



**Verified Carbon
Standard**

WIND POWER PROJECT IN RAJASTHAN



India's Largest Carbon Credit Developer & Supplier

Document Prepared by EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Mytrah Energy (India) Limited (MEIL) (formerly Caparo Energy (India) Limited) is continuously developing the wind power assets in India. MEIL has set up 42 MW wind power project in Jaisalmer District in the state of Rajasthan. The project activity comprises of 20 Wind Energy Generators (WEGs) with a capacity of 2.1 MW each.

The Project activity is a zero-emissions wind based power generation project connected to NEWNE regional grid of India (Now INDIAN grid). The project helps to reduce the supply demand gap in the state and also generates power using zero emissions wind-based power generation which helps to reduce GHG emissions and specific pollutants like SO_x, NO_x, and SPM associated with the conventional thermal power generation facilities. The project activity conserves fossil fuel like coal, which can be used in other industrial applications. In the project site, there are other wind projects owned by other customers connected to the same substation. There is an apportioning procedure which is approved by the state nodal agency for apportioning the electricity to each and every customer. The WEG commissioning details has been mentioned under Section 1.7.

The total VCU generated achieved during this monitoring period is 60,570 tCO_{2e}.

1.2 Sectoral Scope and Project Type

The project activity falls under

Sectoral Scope: 01 - Energy industries (renewable / non-renewable sources)

Project Type : I - Renewable Energy Projects

Title : Consolidated baseline methodology for grid-connected electricity generation from renewable sources

Reference : Approved consolidated baseline and monitoring methodology ACM0002, Version 12.3.0²

This project is not a grouped project activity.

1.3 Project Proponent

Organization name	Mytrah Energy (India) Limited
Contact person	Mr. Ravinder Kumar Rana
Title	Assistant Manager
Address	1st Floor, 8001, 8th Floor, Q-City, Nanakramguda, Gachibowli Hyderabad 500032, Telangana, INDIA

Telephone	+91 9655967129
Email	ravinderrana@mytrah.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Anjali Rao
Title	Project Manager
Address	Office No. 201, EnKing Embassy, Plot No. 48, Scheme No. 78, Part II, Vijay Nagar INDORE – 452010, India.
Telephone	9109120940
Email	anjali@enkingint.org

1.5 Project Start Date

The project start date for this project is said to be 19-June-2011. This is because the first WEG was commissioned as on the said date.

1.6 Project Crediting Period

The project is registered under Clean Development Mechanism (CDM) of UNFCCC with 10 years crediting period (Reference No: 8591) on 13th Dec 2012.¹ Crediting period of the project under CDM starts on 31st December 2012 and ends on 30th December 2022.

The project has begun generating GHG emission reductions from 19th June 2011. Hence, crediting period for VCS begins on 19th June 2011 and ends on 18th June 2021 considering 10 years fixed crediting period.

The project proponent is also not claiming GHG emission reductions under two schemes for the same period.

1.7 Project Location

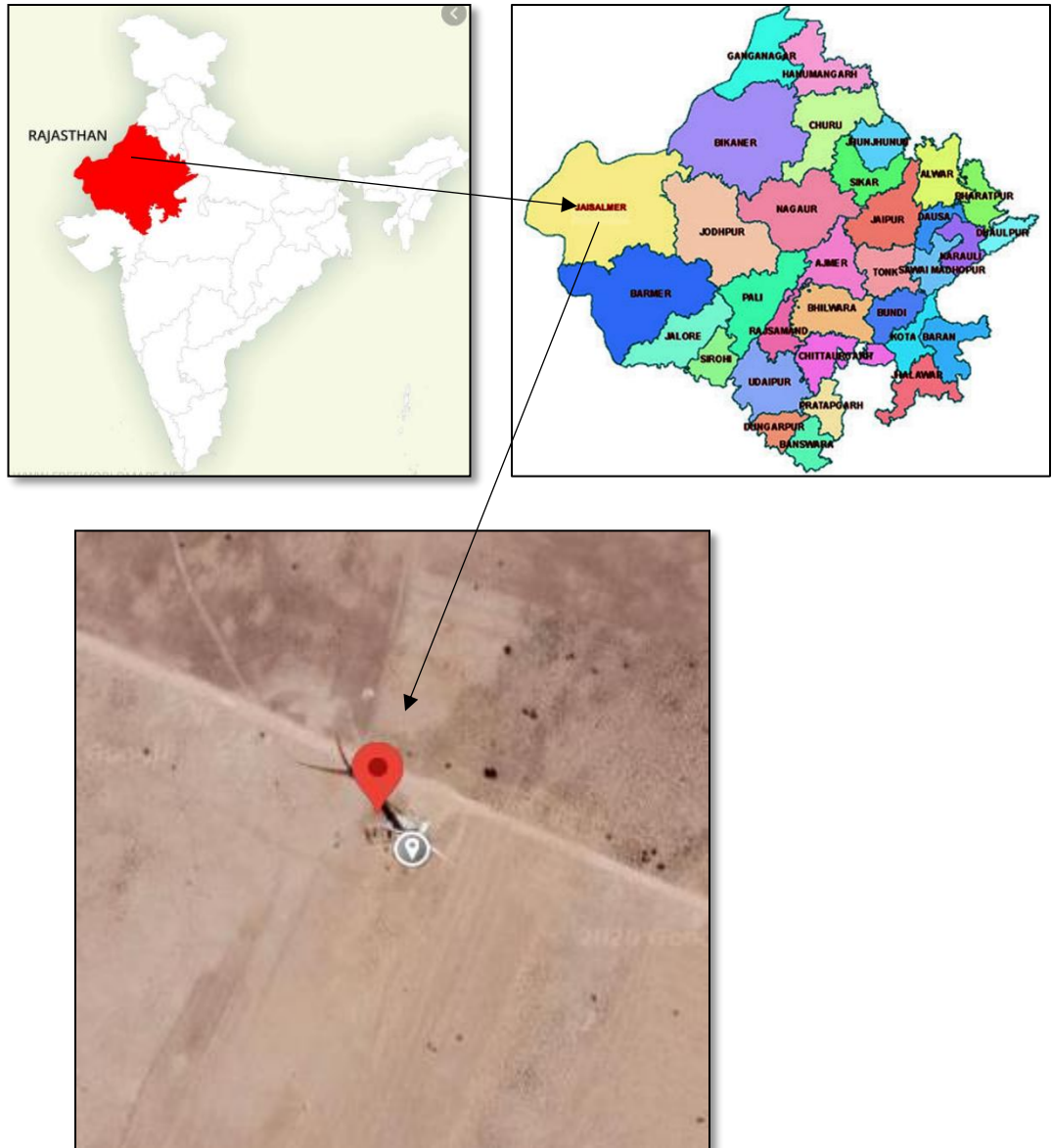
The wind power project is located in Tejwa – Mokal village, Jaisalmer District, Rajasthan State, India. The geo- coordinates of the project location is as follows.

The location of WEGs is as given below

¹ <http://cdm.unfccc.int/Projects/DB/DNV-CUK1354785555.66/view>

The geographical location of the project site with commissioning dates are as shown below:

Sr. No.	WTG ID	WTG Co-ordinate		Date of Commissioning
		Latitude	Longitude	
1	MK014	27.1631	70.6809	04-Aug-2011
2	MK015	27.1612	70.6858	19-Jul-2011
3	MK016	27.1594	70.6907	19-Jul-2011
4	MK017	27.1576	70.6956	19-Jul-2011
5	MK021	27.1466	70.7251	30-Sep-2011
6	MK039	27.1697	70.6926	12-Jul-2011
7	MK040	27.1715	70.6877	12-Jul-2011
8	MK042	27.1752	70.6779	19-Jul-2011
9	MK043	27.1771	70.673	04-Aug-2011
10	MK066	27.1837	70.6848	12-Jul-2011
11	MK067	27.1812	70.6891	30-Jun-2011
12	MK068	27.1804	70.6949	30-Jun-2011
13	MK069	27.1782	70.6995	30-Jun-2011
14	MK092	27.1887	70.7016	19-Jun-2011
15	MK093	27.1905	70.6966	25-Jun-2011
16	MK094	27.1924	70.6917	30-Jun-2011
17	MK161	27.2195	70.6917	25-Jun-2011
18	MK163	27.2237	70.6833	25-Jun-2011
19	MK164	27.2255	70.6784	19-Jun-2011
20	MK165	27.2274	70.6735	19-Jun-2011



1.8 Title and Reference of Methodology

Title: Consolidated baseline methodology for grid-connected electricity generation from renewable sources.

Methodology applied is ACM 0002, version 12.3.0².

“Tool to calculate the emission factor for an electricity system” version 2.2.1.

² <https://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNV3LTK1BP3OR24Y5L>

1.9 Participation under other GHG Programs

Participation under Other GHG Programs: The PP has participated under CDM mechanism of UNFCCC. The UN reference id 8591¹ of program with this project activity. The PP would not consider the credit from any other mechanism for the current monitoring period which is 01-April-2020 to 31-May-2021. The undertaking is provided to confirm that there is no any double accounting for current monitoring period.

1.10 Other Forms of Credit

Include the following information, as applicable:

Emission Trading Programs and Other Binding Limits: The PP has not applied this project in any Emission Trading Programs and other Binding Limits.

Other Forms of Environmental Credit: The PP has not applied this project in any other form of environmental credits or for REC benefits. PP not participating for REC benefits can be verified from this link- https://www.recregistryindia.nic.in/index.php/publics/accredited_regens

1.11 Sustainable Development

Contribution to sustainable development:

Ministry of Environment and Forests, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

- **Social well-being:** The project helps in generating employment opportunities during the construction and operation phases. The project activity leads to development in infrastructure in the region like development of roads and also may promote business with improved power generation.
- **Economic well-being:** The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity also helps to reduce the demand supply gap in the state. The project activity creates local employment generation which helps economic well-being of local people.
- **Technological well-being:** The successful operation of project activity is leading to promotion of renewable based power generation and would encourage other entrepreneurs to participate in similar projects
- **Environmental well-being:** The project activity being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the project activity also helps in avoiding significant amount of GHG emissions.

2 SAFEGUARDS

2.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of wind turbine generators.

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 same³.

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 continual improvement process, feedback from the associated stakeholders is vital, therefore a dedicated Visitor register cum grievance register has been placed at the project site which is accessible to stakeholders to provide their feedback on the project. It is appropriate publicly accessible location at which local stakeholders can provide their feedback on the project. This location is also conducive to continuous and regular checks for stakeholder comments. For the global stakeholders, the suggestion and the grievance can be submitted to mail@mytrah.com

Stakeholder meetings were organized during project activity registration in order to identify the major challenges around the area, stakeholders were invited well in advance through printed invitation, calls, meeting and a notice was placed around the local common areas.

Various CSR activities around site are carried out with proper stakeholder requirements meeting. The stakeholders are also requested to share their experiences and grievances on continuous basis. Registers is used to records the grievances and feedback. During the current monitoring period, positive feedbacks had been received regarding site operation. No any negative comments/ grievances received during the current monitoring period, therefore, no any mitigation measures were required. In case of grievances, the nature of probable resolution is discussed with the plant head office and implemented by the site incharge.

2.3 AFOLU-Specific Safeguards

This Section is not applicable here as the project activity is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

³ <https://smartnet.niua.org/sites/default/files/resources/report-on-developmental-impacts-of-RE.pdf>

3.1 Implementation Status of the Project Activity

The project activity comprises of 20 Wind Turbine Generators (WTG's) with a capacity of 2.1 MW each. The project activity is using S-88- 2.1 MW WTG manufactured by Suzlon Energy Ltd. The technology of electricity generation from renewable wind resource is environment friendly as it does not use any fossil fuel. The power (electricity) thus produced by the project activity would be transmitted to the state electricity grid, thereby displacing equivalent amount of power in the grid which is dominated by emission intensive thermal power plants.

S88_2.1 MW wind turbines utilize well-proven DFIG technology that has been deployed in more than 5000 units around the world. The technical lifetime of the wind turbine is 20 years. Key inclusions in this design are:

- DFIG convertor featuring variable speed
- Larger swept area with rotor diameters; 95 and 97 meters
- 80-meter, 90-meter and 100-meter hub heights

The technical specification of the WTG is as follows:

MODEL	S88- 2.1MW
Operating Data	
Rated power	2.1MW
Cut-in wind speed	4 m/s
Rated wind speed	14 m/s
Cut-out wind speed	25 m/s
50 years gust wind speed	59.5 m/s
Hub height	79 m (Foundation top equal to ground level)
Wind Class	IEC – IIA
Rotational Speed	15 to 17.6 rpm
Rotor	
Pitch system	Pitch regulated, electrical
Diameter	88 m
Swept area	6082 m ²
Blade material type	Epoxy bounded fibre glass
Generator	
Type	Asynchronous slip ring type induction generator
Rated power	2100 kW
Rated voltage	690/600 V
Frequency	50/60 Hz
Protection	IP 54, IP23 for slip ring unit
Cooling system	Air cooled
Insulation	Class H
Slip control	Unique Flexi-Slip providing slip up to 16.67%
Braking System	
Aerodynamic brake	3 independent systems with blade pitching mechanism
Mechanical brake	Hydraulic fail-safe disc brake system
Gearbox	
Type	3 stages (One planetary & Two helical)

Ratio	1:98.8 / 1:118.1
Nominal load	2200 kW
Yaw System	
Type	Driven by 3 electrical driven planetary drives
Bearings	Polyamide slide
Certifications	
Design standards	GL 2003
Quality	ISO 9001:2000, ISO 9001:2008, ISO 14001:2004 & OHSASA 18001:2007
Tower	
Type	Tubular Steel Tower (4 sections)
Corrosion protection	Epoxy/PU coated

No events or situations happened during the reported monitoring period that can alter the applicability of the applied methodology.

The commissioning dates respective to the WTG sites are mentioned in section 1.7

3.2 Deviations

3.2.1 Methodology Deviations

There is no request for deviation applied during this monitoring period.

3.2.2 Project Description Deviations

Deviation 1-

The below deviation is requested for correction in formula for calculation of Net electricity exported by the project proponent.

As per the registered PDD:

Net electricity exported by the project proponent is calculated as mentioned below:

$$EG_{PJ,y} = (Export - Import) \times (1 + \text{Transmission Loss})$$

The above formula was not followed currently and in actual, transmission losses are calculated separately for export and import and below formulas are considered for export and import values of project activity WTGs

$$Export = \left(\frac{E_{Exp,feeder,i}}{E_{Gen,feeder,i}} \times E_{WTG,i} \right) - \left(\left(\sum E_{Exp,feeder,i} \right) - E_{Exp,sub-station} \right) \div \sum E_{Gen,feeder,i} \times E_{WTG,i}$$

$$Import = \left(\frac{E_{Imp,feeder,i}}{E_{Gen,feeder,i}} \times E_{WTG,i} \right) - \left(\left(\sum E_{Imp,feeder,i} \right) - E_{Imp,sub-station} \right) \div \sum E_{Gen,feeder,i} \times E_{WTG,i}$$

The use of above apportioning formula and calculation of export and import values for project activity WTGs is under control of state electricity board and PP do not have any control on it.

The actual monitoring practice/formula has been updated now and PP is getting share certificate/break up certificate which gives the direct values of Net electricity exported by the project proponent. The net electricity can be verified from the invoices provided by the PP.

Thus deviation is requested to correct project description information.

Deviation 2-

The crediting period mentioned in VCS PD section 1.6 is as “The project has begun generating GHG emission reductions from 19th June 2011. Hence crediting period for VCS begins on 19th June 2011 and ends on 30th December 2012, since the crediting period under CDM starts on 31st December 2012. The project proponent will also not claim GHG emission reductions under VCS and CDM scheme for same period during the period of 31st December 2012 to 30th December 2022”

Also section 1.7 of VCS PD mentioned 10 years fixed crediting period. Thus there is inconsistency in VCS crediting period mentioned in VCS PD. Hence deviation is requested to confirm that VCS crediting period will be 19th June 2011 to 18th June 2021 i.e 10 years fixed crediting period. Also end date of VCS crediting period is within end date of CDM crediting period which is in line with VCS Standard Version 4.1.

The previous verification (VCS MR and Verification Report) confirmed the VCS crediting period as 19th June 2011 to 18th June 2021.

Thus deviation is requested to correct VCS Crediting period information.

3.3 Grouped Projects

This project activity is not a grouped project activity.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OMsimple,y}$
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor of NEWNE grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 07 ⁴
Value applied	0.9842
Justification of choice of data or description of measurement methods and procedures applied	The operating margin emission factor data has been deduced from CO ₂ database. CEA CO ₂ Baseline database Version 07
Purpose of Data	Calculation of baseline emissions

⁴ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver7.pdf

Comments	The operating margin emission factor is a 3-year generation-weighted average (2008-11). Data calculated to be 0.9842. The operating Margin is calculated ex ante and fixed during the crediting period.
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Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor of NEWNE grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 07 ⁵
Value applied	0.8588
Justification of choice of data or description of measurement methods and procedures applied	The operating margin emission factor data has been deduced from CO₂ database. CEA CO₂ Baseline database Version 07
Purpose of Data	Calculation of baseline emissions
Comments	The build Margin would be calculated ex-ante and fixed during the crediting period. For ex-ante calculation the most recent data available has been used and the build margin thus calculated is 0.8588

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor of NEWNE grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 07 ⁶
Value applied	0.9529
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per the procedures in “Tool to calculate the emission factor for an electricity system” based on CEA data.
Purpose of Data	Calculation of baseline emissions
Comments	The combined margin would be calculated ex-ante and fixed for the entire crediting period and the combined margin thus

⁵ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver7.pdf

⁶ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver7.pdf

calculated is 0.9529.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PI,y}$
Data unit	MWh
Description	Quantity of net electricity exported to the grid during the year y.
Source of data	Certificate for share of electricity generated by Wind Farm.
Description of measurement methods and procedures to be applied	Net electricity supplied is calculated on the basis of the difference between calculated values of “export” and calculated value “import” on the JVVNL energy meter at the common evacuation point and the percentage transmission loss as prescribed in the PPA for metering at 220 kV. All the data items monitored under the monitoring plan is archived for entire crediting period or till the last issuance of VER/CERs for this project activity whichever occurs later. Calibration Frequency: All Energy meters are tested for accuracy at least once in a year. The accuracy class of the energy meter is 0.2s
Frequency of monitoring/recording	Measuring frequency: Continuous Reading frequency: Daily Recording frequency: Monthly
Value monitored	63,565.06 MWh
Monitoring equipment	Energy meters of 0.2s accuracy class. Refer to appendix 1 for further details.
QA/QC procedures to be applied	Net electricity supplied to the grid by the project activity is cross checked with invoices submitted to JVVNL.
Purpose of the data	Calculation of baseline emissions
Calculation method	Net electricity supplied to the grid by the project activity is cross checked with invoices submitted to JVVNL.
Comments	The data will be archived for two years after the end of the last crediting period or till the last issuance of CERs for the project activity, whichever is later.

Data / Parameter	$E_{WEG,I,Y}$
Data unit	MWh

Description	Quantity of Electricity generated by the individual WEGs of the PP in year y.
Source of data	WEG controller meter reading
Description of measurement methods and procedures to be applied	Electricity generated by the WEG is continuously monitored by the controller meter installed within the WEG. These reading are recorded online by the technology supplier. Calibration Frequency: The WEG controller meter does not require calibration as per the specification provided by the technology supplier.
Frequency of monitoring/recording	Continuous measuring
Value monitored	65,871.45 MWh (summation of generation from all 20 WEGs)
Monitoring equipment	Microprocessor based controller meter
QA/QC procedures to be applied	The quantity of electricity generated by the individual WEG is cross-checked with the online tracking system provided by the technology supplier.
Purpose of the data	Calculation of baseline emissions
Calculation method	Not Applicable
Comments	-

4.3 Monitoring Plan

The electricity exported to the grid through the project activity and the electricity imported from the JVVNL grid is monitored. The electricity export and import is through a common evacuation system having common metering equipments. Suzlon Energy Limited has been identified as the common agency responsible for joint metering.

As mentioned in deviation request, the correct formula used for export and import values of project activity WTGs are as below

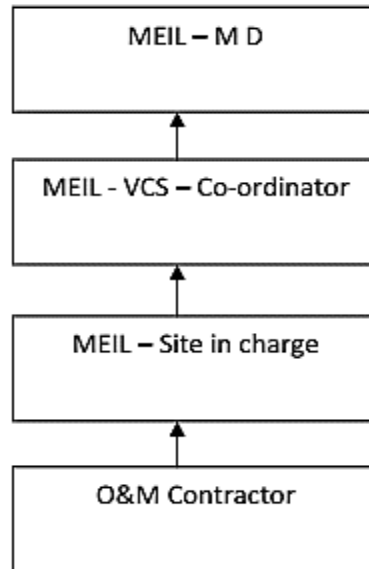
$$\begin{aligned}
 \text{Export} &= \left(\frac{E_{Exp,feeder,i}}{E_{Gen,feeder,i}} \times E_{WTG,i} \right) - \left(\left(\sum E_{Exp,feeder,i} \right) - E_{Exp,sub-station} \right) \div \sum E_{Gen,feeder,i} \times E_{WTG,i} \\
 \text{Import} &= \left(\frac{E_{Imp,feeder,i}}{E_{Gen,feeder,i}} \times E_{WTG,i} \right) - \left(\left(\sum E_{Imp,feeder,i} \right) - E_{Imp,sub-station} \right) \div \sum E_{Gen,feeder,i} \times E_{WTG,i}
 \end{aligned}$$

The use of above apportioning formula and calculation of export and import values for project activity WTGs is under control of state electricity board and PP do not have any control on it.

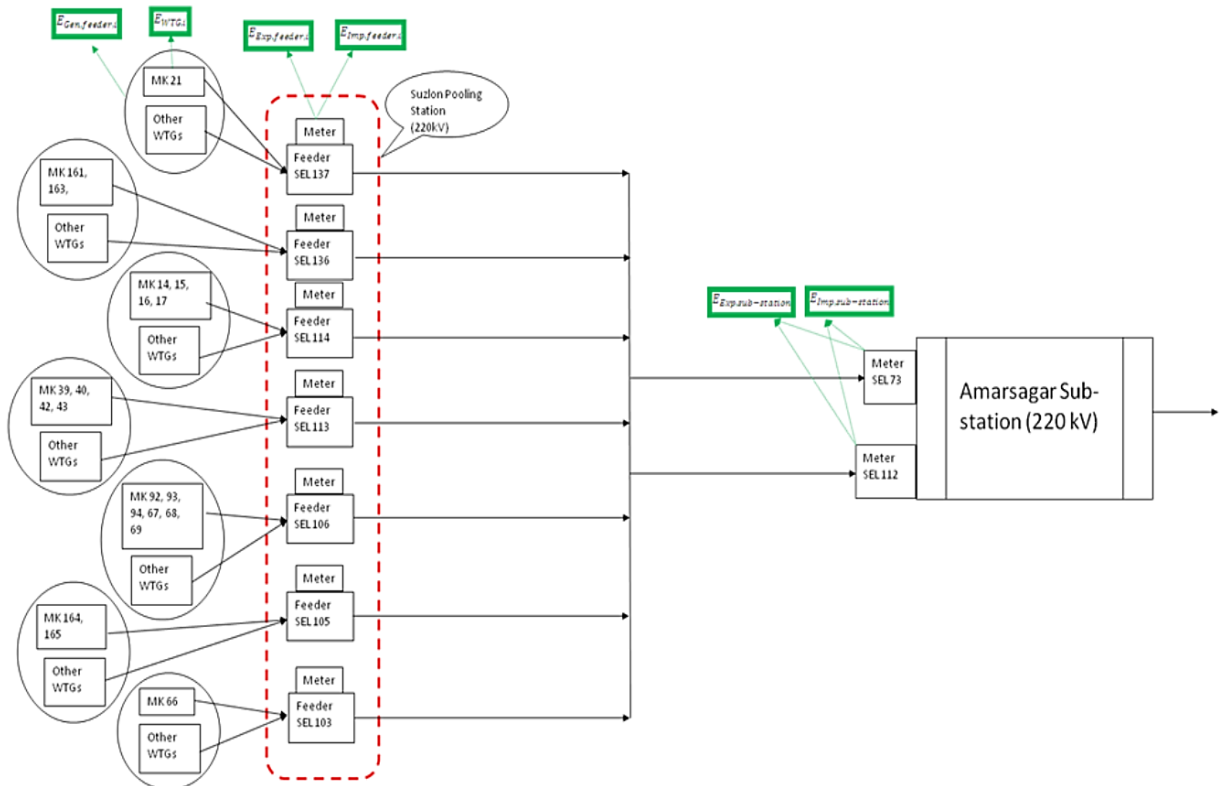
The transmission losses between suzlon pooling substation (feeder) and sub-station are accounted in above formula, hence separate consideration of transmission losses is not required.

The PP is getting share certificate/break up certificate which gives the direct values of Net electricity exported by the project proponent and same is considered for ER calculations.

The organizational structure of this VCS project activity is as follows:



The project proponent has entered into agreement with the WEG- Supplier – Suzlon Energy Limited for the operation and maintenance of WEGs. The WEG supplier has dedicated and technically well-equipped O&M team for day to day Operation and maintenance of each WEG. O&M contractor provides a monthly report, which includes wind data, generation data, major breakdown events and machine availability, which forms the basis for invoicing and emission reduction computation. Project Manager is responsible for recording of monthly Joint Meter Readings of export and import. Monthly power export and import data are to be sent regularly to CDM coordinator of MEIL. All data will be archived for a period two years after crediting period. The single line diagram for the project activity is as follows:



5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor. Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors.

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

Where:

BE_y : Baseline Emissions in year y; t CO₂
 $EG_{PJ,y}$: Energy baseline in year y; MWh
 $EF_{grid,CM,y}$: Combined margin CO₂ emission factor for grid connected power generation in year y, tCO₂/MWh

As per registered CDM PDD, combined margin emission factor is 0.9529 tCO₂ /MWh. Hence the baseline emissions for the project activity for the current monitoring period are as follows.

$$BE_y = 63,565.06 * 0.9529 = 60,570 \text{ tCO}_2\text{e (round down values).}$$

5.2 Project Emissions

The project activity involves in harnessing wind power. So the emissions from the project are zero.

5.3 Leakage

The project activity is a Greenfield wind power project and there is no technology transfer with respect to this project activity. Hence the Leakage emissions for the project are zero.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2020	40,936	0	0	40,936
2021	19,634	0	0	19,634
Total	60,570	0	0	60,570

The actual GHG avoided during the current monitoring plan is 60,570 tCO₂e. The estimated GHG during current monitoring period is 82,489 tCO₂e. The actual VER is -26.57% lower than the estimated VER. This variation is majorly due to the variations in wind flow pattern, grid availability and other parameters which are not in the control of PP. The above variations is conservative.

APPENDIX 1: CALIBRATION DETAILS

Feeder number	Meter number	Meter make	Calibration date	Calibration due date
SEL-73	13195548	L&T	23-January-2020	23-January-2021
			13-January-2021	13-January-2022
	13195549	L&T	23-January-2020	23-January-2021
			13-January-2021	13-January-2022
SEL-112	RJB90206	L&T	23-January-2020	23-January-2021
			13-January-2021	13-January-2022
	RJB90207	L&T	23-January-2020	23-January-2021
			13-January-2021	13-January-2022

Feeder meter details:-

WEG	Feeder Number	Meter Number	Meter Make	Calibration Date	Next Calibration due date
MK 66	Fed No. 10	RJB 72831	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
		RJB 72832	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
MK 164 MK 165	Fed No. 11	RJB 73524	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
		RJB 73525	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
MK67 MK68 MK69 MK92 MK93 MK94	Fed No. 12	RJB 73521	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
		RJB 73522	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
MK14 MK15 MK16 MK 17	Fed No. 14	RJB 73571	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
		RJB 73572	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
MK39 MK40 MK42 MK43	Fed No. 13	RJB 73569	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
		RJB 73570	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021

MK 21	Fed No. 17	RJB 74434	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
		RJB74435	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
MK 161 MK 163	Fed No. 16	RJB 74432	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021
		RJB 74433	Secure Meters Limited	10-May-2019	10-May-2020
				02-June-2020	02-June-2021

Error factor has been applied during the months of May-2020 & June-2020 due to delay in calibration during the period of 10-May-2020 to 02-June-2020 as a conservative approach.

APPENDIX II: BREAK-DOWN DETAILS

Gen. Date	Site	Loc. No.	Breakdown Remark	Breakdown Hrs.
07-April-2020	Mokal	MK42	Pitch EmergencyRun	18.7
08- April-2020	Mokal	MK164	Elec SafetyChainStop	24.0
13- April-2020	Mokal	MK40	Battery Charger2 Disconnected	17.2
23- April-2020	Mokal	MK66	Elec FB GeneratorFan	21.2
25-May-2020	Mokal	MK14	DFIG Inverter Fault Shutdown	17.2
31- May-2020	Mokal	MK164	Pitch EmergencyRun	21.0
04-June-2020	Mokal	MK164	Rep Pitch FreqConvPitch3 ErrStop	19.6
08- June-2020	Mokal	MK39	DFIG Invrtr CANFail	24.0
15- June-2020	Mokal	MK164	Damper FullLoad Osc Stop	21.2
16- June-2020	Mokal	MK14	Rep Pitch EmergencyRun	23.0
12-July-2020	Mokal	MK68	Rep Pitch FreqConvPitch1 ErrStop	24.0
23-Aug-2020	Mokal	MK66	Rep Pitch FreqConvPitch1 ErrStop	24.0
24- Aug-2020	Mokal	MK92	Rep Pitch FreqConvPitch1 ErrStop	23.9
03-September-2020	Mokal	MK164	Elec FB GeneratorFan	19.6
04- September-2020	Mokal	MK164	DFIG Inverter Fault Shutdown	24.0
27- September-2020	Mokal	MK39	Pitch EmergencyRun	21.2
28- September-2020	Mokal	MK164	Rep Pitch FreqConvPitch3 ErrStop	23.0
29- September-2020	Mokal	MK14	DFIG Invrtr CANFail	24.0
11-October-2020	Mokal	MK68	Pitch EmergencyRun	24.0
31- October-2020	Mokal	MK40	Rep Pitch FreqConvPitch3 ErrStop	24.0
01-November-2020	Mokal	MK66	DFIG Invrtr CANFail	23.9
02- November-2020	Mokal	MK14	Damper FullLoad Osc Stop	19.6
03- November-2020	Mokal	MK164	Rep Pitch EmergencyRun	24.0
17- November-2020	Mokal	MK68	Pitch EmergencyRun	18.7

21- November-2020	Mokal	MK66	Elec SafetyChainStop	24.0
25- November-2020	Mokal	MK92	Battery Charger2 Disconnected	17.2
26- November-2020	Mokal	MK14	Elec FB GeneratorFan	21.2
28- November-2020	Mokal	MK164	Rep Pitch FreqConvPitch1 ErrStop	17.2
12-January-2021	Mokal	MK68	Rep Pitch FreqConvPitch1 ErrStop	21.0
20-January-2021	Mokal	MK14	Elec FB GeneratorFan	19.6
21-January-2021	Mokal	MK68	DFIG Inverter Fault Shutdown	24.0
25-January-2021	Mokal	MK40	Pitch EmergencyRun	18.7
16-February-2021	Mokal	MK66	Rep Pitch FreqConvPitch3 ErrStop	24.0
17-Febrary-2021	Mokal	MK14	Damper FullLoad Osc Stop	17.2
20- Febrary-2021	Mokal	MK92	Rep Pitch EmergencyRun	21.2
28- Febrary-2021	Mokal	MK164	Pitch EmergencyRun	19.6
20-March-2021	Mokal	MK164	Elec SafetyChainStop	24.0
25- March-2021	Mokal	MK39	Battery Charger2 Disconnected	18.7
26- March-2021	Mokal	MK164	Elec FB GeneratorFan	16.5
27- March-2021	Mokal	MK14	Rep Pitch FreqConvPitch1 ErrStop	17.2
05-April-2021	Mokal	MK164	Rep Pitch FreqConvPitch1 ErrStop	24.0
06- April-2021	Mokal	MK164	Pitch EmergencyRun	17.2
16- April-2021	Mokal	MK39	Rep Pitch FreqConvPitch3 ErrStop	21.2
15-May-2021	Mokal	MK164	DFIG Invrtr CANFail	18.0
28- May-2021	Mokal	MK14	Pitch EmergencyRun	24.0
19- May-2021	Mokal	MK68	Rep Pitch FreqConvPitch3 ErrStop	18.7
23-May-2021	Mokal	MK68	Rep Pitch FreqConvPitch3 ErrStop	19.2