Grid Connected Wind Power Project by M/s. D. J. Malpani in Rajasthan

Document Prepared By

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Project Title	Grid Connected Wind Power Project by M/s. D. J. Malpani in Rajasthan
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1 PROJECT DETAILS

1.1 Summary Description of Project

The project activity is grid-connected wind power generation located at Villages: Sangana, Asayach & Chord, Taluka: Jaisalmer & Fategarh, 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.

Further details on the project activity are given below:

Table 01: Details on the project activity

Sr. No.	Loc. No.	Capacity, MW	Village	Taluka	District	Commissioning date
1.	AK-278	1.5	Sangana	Fatehgarh	Jaisalmer	30/03/2011
2.	AK-283	1.5	Asayach	Jaisalmer	Jaisalmer	21/03/2011
3.	AK-262	1.5	Chord	Jaisalmer	Jaisalmer	30/03/2011
4.	AK-321	1.5	Chord	Jaisalmer	Jaisalmer	30/03/2011
5.	AK-331	1.5	Asayach	Jaisalmer	Jaisalmer	21/03/2011

The project activity is supplying the generated electricity to NEWNE Grid of India. The purpose of the project activity is generation of clean electricity by utilizing kinetic energy of wind. The project activity has generated 9,386 MWh of electricity during the monitoring period under consideration i.e. 21/03/2011[1] to 13/02/2012[2] (including both days). This has helped in mitigating 8,904 tCO_2e during the same period.

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.

Technical specifications for Class S-82:

Table 02: Technical specifications for Class S-82

1.	**Main Data**	
	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

[1] Earliest date of commissioning (WTG locations AK-283 & AK-331)
[2] The project is registered under CDM on 14/02/2012 (UNFCCC ref. no.: 5794). Please refer - http://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1329231564.5/view

	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.

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 : I.D. – Grid connected renewable electricity generation.

The project activity is not a grouped project.

1.3 Project Proponent

Contact Information of the project proponent:

This project activity is owned by M/s D. J. Malpani. The contact details of the project participant are given below:

Table 03: Contact information of the project proponent

Organization:	M/s D. J. Malpani
Street/P.O.Box:	Kasara Dumala
Building:	Malpani Estate
City:	Sangamner
State/Region:	Maharashtra
Postfix/ZIP:	422 605
Country:	India
Telephone:	+91-2425-225 261
FAX:	+91-2425-225 033
E-Mail:	prafulla@malpani.com
URL:	www.malpani.com

Represented by:	
Title:	Head - Wind Power Projects
Salutation:	Mr.
Last Name:	Khinvasara
Middle Name:	-
First Name:	Prafulla
Department:	-
Mobile:	+91-98223 22145
Direct FAX:	-
Direct tel:	-
Personal E-Mail:	-

Roles/responsibilities for the project proponent(s):

The roles/responsibilities of the project proponent are detailed under section 3.3.

1.4 Other Entities Involved in the Project

M/s D. J. Malpani is the only project participant in this project.

1.5 Project Start Date

21/03/2011 (earliest date of commissioning for of the project activity WTGs AK-283 & AK-331)

1.6 Project Crediting Period

10 years & 0 months with renewable once[3] i.e. 21/03/2011 to 20/03/2021(as renewable once; so maximum till 20/03/2031)

PP ensures that there will not be any double counting on carbon credit benefit (VCS/CDM) during the applicable crediting period.

However, the current monitoring period starts from the earliest date of commissioning (i.e. 21/03/2011) of the project to the date earlier than the date of CDM registration (i.e. 13/02/2012) - with a total duration of 330 days.

1.7 Project Location

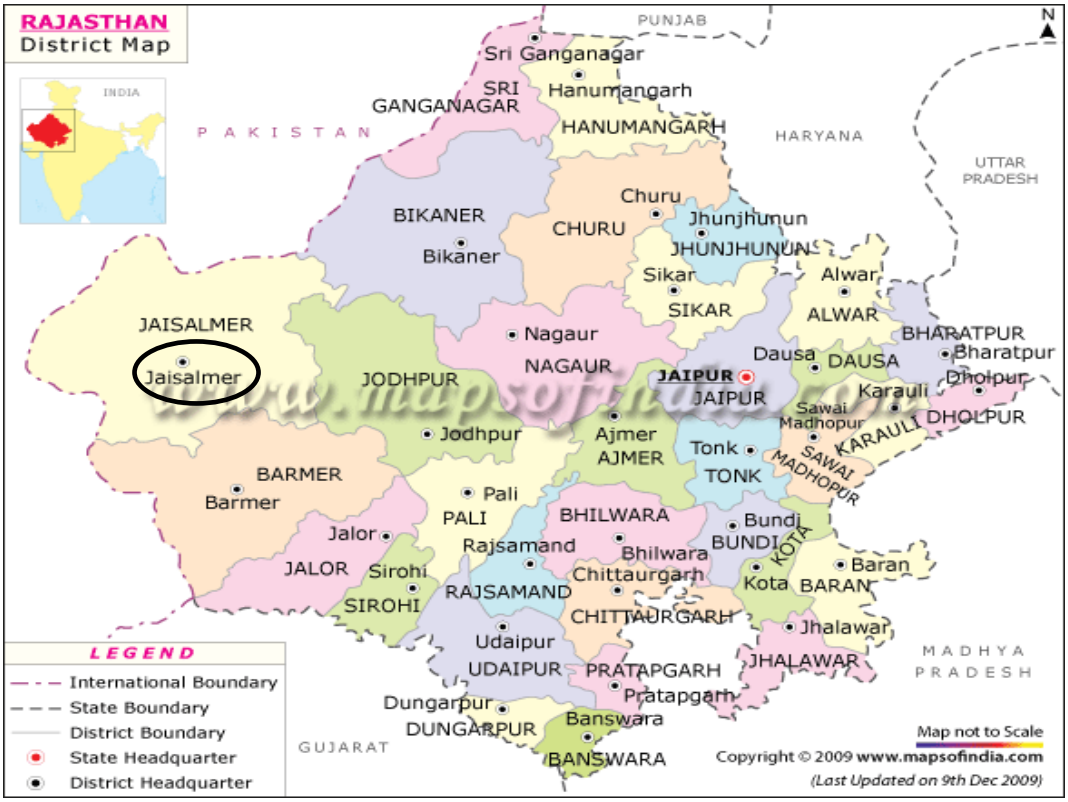
The project activity is located at Villages: Sangana, Asayach & Chord, Taluka: Jaisalmer & Fategarh, District: Jaisalmer, State: Rajasthan, India. The details are given below:

[3] 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.

Table 04: Project location

Sr. No.	Loc. No.	Village	Latitude	Longitude
1.	AK-278	Sangana	N 26°47'48.7"	E 71°08'12.6"
2.	AK-283	Asayach	N 26°48'54.9"	E 71°07'04.6"
3.	AK-262	Chord	N 26°45'32.0"	E 71°09'49.3"
4.	AK-321	Chord	N 26°47'36.7"	E 71°10'15.8"
5.	AK-331	Asayach	N 26°49'45.3"	E 71°07'59.6"



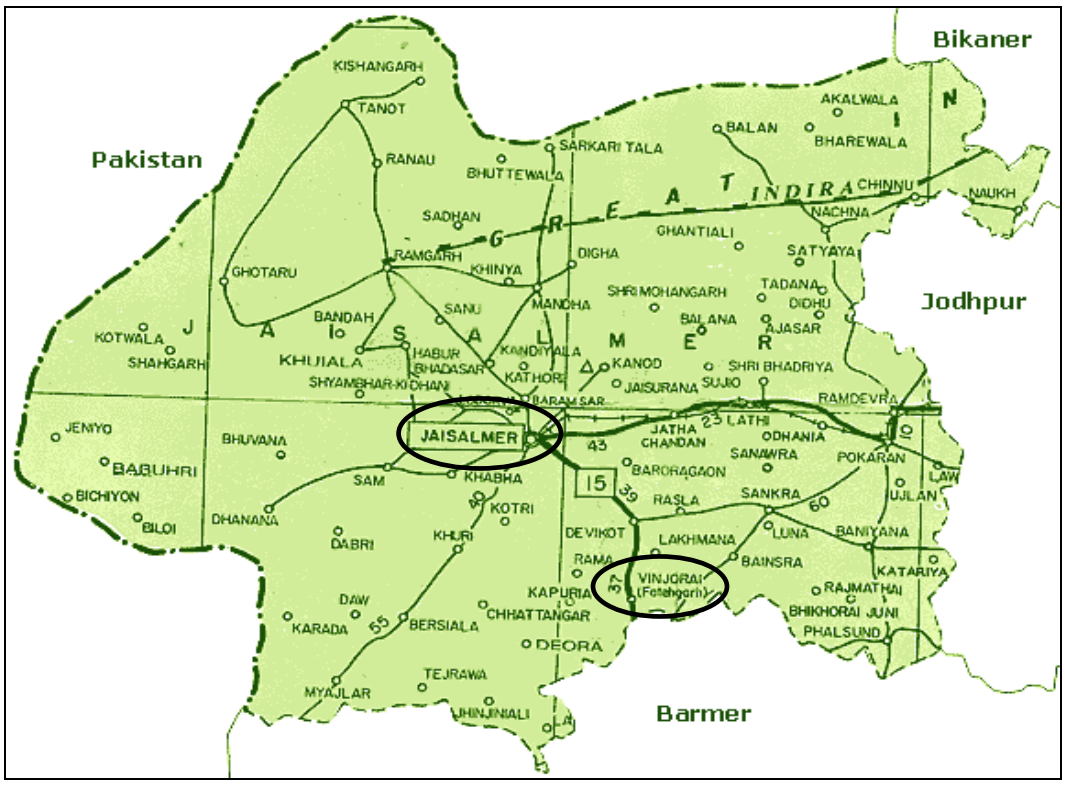


Figure 01: Project activity on map

1.8 Title and Reference of Methodology

Title of methodology : Grid connected renewable electricity generation
Reference : AMS- I.D.
Version number : 16

Additionally the project has referred:

- Tool to calculate the emission factor for an electricity system (Version- 02.2.1 , EB- 63, Annex- 19)

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Description on the implementation status of the project activity(s):

The project activity has been commissioned & running successfully. The details are given below:

Table 05: Implementation status of the project activity

Sr. No.	Loc. No.	Capacity, MW	Village	Commissioning date
1.	AK-278	1.5	Sangana	30/03/2011
2.	AK-283	1.5	Asayach	21/03/2011
3.	AK-262	1.5	Chord	30/03/2011
4.	AK-321	1.5	Chord	30/03/2011
5.	AK-331	1.5	Asayach	21/03/2011

Information on the operation of the project activity(s) during this monitoring period:

The details on the project operation during the monitoring period 21/03/2011 to 13/02/2012 (including both days) are given below:

Table 06: Information on project operation

Sr. No.	Particulars	Details
1.	Generation at controller, kWh[4]	9,786,533
2.	Average Machine availability, %[5]	92
3.	Net Electricity Exported to the Grid by the Project Activity, kWh[6]	9,386,853

Information on events that may impact the GHG emission reductions or removals and monitoring:

During the monitoring period under consideration, there is no such event which has affected the GHG emission reductions and monitoring. Overall the project is running successfully.

2.2 Project Description Deviations

There is no deviation from the registered monitoring plan during the current monitoring period.

2.3 Grouped Project

Not applicable, as project is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Table 07: Combined margin CO2 emission factor

Data Unit / Parameter:	$EF_{CO2,grid,y}$
Data unit:	tCO_2/ MWh
Description:	Combined margin CO_2 emission factor for the project electricity system.
Source of data:	CEA CO_2 Baseline Database (Version- 6.0, Date- March 2011). The value is calculated for year 2007-08, 2008-09 & 2009-10.
Value applied:	0.9487
Purpose of the data:	Baseline emission calculations
Any comment:	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).

Table 08: Operating margin CO_2 emission factor

Data Unit / Parameter:	$EF_{grid, OM, y}$
Data unit:	tCO_2/ MWh
Description:	Operating margin CO_2 emission factor for the project electricity

[4] Generation details provided by Suzlon
[5] Generation details provided by Suzlon
[6] Referred from monthly *Break up of net export units* reports

	system.
Source of data:	CEA CO_2 Baseline Database (Version- 6.0, Date- March 2011). The value is calculated for year 2007-08, 2008-09 & 2009-10.
Value applied:	0.9942
Purpose of the data:	Baseline emission calculations
Any comment:	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).

Table 09: Build margin CO_2 emission factor for the project electricity system

Data Unit / Parameter:	$EF_{grid, BM, y}$
Data unit:	tCO_2/ MWh
Description:	Build margin CO_2 emission factor for the project electricity system.
Source of data:	CEA CO_2 Baseline Database (Version- 6.0, Date- March 2011). The value is calculated for year 2009-10.
Value applied:	0.8123
Purpose of the data:	Baseline emission calculations
Any comment:	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).

3.2 Data and Parameters Monitored

Table 10: Monitoring Parameter $EG_{BL,y}$

Data Unit / 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 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.
Frequency of monitoring/recording:	Monitoring Frequency: Continuous Recording frequency: Monthly
Value monitored:	9,386 MWh
Monitoring equipment:	The details of the project activity metering equipment are given below:

	WTGs: AK-278 & AK-283 **Year: 2011** **Metering arrangements: SEL – 77** **Type:** Trivector meters **Accuracy Class:** 0.2s **Main meter no.:** MSB10307 **Check meter no.:** MSB10309 **Calibration frequency:** Once in three years **Date of last calibration:** 12/03/2011[7] **Validity:** 11/03/2014 **Result:** % error – within permissible limit **Year: 2012** **Metering arrangements: SEL – 77** **Type:** Trivector meters **Accuracy Class:** 0.2s **Main meter no.:** MSB10307 **Check meter no.:** MSB10309 **Calibration frequency:** Once in three years **Date of last calibration:** 15/03/2012[8] **Validity:** 14/03/2015 **Result:** % error – within permissible limit **WTGs: AK-331** **Year: 2010** **Metering arrangements: SEL – 102** **Type:** Trivector meters **Accuracy Class:** 0.2s **Main meter no.:** RJB72835 **Check meter no.:** RJB72836 **Calibration frequency:** Once in three years **Date of last calibration:** 15/12/2010[9] **Validity:** 14/12/2013 **Result:** % error – within permissible limit **Year: 2012** **Metering arrangements: SEL – 102** **Type:** Trivector meters **Accuracy Class:** 0.2s **Main meter no.:** RJB72835 **Check meter no.:** RJB72836 **Calibration frequency:** Once in three years **Date of last calibration:** 15/03/2012[10] **Validity:** 14/03/2015

[7]Calibration certificate by Jodhpur Vidyut Vitaran Nigam Ltd. dated 12/03/2011
[8]Calibration certificate by C&I Systems dated 15/03/2012
[9]Calibration certificate by Jodhpur Vidyut Vitaran Nigam Ltd. dated 15/12/2010
[10]Calibration certificate by C&I Systems dated 15/03/2012

	Result: % error – within permissible limit **WTGs: AK-262 & AK-321** **Year: 2011** **Period: 30/03/2011 to 18/11/2011**[11] **Metering arrangements: SEL – 109** **Type:** Trivector meters **Accuracy Class:** 0.2s **Main meter no.:** RJB 73526 **Check meter no.:** RJB 73527 **Calibration frequency:** Once in three years **Date of last calibration:** 03/03/2011 (RJB 73526) & 24/01/2011 (RJB 73527)[12] **Validity:** 02/03/2014 & 23/01/2014 respectively **Result:** % error – within permissible limit **Note: 18/11/2011 onwards the WTGs shifted to SEL – 142** **Year: 2012** **Type:** Trivector meters **Accuracy Class:** 0.2s **Main meter no.:** RJB 74438 **Check meter no.:** RJB 74439 **Calibration frequency:** Once in three years **Date of last calibration:** 11/08/2011[13] **Validity:** 10/08/2014 **Result:** % error – within permissible limit
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.
Calculation method:	Please refer section 3.3.
Any comment:	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.

3.3 Description of the 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-

[11] Minutes of meeting for shifting of Feeder between JVVNL, RVPNL RRECL & Suzlon dated 15/11/2011
[12] Testing reports by JVVNL dated 3/03/2011 (RJB 73526) & 24/01/2011 (RJB 73527) respectively
[13] Testing reports by JVVNL dated 11/08/2011

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:

$G_{R,\ Common\ Delivery\ Point}$	:	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*:**

Table 11: 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:

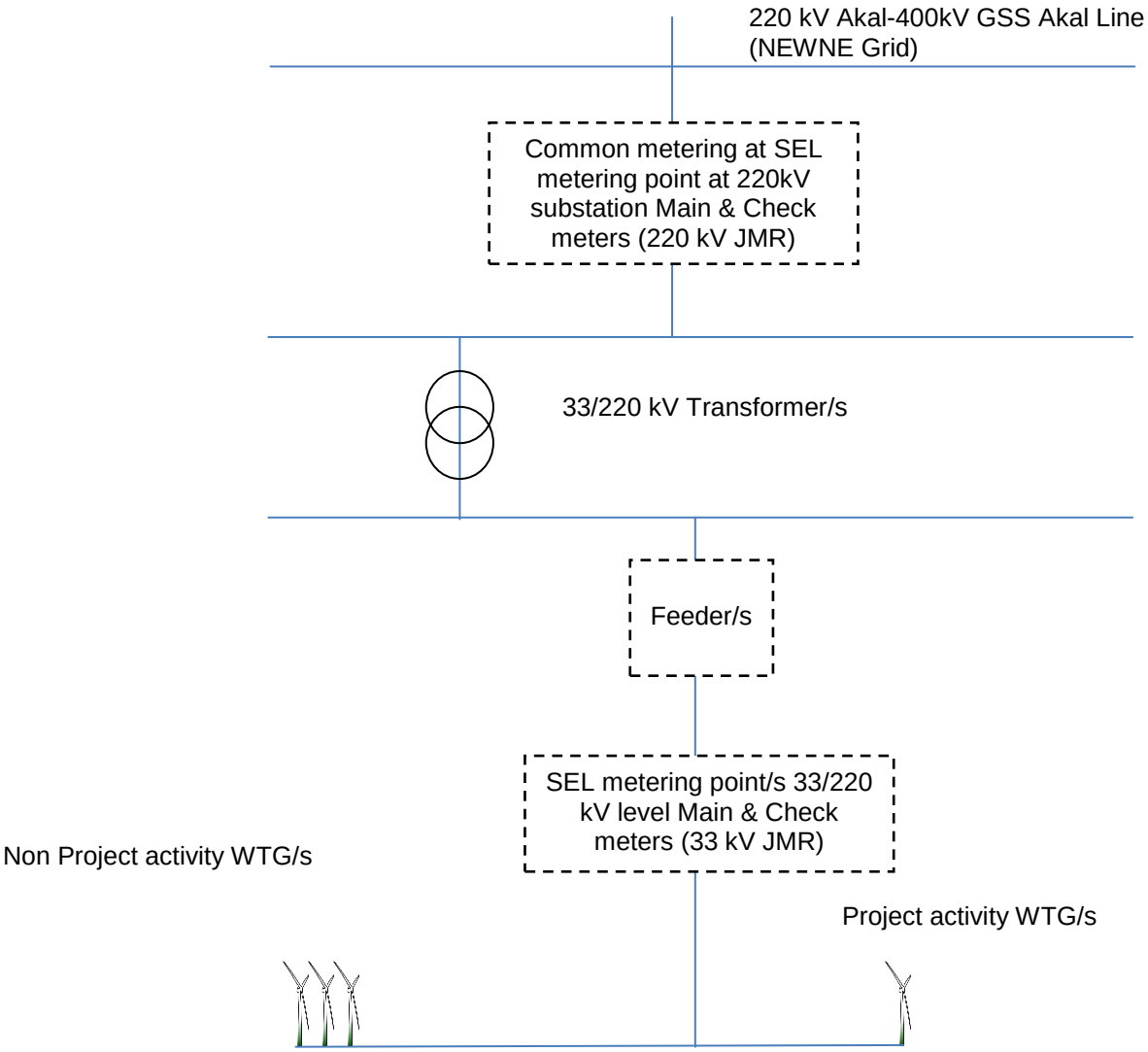


Figure 02: Indicative line diagram with location of metering equipment

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline Emissions (BE_y):

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).

$$BE_y = EG_{BL,y} \times EF_{CO2,grid,y}$$

Grid emission factor:

The grid emission factor for the project activity has been calculated *ex ante* as 0.9487 tCO_2/MWh.

Thus the baseline emissions for the project activity are given below:

Table12: Baseline emissions

Sr. No.	Monitoring Year	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y in MWh, $EG_{BL,y}$	Grid emission factor (tCO_2/MWh)	Baseline Emissions, tCO_2
1.	21/03/2011 to 31/12/2011	8,632	0.9487	8,189
2.	01/01/2012 to 13/02/2012	754	0.9487	715
Total		9,386		8,904

Thus, the baseline emissions by the project activity are 8,904 tCO_2 during the monitoring period 21/03/2011 to 13/02/2012 (including both days).

4.2 Project Emissions

Project Emissions (PE_y):

As per paragraph 19 of approved methodology AMS- I.D. (Version- 16, EB- 54), *for most renewable energy project activities, PE_y = 0.*

As project activity is wind power generation. The project emissions are thus considered as zero tCO_2. Thus, *PE_y = 0.*

4.3 Leakage

Leakage Emissions (LE_y):

As per paragraph 20 of the 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 are considered as zero tCO_2 as no such equipment shall be transferred from another project activity.Thus, $LE_y = 0$

4.4 Summary of GHG Emission Reductions and Removals

Emission Reductions (ER_y):

The emission reductions (ER_y) are calculated as per paragraph 21 of AMS- I.D. (Version- 16, EB- 54).

$$ER_y = BE_y – PE_y - LE_y$$

As for wind power project activity the leakages & project emissions are considered as zero, the emission reductions of the project activity are equal to the baseline emissions.

Thus, $ER_y = BE_y = 8,904\ tCO_2$

Thus, the project activity has achieved emission reductions of 8,904 tCO_2e during the monitoring period 21/03/2011 to 13/02/2012 (including both days).

Breakdown of emission reductions by vintages

Table 13: Breakdown of emission reductions by vintages

Sr. No.	Vintage	Baseline Emissions, tCO_2	Project Emissions, tCO_2	Leakage Emissions, tCO_2	Emission Reductions, tCO_2
1	2011	8,189	0	0	8,189
2	2012	715	0	0	715
Total, tCO_2		8,904	0	0	8,904

5 ADDITIONAL INFORMATION

Not application.

Annexure 01: Emission reductions (ER_y), tCO_2

Table 14: Emission Reductions, tCO_2

State		**Rajasthan**				
Grid		**NEWNE**				
Capacity		**5 x 1.5 MW**				
Location		**Akal Site (Sangana, Asayach & Chord)**				
Location Nos.		**AK-278, AK-283, AK-262, AK-321 & AK-331**				
Monitoring Period		**21/03/2011 to 13/02/2012 (including both days)**				
Sr. No.	**Month**	**Export, kWh**	**Import, kWh**	**Net Export, kWh**	**Adjustment of net electricity inline with the monitoring period, kWh**	**Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity, kWh**
1	Mar-11[14]	11,468	151	11,317	NA	11,317
2	Apr-11	694,514	4,182	690,332	NA	690,332
3	May-11	1,648,870	1,100	1,647,770	NA	1,647,770
4	Jun-11	2,028,061	1,722	2,026,339	NA	2,026,339
5	Jul-11	1,481,842	2,971	1,478,871	NA	1,478,871
6	Aug-11	846,508	5,351	841,157	NA	841,157
7	Sep-11	840,986	2,042	838,944	NA	838,944
8	Oct-11	448,564	10,390	438,174	NA	438,174
9	Nov-11	227,618	10,801	216,817	NA	216,817
10	Dec-11	449,654	6,970	442,684	NA	442,684
11	Jan-12	577,670	6,185	571,485	NA	571,485
12	Feb-12[15]	662,512	4,798	657,714	182,963	182,963
Total, kWh		**9,918,267**	**56,663**	**9,861,604**	**-**	**9,386,853**
Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y ($EG_{BL,y}$), MWh						**9,386[16]**
Grid emission factor, tCO_2/MWh						0.9487
Baseline Emissions, tCO_2						8,904
Project Emissions, tCO_2						0
Leakage Emissions, tCO_2						0
Emission Reductions, tCO_2[17]						**8,904**

[14] Start date of the monitoring period is 21/03/2011
[15] End date of the monitoring period is 13/02/2012
[16] Rounded down value (conservative)
[17] Rounded down value (conservative)

Note: As the billing schedule for the month of February 2012 does not coincides with the monitoring period end date i.e. 13/02/2012, the PP has applied a conservative approach to calculate the net electricity exported by project to the grid during the period 01/02/2012 – 13/02/2012. The net electricity supplied to the grid during 01/02/2012 – 13/02/2012 is arrived by deducting controller generation of the project during the period 14/02/2012 – 29/02/2012 (i.e. 474,751 kWh) from the net export by the project to the grid for entire month of Feb 2012 (i.e. 657,714 kWh). Thus the resulting value of the net electricity exported by the project during the period 01/02/2012 – 13/02/2012 is 182,963 kWh. This value has been applied for emission reduction calculation for the month of Feb 2012. Please refer cell F24 in the 'Emission Reductions' work sheet.

Annexure 02: Comparison of actual emission reductions with the estimated emission reductions in the registered CDM - PDD

The comparison of actual emission reductions with the estimated emission reductions in the registered PDD during the monitoring period i.e. 21/03/2011 to 13/02/2012 (including both days) is tabulated as below:

Table 15: Comparison of emission reductions with the estimated emission reductions in the approved PDD

Parameters	Values
Estimated Emission Reductions during 21/03/2011 - 13/02/2012, tCO2e as per registered CDM PDD, tCO_2e	12,328
Actual Emission Reductions, tCO_2e	8,904
Difference in tCO_2e	3,424
Difference in tCO_2e, %	(-) 27.77

The actual emission reductions for the monitoring period under consideration are less by 27.77% than the value estimated in the registered CDM-PDD.