021-22	26,900	0	0	26,900
2022-23	26,900	0	0	26,900
2023-24	26,900	0	0	26,900
2024-25	26,900	0	0	26,900
2025-26	26,900	0	0	26,900
2026-27	26,900	0	0	26,900
2027-28	26,900	0	0	26,900
2028-29	26,900	0	0	26,900
Total	**269,000**	**0**	**0**	**269,000**

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{BM,y}$
Data unit	tCO_2/MWh
Description	Build Margin Emission Factor for Indian Grid
Source of data	Calculated from CEA database, Version 15[13]
Value applied	0.8811
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07".as per the latest data available for the most recent year 2017-18. The data is obtained from "CO_2 Baseline Database for Indian Power Sector" version 15, published by the Central Electricity Authority, Ministry of Power, and Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{OM,y}$
Data unit	tCO_2/MWh
Description	Operating Margin Emission Factor for Indian Grid
Source of data	Calculated from CEA database, Version 15, Dec 2019[14]
Value applied	0.9622
Justification of choice of data or description of measurement methods and procedures applied	Calculated as the last 3 year (2016-17, 2017-18, 2018-19) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 15.0, published by Central Electricity Authority (CEA), Government of India.
Purpose of Data	For the calculation of the Baseline Emission

[13] https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_15.zip
[14] https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_15.zip

Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{CM,y}$
Data unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 15, Dec 2019[15]
Value applied	0.9419
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $\mathbf{EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}}$ Where: $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year y (tCO_2/MWh) $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year y (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

5.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,facility,y}$
Data unit	MWh
Description	Net electricity supplied to the grid by the project activity
Source of data	Credit report Sheets. (KPTCL/ BESCOM Form B2[16])/ Invoice (whichever is conservative).
Description of measurement methods and procedures to be applied	The net electricity supplied by the set of WTGs of the project activity is calculated by following formula: Net electricity supplied to the grid by the project activity i.e. $EG_{PJ,facility,y}$ = Net electricity supplied to the grid by the set 1 (5* 1.25 MW) WTGs { $EG_{PJ,facility,y}$ for set 1 WTGs} + Net electricity supplied to the grid by the set 2 (5* 1.5 MW) WTGs { $EG_{PJ,facility,y}$ for set 2 WTGs} Net Electricity supplied to the grid is in kWh. However for the calculation purpose Net electricity supplied is converted in MWh. The Net electricity supplied to the grid by the project

[15] https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_15.zip

[16] Form B consists of a set of documents which is issued by KPTCL/BESCOM which consists of data such as the import and export of electricity by group of WTGs of the project activity at a site at 33 kV metering point, export and import of electricity at the 33/220 kV KPTCL sub-station from all the WTGs (PP and non PP) connected to the substation, Transmission losses and its calculation (i.e. calculation of percentage line losses for a month) done by BESCOM.

	activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid and the transmission losses obtained from credit reports provided by KPTCL/BESCOM as per below equation: ($EG_{PJ,facility,y}$ (calculated separately for both sets of WTGs of PP) = $EG_{Exported}$ - EG $_{Import}$ - EG $_{Transmission\ Losses}$).
Frequency of monitoring/recording	Continuous monitoring and monthly recording
Value applied	28,559.94
Monitoring equipment	This is a calculated value
QA/QC procedures to be applied	Net electricity supplied to the grid as mentioned in Form B will be cross- checked with the invoices[17] raised by the PP for the project activity. Whichever is the conservative value will be considered for emission reduction calculation during verification of the project activity. Calibration of energy meters (i.e. both the main meter and check meter) would be carried out on an annual basis.
Purpose of data	To Determine baseline emissions
Calculation method	$EG_{PJ,facility,y}$ (calculated separately for both sets of WTGs of PP) = $EG_{Exported}$ - EG $_{Import}$ - EG $_{Transmission\ Losses}$.
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this project activity, whichever occurs later.

Data / Parameter	$EG_{exported}$[18]
Data unit	MWh
Description	Electricity exported by the WTGs of the project activity
Source of data	Credit report Sheets. (KPTCL/ BESCOM Form B)
Description of measurement methods and procedures to be applied	Monitoring: Bi-directional Trivector meters (main and check meter at 33 kV metering point) will be used for monitoring of electricity exported by WTGs of the project activity. The meters are of 0.2s accuracy class. Electricity exported is in kWh. However for the calculation purpose electricity exported is converted in MWh.
Frequency of monitoring/recording	Measuring Frequency: Continuously measured & monthly recording
Value applied	-
Monitoring equipment	Type of meter: Energy Meter

[17] The values of Export, import and transmission losses can be cross checked from the invoice. However as per the provision of the State utility an increase of 115% has to be applied on the import value for billing purpose. This results in a higher import value than that in the credit note thus resulting in a lesser value of the net electricity supplied to the grid in the invoice.

18 In case of apportioning of electricity for any month (When billing cycle and crediting period years or monitoring period not matches) as per the procedures provided under "Apportioning Procedure" of monitoring plan (B.7.3), EG Exported (i.e. Sum of G for each group of WTGs of the project activity) and G for any month are same only

QA/QC procedures to be applied	The meters used for the monitoring of this parameter shall be tested/ calibrated on quarterly basis as per article 7.5 of the PPA.
Purpose of data	Baseline emission calculation
Calculation method	Not Applicable
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this project activity, whichever occurs later.

Data / Parameter	EG_{import}
Data unit	MWh
Description	Electricity imported from the grid by the WTGs of the project activity.
Source of data	Credit report Sheets. (KPTCL/ BESCOM Form B)
Description of measurement methods and procedures to be applied	Monitoring: Bi-directional Trivector meters (main and check meter at 33 kV metering point) will be used for monitoring of electricity exported by WTGs of the project activity. The meters are of 0.2s accuracy class. Electricity imported is in kWh. However for the calculation purpose electricity exported is converted in MWh.
Frequency of monitoring/recording	Measuring Frequency: Continuously measured & monthly recording
Value applied	-
Monitoring equipment	Type of meter: Energy Meter
QA/QC procedures to be applied	The meters used for the monitoring of this parameter shall be tested/ calibrated on quarterly basis as per article 7.5 of the PPA.
Purpose of data	Baseline emission calculation
Calculation method	Not Applicable
Comments	The data will be kept for two years after the end of the crediting period or the last issuance of VERs for this project activity, whichever occurs later.

Data / Parameter	$EG_{Transmission\ Losses}$
Data unit	MWh
Description	Electricity Losses in Transmission
Source of data	Credit report Sheets. (KPTCL/ BESCOM Form B)
Description of measurement methods and procedures to be applied	Monitoring: This is a calculated parameter, based on the measurement results of the meters installed at 33 kV metering point and 220 kV sub-station. Bi- directional Trivector meters (main and check meter at 33 kV metering point and 220 kV sub-station (SS)) will be used for monitoring of electricity. The meters will be of 0.2s accuracy class
Frequency of monitoring/recording	Continuous monitoring and monthly recording
Value applied	-
Monitoring equipment	Not Applicable
QA/QC procedures to be applied	-
Purpose of data	Baseline emission calculation

Calculation method	**Calculation Procedure EG** $_{\text{Transmission Losses}}$ Z= % of line losses X= Total exported electricity from all the metering points connected to the sub – station (as measured at 33 kV metering point of all the WTGs (PP + non PP) connected to the SS) hence X= X1+ X2+X3+.....Xn Y= Total exported electricity as measured at Sub – Station Bulk meter (i.e main and check meter at 220 kV SS). Z= [(X-Y)/X]*100 EG Transmission Losses = Z* EG $_{\text{Exported}}$ Electricity Loss in Transmission is in kWh. However for the calculation purpose electricity loss in transmission is converted in MWh.
Comments	This % transmission loss calculation as explained above is done by the state utility based on measured parameters and transparently provided in the FORM B. However, PP has no control over this calculation. Nonetheless, this calculation is transparently mentioned in the FORM B and can be verified any time during the verification. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

5.3 Monitoring Plan

The project activity is in accordance with approved small scale methodology AMS-I.D, and therefore, can use the monitoring methodology for type I.D of 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 18.0, - Grid connected renewable electricity generation.

This approved monitoring methodology requires monitoring of the following:

✓ Net Electricity supplied by the project activity to the grid

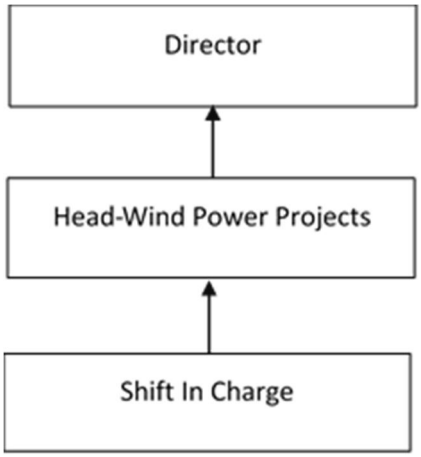
In order to monitor the mitigation of GHG due to the project activity, the Net electricity supplied by the project activity to the grid needs to be monitored. The net electricity supplied to grid by the project activity multiplied by grid emission factor for regional grid, would form the baseline for the project activity.

Since the emission factor (combined margin) of the grid is fixed for the crediting period, the monitoring of grid emission factor is not required. The sole parameter for monitoring is the net electricity supplied to the grid.

The Project is operated and managed by M/s Suzlon Energy Limited/ Its Group Companies/Contractor specifically appointed by Suzlon. The operational and management structure will be implemented by the project participant in order to monitor emission reductions by the project activity:

Net electricity supplied by the project activity is the most important parameter required for the financial reporting and sustainability of the project and monitored with due care by both

the parties (O&M Contractor (PP's representative and representative of KPTCL). For emission reductions project proponents proposes the following structure.



Roles and responsibilities:

Director: In the project management structure Director is responsible for the overall project performance. The Director will review the monthly Net electricity supplied and annual emission reduction calculations. Operation and maintenance of WTGs of the project activity will be done by Suzlon Energy Limited/It's Group Companies/Contractor specifically appointed by Suzlon.

Head- Wind Power Projects: Head- Wind Power Projects is assisting to director for completing the task discussed above. He is responsible for the electricity generations at the individual wind turbine installations. He will report to Director for any abnormality.

Shift In-charge: Shift in charge is responsible for recording the electricity meter reading from the KPTCL meter. He will be the person of Suzlon Energy Limited/It's Group Companies/Contractor specifically appointed by Suzlon.

Record Handling: OEM contractors (i.e. Suzlon Energy Limited/It's Group Companies/Contractor specifically appointed by Suzlon) are responsible for daily records with all the related parameters. The relevant records are submitted to Head- Wind Power Projects on monthly basis. The Head- Wind Power project has final responsibility for record keeping. The O&M personnel are qualified engineers and are trained by Suzlon for operating and ensuring best performance of the WTGs. The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be as per the PPA (power purchase agreement)with KPTCL/BESCOM.

1. **Metering:** The Delivered Electricity shall be metered by the Parties at the high voltage side of the step up transformer installed at the Receiving Station (main and check meter at 220 kV substation). The electricity exported and imported by the WTGs of the Project activity shall be metered by the Parties at the high voltage side of the step up transformer installed at the Project Site (main and check meter at 33 kV metering point). The WTGs of a single customer (SRPL in this case) at a particular site are connected to a 33 kV metering point (having the main and check meter) which in turn connects to a bulk meter (main and check meter) at the 220 kV substation maintained by Suzlon Power Infrastructure Limited. Data monitoring takes place at the 33 kV metering point, 220 kV sub-station and at the WTG inbuilt controller meter. The emission reduction calculations are done on the basis of net electricity supplied to the grid

by the project activity as explained later in this section under heading “Procedure of monitoring of net electricity supplied to the grid by the project activity”.

2. **Metering Equipment:** Metering equipment shall be electronic bi-directional trivector meters of accuracy class 0.2s required for the Project (both main and check meters at 33 kV metering point and 220 kV sub-station). The metering equipment shall be maintained in accordance with electricity standards. Such equipment shall have the capability of recording a month’s reading and measure both import and export simultaneously.

3. **Meter Readings:** The monthly meter readings (both main and check meters) at the Project Site and the Receiving Station shall be taken simultaneously and jointly by the Parties every month. The recorded metering data shall be downloaded through meter recording Instrument by KPTCL officer as and when required.

4. **Inspection of Energy Meters**: All the main and check energy meters used for the monitoring under the project activity shall be of 0.2s accuracy class. Each meter shall be jointly inspected and sealed on behalf of the Parties and shall not be interfered with by either Party except in the presence of the other Party or its accredited representatives.

Data Adjustments and Uncertainties:

5. Meter Test Checking: All the main and check meters shall be tested for accuracy. as per requirement with reference to a portable standard meter which shall be of an accuracy class of 0.1%. The portable standard meters shall be owned by the Corporation at its own cost and expense and tested and certified at least once every year or as per requirement against an accepted laboratory standard meter in accordance with electricity standards. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2% accuracy class. As per the PPA Article 7 Sub-clause 7.5, the consumption registered by the main meters alone will hold well for the purpose of billing as long as the error in the main meter is within the permissible limits.

a. If during the quarterly tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then billing will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.
b. If during the quarterly tests, the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limits of error, then the billing for the month upto the date and time of such test shall be as per the check meter. There will be a revision in the bills for the period from the previous calibration test up to the current test based on the readings of the check meter. The main meter shall be calibrated immediately and billing for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.

c. If during the quarterly tests, both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive at the correct reading of electricity supplied for billing purposes for the period from the last month's meter reading upto the current test. Billing for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.

d. If during any of the monthly meter readings, the variation between the main meter and the check meter is more than that permissible for meters of 0.2% accuracy class, all the meters shall be re-tested and calibrated immediately.

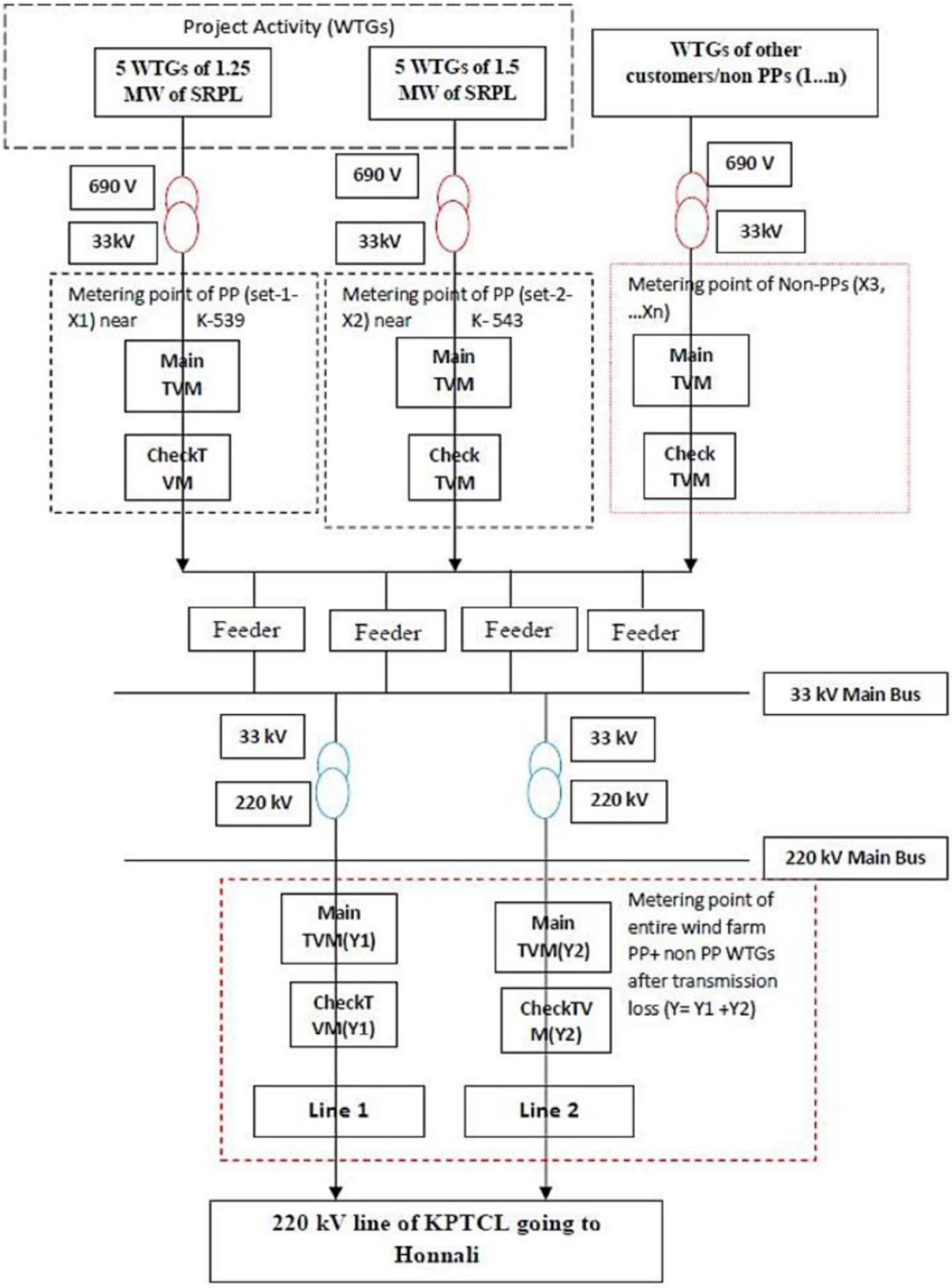
Description of calibration of WTG Controller:

The controller used for the WTG is SCS Controller is a micro-processor based intelligent controller which has been specially designed for control of wind turbines. It uses a Woodward Multi function Relay that has three current inputs from CT and three direct voltage inputs (690 Volts). The analog values of current/ voltage is converted into digital signal internally using A/D Converters at very high sampling rate. A software program reads these values and displays instantaneous parameters such as voltage, current, power factor, kVAh, kVArh and kWh. These instantaneous values are then time integrated and displayed /stored. Woodward relay is having no display and needs special protocol to view energy readings as this relay is communicating digital signal through special communication protocol. Moreover, turbine can not run without this relay hence it cannot be removed for calibration, hence, it is not possible to calibrate16.Incase of any problem related to the panel meter, the WTG will automatically get shut down and the meter will be replaced by a new meter immediately.

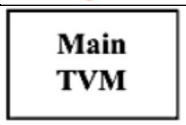
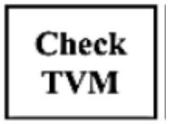
6. **Records:** Suzlon Energy Limited/It's Group Companies/Contractor specifically appointed by Suzlon will maintain an accurate operating record at the wind farm site of:
   a. Daily generation reading
   b. Any unusual conditions found during operation/inspections
   c. All the records will be preserved for 2 years beyond the crediting period.

7. The billing will be on monthly basis. The BESCOM will be billed by Sargam Retails pvt Ltd based on statement given by BESCOM at the end of each month for the net electricity supplied by the WTGs of the project activity.

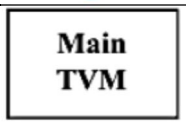
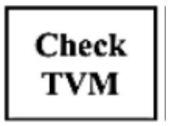
   Schematic Diagram of whole monitoring activity, including the physical meter locations and connections to the project activity has been provided below:


Project Activity (WTGs)
5 WTGs of 1.25 MW of SRPL
5 WTGs of 1.5 MW of SRPL
WTGs of other customers/non PPs (1...n)
690 V
33kV
690 V
33kV
690 V
33kV
Metering point of PP (set-1-X1) near K-539
Main TVM
CheckT VM
Metering point of PP (set-2-X2) near K- 543
Main TVM
Check TVM
Metering point of Non-PPs (X3, ...Xn)
Main TVM
Check TVM
Feeder
Feeder
Feeder
Feeder
33 kV Main Bus
33 kV
220 kV
33 kV
220 kV
220 kV Main Bus
Main TVM(Y1)
CheckT VM(Y1)
Main TVM(Y2)
CheckTV M(Y2)
Metering point of entire wind farm PP+ non PP WTGs after transmission loss (Y= Y1 +Y2)
Line 1
Line 2
220 kV line of KPTCL going to Honnali

Legends at 33 kV side:

	Step-up transformer for Step up from 690 V to 33 kV
	Main Meter (Bi-directional Trivector Meter – TVM) at 33 kV side
	Check Meter (Bi-directional Trivector Meter – TVM) at 33 kV side

Legends at 220 kV side:

	Step-up transformer for Step up from 33 kV to 220 kV
	Main Meter (Bi-directional Trivector Meter – TVM) at 220 kV side on Line 1 and Line 2
	Check Meter (Bi-directional Trivector Meter – TVM) at 220 kV side on Line 1 and Line 2

The monitoring/calculation of net electricity supplied to the grid by the project activity is as per PPA, which is further explained below:

Electricity from each WTG of the project activity is generated at 690 V which is further step-up to 33 kV voltage level through a step up transformer installed at each WTG yard. There are a total 10 WTGs in the project activity which are in two sets (as far as monitoring of net electricity supplied is concerned) first set constitutes five WTGs of 1.25 MW (5 X 1.25 MW) and second set constitutes of five WTGs of 1. 5 MW (5 X 1.5 MW). Each set of 5 X 1.25 MW and 5 X 1.5 MW has one metering set at 33 kV. The 33 kV metering points monitors the generation of import and export for the individual WTG or a set of WTGs (PP + non-PP) connected to it. The feeders of 33 kV metering point are further connected to 220 kV step up transformer at substation; on the high voltage side of these step-up transformers, another set of bulk meters, both main and check, are installed. These bulk meters are not exclusive to project WTGs, but instead are also connected to WTGs belonging to other project developers.

In order to obtain the net electricity supplied by the WTGs, meter readings are taken at two sides that is one at the 33 kV side and the other at 220 kV side. The electricity export (without transmission losses) and import by the WTGs (individual or set of WTGs at the wind farm site) of the customers (PP and non PP) is measured by taking the main and check meter readings at 33 kV side. Further to this, the main and check meter readings (also known as Bulk meter readings) are taken at Line 1 and Line 2 of the 220 kV side.

Both these readings are used to compute the transmission loss % as below:

Total Export Meter readings @ 33 kV side for all customers – X (= X1+ X2+….XN)

Bulk meter readings @ 220 kV side (Total Export after transmission loss) for all customers – Y (=Y1+Y2)

Transmission Losses % (Z) = {(X – Y)/X}*100

This value of Z (%) is multiplied with the export meter reading of the set of WTGs of PP (i.e. set 1 and set2) obtained at 33 kV side to calculate the transmission losses incurred by the PP. The import of electricity as measured at 33kV metering point is not subjected to any treatment of transmission loss by the state utility during the FORM B preparation. The net electricity supplied by the set of WTGs of the project activity is calculated by following formula: Net electricity supplied to the grid by the project activity = Electricity export by the WTGs of the project activity (measured at 33 kV metering point for set 1 and set 2) - import from grid (measured at 33 kV metering point for set 1 and set 2) - (transmission loss % calculated by state utility * export as measured at33 kV metering point for set 1 and set 2).

The Electricity export by the WTGs of the project activity, import from grid and the transmission loss on export will be crosschecked with the invoice raised by the PP to the state utility. Based on this invoice state utility makes the payment to the PP. This is based on the PPA signed between the PP and state utility and this invoice is a commercial document, a credible and authentic document. The Net electricity supplied to the grid by the project activity, however differs in the invoice and JMR/Form B as explained below:

The value of net electricity supplied to the grid by the project activity in the invoice is lesser than that in the credit note/Form B provided by BESCOM. This difference in the value is due to a higher import value obtained after applying an increase of 115% on the import value of the credit note for billing purpose.

As per Article 5.5 of the PPA, “The Company shall be permitted to use 10% of the installed capacity for start-up, after inspection by the concerned officers of the BESCOM and 105% of such energy provided by the BESCOM for start-up purposes shall be deducted from the energy pumped into the grid by the company for determining the amount to be paid by the BESCOM to the company”. However as per the KERC order18, the state utility has instructed all the WTG owners to raise an invoice after deducting 115%of the energy supplied by BESCOM to the PP. This results in higher value of import than that provided in the credit note.

Hence conservatively the lower value of net electricity supplied to the grid (between invoices/ JMR/Form B) will be used for emission reduction calculation.

SRPL (Head- Wind Power Projects & Director) will be keeping the daily / monthly data generated from all the WTGs provided by Suzlon and KPTCL.

Internal audits & Performance review:

The records are regularly reviewed and checked by the SRPL representatives based upon the daily power generation reports and credit report sheets (KPTCL/BESCOM Form B). The SRPL representatives shall do the internal audit on yearly basis and will crosscheck the emissions reductions estimated in the PDD with respect to actual emissions reduction. For any deviation

from the actual emission reduction values and reported values corrective action will be suggested by SRPL representatives to calculate the conservative emission reduction.

Apportioning Procedure:

The following apportioning procedure will be followed, if the monitoring period date of the project activity falls in – between the billing cycles of KPTCL/BESCOM:

Partial days generation of the Month at Controller by the WTGs of the project activity (kWh): X Total generation at Controller (kWh) for the same month by the WTGs of the project activity: Y kWh % Generation for partial days of generation (%): Z= (X/Y) *100

Electricity export to the grid by the WTGs of the project activity as per credit report (KPTCL/BESCOM from B) for the month: G kWh

Electricity export to the grid by the WTGs of the project activity for the partial days: (G*Z/100).

Form B, which contains the electricity data, is certified by the Site-in-Charge (O&M contractor) of SEL and also by the Asst. Executive Engineer of KPTCL/BESCOM. The monthly Net Electricity supplied shall be derived from Form B and the same shall be used in monitoring report during verification. Head – Wind power projects of SRPL is responsible for keeping the copies of Form B sent to SRPL from KPTCL.