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

Document Prepared By EKI Energy Services Limited

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

1 PROJECT DETAILS

1.1 Summary Description 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 having capacity 7.5 MW & is within the SSC limit of 15 MW comes under Type I project activity as Renewable energy project activities which have an output capacity up to 15 megawatts (or an appropriate equivalent), in accordance with the CDM rules and requirements are Type I, Small scale project activity.

The project activity employs Wind Turbine Generators (WTGs) of Class S-82 manufactured by M/s. Suzlon Energy Limited. The project activity will supply the generated electricity to 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 13,636 tCO2e / annum for the entire crediting period of 7 years.

Purpose of the project activity:

Since the proposed project activity is a Greenfield project, the methodology AMS I.D. already prescribes the baseline scenario as being “Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the Tool to calculate the emission factor for an electricity system”. The electricity exported by the proposed project activity would displace an equivalent amount of electricity generated by the power plants already operational and proposed to be added in the Indian Grid which relies predominantly on power plants running on fossil fuels (particularly coal).

Thus, it contributes towards reduction in the demand-supply gap during periods of electricity shortage and increase in the share of renewable energy in the grid mix.

The Indian grid is mainly dominated by fossil fuel based power projects. The development of the project activity would reduce generation of electricity in the Indian grid by fossil fuel based power projects. This will help to mitigate Green House Gases (GHGs) emission by fossil fuel based power projects and contribute to conservation of fossil fuel resources.

In absence of the project activity, the grid could have procured power generated from fossil fuel based power projects.

The relevant implementation dates

The following table shows the details of the implementation status of WTGs of the project activity:

Sr. No.	Loc. No.	Capacity, MW	Village	Commissioning date
1.	AK-278	1.5	Sangana	30 March 2011
2.	AK-283	1.5	Asayach	21 March 2011
3.	AK-262	1.5	Chord	30 March 2011
4.	AK-321	1.5	Chord	30 March 2011
5.	AK-331	1.5	Asayach	21 March 2011

In the current monitoring period, total GHG emissions reductions achieved by the project activity is 34,931 tCO_2e

1.2 Sectoral Scope and Project Type

Sectoral Scope **:** 01 - Energy industries (renewable / non-renewable sources)
Project Type : Type I – Renewable Energy Projects

Project Category[1] : I.D. – Grid connected renewable electricity generation (Version-16, EB- 54)

Reference : Appendix B of the simplified modalities and procedures for small-scale CDM project activities indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories.

1.3Project Proponent

Organization name	**M/s. D.J. Malpani**
Contact person	Mr. Prafulla Khinvasara
Title	CEO- Renewable Power Projects
Address	Malpani House, New Nagar Road, Tal- Sangamner, Dist –

[1] http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X

	Ahmednagar, Maharashtra, India
Telephone	+91-2425-225 035
Email	prafulla@malpani.com

1.4Other Entities Involved in the Project

Organization name	**EKI Energy Services Limited**
Role in the Project	Project Consultancy
Contact person	Mr. Barun Kumar
Title	DGM
Address	Office No 201, Plot No 48, Scheme 78, Part 2, Vijay Nagar, Indore- 452010, Madhya Pradesh, India
Telephone	+91-9109120952
Email	barun@enikingint.org

1.5 Project Start Date

The start date of the project activity is 21-March-2011 (earliest date of commissioning for of the project activity WTGs AK-283 & AK-331)

1.6 Project Crediting Period

Crediting Period Start date: 21/03/2011
Crediting Period End date: 20/03/2021
The project activity adopts renewable crediting period of 10 years period which can be renewed once.

1.7 Project Location

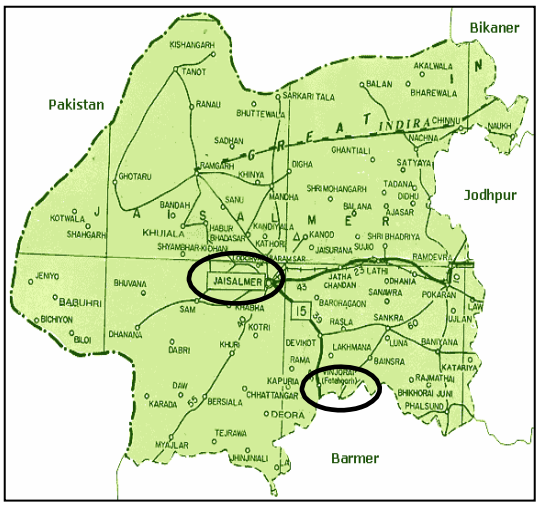
Host Party: India
Region/State/Province: Rajasthan
Site Fatehgarh & Jaisalmer
District: Jaisalmer

The project activity is located in District- Jaisalmer, State- Rajasthan in India. The details of each 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"

Project location on Map



1.8 Title and Reference of Methodology

Title: Grid-connected electricity generation from renewable sources

Reference: The project activity meets the eligibility criteria of small scale project as it is less than 15 MW

Methodology: Grid connected renewable electricity generation (Version- 16, EB- 54)

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

1.9 Participation under other GHG Programs

The project has been registered under CDM having registration Id :5794 [2]

For CDM Project 5794 CERs issued is upto 30 September 2016 and in VCS current monitoring period is considered from 01-October-2016 to 31-August-2020

PP has provided undertaking that in current monitoring period, it would not claim GHG emission reduction credits in any GHG program other than that in VERRA.

[2] 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: Net GHG emission reductions or removals generated by the Project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits.

PP has provided undertaking that in current monitoring period, it would not claim GHG emission reduction credits in any GHG program other than that in VERRA.

1.11 Sustainable Development

The project activity contributes to sustainable development in various ways. These are 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 is 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.

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 draws additional investment to the region. In general, the project activity envisages following economic benefits:

- Employment opportunities
- Market facilities for local products
- Industrial development
- Improvement of a rural economy
- Flow of goods and services

Although the realization of the above benefits would take a longer time needlessly, the economic development of the region would be attributed to the project operation. The project contributes to the sustainable development of the region during its entire operational life.

2 SAFEGUARDS

2.1 No Net Harm

As per the Ministry of Environment & Forest (MoEF), Government of India, Environmental Impact Assessment (EIA) studies of the wind power generation plant is not an essential requirement as it is not covered under the eleven categories 12 as described in EIA Notification of 1994, or the Amended Notification of 2006.

As the project activity does not cause any negative impact on the environment, no EIA study was conducted.

Hence, there is no significant environmental or socio-economic impacts due to implementation of the project activity.

2.2 Local Stakeholder Consultation

The stake holder meeting was conducted at Suzlon's Regional office at Jaisalmer (Rajasthan) on 24/03/2011 at 11.30 a.m. The stake holders were invited by Public Notice dated 12/03/2011, 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 projects 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

The stakeholder meeting ended with vote of thanks by Suzlon and PP.

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 project activity is estimated to generate 14,374 MWh of electricity annually; thus reducing GHGs to the tune of 13,636 tCO2e /annum for the entire crediting period of 10 years.

The project has already been commissioned & running successfully and the commissioning details of the project activity have been mentioned in section 1.5 of this report.

Implementation status of the project activity:

Sr. No.	Loc. No.	Capacity, MW	Village	Commissioning date
1.	AK-278	1.5	Sangana	30 March 2011

2.	AK-283	1.5	Asayach	21 March 2011
3.	AK-262	1.5	Chord	30 March 2011
4.	AK-321	1.5	Chord	30 March 2011
5.	AK-331	1.5	Asayach	21 March 2011

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 having capacity 7.5 MW & is within the SSC limit of 15 MW comes under Type I project activity as Renewable energy project activities which have an output capacity up to 15 megawatts (or an appropriate equivalent), in accordance with the CDM rules and requirements are Type I, Small scale project activity.

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.

Detailed specifications of the technology are:

1.	**Main Data**	
C	Turbine type	Horizontal axis turbine
	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 downtime for the project activity for the current monitoring period is mentioned in the following table:

WTG Location No.	Unit	Downtime					Total
		2016	2017	2018	2019	2020	hrs
AK-262	hrs	40	588.5	452.1	476.6	110.2	8147.7
AK-278	hrs	99.1	408.9	481.5	542.9	60.1	
AK-283	hrs	82.9	480.5	442.4	529.3	231.7	
AK-321	hrs	54.6	595.3	472.2	538.3	150.5	
AK-331	hrs	18.6	401.9	450	378.1	61.5	

All the WTGs are running satisfactorily during the reported monitoring period. There are no special events occur during the reported monitoring period. Hence, no impact occurs on the GHG emission reduction from the project activity.

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.2.2 Project Description Deviations

No deviation has taken place in project description during the monitoring period.

3.2.3 Grouped Projects

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

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for the project electricity system.
Source of data	Calculated from CEA database
Value applied	0.9487
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07.0". The data is obtained from "CO_2 Baseline Database for Indian Power Sector", published by the Central Electricity Authority, Ministry of Power, and Government of India.
Purpose of Data	For the calculation of the Baseline Emission

Data / Parameter	$EF_{grid, OM, y}$
Data unit	tCO_2/MWh
Description	Operating margin CO2 emission factor for the project electricity system.
Source of data	CEA CO2 Baseline Database (Version- 6.0, Date- March 2011). The value is calculated for year 2007-08, 2008-09 & 2009-10.
Value applied	0.9942

Justification of choice of data or description of measurement methods and procedures applied	The calculation is done as ex ante. The calculation is done as per- Tool to calculate the emission factor for an electricity system (Version- 02.2.1, EB- 63, Annex- 19).
Purpose of Data	Baseline emission calculations

Data / Parameter	$EF_{grid, BM, y}$
Data unit	tCO_2/MWh
Description	Build margin CO2 emission factor for the project electricity system.
Source of data	CEA CO2 Baseline Database (Version- 6.0, Date- March 2011). The value is calculated for year 2009-10.
Value applied	0.8123
Justification of choice of data or description of measurement methods and procedures applied	The calculation is done as ex ante. The calculation is done as per - Tool to calculate the emission factor for an electricity system (Version- 02.2.1, EB- 63, Annex- 19).
Purpose of Data	Baseline emission calculations

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{BL,y}$
Data unit	MWh/y
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 gives 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 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 being 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

<table>
<tr><td></td><td>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</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Monitoring Frequency: Continuous

Recording frequency: Monthly</td></tr>
<tr><td>Value monitored</td><td>36,821.94 MWh</td></tr>
<tr><td>Monitoring equipment</td><td>The details of the project activity metering equipment at 220 kV

level are given below:

WTG’s are: AK283, 278, 331, 262 & 321, these are connected to metering point as below:

SEL 81 Metering Point
<table>
<tr><th>Type</th><th>Make</th><th>Meter</th><th>Serial No.</th><th>Calibration date</th><th>Validity till</th></tr>
<tr><td rowspan="3">3-Phase Energy Meter</td><td rowspan="3">SECURE</td><td rowspan="3">Main Meter</td><td>MSB 10311</td><td>26-Apr-16</td><td>25-Apr-19</td></tr>
<tr><td rowspan="2">RJB 90208</td><td>18-Apr-17[3]</td><td>17-Apr-20</td></tr>
<tr><td>20-Apr-18</td><td>19-Apr-21</td></tr>
<tr><td rowspan="3">3-Phase Energy Meter</td><td rowspan="3">SECURE</td><td rowspan="3">Check Meter</td><td>MSB 10312</td><td>26-Apr-16</td><td>25-Apr-19</td></tr>
<tr><td rowspan="2">RJB 90209</td><td>18-Apr-17[4]</td><td>17-Apr-20</td></tr>
<tr><td>20-Apr-18</td><td>19-Apr-21</td></tr>
</table>
SEL 204 Metering Point
<table>
<tr><th>Type</th><th>Make</th><th>Meter</th><th>Serial No.</th><th>Calibration date</th><th>Validity till</th></tr>
<tr><td rowspan="3">3-Phase Energy Meter</td><td rowspan="3">SECURE</td><td rowspan="3">Main Meter</td><td rowspan="3">RJB 85056</td><td>28-Apr-16</td><td>27-Apr-19</td></tr>
<tr><td>20-Apr-18</td><td>19-Apr-21</td></tr>
<tr><td>12-Jun-19</td><td>11-Jun-22</td></tr>
</table></td></tr>
</table>

[3] Meter Sr. No. MSB10311 has changed with Meter Sr. No. RJB90208 on dated 18/04/2017. Meter replacement certificate submitted by PP for verification.
[4] Meter Sr. No. MSB10312 has changed with Meter Sr. No. RJB90209 on dated 18/04/2017. Meter replacement certificate submitted by PP for verification.

	3-Phase Energy Meter | SECURE | Check Meter | RJB 85057 | 28-Apr-16 to 27-Apr-19; 20-Apr-18 to 19-Apr-21; 12-Jun-19 to 11-Jun-22 Calibration frequency: Once in three years.
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 is carried out by State Utility. In case of malfunction of both meters (main & check) at the same time, PP will not consider any generation during that malfunction time. This will ensure conservativeness of emission reductions. The measurement results shall be cross checked with records for sold electricity (e.g. invoices)..
Purpose of the data	To calculate the baseline emission
Calculation method	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.
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

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 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 being done based on the energy break up available at the metering at 220 kV level.
- The monitoring & measurement of electricity is being 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 is 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 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.

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.

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

Where:

$G_{R,\text{ metering point}}$	:	Generation Ratio at metering point
$EG_{\text{Controller, WTG}}$	:	Electricity generated by installed WTG of PP connected to the applicable metering point
$EG_{\text{Controller, metering point}}$	:	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:

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

Where:

$EG_{Export,\ metering\ point}$: 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.

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

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 for the given month (net export kWh) is then obtained by subtracting import from export. Thus,

= Export – Import (f)

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

***Identification of organizational structure, responsibilities and competencies*:**

Organizational structure, responsibilities and competencies

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

Description of the methods for generating, recording, storing, aggregating, collating and reporting data on monitored parameters:

The methods for generating, recording, storing, aggregating, collating and reporting data on monitored parameters is detailed under the section 3.2 of the monitoring report.

Description of the procedures for handling internal auditing and non-conformities:

The Project Promoter is responsible for the internal audit. It is done on yearly basis. Following are some important steps in internal audit process:

- Data collection regarding project activity results and performance
- Analysis of the data
- Cross checking with the expected results/expectations/standards
- Arriving at the conclusion
- Deciding on the methods to fix them
- Seek for necessary corrective actions if any
- Inform the concerned authority for corrective measure
- Cross checking final output
- Records

Indicative line diagram displaying the GHG collection and management system:

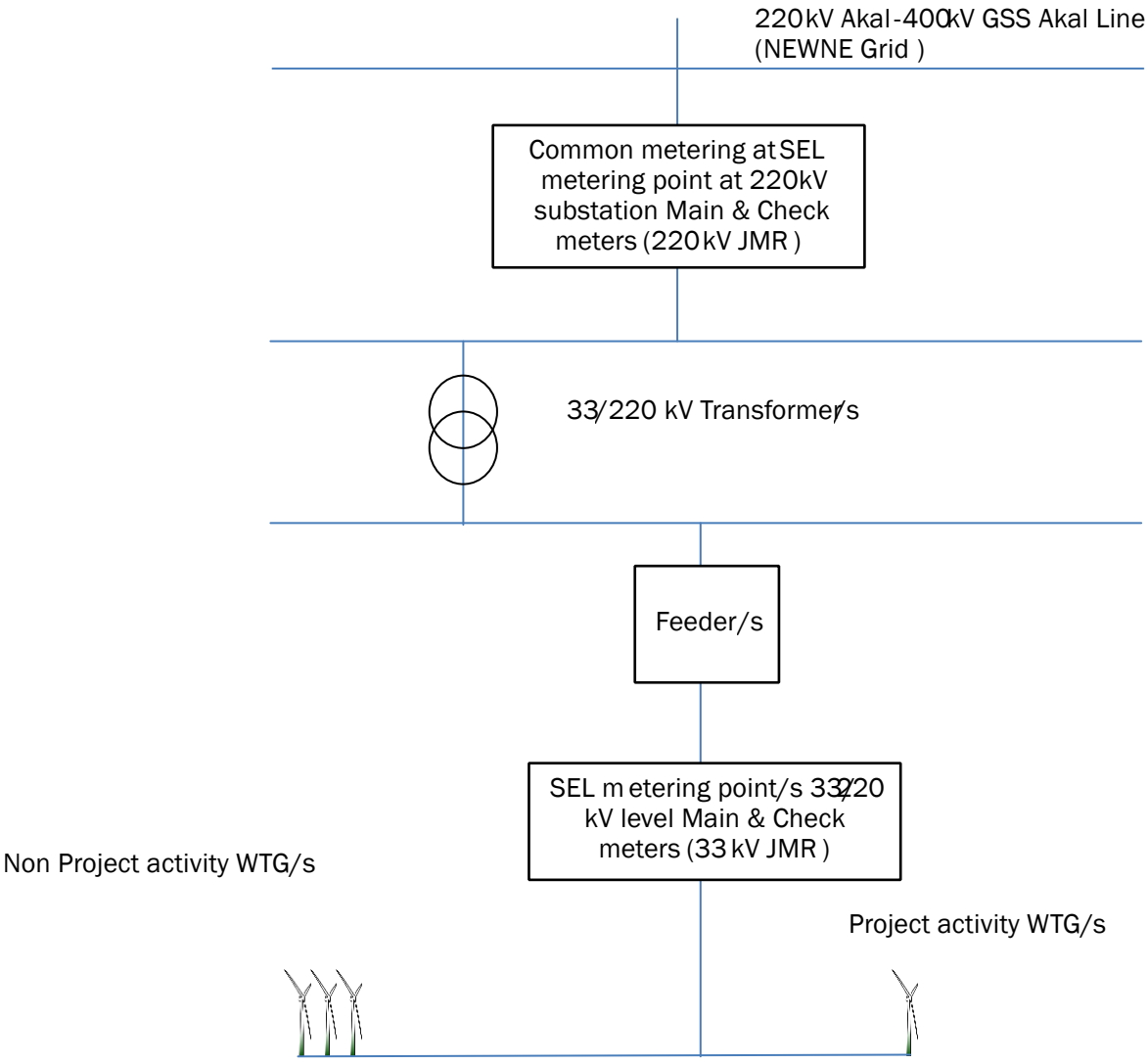


Figure 02: Indicative line diagram with location of metering equipment

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The product of Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y in MWh with CO_2 Emission Factor of the grid in year y in tCO_2/MWh will give the estimated value of Baseline Emissions tCO_2 (BE_y).

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

Year	Net Electricity	Baseline Grid	Baseline

	Supplied to grid(MWh)	Emission Factor(tCO2/MWh)	Emissions(tCO2e)
2016	899.15	0.9487	853
2017	10,152.96	0.9487	9,632
2018	8,926.65	0.9487	8,468
2019	9,366.24	0.9487	8,885
2020	7,476.94	0.9487	7,093
Total	**36,821.94**		**34,931**

Total Baseline Emissions (BE_y) = 34,931 tCO_2e

5.2 Project Emissions

As per approved methodology AMS- I.D. (Version- 16, EB -54), For most renewable energy project activities, no project emissions are considered. .

As the project activity is a wind power generation, the project emissions are considered zero.

PE_y = 0 tCO_2e

5.3 Leakage

As per approved methodology AMS- I.D.(Version- 16,EB -54),If the energy generating equipment is transferred from another activity, leakage is to be considered. The leakage emissions may be considered as zero tCO2 as no such equipment shall be transferred from another project activity.

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)
2016	853	0	0	853
2017	9,632	0	0	9,632

2018	8,468	0	0	8,468
2019	8,885	0	0	8,885
2020	7,093	0	0	7,093
Total	**34,931**	0	0	**34,931**

It is to be noted here that as per the estimated emission reduction to be achieved from the project activity for the current monitoring period is 53,461 tCO2e, whereas actual emission reductions achieved are 34,931 tCO_2e, which is approximately 34.7% lower than the estimated emission reductions. The generation of electricity depends upon many other climatic conditions, which are not within the control of the project participant. The lower generation during the current verification period is due to certain natural conditions. Hence, it is acceptable.