GRID CONNECTED WIND POWER PROJECT BY M/S. D. J. MALPANI IN RAJASTHAN

Document Prepared by EKI Energy Services Limited

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[1] https://registry.verra.org/app/projectDetail/VCS/1021

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity is grid-connected wind power generation in District- Jaisalmer, State- Rajasthan in India. M/s. D. J. Malpani is the owner and developer of the project activity. The total capacity of the project activity is 7.5 MW (5 WTGs × 1.50 MW). The project activity employs Wind Turbine Generators (WTGs) of Class S-82 manufactured by M/s. Suzlon Energy Limited.

The project activity supplies the generated electricity to Unified Indian Grid of India. The purpose of the project activity is generation of clean electricity by utilizing kinetic energy of wind. The project activity is estimated to generate 14,374 MWh of electricity annually; thus, reducing GHGs to the tune of 13,433 tCO_2e/ annum for the entire crediting period of 10 years.

Pre-project Scenario:

The Project proponent was not involved in generation of wind-based power and supplying to grid at the same site under the pre-project scenario therefore, in the absence of the project activity, the equivalent amount of electricity would have been generated from the connected / new power plants in the Unified Indian Grid. The installed capacity is predominantly coal based and therefore is a major source of carbon dioxide emissions in India. The main emission source in the pre-project scenario is the power plants connected to the Unified Indian Grid and main GHG involved is CO_2.

The relevant implementation dates

The project plant has commissioned on 21-March-2011 and run satisfactorily since then.

The total GHG emission reductions or removals generated in this monitoring period.

The total emission reductions achieved in this monitoring period i.e., from 01-September-2021 to 31-March-2022 (first and last days included) is 2,505 tCO_2e.

1.2 Sectoral Scope and Project Type

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

Project is not grouped project activity as per VCS guidelines.

1.3 Project Proponent

Organization name	M/s. D. J. Malpani
Contact person	Mr. Prafulla Khinvasara
Title	Head – Wind Power Project
Address	Malpani Estate, KasaraDumala, Sangamner, Maharashtra -422 605, India
Telephone	9822322145
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	Mr. Ankit Sethiya
Title	Deputy Manager– Operations
Address	Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, Madhya Pradesh, India
Telephone	0731 428 9086
Email	registry@enkingint.org, ankit.sethiya@enkingint.org

1.5 Project Start Date

The start date of the project activity is 21–March-2011 being the date of commissioning of the first wind turbine installed under the project activity (earliest date of commissioning for the project activity of WTGs AK-283 & AK-331).

1.6 Project Crediting Period

Project Crediting Period Start date: 21-March-2021

Project Crediting Period End date: 20-March-2031

Total Crediting Period: 10 Years
10 years & 0 months with renewable once[2] i.e., 21-March-2011 to 20-March-2021 (as renewable once; so maximum till 20-March-2031)
PP ensures that there will not be any double counting on carbon credit benefit (VCS/CDM) during the applicable crediting period.

1.7 Project Location

The project activity is located in District- Jaisalmer, State- Rajasthan in India. The details of project location are given below:

Sr. No.	Location No.	Khasra No.	Village	Taluka	Latitude	Longitude
1.	AK-278	83/P, 76/P	Sangana	Fatehgarh	N 26°47'48.7"	E 71°08'12.6"
2.	AK-283	147/P	Asayach	Jaisalmer	N 26°48'54.9"	E 71°07'04.6"
3.	AK-262	370/P	Chord	Fatehgarh	N 26°45'32.0"	E 71°09'49.3"
4.	AK-321	310/P	Chord	Fatehgarh	N 26°47'36.7"	E 71°10'15.8"
5.	AK-331	94/P	Asayach	Jaisalmer	N 26°49'45.3"	E 71°07'59.6"



[2] As per § 3.8.1 of the VCS Standard version 3.3, the project is eligible for a crediting period of 10 years & 0 months with renewable twice option (i.e., 30 years). However, as the technical life of the project activity is 20 years, the technical possible crediting period for the project activity shall be of 10 years & 0 months with renewable once i.e., maximum till 20/03/2031. The project activity is registered under CDM with UNFCCC ref. no.: 5794 (http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1329231564.5/view) - with maximum crediting period of 21 years & 0 months – ending on 28/02/2033.
However, as per § 3.8.3 of the VCS Standard version 3.3, the project activity is not eligible to take VCS beyond crediting period of 21 years. Thus, as mentioned above the technical possible crediting period for the project activity is only till 20/03/2031.

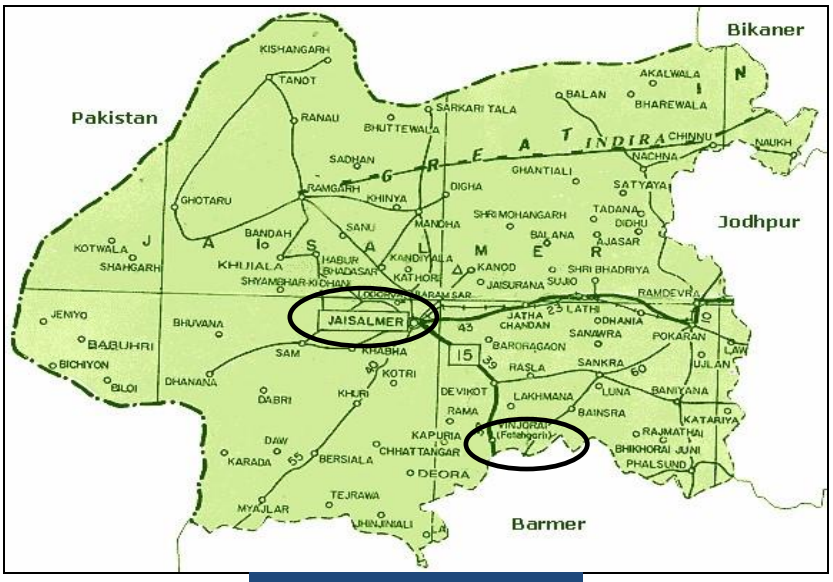


Figure: 01 Project activity on Map

1.8 Title and Reference of Methodology

Title: "Grid Connected Renewable Electricity Generation" Version 18.0[3]

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)[4]
Tool for the demonstration and assessment of additionality, Version 7.0[5]

1.9 Participation under other GHG Programs

Project has been registered with UNFCCC under Clean Development Mechanism program; Registration reference number is 5794.

The Web-link for the same has been mentioned below:
https://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1329231564.5/view?cp=1

1.10 Other Forms of Credit

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 5794. 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

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

GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions.

Other Forms of Environmental Credit:

Emission reduction generated from the project activity will not be double counted (i.e., issuance of other form of environmental credit/certificate) for a particular crediting period. PP has submitted an undertaking that they shall not claim GHG Emission Reduction credits from another type of credit.

1.11 Sustainable Development Contributions

Designated National Authority (DNA) of the host country (India) has stipulated four indicators for sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects in India. The project proponent believes that the project activity has contributed to sustainable development in terms of the four indicators as follows:

Social well-being:

Social well-being focuses on the reflections of the project activity on the neighboring community. The project promoter envisages following social benefits:

- Improved standard of living
- Availability of infrastructure like electricity, roads, medical facilities etc.
- Reduce migration from rural to urban area for the sake of employment
- Awareness about the global issues, their solutions & role of India in the same
- Awareness among local people regarding wind power & its effect on rain and ground water level

It will thus be responsible in bringing social well-being in the region.

Environmental well-being:

The project activity is a clean source of power generation. The environmental aspects in consideration are as follows:

- In comparison to other sources of power generation prevailing in the country, wind power is the cleanest technology.
- As compared to other power plants, less amount of land is required for a single wind turbo generator.
- Wind power is renewable. It can be used continuously, whenever available. There is no danger of depletion of the raw material used for power generation.
- Wind power is a naturally available source of energy. There is no processing required to make it available for power generation.
- It does not result in biodiversity loss which occasionally occurs in some other power plants like hydro.

Thus, wind power technology goes hand-in-hand with the environmental well-being of the region.

Technological well-being:

The power generation technology used in this project activity is provided by M/s. Suzlon Energy Limited. The technological well-being envisaged by the project promoter is as follows:

- It boosts the use of such technology by other project developers.
- Successful implementation and operation of this project gives necessary impetus in implementation of similar technology in the region.
- The project activity leads to transfer of environmentally safe and sound technologies that are comparable to best practices in order to assist in upgradation of the technological base in the local region.

Economic well-being:

Economic well-being refers to additional investment consistent with the needs of the local community. The project in due course of time drew additional investment to the region. In general, the project activity envisages following economic benefits:

- Employment opportunities
- Market facilities for local products
- Industrial development
- Increase in real income
- Increase in regional gross domestic product
- Capital formation
- Improvement of a rural economy
- Flow of goods and services

All the above are the contributions of the project activity for the sustainable development, the economic development of the region has been attributed to the project operation. The project contributes to the sustainable development of the region during its entire operational life.

The project supplies clean electricity from the wind power project to the Indian Grid, hence displacing the electricity generated from grid connected fossil fuel power plants and thereby avoiding the equivalent Carbon dioxide which is a Green House Gas.

For SDG-7, this project activity generates electricity from wind energy sources that ensures supply of electricity sources from clean energy sources at affordable rate. In this monitoring period, this project activity, has supplied 2,680.75 MWh clean electricity.

For SDG- 13, this project activity has led GHG emissions reductions by generating electricity using wind energy thus avoiding fossil-fuel electricity generation. In this monitoring period, this project activity has achieved GHG emission reductions of 2,505 tCO_2e.

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	2,680.75 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.	About 59,253.75 (9,386 + 36,821 + 10,366 + 2,680.75) MWh renewable electricity has already supplied over till date to Indian grid that helps to increase the renewable energy share in the energy mix.
2)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By supplying 2,680.75 MWh clean electricity to Indian grid, the project avoided release of 2,505 tCO_2e in to the atmosphere during the reporting period.	Prevented the release of 56,061 (8,904 + 34,931 + 9,721 + 2,505) tCO_2e has already achieved over till date into the atmosphere.

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, Forest 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 AND FORESTS) states that any project developer in India needs to file an application to the Ministry of Environment, Forest and Climate Change (including a public hearing and an EIA) in case the industry or project is listed in a predefined list. Wind parks are not included in this list and thus an EIA is not required.

There are no negative impacts on air, water, soil quality and ambience envisaged due to the project activity and no potential negative environmental and socio-economic impacts in this monitoring period. There were no harm identified form the project and hence no mitigations measures are applicable.

Being a renewable resource, using wind energy to generate electricity contributes to natural resource conservation. Thus, the project causes no negative impact on the surrounding environment contributing to environmental well-being.

2.2 Local Stakeholder Consultation

The stake holder meeting was conducted at Suzlon's Regional office at Jaisalmer (Rajasthan) on 24-March-2011 at 11.30 a.m. The stake holders were invited by Public Notice dated 12-March-2011, personal invitations were also given to the stake holders. The meeting was coordinated by Suzlon Energy Limited. Mr. Mohammad Abid & Mr. Himanshu Kulkarni represented Suzlon in the meeting. The PP was represented by Mr. Nitin Jadhav. The stake holders were identified based on the sustainability impact (direct & indirect) of this project activity on the life of the local people.

The project proponent & Suzlon welcomed the stakeholders for the meeting. The meeting was conducted in Hindi. Mr. Mohammad Abid explained the purpose of the meeting to the present stakeholders and introduced all the stakeholders to all the representatives. He briefed the stakeholders about the concept of Clean Development Mechanism, wind technology, climate change, effect of greenhouse gases on human life, environmental benefits of the wind power project etc.

During the meeting, Mr. Mohammad Abid explained about the power-deficit scenario in India and the need of energy. He explained importance of wind mills projects with respect to environmental well-being and its effect on local economy. He informed stakeholders about project promoter's keen interest in development of this proposed project and its effect on sustainable development of the local area.

Some villagers gave comments (which are discussed below) on the wind farm and its effect on their life. The stakeholder meeting ended with vote of thanks by Suzlon and PPs.

Summary of comments received

During the meeting the project proponent & Suzlon invited the stakeholders to offer their comments on the project.

The stake holders present in the meeting gave a positive response; illustrating the different improvements made in the village due to the project activity like medical facilities, availability of ambulance, oxygen cylinders, civil work contracts to the local people etc. They further added that, different employment opportunities, like security guards, drivers, have been created for local people.

Baburam, one of the villagers, said that due to wind mill projects he has got employment at the wind farm, which has helped him to live much better life.

Jitendra, a local driver, said he is happy with the wind farm development in the local area as he has got job as a driver and that helped him to live a stable life.

Report on consideration of comments received

No negative comments were received on the project activity, so no additional measures are required by the PP. PP has been implemented the local stakeholder consultation process at site and also kept Grievance register on site for local villagers/ visitors.

The process of Local Stakeholder Consultation is continuous. Registers is used to records the grievances and feedback. No grievances received during the current monitoring period; therefore, no any 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. The grievance copies have been submitted to VVB.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Technology/Measure:

The wind power technology is considered as one of the most environmental friendly technologies available. The operation of the wind turbine does not emit any harmful GHGs or any other harmful gases like conventional power plants during their operation. The electricity generation is the result of the utilization of kinetic energy in wind to drive the wind turbine blades to generate electricity. Thus, the operation of the wind power project is considered as environmentally safe.

The total capacity of the project activity is 7.5 MW. The project involves erection and commissioning of 05 wind turbines, out of which all WTG's are of 1.5 MW capacity. The project activity employs Wind Turbine Generators (WTGs) of Class S-82 manufactured by M/s. Suzlon Energy Limited. Suzlon Infrastructure Services Ltd. is providing O & M services to the project promoter.

Technical specifications for Class S-82[6]:

1.	Main Data	
	Turbine type	Horizontal axis turbine

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

	Rated Power	1500 kW
	Rotor Diameter	82 m
	Hub height (including foundation)	Approximately 78.5 m
	Rotational Speed	15.6 to 18.4 rpm
2.	**Rotor**	
	Number of rotor blades	3
	Rotor Orientation	Upwind
	Material	Epoxy bonded fiber glass
3.	**Gear Box**	
	Type of Gear Box housing	One planetary stage / Two helical stages
	Ratio	1: 95.09
	Power	1650 kW
	Type of cooling	Forced oil cooling lubrication system
4.	**Generator System**	
	Generator type	Single speed induction generator with slip rings, variable rotor resistance via Suzlon Flexi slip system
	Rated power	1500 kW
	Speed at rated power	1511 rpm
	Rated voltage	690 V AC (phase to phase)
	Frequency	50 Hz
	Insulation Class	Class H
5.	**Tower**	
	Tower type	Tubular tower (corrosion proof painting on inner and outer surface) with welded steel plates
	Tower Height	76 m
6.	**Operational Parameters**	
	Cut-in wind speed	4 m/s
	Rated wind speed	14 m/s
	Cut-off wind speed	20 m/s
	Survival wind speed	52.5 m/s

The project technology is indigenous & no technology transfer is involved.

All WTGs involved in the project activity are developed and supplied by Suzlon Energy Limited, which is a well-known Indian supplier of wind turbines and so far, has installed different capacities of WTGs in various countries. Suzlon Infrastructure Services Limited (SISL), a SUZLON Group Company, will provide all operations and maintenance services to the project activity.

The project activity uses wind energy in producing electricity and no other input is being used, therefore, it will not produce any GHG emission during its lifetime.

The commissioning details of WTGs of this project activity is shown below:

WTG ID	Date of Commissioning
AK-283, AK-331	21-March-2011
AK-278, AK-262, AK-321	30-March-2011

As the first WTG commissioning date of this project activity is 21-March-2011, this is considered as the start date of project activity.

The operational lifetime of the project activity is 20 years. The wind power produced being GHG neutral will not only displace fossil fuel dominated power but will also reduce the associated emissions with existing power generation plants connected to the Unified Indian Grid of India.

The breakdown details of the project activity have been mentioned in Appendix II of this Monitoring Report. The impact of breakdown on the GHG emission reduction during current monitoring period is justified in section 5.4 of this report. The emission reduction for this monitoring period pro rata comparing with registered Joint PD&MR is 7,802 tCO2e, whereas actual emission reductions achieved are 2,505 tCO2e, which is 67.89% less (26% is due to breakdown and another 41.89% is due to lean periods in the year) due to low wind, maintenance of WTGs, major breakdowns during this monitoring period, project activity is not generating the same. In the current monitoring period wind speed was very low and also falls under lean period and total breakdown hours are 1,319.4 during this monitoring period.

3.2 Deviations

3.2.1 Methodology Deviations

There is no request for methodology deviation applied during current monitoring period.

3.2.2 Project Description Deviations

There is no request for methodology deviation applied during current monitoring period.

3.3 Grouped Projects

The project involves setting up a wind farm of 7.5 MW (“Project) in the state of Rajasthan, India. Hence, the project has been designed to include a single installation of an activity and is not a grouped activity. Not applicable to this project activity as this is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$

Data unit	tCO_2 /MWh
Description	Operating margin CO_2 emission factor for Unified Indian Grid in the year y
Source of data	CO_2 Baseline Database for the Indian Power Sector, User Guide (Version 16)
Value applied	0.9568
Justification of choice of data or description of measurement methods and procedures applied	The Central Electricity Authority of India prepares the data
Purpose of Data	For the calculation of grid emission factor for estimating the baseline emissions
Comments	This database is an official publication of Government of India for the purpose of CDM baseline. It is based on most recent data available to the Central Electricity Authority and hence considered authentic. As the calculation of baseline emission has been done *ex ante* its value will remain fixed for the entire crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2 /MWh
Description	Build margin CO_2 emission factor for Unified Indian Grid in the year y
Source of data	CO_2 Baseline Database for the Indian Power Sector, User Guide (Version 16[7])
Value applied	0.8682
Justification of choice of data or description of measurement methods and procedures applied	The Central Electricity Authority of India prepares the data.
Purpose of Data	For the calculation of grid emission factor
Comments	This database is an official publication of Government of India for the purpose of CDM baselines. It is based on most recent data available to the Central Electricity Authority and hence considered authentic. As the calculation of baseline emission has been done *ex ante* its value will remain fixed for the entire crediting period.

Data / Parameter	$EF_{grid,CM,y}$

[7] https://cea.nic.in/wp-content/uploads/baseline/2021/06/User_Guide_ver_16_2021-1.pdf

Data unit	tCO_2 /MWh
Description	Combined margin CO_2 emission factor for Unified Indian Grid in the year y
Source of data	Gridemission factor calculation: $EF_{grid,CM,y}$ = $0.75 \times EF_{grid,OM,y} + 0.25 \times EF_{grid,BM,y}$ = $0.75 \times 0.9568 + 0.25 \times 0.8682$ = $0.9346\ tCO_2/MWh$ Values of OM and BM are taken from CEA User Guide, CO_2 Baseline Database for the Indian Power Sector, Version 16.
Value applied	0.9346
Justification of choice of data or description of measurement methods and procedures applied	The $EF_{grid,CM,y}$ calculation is based on the guidelines in emission tool.
Purpose of Data	For the calculation of emission reductions from the project activity.
Comments	The calculation is done ex ante.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,facility,y}$
Data unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y
Source of data	Monthly Break up of net export units report
Description of measurement methods and procedures to be applied	**Metering at 33 kV/220 kV level:** 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 tri vector energy meters are having accuracy class of 0.2s. The joint meter reading is taken on monthly basis at these metering point/s by the representatives of PP & State Utility, which records parameters like export, import. The electricity (export and import) for the connected WTG/s is apportioned on monthly basis by the State Utility at 33 kV/220 kV level on the basis of generation ratio at the applicable metering point (ratio of controller reading of connected WTG to the controller reading for all WTGs connected to the applicable metering point) and the electricity (export, import etc.) recorded by the energy meters at 33 kV/220 kV GSS on monthly basis. It will

give export kWh & import kWh for connected WTG. The net export obtained at 33 kV/220 kV level for any given month for the connected WTG is then obtained by:

Net Export = Export kWh – Import kWh

All these metering points are further connected to the common delivery point at the 220 kV level.

Metering at 220 kV level:

The common metering point at 220 kV GSS concurrently records total electricity (total export and total import) receiving from all connected metering points. The common metering point consist 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 will be done based on the energy break up available at the metering at 220 kV level.

Transmission loss:

The total transmission loss occurred during export of the electricity between the 33/220 kV level pooling station & 220 kV level common delivery point is calculated as the difference between total aggregated reading of exports for all metering points at 33/220 kV level and the total reading of exports for same metering points recorded at the 220 kV level. Similarly, transmission loss occurred during import of the electricity is also calculated.

The PP/WTG wise transmission loss during export & import is calculated by multiplying the values of arrived transmission loss for export & import for wind farm with the Generation Ratio at common delivery point (ratio of electricity generated by installed WTG to the total generation by all the connected WTGs/ or connected metering points under common delivery point)

The values of transmission loss during export & import for the given WTG are subtracting from EG Export, metering point & EG Import, metering point respectively to get the values of export and import respectively for the given month.

Net electricity delivered to the Grid:

The net electricity delivered to the Grid by the given WTG for the given month (net export kWh) is then obtained by subtracting import from export.

The values of the net electricity delivered to the Grid are aggregated annually to get $EG_{BL,y.}$

The value of net electricity delivered to the Grid ($EG_{BL,y}$) by the project activity per annum is converted to MWh before the calculation of emission reductions (ex-ante determined in tCO2/MWh unit).

Frequency of monitoring/recording	Continuous Monitoring and Monthly Recording
Value monitored	2,680.75
Monitoring equipment	Electricity Meters. The Calibration details of the Energy Meter has been mentioned in Appendix-I of the Monitoring Report.
QA/QC procedures to be applied	The meters are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The calibration of the meters will be carried out by State Utility. The calibration of the meters will be 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 of the meter calibration— Guidelines for Assessing Compliance With The Calibration Frequency Requirements will be applied appropriately to confirm the conservativeness of metering and emission reductions.
Purpose of the data	To calculate baseline emission
Calculation method	Net Export is calculated as the following formula Net Export = Export kWh – Import kWh
Comments	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.

4.3 Monitoring Plan

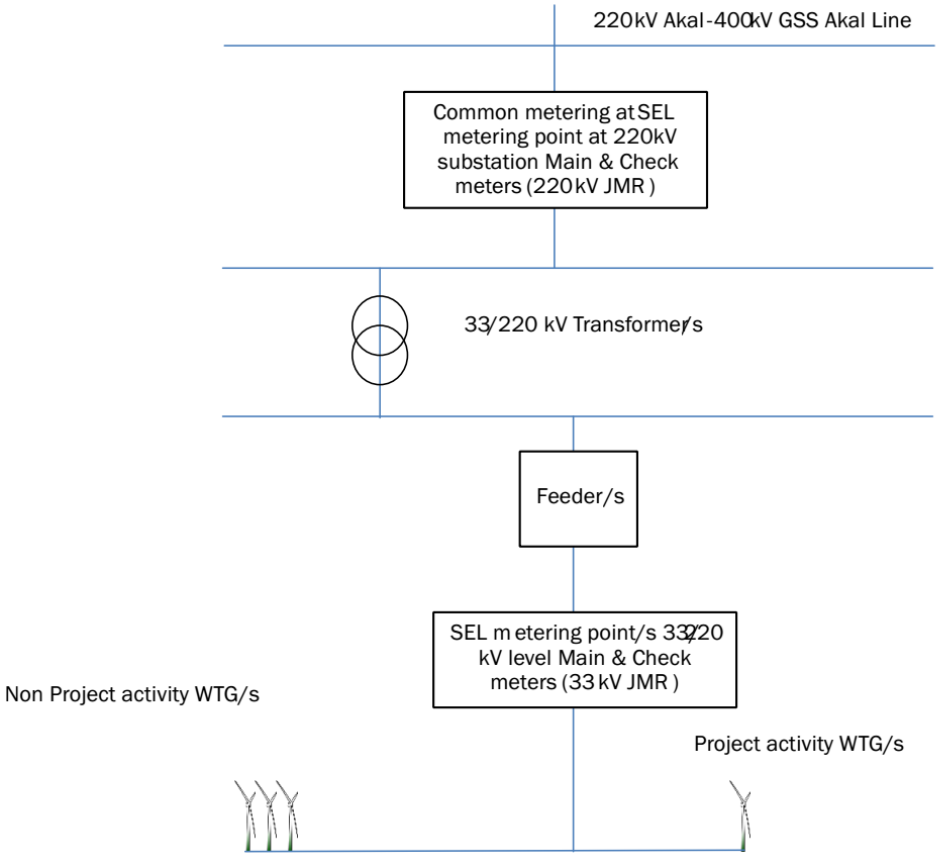
Monitoring of the project activity:

The monitoring of the project activity is given as below:

- The electricity generated by the project activity WTGs is evacuated to the pooling station at 33 kV/220 kV level. The project activity WTGs along with other WTGs, are connected to the feeder-wise metering point/s, where each metering point consists of both main & check meters. These tri vector energy meters are having accuracy class of 0.2s.
- The joint meter reading is taken on monthly basis at these metering point/s 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 consist 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 will be done based on the energy break up available at the metering at 220 kV level.

- The monitoring & measurement of electricity will be done on continuous basis; while recording will be 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 will be 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 shall be approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The calibration of the meters will be carried out by State Utility.
- The calibration of the meters will be 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 of the meter calibration— Guidelines for Assessing Compliance with the Calibration Frequency Requirements will be applied appropriately to confirm the conservativeness of metering and emission reductions.
- The net electricity supplied to the grid will be converted to MWh for calculation of emission reductions.
- Data is 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 of the project activity 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 WTG for any given month is given below:

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

The generation ratio 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.

$$G_{R,\ metering\ point} = EG_{Controller,\ WTG} / EG_{Controller,\ metering\ point} \quad (a)$$

Where:

$G_{R,\ metering\ point}$: Generation Ratio at metering point

$EG_{Controller,\ WTG}$: Electricity generated by installed WTG of PP connected to the applicable metering point.

$EG_{Controller,\ metering\ point}$: Total generation by all the connected WTGs to the applicable metering point.

Calculation of net electricity exported at applicable metering point:

The Main and Check meters at the applicable metering point measures 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:

$$EG_{Import,\ metering\ point} = G_{R,\ metering\ point} \times EG_{Total\ Import,\ metering\ point} \quad (b)$$

Where:

$EG_{Import,\ metering\ point}$: Import, kWh by the WTG at the metering point

$G_{R,\ metering\ point}$: Generation Ratio at metering point

$EG_{Total\ Import,\ metering\ point}$: Total Import, kWh by all the WTGs at the metering point

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

$$EG_{Export,\ metering\ point} = G_{R,\ metering\ point} \times EG_{Total\ Export,\ metering\ point} \quad (c)$$

$EG_{Export,\ metering\ point}$: Export, kWh by the WTG at the metering point

$G_{R,\ metering\ point}$: Generation Ratio at metering point

$EG_{Total\ Export,\ metering\ point}$: Total Export, kWh by all the WTGs at the metering point

The net electricity exported by the WTG 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

$$= EG_{Export,\ metering\ point} - EG_{Import,\ metering\ point} \quad (d)$$

Transmission Loss Calculation:

The total transmission loss occurred during export of the electricity between the 33/220 kV level pooling station & 220 kV level common delivery point is calculated as the difference between total aggregated reading of export for all metering points at 33/220 kV level and the total reading of export for same metering points recorded at the 220 kV level. Similarly, transmission loss occurred during import of the electricity is also calculated.

The PP/WTG wise transmission loss during export & import is calculated by multiplying the values of arrived transmission loss for export & import for wind farm with the Generation Ratio at common delivery point.

Generation Ratio at common delivery point:

It is the ratio of electricity generated by installed WTG to the total generation by all the connected WTGs/ or connected metering points under common delivery point.

$$GR_{Common\ Delivery\ Point} = EG_{Controller,\ WTG} / EG_{Controller,\ Common\ Delivery\ Point} \quad (e)$$

Where,

$GR_{Common\ Delivery\ Point}$: Generation Ratio at common delivery point

$EG_{Controller,\ WTG}$: Electricity generated by installed WTG

$EG_{Controller,\ Common\ Delivery\ Point}$: Total generation by all the connected WTGs/ or connected metering points under common delivery point

Calculation of net electricity delivered to the Grid:

The values of transmission loss during export & import for the given WTG are subtracting from $EG_{Export,\ metering\ point}$ & $EG_{Import,\ metering\ point}$ respectively to get the values of export and import respectively for the given month.

The net electricity delivered to the Grid by the given WTG is calculated by subtracting equation (b) from (c). Thus,

$$= Export - Import \quad (f)$$

These apportioned values viz import, export and net export kWh can be referred from the Monthly Break up of net export units report.

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 labour work involves making available suitable manpower for operation and maintenance of the equipment and covers periodic preventive maintenance, cleaning and upkeep of the equipment including –

- Tower torquing
- Blade cleaning
- Nacelle torquing and cleaning
- Transformer oil filtration
- Control panel & LT panel maintenance
- Site and transformer yard maintenance

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 in agreed format.
- 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:

Sr. No.	Monitoring Team	Responsibility
1	Project Head	• Overall project management • Project execution • Review of project operations • Review of generation & achieved emission reductions by project • Liaisoning with Consultant/Suzlon
2	Project Coordinator	• Data Archival (electronic) • Site visit for actual project monitoring Storage of data • Coordination with O & M Contractor for day to-day operations • Coordination with Suzlon for regular calibration of meters • Reporting to Project Head • Online project monitoring • Feedback and corrective action wherever necessary
3	O & M Contractor (Suzlon)	• Compliance as per O & M Agreement with the PP.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Emission reductions due to project activity are calculated as follows,

$ER_y = BE_y - PE_y - LE_y$

Where,

ER_y = Emission reductions in year y (tCO2e/yr)
BE_y = Baseline emissions in year y (tCO2e/yr)
PE_y = Project emissions in year y(tCO2e/yr)
LE_y = Leakage emissions in year y(tCO2e/yr)

The baseline emissions are to be calculated as follows:
$BE_y = EG_{PJ,y} * EF_{grid,y}$[8]

Where:

BE_y = Baseline Emissions in year y; t CO_2

$EG_{PJ,y}$ = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y*; MWh

$EF_{grid,y}$ = CO_2 emission factor of the grid in year y; t CO_2/MWh

The baseline emissions for the project activity for the current monitoring period are as follows.

Baseline Emission factor = 0.9346 tCO_2/MWh

Calculation of $EG_{PJ,y}$

As the project activity is the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$EG_{PJ,y} = EG_{facility,y}$

Where;

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as aresult of the implementation of the CDM project activity in year y (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to thegrid in year y (MWh/yr)

Net Electricity Supplied to the Grid, $EG_{PJ,y}$ = 2,680.75 MWh

Baseline Emission, BE_y = 2,680.75x 0.9346
= 2,505 tCO_2e (ROUNDDOWN)

[8] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

5.2 Project Emissions

The project activity is based on renewable wind energy; therefore, project emissions should not be considered as per methodology, $PE_y = 0$

5.3 Leakage

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

5.4 Net GHG Emission Reductions and Removals

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)
2021 (01-September-2021 to 31-December-2021)	1,272	0	0	1,272
2022 (01-January-2022 to 31-March-2022)	1,233	0	0	1,233
Total	**2,505**	**0**	**0**	**2,505**

The estimated emission reduction to be achieved from the project activity for the current monitoring period is 7,802 tCO2e (the basis of calculation is unitary method using annual emission reduction in the registered VCS Joint PD&MR), whereas actual emission reductions achieved are 2,505 tCO2e, which is 67.89% decrease in the ERs from the estimated ones in the VCS Joint PD&MR which is due to the low PLF achieved by the project activity during the monitoring period. It is to be noted that PLF is completely governed by the availability of wind, which is natural phenomenon and same is beyond the control of the project proponent.

Also, PLF is nature dependent and it will vary based on climatic condition and PP do not have any control on it. As per financial benchmark low generation will lead to low IRR. Low generation is not impacting project cost. And also PP has taken some major shutdowns during this monitoring period. That is around 1,319.4 breakdown hours during current monitoring period. The breakdown details have been mentioned in Appendix II of the Monitoring Report.

APPENDIX I: METER CALIBRATION DETAILS

Location	Meter No.	Type	Make	Accuracy	Calibration Date	Validity of Calibration
SEL 81	RJB90208	Main Meter	Secure	0.2s	17-June-2019	16-June-2022
SEL 81	RJB90209	Back Up Meter	Secure	0.2s	17-June-2019	16-June-2022
SEL 204	RJB85056	Main Meter	Secure	0.2s	12-June-2019	11-June-2022
SEL 204	RJB85057	Back Up Meter	Secure	0.2s	12-June-2019	11-June-2022

APPENDIX II: MAJOR BREAKDOWN DETAILS

WTG ID	Date	Breakdown Hours
AK283	01-September-2021	3.80
AK262	02-September-2021	2.20
AK278	02-September-2021	0.20
AK283	02-September-2021	8.70
AK321	02-September-2021	0.90
AK331	02-September-2021	0.20
AK262	03-September-2021	5.00
AK262	03-September-2021	4.60
AK262	04-September-2021	13.40
AK278	08-September-2021	0.10
AK283	08-September-2021	1.10
AK283	09-September-2021	5.80
AK331	09-September-2021	1.50
AK278	10-September-2021	1.30
AK278	12-September-2021	2.80
AK262	14-September-2021	2.10
AK331	17-September-2021	1.70
AK321	18-September-2021	1.60
AK331	19-September-2021	1.20
AK262	20-September-2021	5.80
AK262	22-September-2021	4.10
AK262	24-September-2021	0.80
AK262	24-September-2021	1.20

AK321	24-September-2021	0.90
AK321	24-September-2021	1.20
AK278	26-September-2021	0.40
AK278	27-September-2021	2.20
AK262	28-September-2021	9.30
AK278	29-September-2021	9.20
AK262	27-October-2021	1.80
AK283	30-September-2021	7.40
AK331	01-October-2021	8.00
AK262	02-October-2021	6.90
AK321	03-October-2021	7.80
AK331	03-October-2021	1.00
AK283	04-October-2021	2.30
AK262	12-October-2021	1.80
AK278	12-October-2021	4.40
AK321	12-October-2021	7.20
AK278	13-October-2021	6.40
AK278	13-October-2021	6.50
AK283	13-October-2021	6.40
AK321	13-October-2021	2.00
AK278	14-October-2021	6.70
AK331	14-October-2021	7.10
AK262	15-October-2021	3.70
AK278	15-October-2021	3.10
AK283	15-October-2021	3.10
AK321	15-October-2021	3.70
AK331	15-October-2021	1.70

AK262	20-October-2021	5.80
AK321	20-October-2021	1.30
AK321	20-October-2021	5.80
AK262	22-October-2021	1.20
AK278	22-October-2021	1.20
AK283	22-October-2021	1.20
AK283	22-October-2021	5.90
AK321	22-October-2021	10.70
AK321	22-October-2021	1.20
AK331	22-October-2021	1.20
AK283	26-October-2021	1.70
AK331	26-October-2021	1.10
AK262	27-October-2021	1.80
AK278	27-October-2021	1.00
AK283	27-October-2021	0.20
AK321	27-October-2021	0.90
AK283	28-October-2021	0.20
AK331	28-October-2021	4.80
AK331	28-October-2021	0.20
AK262	29-October-2021	24.00
AK278	29-October-2021	24.00
AK283	29-October-2021	24.00
AK321	29-October-2021	24.00
AK331	29-October-2021	24.00
AK262	30-October-2021	5.60
AK321	30-October-2021	5.60
AK262	11-November-2021	0.10

AK262	16-November-2021	0.10
AK283	16-November-2021	1.40
AK321	16-November-2021	0.70
AK321	16-November-2021	4.70
AK283	17-November-2021	0.10
AK283	19-November-2021	0.10
AK262	21-November-2021	0.20
AK283	21-November-2021	0.40
AK283	29-November-2021	5.50
AK283	30-November-2021	1.00
AK331	01-December-2021	5.70
AK262	02-December-2021	24.00
AK278	02-December-2021	24.00
AK283	02-December-2021	24.00
AK321	02-December-2021	24.00
AK331	02-December-2021	24.00
AK262	03-December-2021	4.10
AK262	03-December-2021	9.90
AK262	03-December-2021	0.80
AK278	03-December-2021	2.50
AK283	03-December-2021	1.90
AK321	03-December-2021	6.90
AK321	03-December-2021	4.10
AK321	03-December-2021	0.50
AK321	03-December-2021	7.20
AK262	04-December-2021	0.20
AK321	23-December-2021	2.10

AK262	26-December-2021	6.80
AK262	26-December-2021	1.10
AK262	26-December-2021	4.00
AK278	26-December-2021	6.80
AK283	26-December-2021	6.80
AK321	26-December-2021	6.80
AK331	26-December-2021	6.80
AK278	28-December-2021	2.80
AK262	02-January-2022	0.60
AK278	02-January-2022	0.10
AK321	02-January-2022	1.30
AK331	02-January-2022	2.40
AK331	02-January-2022	0.40
AK278	04-January-2022	0.10
AK262	05-January-2022	5.80
AK262	05-January-2022	0.20
AK283	05-January-2022	1.20
AK262	06-January-2022	0.10
AK321	09-January-2022	3.70
AK262	10-January-2022	2.40
AK283	12-January-2022	3.30
AK283	13-January-2022	2.40
AK321	16-January-2022	2.30
AK331	17-January-2022	2.30
AK283	20-January-2022	10.90
AK321	20-January-2022	6.70
AK262	25-January-2022	6.00

AK262	25-January-2022	3.70
AK278	25-January-2022	5.40
AK283	25-January-2022	5.40
AK321	25-January-2022	6.00
AK331	27-January-2022	3.70
AK262	04-Febuary-2022	0.10
AK278	04-Febuary-2022	1.80
AK283	04-Febuary-2022	1.80
AK283	04-Febuary-2022	0.20
AK262	05-Febuary-2022	4.40
AK283	05-Febuary-2022	10.90
AK321	06-Febuary-2022	0.30
AK283	07-Febuary-2022	0.30
AK278	10-Febuary-2022	0.10
AK283	10-Febuary-2022	0.10
AK262	11-Febuary-2022	5.20
AK278	12-Febuary-2022	0.20
AK278	12-Febuary-2022	0.20
AK283	12-Febuary-2022	24.00
AK283	13-Febuary-2022	24.00
AK283	14-Febuary-2022	24.00
AK283	15-Febuary-2022	24.00
AK283	16-Febuary-2022	24.00
AK283	17-Febuary-2022	24.00
AK283	18-Febuary-2022	24.00
AK283	19-Febuary-2022	24.00
AK331	19-Febuary-2022	24.00

AK283	20-Febuary-2022	24.00
AK331	20-Febuary-2022	24.00
AK283	21-Febuary-2022	24.00
AK331	21-Febuary-2022	24.00
AK283	22-Febuary-2022	24.00
AK331	22-Febuary-2022	24.00
AK283	02-March-2022	1.70
AK331	03-March-2022	1.70
AK262	04-March-2022	4.10
AK278	04-March-2022	4.90
AK283	04-March-2022	4.90
AK321	04-March-2022	4.10
AK331	04-March-2022	1.50
AK331	04-March-2022	5.50
AK331	05-March-2022	4.60
AK278	07-March-2022	5.20
AK283	07-March-2022	5.20
AK278	08-March-2022	4.70
AK283	08-March-2022	4.70
AK262	09-March-2022	4.20
AK321	09-March-2022	4.20
AK262	12-March-2022	2.10
AK283	13-March-2022	3.30
AK262	15-March-2022	8.30
AK278	16-March-2022	9.00
AK283	17-March-2022	7.60
AK321	19-March-2022	7.60

AK331	21-March-2022	7.40
AK262	26-March-2022	0.20
AK278	26-March-2022	0.10
AK331	26-March-2022	0.20
AK283	27-March-2022	0.10
AK331	27-March-2022	24.00
AK331	28-March-2022	24.00
AK262	29-March-2022	24.00
AK321	29-March-2022	24.00
AK331	29-March-2022	24.00
AK262	30-March-2022	0.10
AK262	30-March-2022	2.90
AK278	30-March-2022	7.40
AK321	30-March-2022	2.90
AK331	30-March-2022	24.00
		1,319.4