# 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 |
| Version | 08 |
| Report ID | 927 |
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| Monitoring Period | 01-July-2021 to 31-March-2022 |
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# 1 PROJECT DETAILS

## 1.1 Summary Description of the Implementation Status 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), located 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 will partially contribute 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.

The first phase of project activity was commissioned on 31-March-2009 and last was commissioned on 29-May-2009.

Total GHG emission reductions achieved during the current monitoring period 01-July-2021 to 31-March-2022 which comes under the second crediting period of 31-March-2019 to 30-March-2029is 18,520t$CO_2$e.

## 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 a grouped project because there is no addition of other project activity.

This is a non-AFOLU type of project.

## 1.3 Project Proponent

| | |
|---|---|
| Organization name | Sargam Retails Pvt. Limited |

| | |
|---|---|
| Contact person | Mr. Prafulla PremchandKhinvasara |
| Title | Head- Wind Power Projects |
| Address | Malpani House, Indira Gandhi Marg, Sangamner, Maharashtra – 422605, India |
| Telephone | +91- 9021032214 |
| Email | prafulla@malpani.com |

## 1.4 Other Entities Involved in the Project

| | |
|---|---|
| Organization name | EKI Energy Services Limited |
| Role in the Project | Project Consultant |
| Contact person | Vanya Chauhan |
| Title | Executive Operations – Climate Change |
| Address | Enking Embassy, Office no. 201, Plot 48, Scheme 78 part 2, Vijay Nagar, Indore-452010 (M.P, India) |
| Telephone | +91 7898102069 |
| Email | vanya.chauhan@enkingint.org, registry@enkingint.org |

## 1.5 Project Start Date

Start date of the project activity is the earliest date of commissioning of the WTGs i.e. 31-March-2009 and hence it is considered as the project start date.

Project Start Date: 31-March-2009

## 1.6 Project Crediting Period

Crediting period start date: 31-March-2019 (second crediting period)

Crediting period end date: 30-March-2029 (second crediting period)

Length of crediting period: 10 years

Type: Renewable Crediting Period

Previous crediting period: 31-March-2009 to 30-March-2019

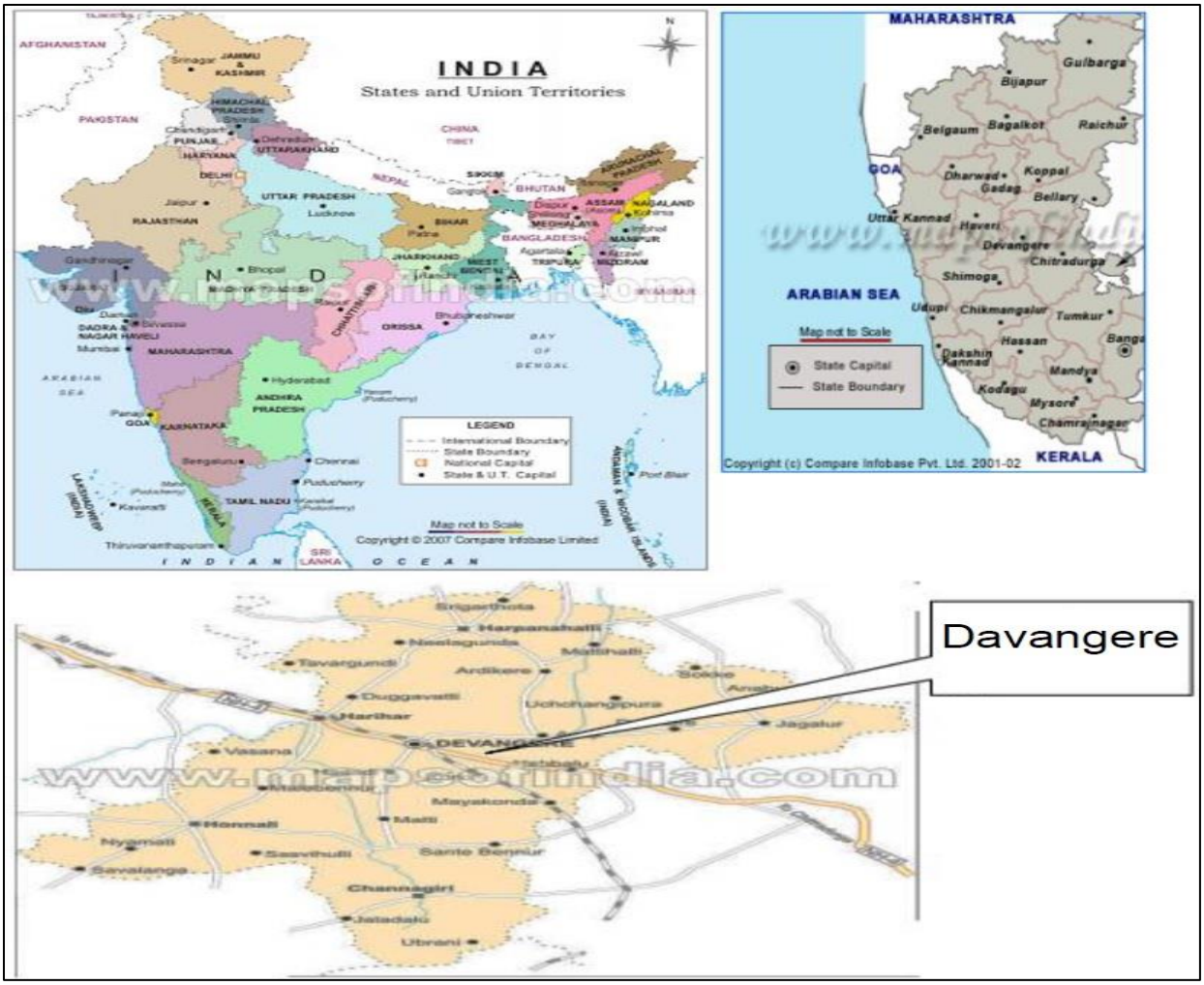
The project activity adopts renewable crediting period of 10 years period which can berenewed for maximum 2 times. The same is mentioned in section 1.9 of RCP PD dated 26-February-2021 which has been approved.

## 1.7 Project Location

The project activity is located at Davangere in the state of Karnataka.

Geographical Location Details of the project site of 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" |




## 1.8 Title and Reference of Methodology

**Title:** "Grid Connected Renewable Electricity Generation" Version 18.0[1]
**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)[2]

Tool for the demonstration and assessment of additionality, Version 7.0[3]

## 1.9 Participation under other GHG Programs

The project activity has already been registered with UNFCCC CDM standard on 07-January-2011 with Reference Number 3700[4]. For the CDM Project 3700, CERs have already

[1] https://cdm.unfccc.int/UserManagement/FileStorage/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC
[2] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[3] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
[4] https://cdm.unfccc.int/Projects/DB/SGS-UKL1273659698.37/view?cp=1

issued till 30-September-2016. In the current verification, VCS monitoring period has been considered from 01-July-2021 to 31-March-2022. Hence, there are no GHG Emission Reduction credits claimed under the CDM mechanism for current monitoring period. There would be no double counting of GHG emission reductions. PP has also provided undertaking that in current monitoring period, it would not claim GHG emission reduction credits in any GHG program other than that in VERRA during this monitoring period.

## 1.10 Other Forms of Credit

Emission reduction generated from the project activity is not double counted (i.e. issuance of other form of environmental credit/certificate) for a particular crediting period.

Emission 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.

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 credits(including REC benefits) for the same crediting period under consideration. PP has given undertaking that it has not applied REC mechanism and will not claim any REC benefits during the current monitoring period.

## 1.11 Sustainable Development Contributions

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 will lead to reduction of poverty by establishing direct and indirect employment benefits. Such benefits will, 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 will also improve 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 Indian 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(like coal, lignite, gas and diesel) based generating units.

**Environmental Well-being**

The project will utilize 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 will therefore motivate 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.

**Table 1: Sustainable Development Contributions**

| Row number | SDG Target | SDG Indicator | Net Impact on SDG Indicator | Current Project Contributions | Contributions Over Project Lifetime |
|---|---|---|---|---|---|
| 1) | 7.2 | 7.2.1: Renewable energy share in the total final energy consumption | Implemented activities to increase | 19,663.48 MWh, of renewable electricity has been supplied to Indian grid during the reported period that helps to increase the renewable energy share in the energy mix. | (56,373.581 + 54,340.38 + 51,813.52578 + 78,848.30 + 70,412.40 + 66,684 + 19,663.48) = 398,135.67[5]MWh renewable electricity has been supplied to Indian grid that helps to increase the renewable energy share in the energy mix. |
| 2) | 13.0 | Tons of greenhouse gas emissions avoided or removed | Implemented activities to increase | By supplying 19,663.48 MWh clean electricity to Indian grid, the project avoided release of 18,520 $tCO_2$ in to the atmosphere during the reporting period | Prevented the release of (52,258 + 50,374 + 48,029 + 73,092+ 65,271+ 62,808 + 18,520) = 370,352[6]$tCO_2$ into the atmosphere. |

[5]The previous electricity generation values have been updated from the corresponding monitoring reports present in: https://registry.verra.org/app/projectDetail/VCS/927 , https://cdm.unfccc.int/Projects/DB/SGS-UKL1273659698.37/view?cp=1

[6]The previous GHG removal values have been updated from the corresponding monitoring reports present in: https://registry.verra.org/app/projectDetail/VCS/927 , https://cdm.unfccc.int/Projects/DB/SGS-UKL1273659698.37/view?cp=1

# 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, Forests and Climate Change (MoEFCC), Government of India notification dated 14-September-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, Forests and Climate Change, Government of India) 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.

**During construction**

Impact on air

Movement of construction material during construction will have some impact on the air. As the transportation is quite less for the project activity, the impacts will be negligible.

Impact on water

Not much water discharge takes place during construction. However, proper sanitary arrangements are provided by project proponents.

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 Energy Ltd. maintains highest level of safety standards. Systematic and scientific maintenance of all equipment 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 upliftment of skilled and unskilled manpower in the region. The project will be providing 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 socio-economic impacts due to increased job opportunities at the facility as well as other ancillary units coming up.

## 2.2 Local Stakeholder Consultation

Project Proponent had conducted local stakeholder consultation extensively during registration of the project through identification of stakeholders, invitation of stakeholders for meeting, explanation on the project and resolving comments/suggestions/ grievances of the stakeholders.

The process of local stakeholder consultation is continuous. During the current monitoring period, the project proponent has kept grievance register in plant site office and sought comments/grievances/suggestions from local stakeholders including local community, government agencies and NGOs. Besides, the PP has also kept provision for submitting comments/grievances/suggestions from local stakeholders through direct mail. However, no comments/grievances/suggestions have been received from the aforementioned stakeholders during the current monitoring period.

## 2.3 AFOLU-Specific Safeguards

Not applicable as the project activity is not an AFOLU project activity.

# 3 IMPLEMENTATION STATUS

## 3.1 Implementation Status of the Project Activity

The project has already been commissioned and monitoring equipments were installed in accordance with registered VCS Project Description (PD). The commissioning details of the project activity are given below. The project started operation on 31-March-2009 which is the earliest date of commissioning and has been in operation till now since commissioning except scheduled maintenance and shutdowns.

| WTG ID | Capacity and Number of WTGs | Date of Commissioning |
|---|---|---|
| K-543, K-544, K-549, K-550, K-551 | 1.5 MW x 05 Nos | 31-March-2009 |
| K-538, K-539, K-541, K-542 | 1.25 MW x 04 Nos | 31-March-2009 |
| K-540 | 1.25 MW x 01 No. | 29-May-2009 |

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-82 1500 kW capacity and 5 nos. S 64 1250 kW capacity.

The salient features of the technology are:

**S-82 1.5 MW 50Hz**

| | |
|---|---|
| Rated Power | 1500 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 | Asynchronous |
| Insulation | Class H |

**S-64 1.25 MW 50Hz:**

| | |
|---|---|
| Rated Power | 1250 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 |
| Generator Type | Asynchronous |
| Insulation | Class 'H' |

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.

During the current monitoring period, all the WTGs were operational and the project activity has supplied 19,663.48 MWh of electricity, and thus contributing to 18,520 tCO2e GHG reductions.

For the current monitoring period estimated emission reduction is 20,193 tCO2e, whereas actual emission reductions achieved are 18,520tCO2e (round down value), which is approximately 8.3% lower than the estimated emission reductions.

This variation is majorly due to low plant load factor (PLF). Some other reasons for this are the variations in the wind flow pattern, grid availability, breakdown due to various reasons, and other parameters which are not in the control of the project proponent.

Breakdown details for the current monitoring period have been mentioned in Appendix 2 of the monitoring report. These breakdowns do not impact the monitoring process.

## 3.2 Deviations

### 3.2.1 Methodology Deviations

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

### 3.2.2 Project Description Deviations

Project Description Deviations in the previous monitoring period:

Deviation 1:

In the previous monitoring period (31-March-2019 to 30-June-2021), change in the calibration frequency has been sought. As per the Section 5.2 of the registered VCS RCP PD, the calibration of energy meters (including both main meter and check meter) would be carried on an annual basis. However, according to the Power Purchase Agreement (PPA) with Bangalore Electricity Supply Company Limited (BESCOM) - to which electricity generated by the project activity is supplied, calibration should ideally be carried out on a quarterly basis. Therefore, to maintain the practice expected by BESCOM Standard, the PP has done the meter calibrationsquarterly as mentioned in the clause 7.5 of PPA.The meters are deemed to be working satisfactorily if the errors are within specifications for meters of 0.2s accuracy class. The consumption registered bythe main meters alone holds good for the purpose of billing as long as the error in the main meter is within the permissible

limits.Howeverif there has been delays in meter calibration during the monitoring period for which, an error factor of 0.2% has been applied, since the accuracy class of the meter is 0.2s and even in case of delayed calibration, meters have been found to be working satisfactorily i.e. errors were within the permissible limits of 0.2%.

The change in the calibration frequency in the previous monitoring periodi.e.monitoring period number 6 (31-March-2019 to 30-June-2021) during the second crediting period of 31-March-2019 to 30-March-2029will not have any impact on the ER calculations. Both parties, the PP and the state electricity board - BESCOM accepts the meter reading and PP raise the invoice to BESCOM based on monthly JMR reading. Due to the financial obligations for the PP and the state electricity board- BESCOM, both parties ensure that the meters are running accurately.

The deviation was approved during the previous monitoring period.

## 3.3 Grouped Projects

This is not a grouped project. So, this section is not applicable.

# 4 DATA AND PARAMETERS

## 4.1 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 Dec 2019[7] |
| 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 2018-19. 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 | $EF_{OM,y}$ |
|---|---|

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

| | |
|---|---|
| Data unit | $tCO_2/MWh$ |
| Description | Operating Margin Emission Factor for Indian Grid |
| Source of data | Calculated from CEA database, Version 15 Dec 2019[8] |
| 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, and 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 |
| Comments | This parameter is fixed ex-ante for the entire crediting period. |

| | |
|---|---|
| Data / Parameter | $\mathbf{EF_{CM,y}}$ |
| Data unit | $tCO_2/MWh$ |
| Description | Combined Margin Emission Factor in year y |
| Source of data | Calculated from CEA database, Version 15 Dec 2019[9] |
| 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: $\mathbf{EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}}$<br>Where:<br>$EF_{grid,BM,y}$= Build margin $CO_2$ emission factor in year y ($tCO_2/MWh$)<br>$EF_{grid,OM,y}$= Operating margin $CO_2$ emission factor in year y ($tCO_2/MWh$)<br>$W_{OM}$ = Weighting of operating margin emissions factor (%) = 75%<br>$W_{BM}$= 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. |

## 4.2 Data and Parameters Monitored

| | |
|---|---|
| Data / Parameter | $\mathbf{EG_{PJ,facility,y}}$ |
| Data unit | MWh |
| Description | Net electricity supplied to the grid by the project activity |

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

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

| | |
|---|---|
| Source of data | Credit report Sheets. (KPTCL/ BESCOM Form B2[10])/ 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:<br><br>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}<br><br>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 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:<br><br>($EG_{PJ,facility,y}$ (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 monitored | 19,663.48 |
| Monitoring equipment | This is a calculated value |
| QA/QC procedures to be applied | Net electricity supplied to the grid as mentioned in Form B is cross- checked with the invoices[11] raised by the PP for the project activity. Whichever is the conservative value, is considered for emission reductions calculation during verification of the project activity. |
| Purpose of the data | To Determine baseline emissions |
| Calculation method | $EG_{PJ,facility,y}$ (calculated separately for both sets of WTGs of PP) = $EG_{Exported}$- $EG_{Import}$ - $EG_{Transmission\ Losses}$. |

[10] 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.

[11] 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.

| | |
|---|---|
| Comments | The data will be kept for two years after the end of the crediting period or the last issuance of VCUs for this project activity, whichever occurs later. |

| | |
|---|---|
| Data / Parameter | $EG_{exported}$[12] |
| Data unit | MWh |
| Description | Electricity exported by the WTGs of the project activity |
| Source of data | |
| Description of measurement methods and procedures to be applied | Monitoring: Bi-directional Trivector meters (main and check meter at 33 kV metering point) are 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.<br><br>Data Type: Measured<br>Frequency: Continuously measured & monthly recording<br>Archiving Policy: Paper & Electronic<br><br>The meters are calibrated once in a quarter by NABL accredited agency through BESCOM as per PPA. Calibration details of the meters are provided in Appendix 1. |
| Frequency of monitoring/recording | Measuring Frequency: Continuously measured & monthly recording |
| Value monitored | 20,037.93 |
| Monitoring equipment | Type: Bi-directional Trivector meters (main and check meter at 33 kV metering point) are used for monitoring of electricity exported by WTGs of the project activity.<br><br>Accuracy Class: 0.2s<br><br>Serial Number: |

| WTGs | WTG Location No. | Main Meter Sl. No. | Check Meter Sl. No. |
|---|---|---|---|
| 5 x 1.25 MW | K-538, K539, K-540, K-541, K542 | 08001351 | 08001352 |
| 5 x 1.5 MW | K-543, K544, K-549, K-550, K551 | 08001358 | 08001371 |

12In case of apportioning of electricity for any month (When billing cycle and crediting period years ormonitoring 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 forany month are same only

| | |
|---|---|
| | The meters are calibrated on a quarterly basis by NABL accredited agency through BESCOM as per PPA. Calibration details of meters are provided in Appendix 1. |
| QA/QC procedures to be applied | The meters are calibrated once in a quarter as per the clause 7.5 of PPA. There has been a delay in calibration of energy meters and in case of delayed calibration, meters were found to be working satisfactorily i.e.errors were within the permissible limits of 0.2%. Therefore an error factor of 0.2% has been applied in export and import electricity values on respective months (as per the meter accuracy class of 0.2s). The months in which error factor has been applied are mentioned in Appendix 1 of the MR. |
| Purpose of the data | Baseline emission calculation |
| Calculation method | Not Applicable as this is a measured parameter |
| Comments | The data will be kept for two years after the end of the crediting period or the last issuance of VCUs 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) are 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.<br><br>Data Type: Measured<br>Frequency: Continuously measured & monthly recording<br>Archiving Policy: Paper & Electronic<br><br>The meters are calibrated on a quarterly basis by NABL accredited agency through BESCOM as per PPA. The calibration certificates detail are provided in the Appendix 1. |
| Frequency of monitoring/recording | Measuring Frequency: Continuously measured & monthly recording |
| Value monitored | 74.05 |
| Monitoring equipment | Type: Bi-directional Trivector meters (main and check meter at 33 kV metering point) are used for monitoring of electricity exported by WTGs of the project activity. |

<table>
<tr><td></td><td>Accuracy Class: 0.2s<br><br>Serial Number:<table><tr><th>WTGs</th><th>WTG Location No.</th><th>Main Meter Sl. No.</th><th>Check Meter Sl. No.</th></tr><tr><td>5 x 1.25 MW</td><td>K-538, K539, K-540, K-541, K542</td><td>08001351</td><td>08001352</td></tr><tr><td>5 x 1.5 MW</td><td>K-543, K544, K-549, K-550, K551</td><td>08001358</td><td>08001371</td></tr></table>Calibration details of meters are provided in Appendix 1. The meters used for the monitoring of this parameter are calibrated on quarterly basis once by NABL accredited agency through BESCOM. There has been delay in the calibration. Therefore error factor of 0.2% has been applied in export and import electricity values (as per the meter accuracy class 0.2s).</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>The meters used for the monitoring of this parameter are calibrated on quarterly basis once as per the clause 7.5 of PPA. There has been delay in calibration. Therefore error factor of 0.2% has been applied in export and import electricity values (as per the meter accuracy class 0.2s).</td></tr>
<tr><td>Purpose of the data</td><td>Baseline emission calculation</td></tr>
<tr><td>Calculation method</td><td>Not Applicable as this is measured parameter.</td></tr>
<tr><td>Comments</td><td>The data will be kept for two years after the end of the crediting period or the last issuance of VCUs for this project activity, whichever occurs later.</td></tr>
</table>

| | |
|---|---|
| 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 | Monthly |
| Value monitored | 296.69 |
| Monitoring equipment | Not Applicable |
| QA/QC procedures to be applied | - |
| Purpose of the data | Baseline emission calculation |
| Calculation method | **Calculation Procedure EG** $_{\text{Transmission Losses}}$<br>Z= % of line losses<br>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<br>Y= Total exported electricity as measured at Sub – Station Bulk meter (i.e main and check meter at 220 kV SS).<br>Z= [(X-Y)/X]*100<br>EG Transmission Losses = Z* EG $_{\text{Exported}}$<br>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. |

## 4.3 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:

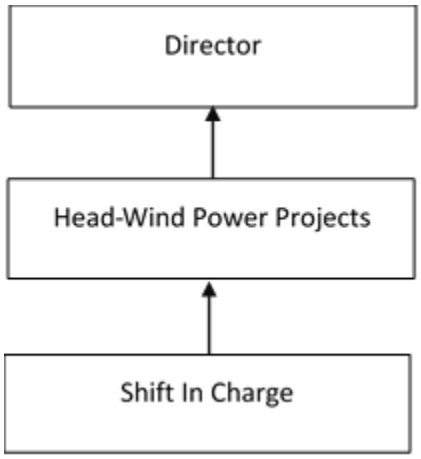
- ✓ Net Electricity supplied by the project activity to the grid

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 is 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 proponent proposes the following structure.




**Roles and responsibilities:**

**Director:** In the project management structure Director is responsible for the overall project performance. The Director reviews the monthly Net electricity supplied and annual emission reduction calculations. Operation and maintenance of WTGs of the project activity is 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 reports to Director for any abnormality.

**Shift In-charge:** Shift in charge is responsible for recording the electricity meter reading from the KPTCL meter. He is 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 is as per the PPA (power purchase agreement)with KPTCL/BESCOM.

1. **Metering:** The Delivered Electricity is 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 is 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 are 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 are maintained in accordance with electricity standards. Such equipment has 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 is taken simultaneously and jointly by the Parties every month. The recorded metering data can 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 are of 0.2s accuracy class. Each meter is jointly inspected and sealed on behalf of the Parties and cannot 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 are tested for accuracy as per requirement with reference to a portable standard meter which is of an accuracy class of 0.1%. The portable standard meters are 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 are 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 holds well for the purpose of billing as long as the error in the main meter is within the permissible limits.

a. If during the 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 is done as per the main meter as usual. The check meter is, however, calibrated immediately.

b. If during the 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 is as per the check meter. There is 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 is calibrated immediately and billing for the period thereafter till the next monthly meter reading is as per the calibrated main meter.

c. If during the tests, both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters are 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 is 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 are 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 cannot run without this relay hence it cannot be removed for calibration, hence, it is not possible to calibrate.Incase of any problem related to the panel meter, the WTG automatically gets shut down and the meter is replaced by a new meter immediately.

6. **Records:** Suzlon Energy Limited/It's Group Companies/Contractor specifically appointed by Suzlon maintains an accurate operating record at the wind farm site of:

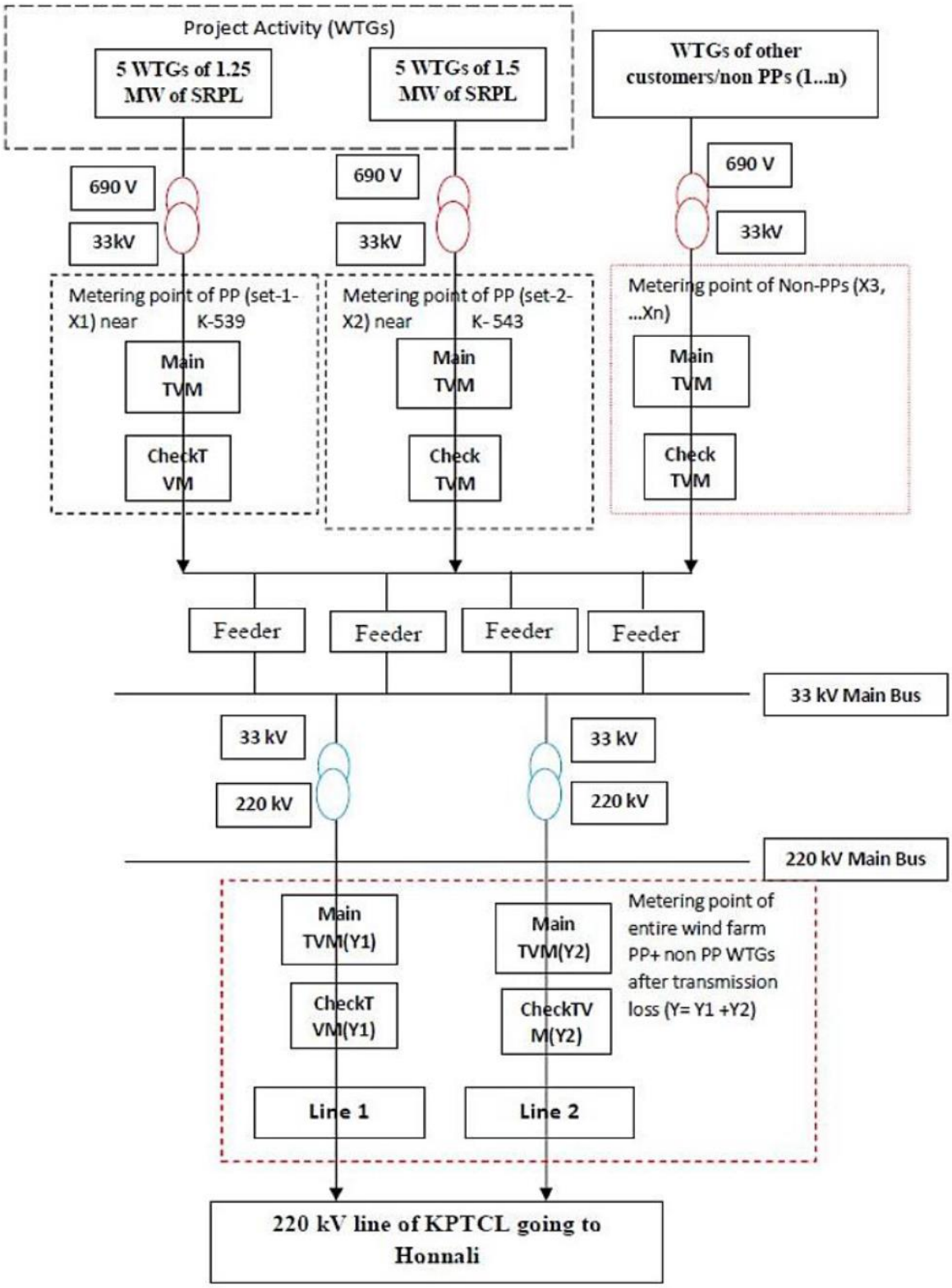
    a) Daily generation reading

    b) Any unusual conditions found during operation/inspections

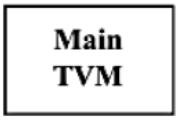
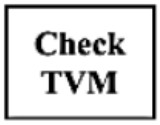
    All the records will be preserved for 2 years beyond the crediting period.

7. The billing is done on monthly basis. The BESCOM is 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.

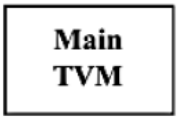
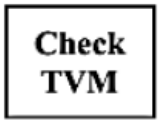
Schematic Diagram of whole monitoring activity, including the physical meter locations and connections to the project activity has been provided below:




**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 is 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 is 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 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 order, 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) are used for emission reduction calculation.

SRPL (Head- Wind Power Projects & Director) is 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 do the internal audit on yearly basis and 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 is suggested by SRPL representatives to calculate the conservative emission reduction.

**Apportioning Procedure:**

The following apportioning procedure is 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 is derived from Form B and the same is 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.

# 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

## 5.1 Baseline Emissions

Baseline Emissions

$BE_y = EG_{PJ,\ facility,\ y} \times EF_{grid,CM,y}$
$= 19{,}663.48\ MWh * 0.9419\ tCO_2e/MWh$

$= 18{,}520\ tCO_2e$ (Round down value)

| Year | Baseline emissions or removals ($tCO_2e$) |
|---|---|
| 01-July-2021 to 31-December-2021 | 14,824 |
| 01-Jan-2022-31-March-2022 | 3,696 |
| Total | 18,520 |

## 5.2 Project Emissions

For most renewable energy power generation project activities, $PE_y$ = 0 $tCO_2e$.

## 5.3 Leakage

No other leakage emissions are considered. $LE_y$ = 0$tCO_2e$.

## 5.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$\mathbf{ER_y = BE_y - PE_y - LE_y}$$

Where

$\mathbf{ER_y}$ = Emission reductions in year y (t $CO_2$)
$\mathbf{BE_y}$ = Baseline emissions in year y (t $CO_2$)
$\mathbf{PE_y}$ = Project emissions in year y (t $CO_2$)
$\mathbf{LE_y}$ = Leakage emissions in year y (t $CO_2$)

| Year | Baseline emissions or removals ($tCO_2e$) | Project emissions or removals ($tCO_2e$) | Leakage emissions ($tCO_2e$) | Net GHG emission reductions or removals ($tCO_2e$) |
|---|---|---|---|---|
| 01-July-2021 to 31-December-2021 | 14824 | 0 | 0 | 14824 |
| 01-Jan-2022-31-March-2022 | 3696 | 0 | 0 | 3696 |
| **Total** | **18520** | **0** | **0** | **18520** |

It is to be noted here that the estimated emission reduction to be achieved from the project activity for the current monitoring period is 20,193 $tCO_2e$, whereas actual emission reductions achieved are 18,520$tCO_2e$ (round down value), which is approximately 8.3% lower than the estimated emission reductions.

This variation is majorly due to low plant load factor (PLF) or lower generation of electricity which is attributed to the factors like wind flow pattern, grid availability, breakdown due to

various reasons, and other parameters which are beyond the control of the project proponent.

# APPENDIX 1: METER CALIBRATION DETAILS

**Main and Check Meter Details**

| WTG Location No. | Meter. No. | Meter Make | Meter Type | Meter Accuracy Class | Calibration Dates | Validity of Calibration | Delay in Calibration[13] |
|---|---|---|---|---|---|---|---|
| K-538, K- 539, K-540, K-541, K- 542 | 08001351 | L & T | Main Meter | 0.2s | 16-March-2021<br>18-September-2021<br>17-April-2022 | 15-June-2021<br>17-December-2021<br>16-July-2022 | 16-June-2021 to 17-September - 2021 (93 days), 18-December-2021 to 31-March-2022(103 days) i.e. (93 + 103 = 196 days) |
| | 08001352 | L & T | Check Meter | 0.2s | 16-March-2021<br>18-September-2021<br>17-April-2022 | 15-June-2021<br>17-December-2021<br>16-July-2022 | 16-June-2021 to 17-September - 2021(93 days), 18-December-2021 to 31-March-2022 (103 days) i.e. (93 + 103 = 196 days) |
| K-543, K- 544, K-549, K-550, K- 551 | 08001358 | L & T | Main Meter | 0.2s | 16-March-2021<br>18-September-2021<br>17-April-2022 | 15-June-2021<br>17-December-2021<br>16-July-2022 | 16-June-2021 to 17-September - 2021 (93 days), 18-December-2021 to 31-March-2022 (103 days) i.e. (93 + 103 = 196 days) |
| | 08001371 | L & T | Check Meter | 0.2s | 16-March-2021<br>18-September-2021<br>17-April-2022 | 15-June-2021<br>17-December-2021<br>16-July-2022 | 16-June-2021 to 17-September - 2021 (93 days), 18-December-2021 to 31-March-2022 |

[13] Error Factor 0.2% has been applied where delay in monitoring meter calibration happened.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | (103 days) i.e. (93 + 103 = 196 days) |

Due to delay in calibration an error factor of 0.2% has been applied for the months of: July-2021, August-2021, September-2021, December-2021, January-2022, February-2022 and March-2022.

# APPENDIX 2: BREAKDOWN DETAILS

| Date | WTG No. | Reason for Breakdown | Breakdown Hrs. |
|---|---|---|---|
| 09-Jul-2021 | K544 | Modification | 12.70 |
| 10-Jul-2021 | K544 | Modification | 14.30 |
| 28-Jul-2021 | K550 | Pitch 2 Motor OverTemp | 11.10 |
| 04-Aug-2021 | K544 | FPS Top PowerSupplyPanelDoorStatusNotOk | 14.50 |
| 01-Sep-2021 | K538 | Rep Pitch FreqConvPitch3 ErrStop | 15.00 |
| 14-Sep-2021 | K539 | Rep Elec CurrentAsymmetry | 20.50 |
| 14-Sep-2021 | K551 | SFS GenRpmFailLowerthanSyncRpm Stop | 10.60 |
| 25-Sep-2021 | K551 | SFS GenRpmFailLowerthanSyncRpm Stop | 10.60 |
| 27-Sep-2021 | K551 | Generator Bearing problem | 14.40 |
| 28-Sep-2021 | K551 | Generator Bearing problem | 24.00 |
| 29-Sep-2021 | K551 | Generator Bearing problem | 14.50 |
| 02-Oct-2021 | K551 | Elec FB PowerSupplyPitch | 10.40 |
| 22-Oct-2021 | K538 | HydGearOilPressureLowStop | 10.20 |
| 22-Oct-2021 | K550 | Pitch ExtPowerSupply24VStopp Conv1 | 16.00 |
| 14-Nov-2021 | K544 | SFS GenRpmFailLowerthanSyncRpm Stop | 11.90 |
| 17-Nov-2021 | K550 | Pitch FreqConvPitch3 ErrStop | 14.20 |
| 20-Nov-2021 | K543 | Rep PID DiffGenSpeedSPToAct | 21.90 |
| 20-Nov-2021 | K550 | Pitch ExtPowerSupply24VStopp Conv2 | 16.50 |
| 21-Nov-2021 | K550 | Pitch ExtPowerSupply24VStopp Conv2 | 19.20 |
| 02-Dec-2021 | K551 | Elec SafteyChainStop | 11.00 |
| 11-Dec-2021 | K538 | Pitch FreqConvPitch3 ErrStop | 24.00 |
| 07-Jan-2022 | K540 | WTG Annual Maintenance | 12.00 |
| 11-Jan-2022 | K543 | WTG Annual Maintenance | 13.10 |
| 12-Jan-2022 | K543 | WTG Annual Maintenance | 18.00 |
| 13-Jan-2022 | K543 | YAW rim problem | 24.00 |
| 13-Jan-2022 | K544 | WTG Annual Maintenance | 13.50 |
| 14-Jan-2022 | K543 | YAW rim problem | 24.00 |
| 15-Jan-2022 | K543 | YAW rim problem | 24.00 |
| 15-Jan-2022 | K550 | WTG Annual Maintenance | 10.40 |
| 16-Jan-2022 | K543 | YAW rim problem | 24.00 |
| 17-Jan-2022 | K543 | YAW rim problem | 20.90 |
| 28-Jan-2022 | K544 | Generator Bearing problem | 21.00 |
| 29-Jan-2022 | K544 | Generator Bearing problem | 24.00 |
| 30-Jan-2022 | K544 | Generator Bearing problem | 22.10 |
| 06-Feb-2022 | K544 | Generator Failure | 16.70 |
| 07-Feb-2022 | K544 | Generator Failure | 15.10 |
| 08-Feb-2022 | K544 | Generator Failure | 24.00 |
| 09-Feb-2022 | K544 | Generator Failure | 24.00 |
| 10-Feb-2022 | K544 | Generator Failure | 24.00 |
| 11-Feb-2022 | K544 | Generator Failure | 24.00 |
| 12-Feb-2022 | K544 | Generator Failure | 24.00 |
| 13-Feb-2022 | K544 | Generator Failure | 24.00 |
| 14-Feb-2022 | K544 | Generator Failure | 24.00 |

| | | | |
|---|---|---|---|
| 15-Feb-2022 | K544 | Generator Failure | 24.00 |
| 16-Feb-2022 | K544 | Generator Failure | 24.00 |
| 17-Feb-2022 | K544 | Generator Failure | 24.00 |
| 18-Feb-2022 | K544 | Generator Failure | 24.00 |
| 19-Feb-2022 | K544 | Generator Failure | 24.00 |
| 20-Feb-2022 | K544 | Generator Failure | 24.00 |
| 21-Feb-2022 | K544 | Generator Failure | 24.00 |
| 22-Feb-2022 | K544 | Generator Failure | 24.00 |
| 23-Feb-2022 | K544 | Generator Failure | 24.00 |
| 24-Feb-2022 | K544 | Generator Failure | 10.30 |
| 17-Mar-2022 | K544 | Pitch ResolverEncoderDiff2Stop | 13.20 |