



# Verified Carbon Standard

## SUZLON 8.40 MW WIND POWER PROJECT



Document Prepared by EKI Energy Services Limited

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**CONTENTS**

- 1 PROJECT DETAILS..... 4**
  - 1.1 Summary Description of the Implementation Status of the Project ..... 4
  - 1.2 Sectoral Scope and Project Type ..... 4
  - 1.3 Project Proponent ..... 5
  - 1.4 Other Entities Involved in the Project ..... 5
  - 1.5 Project Start Date ..... 5
  - 1.6 Project Crediting Period ..... 5
  - 1.7 Project Location ..... 6
  - 1.8 Title and Reference of Methodology ..... 6
  - 1.9 Participation under other GHG Programs ..... 6
  - 1.10 Other Forms of Credit..... 7
  - 1.11 Sustainable Development ..... 7
  
- 2 SAFEGUARDS ..... 8**
  - 2.1 No Net Harm ..... 8
  - 2.2 Local Stakeholder Consultation ..... 8
  - 2.3 AFOLU-Specific Safeguards ..... 9
  
- 3 IMPLEMENTATION STATUS ..... 9**
  - 3.1 Implementation Status of the Project Activity ..... 9
  - 3.2 Deviations ..... 10
  - 3.3 Grouped Projects ..... 10
  
- 4 DATA AND PARAMETERS..... 10**
  - 4.1 Data and Parameters Available at Validation ..... 10
  - 4.2 Data and Parameters Monitored..... 12
  - 4.3 Monitoring Plan ..... 16
  
- 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS ..... 20**
  - 5.1 Baseline Emissions ..... 20
  - 5.2 Project Emissions ..... 21
  - 5.3 Leakage..... 21
  - 5.4 Net GHG Emission Reductions and Removals..... 22
  
- APPENDIX I: <METER CALIBRATION DETAILS> ..... 24**

**APPENDIX II: < BREAKDOWN DETAILS>..... 26**

# 1 PROJECT DETAILS

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

The project activity is promoted by Kishangarh Hi-tech Textile Park Ltd. The project activity involves supply, erection, commissioning and operation of 4 Wind Turbine Generators (WTGs) of 2100 kW each at District Jaisalmer in Rajasthan; all WTGs are supplied and manufactured by Suzlon Energy Limited.

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 selling it to the third party and to contribute to climate change mitigation efforts.

The commissioning details of the WTGs are described below:-

Project Proponent's name	Capacity in MW	Make/Model	Commissioning date
Kishangarh Hi-tech Textile Park Ltd.	2.1x4	S-88	31-December-2010

The project was registered at UNFCCC (Ref. No. 7804) on 19-October-2012 and the details of the same can be viewed on <https://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1350651308.1/view>.

The expected operational lifetime of the project is for 20 years. The total emission reductions achieved under this monitoring period is 59,726 tCO<sub>2</sub>.

## 1.2 Sectoral Scope and Project Type

The project activity involves generation of grid connected electricity from renewable wind energy. Since the project activity capacity is 8.40 MW, which is less than the maximum qualifying capacity of 15 MW for a small scale project. Therefore the project activity may be categorized in Scope Number 1, Sectoral Scope - Energy industries (renewable - / non-renewable sources).

Project type : I – Renewable Energy Project

Project Category : D. – Grid connected renewable electricity generation

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

Further the project activity is not among the grouped projects, which allows the expansion of a project activity subsequent to project validation. Initial project activity instances identified in the project description will remain same throughout VCS verification cycle.

### 1.3 Project Proponent

<b>Organization name</b>	Kishangarh Hi-tech Textile Park Ltd
<b>Contact person</b>	Vijay Kumar Agrawal
<b>Title</b>	Director
<b>Address</b>	Bhat Mohalla, Madanganj, Agrawal Sadan, Kishangarh, Rajasthan-305801
<b>Telephone</b>	0731 428 9086
<b>Email</b>	<a href="mailto:khtml2007@gmail.com">khtml2007@gmail.com</a>

### 1.4 Other Entities Involved in the Project

<b>Organization name</b>	EKI Energy Services Limited
<b>Role in the Project</b>	Project Consultant
<b>Contact person</b>	Bibhushita Ghose
<b>Title</b>	Assistant Manager(Operations-Climate Change)
<b>Address</b>	EnKing Embassy, Office No 201, Plot 48, Scheme 78, Part 2, Vijay Nagar, Indore- 452010, Madhya Pradesh, India.
<b>Telephone</b>	0731 428 9086
<b>Email</b>	<a href="mailto:registry@enkingint.org">registry@enkingint.org</a>

### 1.5 Project Start Date

The project start date for this project is 31-December-2010. This is the day on which all the four machines were commissioned, which includes in the monitoring period.

### 1.6 Project Crediting Period

**Crediting Period Start date:** 31-December-2010

**Crediting Period End date:** 30-December-2020

As per registered VCS PD and first monitoring report, the start date of VCS crediting period is 31-December-2010 and VCS PD mentioned end date of crediting period as 18-October-2012 as CDM crediting period is started on 19-October-2012. However this crediting period needs to correct as 31-December-2010 to 30-December-2020.

The project activity is registered under VCS as per VCS Standard 3.2, thus as per standard - the project is eligible for 10 years crediting period with renewal twice. Thus crediting period needs to be correct as 31-December-2010 to 30-December-2020 renewable twice.

## 1.7 Project Location

Details of the location of the project activity:

Project WTG Titled	UID	Latitude				Longitude			
		N	27°	10'	46.9"	E	70°	38'	12.0"
Kishangarh Hi - tech Textile Park Ltd.	MK 5	N	27°	10'	46.9"	E	70°	38'	12.0"
	MK 6	N	27°	10'	40.3"	E	70°	38'	29.7"
	MK 7	N	27°	10'	33.7"	E	70°	38'	47.4"
	MK 8	N	27°	10'	18.2"	E	70°	38'	00.9"
<b>Capacity</b>	<b>8.4MW</b>								

## 1.8 Title and Reference of Methodology

Title : Grid connected renewable electricity generation

Reference : AMS I. D (Version 17, EB 61)<sup>1</sup>

Tool : Tool to calculate the Emission Factor for an Electricity System, Version 02.2.0

Annex 12, EB 61.

## 1.9 Participation under other GHG Programs

The project has participated in UNFCCC under Clean Development Mechanism program, Registration reference number is 7804<sup>2</sup> with Crediting Period 19-October-2012 to 18-October-2019.

The project has not completed any CDM verification.

The Current VCS verification is for period 19-October-2012 to 18-October-2018. PP will claim credits only from VCS for current monitoring period and there will not be any double accounting.

<sup>1</sup> <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK>

<sup>2</sup> <https://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1350651308.1/view>

## 1.10 Other Forms of Credit

The project has not created any other form of environmental credit. The project proponent provided undertaking that there is no double accounting of emission reduction with any other GHG program during the current VCS monitoring period.

## 1.11 Sustainable Development

The project activity has contributed to the sustainable development as discussed below according to the indicators stipulated by Ministry of Environment, Forest and Climate Change (MoEFCC), Govt. of India for sustainable development

### **I. Social well being:**

- The project activity provided job opportunities to some of the local people during erection and operation of the wind farms contributing up to some extent in poverty alleviation of the local community. The company has developed both the sites and approach roads.
- The project activity also contributes in infrastructure development by improving the availability of the electricity to the NEWNE grid(now a part of Unified Indian Grid), hence contributing towards meeting the electricity deficit in Rajasthan.

### **II. Economic well being:**

- The project activity leads to investment to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is fed into the regional grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which provides new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.
- This project activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; this creates additional employment opportunities.

### **III. Environmental well being:**

- The project utilizes wind energy for generating electricity which otherwise would have been generated through the operation of power plants in the NEWNE grid mix(now a part of Unified Indian Grid), contributing to reduction in specific emissions (tons of emissions /MWh of energy generated) including GHG emissions.

- As wind power projects produce no end products in the form of waste (eg. Particulate Matter, Fly ash, Water effluent etc.).
- Being a renewable resource, using wind energy to generate electricity contributes to natural scarce resource (eg. Fossil fuel used for electricity generation) conservation.
- Thus, the project causes no negative impact on the surrounding environment contributing to environmental well being.

#### **IV. Technological well being:**

- The project activity leads to the promotion of 2.1 MW of SEL WTGs into the region, demonstrating the success of this type of wind turbines, which fed the generated power into substation in Rajasthan, thus strengthening the grid supply and improving quality of power under the service area of the substation. Hence the project leads to technological well being.
- The project technology manufactured, operated & maintained indigenously and doesn't involve any technology transfer from foreign countries.

## 2 SAFEGUARDS

### 2.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of the WTGs, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

The report on “Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects” prepared by MNRE dated September 2013. This report clearly mentioned that wind power project activity operations do not result in direct air pollution, noise pollution. Please refer below web link for the same.

<https://smartnet.niua.org/sites/default/files/resources/report-on-developmental-impacts-of-RE.pdf>

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

As a part of continuous feedback from stakeholders, there were no other major comments or protest raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region. The PP also placed a grievance register onsite in where the stakeholder can put down his/her complain and the same if found genuine will be addressed immediately.

During the current monitoring period, positive feedback are received regarding site operation. No negative grievance received during the current monitoring period, therefore, no mitigation measures are required. In case of grievances, the nature of probable resolution is discussed with the plant head office and implemented by the site in charge.

### 2.3 AFOLU-Specific Safeguards

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

## 3 IMPLEMENTATION STATUS

### 3.1 Implementation Status of the Project Activity

The implementation of the project has been completed on 31-December-2010.

**Wind power technology details** – The technology employed, converts wind energy to electrical energy. In wind power generation, energy of wind is converted into mechanical energy and subsequently into electrical energy. The project activity is the installation of an environmentally safe and sound technology since there are no GHG emissions associated with the electricity generation.

The technical specifications of the WTGs have been provided as below. There is no transfer of technology involved in the project activity. The project activity consists of WTGs of Following Machines:-

Capacity of Machine	Installed Machine Manufacture
2100kW	Suzlon Energy limited

Due to maintenance work, all four WTGs of this project activity was shutdown during October 2013, November 2013, December 2013 and February 2018.

Technical details for 2100 KW Machine manufactured by Suzlon Energy Limited

Sr NO	PARTICULARS	DETAILS
1	Rated power	2.1 MW
2	Cut-in wind speed	4 m/s
3	Rated wind Speed	14 m/s

4	Cut- out speed	25 m/s
5	Hub height	79 m (Foundation top equal to ground level)
6	Rotational Speed	15 to 17.6 rpm
7	Swept area	6082 m square
8	Type	Tubular Tower (4 sections)
9	Gear box Ratio	1:98.8
10	Rated power	2100 kW

## 3.2 Deviations

### 2.1.1 Methodology Deviations

No Methodology Deviation is applied during the monitoring period.

### 2.1.2 Project Description Deviations

As per registered VCS PD and first monitoring report, the start date of VCS crediting period is 31/12/2010 and VCS PD mentioned end date of crediting period as 18/10/2012 as CDM crediting period is started on 19/10/2012.

However this crediting period needs to correct as 31/12/2010 to 30/12/2020. The project activity is registered under VCS as per VCS Standard 3.2, thus as per standard - the project is eligible for 10 years crediting period with renewal twice. Thus crediting period needs to be correct as 31/12/2010 to 30/12/2020 renewable twice.

The deviation does not have any impacts the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

## 3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

# 4 DATA AND PARAMETERS

## 4.1 Data and Parameters Available at Validation

Data / Parameter	EF <sub>CO2,grid,y</sub>
Data unit	tCO <sub>2</sub> / MWh

<b>Description</b>	Combined margin CO2 emission factor for the project electricity system.
<b>Source of data</b>	CEA CO2 Baseline Database (Version- 6.0, Date-March 2011) <sup>3</sup>
<b>Value applied</b>	0.9487
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	<p>The CO2 Baseline Database is the most authentic data available in India since it has been prepared &amp; published by Central Electricity Authority, Government of India.</p> <p>The <math>EF_{grid, CM, y}</math> calculation is based on equation 13 of the 'Tool to calculate the emission factor for an electricity system' (Version- 02.2.1, EB- 63, Annex19) which is given below as:</p> $EF_{grid, CM, y} = 0.75 \times EF_{grid, OM, y} + 0.25 \times EF_{grid, BM, y}$
<b>Purpose of Data</b>	For the calculation of the Baseline
<b>Comments</b>	The calculation is done as ex ante.

<b>Data / Parameter</b>	$EF_{grid, OM, y}$
<b>Data unit</b>	tCO2 / MWh
<b>Description</b>	Operating margin CO2 emission factor for the project electricity system
<b>Source of data</b>	CEA CO2 Baseline Database (Version- 6.0, Date - March 2011)
<b>Value applied</b>	0.9942
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	<p>The CO2 Baseline Database is the most authentic data available in India since it has been prepared &amp; published by Central Electricity Authority, Government of India. The <math>EF_{grid, CM, y}</math> calculation is based on the guidelines in 'Tool to calculate the emission factor for an electricity system' (Version- 02.2.1, EB- 63, Annex- 19)</p>
<b>Purpose of Data</b>	For the calculation of the Baseline Emission
<b>Comments</b>	None

<b>Data / Parameter</b>	$EF_{grid, BM, y}$
<b>Data unit</b>	tCO2 / MWh
<b>Description</b>	Build margin CO2 emission factor for the project electricity system.
<b>Source of data</b>	CEA CO2 Baseline Database (Version- 6.0, Date=March 2011)
<b>Value applied</b>	0.8123

<sup>3</sup> [https://cea.nic.in/wp-content/uploads/baseline/2020/07/user\\_guide\\_ver6.pdf](https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver6.pdf)

Justification of choice of data or description of measurement methods and procedures applied	<p>The CO2 Baseline Database is the most authentic data available in India since it has been prepared &amp; published by Central Electricity Authority, Government of India.</p> <p>The <math>EF_{grid, BM, y}</math> calculation is based on the guidelines in 'Tool to calculate the emission factor for an electricity system' (Version-02.2.1, EB- 63, Annex- 19</p>
Purpose of Data	For the calculation of the Baseline Emission
Comments	None

## 4.2 Data and Parameters Monitored

Data / Parameter	$EG_{Bly}$
Data unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the project activity in year y
Source of data	<p>Breakup of Net Export as per Monthly Generation Report and Joint Meter Reading authorized by R.R.V.P.N.L.</p> <p>The quantity of net electricity supplied to the grid (i.e. Net Export in kWh) by the project activity is taken from the break-up sheet prepared by Suzlon India Limited on the basis of monthly Joint Meter Reading (JMR) certificate certified by Rajasthan Rajya Vidyut Prasaran Nigam Limited (RRVPNL).</p> <p>The value for net electricity supplied to the grid is cross verified from the monthly invoice raised by the project participant.</p>
Description of measurement methods and procedures to be applied	<p><b>Net electricity delivered to the Grid:</b></p> <p>The net electricity delivered to the Grid by the given WTG for the given month (net export kWh) is obtained by subtracting import from export as below:</p> $EG_{Bly} = EG_{Export, Project, y} - EG_{Import, Project, y}$ <p>The values of the net electricity delivered to the Grid are aggregated annually to get <math>EG_{Bly}</math>.</p> <p>The value of net electricity delivered to the Grid (<math>EG_{Bly}</math>) by the project activity per annum is converted to MWh before the calculation of emission reductions.</p>

	The details on the calculation of net electricity exported to grid and the apportioning mechanism adopted are explained in detail under section 4.3.
Frequency of monitoring/recording	Monthly
Value monitored	62,959.252
Monitoring equipment	Calculated Value
QA/QC procedures to be applied	<p>Annual Testing of all the meters are undertaken and faulty meters will be duly replaced immediately. However the meters are calibrated at-least once in 3 years.</p> <p>The Net Units generated is cross checked against the invoice raised by the PP towards the Discom.</p>
Purpose of the data	To determine baseline emissions
Calculation method	$EG_{Bly} = EG_{Export, Project, y} - EG_{import, Project, y}$
Comments	Data will be archived in electronic form for two years after the end of monitoring period.

Data / Parameter	$EG_{Export, Project, y}$
Data unit	MWh
Description	Quantity of electricity exported to the grid as a result of the implementation of the project activity in year y.
Source of data	<p>Monthly Generation Report and Joint Meter Reading authorized by R.R.V.P.N.L.</p> <p>The value for electricity exported to the grid is cross verified from the monthly invoice raised by the project participant</p>
Description of measurement methods and procedures to be applied	The details on the calculation of electricity exported to grid and the apportioning mechanism adopted are explained in detail under section 4.3.
Frequency of monitoring/recording	Monthly
Value monitored	63,469.51 MWh
Monitoring equipment	<p>Monitoring Equipment: Energy Meter</p> <p>Type: Two-way tri-vector energy meter</p>

	Accuracy class: 0.2s Calibration Frequency: Once in 3 years.
QA/QC procedures to be applied	Annual Testing of all the meters are undertaken and faulty meters will be duly replaced immediately. However the meters are calibrated at-least once in 3 years.
Purpose of the data	Calculation of project emissions
Calculation method	Not Applicable
Comments	Data will be archived in electronic form for two years after the end of monitoring period

Data / Parameter	EG <sub>Import, Project, y</sub>
Data unit	MWh
Description	Quantity of electricity imported from the grid as a result of the implementation of the project activity in year y
Source of data	Monthly Generation Report and Joint Meter Reading authorized by R.R.V.P.N.L.  The value for electricity imported from the grid is cross verified from the monthly invoice raised by the project participant.
Description of measurement methods and procedures to be applied	The details on the calculation of electricity imported from the grid and the apportioning mechanism adopted are explained in detail under section 4.3.
Frequency of monitoring/recording	Monthly
Value monitored	510.257
Monitoring equipment	Monitoring Equipment: Energy Meter  Type: Two-way tri-vector energy meter  Accuracy class: 0.2s  Calibration Frequency: Once in 3 years.
QA/QC procedures to be applied	Annual Testing of all the meters are undertaken and faulty meters will be duly replaced immediately. However the meters are calibrated at-least once in 3 years. The electricity imported cross checked against the invoice raised by the PP towards the Discom

<b>Purpose of the data</b>	Calculation of project emissions
<b>Calculation method</b>	Not Applicable
<b>Comments</b>	Data will be archived in electronic form for two years after the end of monitoring period

<b>Data / Parameter</b>	EG <sub>Controller, y</sub>
<b>Data unit</b>	MWh
<b>Description</b>	Electricity generated by installed WTG of PP connected to particular feeder
<b>Source of data</b>	Record of metering available at Central Monitoring Station for the project activity
<b>Description of measurement methods and procedures to be applied</b>	<p>Each WTG in Wind Farm is equipped with controller meter located inside the WTG. The controller meter provides daily generation report from each WTG.</p> <p>The controller meter located in each WTG is a microprocessor based intelligent controller which controls entire turbine operation and record energy generation with basic signal of CT and PT. The controller meter does not require calibration as it is self-calibration type. Further, controller will stop the turbine if it detects any error in measurement therefore avoids the uncertainty in the generation data</p>
<b>Frequency of monitoring/recording</b>	Continuous monitoring, hourly measurement and Monthly recording from Energy Meter, Summarized Annually
<b>Value monitored</b>	67,290.883
<b>Monitoring equipment</b>	The WTG SCS/LCS Controller is micro-processor based
<b>QA/QC procedures to be applied</b>	The monitoring of all these wind turbines is performed from a common monitoring station as a part of central monitoring system. The system consists of a state-of-the-art monitoring station connected via optic cables to individual WTG. CMS is managed by well trained staff personnel. The personal are always present on site to monitor various parameters of power generation and deal with any problems related to generation, transmission or maintenance.
<b>Purpose of the data</b>	To calculate baseline emission
<b>Calculation method</b>	Not applicable

**Comments**

Data will be archived in electronic form for two years after the end of monitoring period.

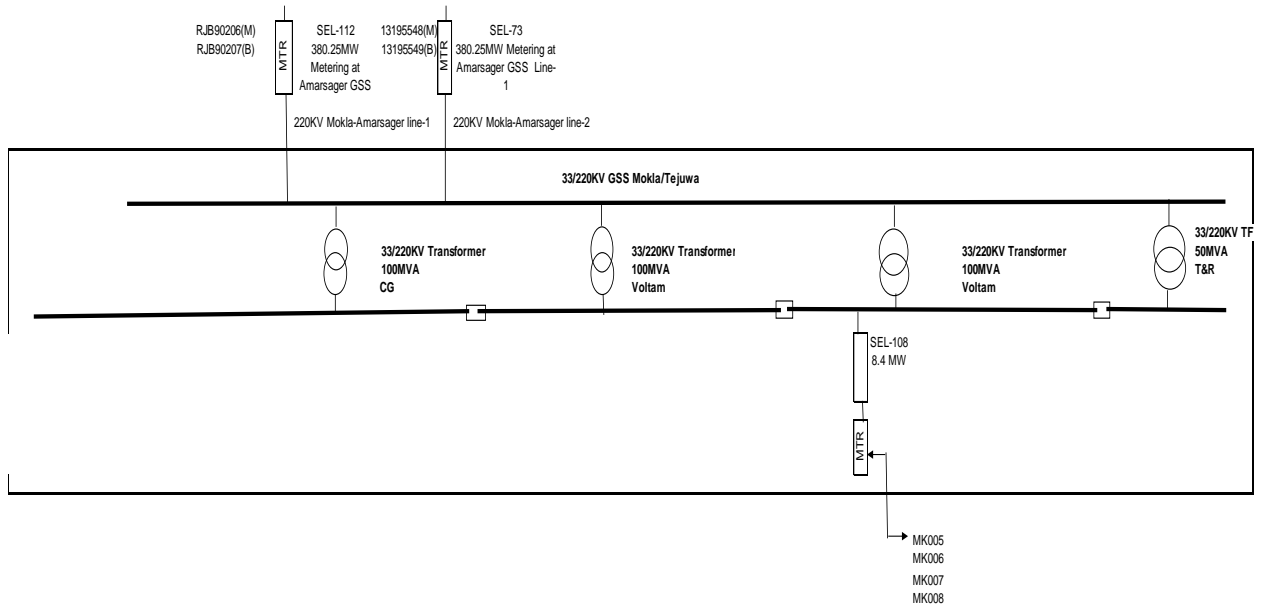
### 4.3 Monitoring Plan

The monitoring of the project activity is given as below:

- The electricity generated by the project activity WTG/s is evacuated to the pooling station at 33 kV/220 kV level. The project activity WTG/s along with other WTGs, are connected to the feeder-wise metering point/s, where each metering point consists of both main & check meters. These energy meters are having accuracy class of 0.2s.
- The joint meter reading is taken on monthly basis at these metering point/s at particular feeders by the representatives of PP & State Utility, which records parameters like export, import. All these metering points are further connected to the common delivery point at the 220 kV level.
- The common metering point at 220 kV GSS concurrently records total electricity (total export and total import) received from all connected metering points. The common metering point consists of both main & check meters. These energy meters are having accuracy class of 0.2s. The monthly JMR is taken by the representative of PP & State Utility.
- Billing of the energy is done based on the energy break up available at the metering at 220 kV level.
- The monitoring & measurement of electricity is done on continuous basis; while recording is done on monthly basis as Joint Meter Reading by the representatives of State Utility & PP.
- The value of monthly export by the project activity along with import and net export are recorded in the monthly Break up of net export units report.
- The values of monthly export & import by the project activity recorded in the monthly Break up of net export units report is calculated based on the apportioning method by the state utility.
- The meters are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility.
- The calibration of the meters are carried out at least once in three years (as per paragraph 17 (c) of General Guidelines to SSC CDM methodologies, Version 17).
- In the absence or delay in meter calibration - appropriate guideline will be applied to confirm the conservativeness of emission reductions.

- The net electricity supplied to the grid is converted to MWh for calculation of emission reductions.
- Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later.
- The PP is responsible for data collection & archiving.

The metering location diagram is shown below:



**Sample Apportioning Procedure:**

The apportioning of the electricity is the responsibility of the State Utility. The sample apportioning procedure adopted for any given WTGs in project activity for any given month is given below:

**Generation Ratio at metering point (33 kV/220 kV level GSS):**

The generation ratio for project activity is the ratio of electricity generated by installed WTG of PP to the total generation by all the connected WTGs to the applicable metering point.

$$G_{R, y} = \frac{EG_{Controller, y}}{EG_{All Controller, y}} \quad (a)$$

Where,

$G_{R, y}$  : Generation Ratio at WTG for the project activity

$EG_{Controller, y}$  : Electricity generated by installed WTGs of PP connected to particular feeder

$EG_{All\ Controller, y}$  : Total generation by all the connected WTGs to the particular feeder. This parameter is not in the control of the PP.

#### Calculation of net electricity exported at applicable metering point:

The Main and Check meters at the particular feeder measure a number of parameters including export and import for all the connected WTGs.

The import, kWh by the WTG at the metering point is calculated in the following manner:

$$EG_{Import, Project, y} = GR_{, y} \times EG_{Import\ feeder, y} \quad (b)$$

Where,

$EG_{Import, Project, y}$  : Import, kWh by the project WTG apportioned at metering point at particular feeder.

$GR_{, y}$  : Generation Ratio at WTG for the project activity

$EG_{Import\ feeder, y}$  : Total Import by all the WTGs at the metering point at particular feeder. This parameter is not within the control of the PP.

The export, kWh by the WTG at the metering point is calculated in the following manner:

$$EG_{Export, Project, y} = GR_{, y} \times EG_{Export\ feeder, y} \quad (c)$$

Where,

$EG_{Export, Project, y}$  : Export, kWh by the project WTG apportioned at metering point at particular feeder

$GR_{, y}$  : Generation Ratio at WTG for the project activity

$EG_{Export, feeder, y}$  : Total Export by all the WTGs at the metering point at particular feeder. This parameter is not within the control of the PP. The net electricity exported by the WTGs at the 33 kV/220 kV level metering point is calculated by subtracting equation (b) from (c).

Thus, the net electricity exported at 33 kV/220 kV level metering point:

$$EG_{Bly} = EG_{Export, Project, y} - EG_{Import, Project, y} \quad (d)$$

The quantity of net electricity supplied to the grid (Net Export in kWh) i.e.  $EG_{Bly}$  by the project activity is taken from the break-up sheet prepared by Suzlon India Limited on the basis of monthly Joint Meter Reading (JMR) certificate certified by Rajasthan Rajya Vidyut Prasaran Nigam Limited (RRVPL) and shall be used for emission reduction calculations.

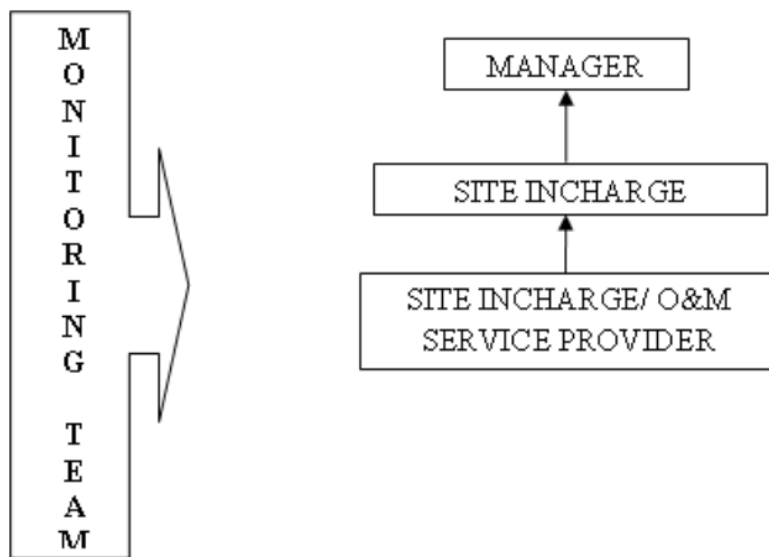
#### Operation & Maintenance of the Project:

Suzlon Infrastructure Services Ltd. is providing O&M services to the project promoter. Following services are provided by Suzlon Infrastructure Services Ltd.:

- Routine Maintenance Services: Routine maintenance labor work involves making available suitable manpower for operation and maintenance of the equipment and covers periodic preventive maintenance, cleaning and upkeep of the equipment
- Security Services: This service includes watch and ward and security of the wind turbines and the equipment.
- Management Services:
  - ✓ Data logging for power generation, grid availability, machine availability.
  - ✓ Preparation and submission of monthly performance report.
  - ✓ Taking monthly meter reading jointly with utility of power generated at promoter's wind turbines and supplied to grid from the meter/s maintained by utility for the purpose and co-ordinate to obtain necessary power credit report/ certificate.
- Technical Services:
  - ✓ Visual inspection of the WTGs and all parts thereof.
  - ✓ Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.

**Operational & Management Structure:**

The O & M Contractor for the project activity is an ISO 9001 certified company. The operational and management structure:



**Organizational Structure for monitoring**

### Organizational Structure for monitoring

Designation	Responsibilities
Manager	Holds complete control over monitoring aspects pertaining to the project
Site In Charge	<ul style="list-style-type: none"> <li>• Recording</li> <li>• Verification</li> </ul>
Site In Charge/O&M Service Provider	<ul style="list-style-type: none"> <li>• Operation and maintenance</li> <li>• Storage of data</li> <li>• Data recording</li> </ul>

## 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 5.1 Baseline Emissions

Procedure for calculating emission reduction due to the project activity:

Step 1: Net annual electricity generated and exported to grid by WTG

$$EG_y = EG_{WTG_i,exp} - EG_{WTG_i,imp}$$

Step 2: Baseline emission of the project activity

$$BE_y = EG_y * EF_{grid,CM,y}$$

Step 3: GHG emission due to the project activity

$$PE_y = 0$$

Step 4: GHG emission due to leakage as a result of the project activity

$$LE_y = 0$$

Step 5: GHG emission reduction due to the project activity

$$ER_y = BE_y - PE_y - LE_y$$

where

$EG_{WTG_i,exp}$  Electricity supplied to NEWNE Grid(now part of Unified Indian Grid) by WTG<sub>i</sub>, MWh

$EG_{WTG_i,imp}$  Electricity drawn from NEWNE Grid(now part of Unified Indian Grid) by WTG<sub>i</sub>, MWh

EGy	Net electricity supplied to the grid by the Project, MWh
EF <sub>Grid, BMy</sub>	Ex-ante (Option 1) Build Margin emission factor of NEWNE Grid(now part of Unified Indian Grid), tCO <sub>2</sub> /MWh
EF <sub>Grid, OMy</sub>	Ex-ante Operation Margin emission factor of NEWNE Grid(now part of Unified Indian Grid), tCO <sub>2</sub> /MWh

The calculation of yearly baseline emissions is provided in the table below:

Period	Baseline emission factor (tCO <sub>2</sub> /MWh)	Net Electricity generation (MWh)	Baseline emissions (ERy) in tCO <sub>2</sub>
19/10/2012 to 31/12/2012	0.9487	761.875	722
01/01/2013 to 31/12/2013	0.9487	8,954.398	8,495
01/01/2014 to 31/12/2014	0.9487	11,205.135	10,630
01/01/2015 to 31/12/2015	0.9487	11,736.083	11,134
01/01/2016 to 31/12/2016	0.9487	9,587.609	9,095
01/01/2017 to 31/12/2017	0.9487	11,901.2898	11,290
01/01/2018 to 18/10/2018	0.9487	8,812.862	8,360
<b>Total</b>		<b>62,959.252</b>	<b>59,726</b>

## 5.2 Project Emissions

The project activity uses wind power to generate electricity and hence the emissions from the project activity are taken as nil.

PEy = 0.

## 5.3 Leakage

Leakage emissions on account of the project activity is considered as zero as neither the Wind Energy Generators are transferred from another activity nor any existing equipment of the project site would be transferred from the project site in accordance with the applied methodology.

LEy = 0

## 5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO <sub>2</sub> e)	Project emissions or removals (tCO <sub>2</sub> e)	Leakage emissions (tCO <sub>2</sub> e)	Net GHG emission reductions or removals (tCO <sub>2</sub> e)
19-October-2012 to 31-December-2012	722	0	0	722
01-January-2013 to 31-December-2013	8,495	0	0	8,495
01-January-2014 to 31-December-2014	10,630	0	0	10,630
01-January-2015 to 31-December-2015	11,134	0	0	11,134
01-January-2016 to 31-December-2016	9,095	0	0	9,095
01-January-2017 to 31-December-2017	11,290	0	0	11,290

01- January- 2018 to 18- October- 2018	8,360	0	0	8,360
<b>Total</b>	<b>59,726</b>	<b>0</b>	<b>0</b>	<b>59,726(Rounded Down)</b>

The annual estimated emission reduction as per Project Description is 13,081 tCO<sub>2</sub>. The number of days for this monitoring period is 2,191 days. So, the estimated emission reduction for this project activity during the current monitoring period is =  $(13,081/365)*2191$

$$= 78,521(\text{Rounded Down Value})$$

The actual emission reduction for the current monitoring period is 59,726 tCO<sub>2</sub>. The actual emission reduction is 18.4% less than the estimated emission reduction. As it is a wind power project, generation from this project is dependent on weather So, such deviation from estimated emission reduction is acceptable.

# APPENDIX I: <METER CALIBRATION DETAILS>

Meter No.	Type of Meter	Make	Accuracy Class	Phase	Calibration Date	Validity of Calibration	Remarks
9166172	Main Meter	L&T	0.2 S	SEL-73	13/03/2012, 12/12/2012, 11/06/2013, 17/01/2014	12/03/2015, 11/12/2015, 10/06/2016, 16/01/2017	Meter No. 9166172 was replaced by Meter No. 13195548 on 29/01/2015
MSB60428	Main Meter	Secure Meters Ltd.	0.2 S	SEL-112	13/03/2012, 17/12/2012, 17/01/2014	12/03/2015, 16/12/2015, 16/01/2017	Meter No. MSB60428 was replaced by Meter No. RJB90206 on 17/04/2017
9166170	Back up Meter	L&T	0.2 S	SEL-73	13/03/2012, 12/12/2012	12/03/2015, 11/12/2015	Meter No. 9166170 was replaced by Meter No. 13195549 on 29/01/2015
MSB60429	Back up Meter	Secure Meters Ltd.	0.2 S	SEL-112	13/03/2012, 17/12/2012, 17/01/2014	12/03/2015, 16/12/2015, 16/01/2017	Meter No. MSB60429 was replaced by Meter No. RJB90207 on 17/04/2017
13195548	Main Meter	L&T	0.2 S	SEL-73	29/01/2015, 23/01/2020	28/01/2018, 22/01/2023	There is delay in calibration from Jan-2018 to Jan-2020. Calibration of meters is not under the control of Project participant as this is in the control of state electricity authority.
13195549	Back up Meter	L&T	0.2 S	SEL-73	29/01/2015, 23/01/2020	28/01/2018, 22/01/2023	There is delay in calibration from Jan-2018 to Jan-2020. Calibration of meters is not under the control of Project participant as this is in the control of state electricity authority.
RJB90206	Main Meter	SECURE	0.2 S	SEL-112(2nd New Line)	17/04/2017, 23/01/2020	16/04/2020, 22/01/2023	There is delay in calibration from 16-Jan-2017 to 17-Apr-2017.

							Calibration of meters is not under the control of Project participant as this is in the control of state electricity authority.
RJB90207	Back up Meter	SECURE	0.2 S	SEL-112(2nd New Line)	17/04/2017, 23/01/2020	16/04/2020, 22/01/2023	There is delay in calibration from 16-Jan-2017 to 17-Apr-2017. Calibration of meters is not under the control of Project participant as this is in the control of state electricity authority.

## APPENDIX II: < BREAKDOWN DETAILS >

Date	Location No.	Breakdown Hours
07-August-2013	MK005	24
08-Aug-2013	MK005	24
24-August-2013	MK008	24
01-October-2013	MK005, MK006, MK007, MK008	2832(Due to maintenance there was no generation from 01- Oct-2013 to 26-01-2014)
21-February-2014	MK006	24
29-April-2014	MK008	24
25-May 2014	MK007	24
06-March 2015	MK005	24
09-March-2015	MK005	24
09-August-2015	MK006	24
20-August-2015	MK006	24
22-August-2015	MK006	23.7
13-October-2015	MK006	24
01-November-2015	MK006	720
13-December-2017	MK008	18.5
19-January-2018	MK005	24
01-February-2018	MK005, MK006, MK007, MK008	960
11-September-2018	MK007	24