

44.40 MW Wind Energy Project by Ruchi Soya Industries Limited, India

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

- A summary description of the implementation status of the technologies/ measures (eg, plant, equipment, process, or management or conservation measure) included in the project.

The project activity is a renewable source of power generation and supplies the electricity to the NEWNE grid. The total installed capacity of the project activity is 44.40 MW equipped with 44 WTGs with rated capacity of 600 kW each (model S-52) and 12 WTGs with rated capacity of 1500 kW each (model S-82). All WTGs involved in the project activity are developed and supplied by Suzlon Energy Limited. Suzlon Infrastructure Services Limited (SISL), a SUZLON Group Company, provides all operations and maintenance services to the project activity.

The technical details of both models are as follows:

MODEL	S82-1500 kW	S52-600 kW
OPERATING DATA		
Rated power	1500 kW	600 kW
Cut-in wind speed	4 m/s	4 m/s
Rated wind speed	14 m/s	13 m/s
Cut-off wind speed	20 m/s	25 m/s
Survival wind speed	52.5 m/s	59.5m/s
ROTOR		
Type	3 Blades, Upwind / Horizontal axis	3 Blades, Upwind / Horizontal axis
Diameter	82 m	52 m
Rotational speed at rated power	15.6 to 18.4 rpm	24.19 rpm (fix speed machine, maximum over speed 28.29 rpm)
Rotor blade material	Epoxy bonded fiber glass	Epoxy bonded fiber glass
Swept area	5281 m ²	2124 m ²
Power regulation	Active pitch regulated with Suzlon Flexi Slip System	Active pitch regulated
GEARBOX		
Type	1 planetary stage / 2 helical stages	1 planetary stage / 2 helical stages
Ratio	1 : 95.09	1:63.6
Nominal load	1650 kW	660 kW
Type of cooling	Forced oil cooling lubrication system	Forced oil cooling lubrication system
GENERATOR		
Type	Single speed induction generator with slip rings, variable rotor resistance via Suzlon Flexi slip system	Single speed induction generator (asynchronous)
Speed at rated power	1511 rpm	1539 rpm
Rated power	1500 kW	600 kW
Rated voltage	690 V AC (phase to phase)	690 V AC (phase to phase)
Frequency	50 Hz	50 Hz
Insulation	Class H	Class H
Enclosure	IP 54 / IP 23 (slip ring unit)	IP 56

Cooling system	Air cooled	Air cooled
TOWER		
Type	Tubular tower (corrosion proof painting on inner and outer surface) with welded steel plates	Lattice tower (Hot deep galvanized)
Tower height	76 m	73 m
Hub height (including)	Approximately 78.5 m	Approximately 75 m
BRAKING SYSTEM		
Aerodynamic braking	3 Independent systems with blade pitching	3 Independent systems with blade pitching
Mechanical braking	Hydraulic fail safe disk brake system	Hydraulic fail safe disk brake system
YAW SYSTEM		
Type	Active electrical yaw motor	Active electrical yaw motor
Bearing	Polyamide Slide bearing with gear ring & automatic greasing system	Polyamide Slide bearing with gear ring & automatic greasing system
Protection	Cable twist sensor, proximity sensor	Cable twist sensor, proximity sensor
PITCH SYSTEM		
Type	3 independent blade pitch control with battery backup for each blade	3 independent blade pitch control with battery backup for each blade
Operating range	-5 ° to +90 °	-5 ° to +90 °
Resolution	0.1 to 10 Deg	0.1 to 10 Deg
CONTROLLER		
	Suzlon Control System with following salient features:	Suzlon Control System with following salient features:
	- Park slave	- Park slave
	- Power output control / limitation	- Power output control / limitation
	- Reactive power control	- Reactive power control
	- Grid measurement	- Grid measurement
	- Low voltage ride through (LVRT)	- Low voltage ride through (LVRT)
	- Weather measurement	- Weather measurement
	- Time synchronization	- Time synchronization
	- Statistics	- Statistics
Wind Class	III a	II a
Certification & Standards	GL (T-GL-009A-2007)	GL (T-GL-020-2007)
Quality System	ISO 9001:2000	ISO 9001:2000

The WTGs of the project activity are located as follows:

Capacity	Make / Model	Location
16x600 kW = 9.60 MW	Suzlon / S-52	Piploda, Ratlam (Madhya Pradesh)
6x1500 kW = 9.00 MW	Suzlon / S-82	Fatehgarh, Jaisalmer (Rajasthan)
4x1500 kW = 6.00 MW	Suzlon / S-82	Shergarh & Osiyan, Jodhpur (Rajasthan)
10x600 kW = 6.00 MW	Suzlon / S-52	Piploda, Ratlam (Madhya Pradesh)
2x1500 kW = 3.00 MW	Suzlon / S-82	Fatehgarh, Jaisalmer (Rajasthan)
10x600 kW = 6.00MW	Suzlon / S-52	Palsodi, Ratlam (Madhya Pradesh)
8x600 kW = 4.80 MW	Suzlon / S-52	Palsodi, Ratlam (Madhya Pradesh)

All WTGs of the project activity have been commissioned. The electricity generated by three WTGs of capacity 600 kW each in Madhya Pradesh is being wheeled to the company's plants in the state-Madhy Pradesh and the electricity from the remaining

WTGs of 42.60 MW installed capacity is being sold to the respective state utilities. The project activity uses wind energy in producing electricity and no other input is being used, therefore, it does not produce any GHG emission.

All WTGs involved in the project activity are developed and supplied by Suzlon Energy Limited. Suzlon Infrastructure Services Limited (SISL), a SUZLON Group Company, provides all operations and maintenance services to the project activity.

- The relevant implementation dates (eg, dates of construction, commissioning, and continued operation periods).

Operation Period: 26-02-2010 to 12-12-2012.

Date(s) of commissioning are provided in Appendix-I

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

Year	Duration	GHG Emission Reductions (tCO ₂ e)
2010	26-02-2010 to 31-12-2010	30046.53
2011	01-01-2011 to 31-12-2011	45911.13
2012	01-01-2012 to 12-12-2012	77197.41

1.2 Sectoral Scope and Project Type

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

Project Type: Non-Grouped

1.3 Project Proponent

Organization name	Ruchi Soya Industries Limited
Contact person	Mr. Vinay Kumar Shah
Title	Director
Address	7/5 South Tukoganj, Nath Mandir Road, 301, Mahakosh House, Indore Madhya Pradesh-452001, India
Telephone	+91-731-2513281
Email	vinay_shah@ruchigroup.com

1.4 Other Entities Involved in the Project

No other entity is involved in the project.

1.5 Project Start Date

The project start date is the date on which the project began generating GHG emission reductions. The first WTG of the project activity commissioned on 26-02-2010 and started generating GHG emission reductions. Therefore, Project Start Date is 26-02-2010 (Day: 26, Month: February, Year: 2010).

1.6 Project Crediting Period

Crediting Period Start Date: 26/02/2010 (Day: 26, Month: February, Year: 2010)

Crediting Period End Date: 25/02/2020 (Day: 25, Month: February, Year: 2020)

Total number of years: 10

1.7 Project Location

The physical locations of the WTGs installed in the project activity spread across two states of India – Madhya Pradesh and Rajasthan. A summary of the physical locations of the installed WTGs is as follows:

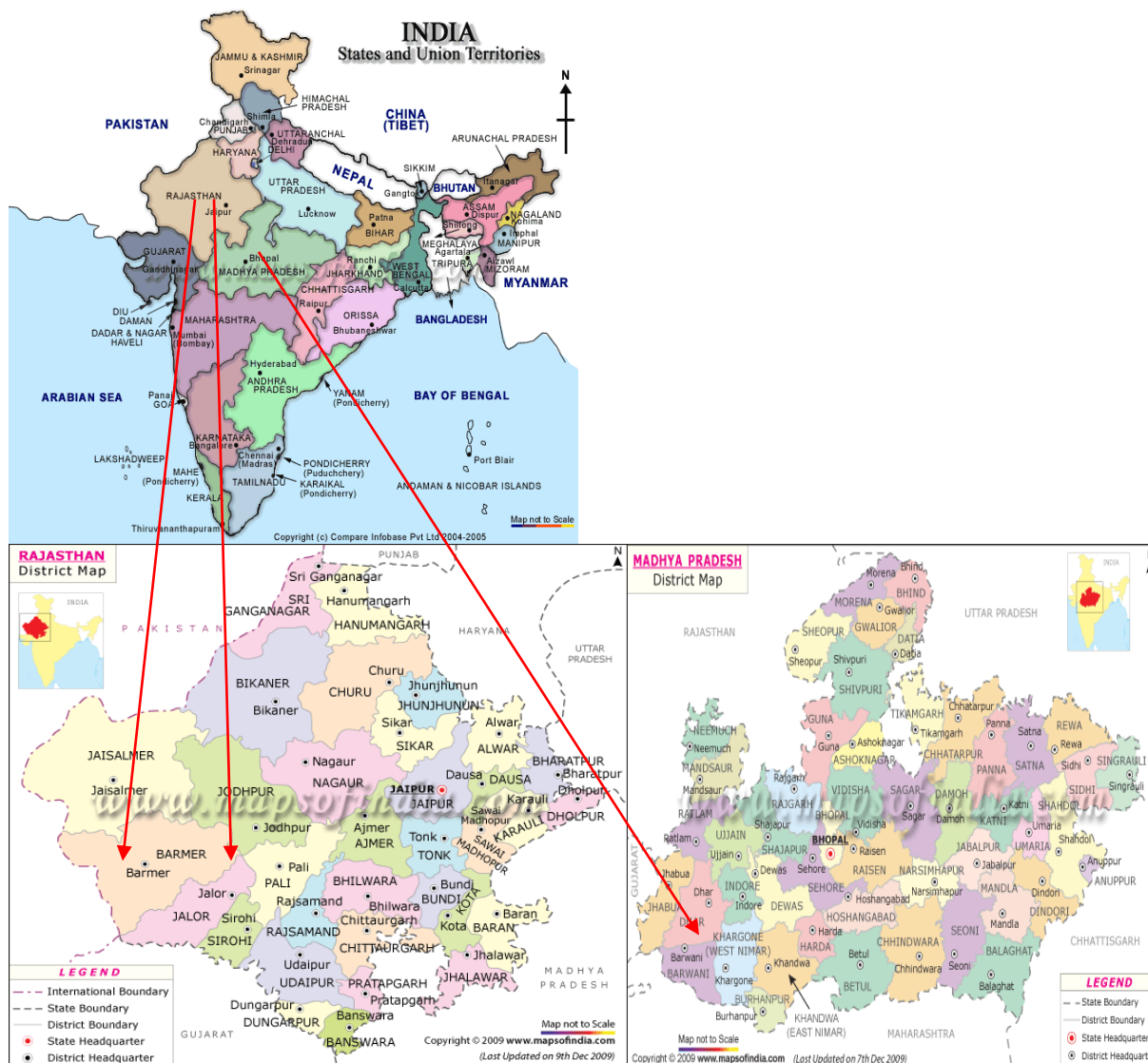
S. No.	Village	Taluka	District	State	Installed Capacity
1.	Naulakha	Piploda	Ratlam	Madhya Pradesh	10x0.60 = 6.00 MW
2.	Padliya Umat	Piploda	Ratlam	Madhya Pradesh	2x0.60 = 1.20 MW
3.	Bargad	Piploda	Ratlam	Madhya Pradesh	2x0.60 = 1.20 MW
4.	Hariyakheda	Piploda	Ratlam	Madhya Pradesh	6x0.60 = 3.60 MW
5.	Chourasi Badayla	Piploda	Ratlam	Madhya Pradesh	3x0.60 = 1.80 MW
6.	Uperwada	Piploda	Ratlam	Madhya Pradesh	3x0.60 = 1.80 MW
7.	Akal	Fatehgarh	Jaisalmer	Rajasthan	8x1.50 = 12.00 MW
8.	Belwa Ranaji & Sagat Nagar	Shergarh	Jodhpur	Rajasthan	2x1.50 = 3.00 MW
9.	Dhundhariya	Osiyan	Jodhpur	Rajasthan	2x1.50 = 3.00 MW
10.	Gopalpura	Ratlam	Ratlam	Madhya Pradesh	9x0.60 = 5.40 MW
11.	Rampuriya	Ratlam	Ratlam	Madhya Pradesh	9x0.60 = 5.40 MW

Location number, latitude and longitude of each WTG are provided below:

S. No.	Physical Location	Rated Capacity of the WTG (kW)	Location No.	Latitude	Longitude
1.	Village-Naulakha, Taluka-Piploda, District - Ratlam (Madhya Pradesh)	600	NL-1	23°38'23.0" N	74°59'12.7" E
		600	NL-2	23°38'25.9" N	74°59'07.1" E
		600	NL-3	23°38'37.3" N	74°59'13.1" E
		600	NL-4	23°38'45.1" N	74°59'25.7" E
		600	NL-5	23°38'35.9" N	74°59'33.3" E
		600	NL-6	23°38'25.9" N	74°59'39.7" E
		600	NL-7	23°38'17.1" N	74°59'39.4" E
		600	NL-8	23°38'21.9" N	74°59'53.7" E
		600	NL-9	23°38'33.5" N	75°00'00.2" E
		600	NL-10	23°38'43.1" N	75°00'00.2" E
2.	Village-Padliya Umat, Taluka-Piploda, District - Ratlam (Madhya Pradesh)	600	JO-10	23°35'51.6" N	75°04'44.1" E
		600	JO-08	23°35'45.5" N	75°04'47.9" E
3.	Village-Bargad, Taluka-Piploda, District - Ratlam (Madhya Pradesh)	600	JO-12	23°36'10.3" N	75°04'30.3" E
		600	JO-13	23°36'17.2" N	75°04'26.6" E
4.	Village-Hariyakheda, Taluka-Piploda, District - Ratlam (Madhya Pradesh)	600	JO-14	23°36'23.7" N	75°04'24.3" E
		600	JO-15	23°36'31.0" N	75°04'21.8" E
		600	JO-16	23°36'37.7" N	75°04'20.8" E
		600	JO-17	23°36'45.9" N	75°04'15.2" E
		600	JO-18	23°36'59.3" N	75°04'12.6" E
		600	JO-19	23°37'05.9" N	75°02'48.5" E

5.	Village-Chourasi Badayla, Taluka-Piploda, District - Ratlam (Madhya Pradesh)	600	JO-03	23°34' 46.9" N	75°05' 46.8" E
		600	JO-04	23°34' 53.5" N	75°05' 48.4" E
		600	JO-05	23°34' 57.2" N	75°05' 22.1" E
6.	Village-Uperwada, Taluka-Piploda, District - Ratlam (Madhya Pradesh)	600	JO-20	23°36' 46.5" N	75°02' 20.9" E
		600	JO-21	23°36' 38.2" N	75°02' 21.7" E
		600	JO-22	23°36' 58.6" N	75°02' 46.0" E
7.	Village-Akal, Taluka-Fatehgarh, District-Jaisalmer (Rajasthan)	1500	AK-400	26°47'17.3" N	77°05'12.0" E
		1500	AK-401	26°47'05.0" N	77°05'25.3" E
		1500	AK-414	26°48'12.4" N	77°05'06.8" E
		1500	AK-415	26°48'33.5" N	77°05'23.5" E
		1500	AK-416	26°48'25.6" N	77°05'35.8" E
		1500	AK-417	26°48'12.2" N	77°05'46.1" E
		1500	AK-253	26°47'51.2" N	77°08'14.0" E
		1500	AK-308	26°47'56.9" N	77°08'55.6" E
8.	Villages-Belwa Ranaji & Sagat Nagar, Taluka-Shergarh, District-Jodhpur (Rajasthan)	1500	RKB-075	26°30'52.3" N	72°32'22.2" E
		1500	RKB-076	26°30'05.7" N	72°31'06.4" E
9.	Village-Dhundhariya, Taluka-Osiyan, District-Jodhpur (Rajasthan)	1500	OS-48	26°43'57.6" N	72°56'43.1" E
		1500	OS-49	26°43'55.5" N	72°56'59.5" E
10.	Village-Gopalpura, Taluka-Ratlam, District-Ratlam (Madhya Pradesh)	600	PR-01	23°23'26.4"N	74°55'27.1"E
		600	PR-02	23°23'20.8"N	74°55'23.1"E
		600	PR-03	23°23'14.9"N	74°55'13.4"E
		600	PR-04	23°23'08.1"N	74°55'10.8"E
		600	PR-05	23°23'01.5"N	74°55'07.9"E
		600	PR-06	23°22'44.6"N	74°55'08.1"E
		600	PR-08	23°22'29.6"N	74°55'14.0"E
		600	PR-17	23°22'54.0"N	74°55'12.0"E
		600	PR-19	23°23'18.0"N	74°55'36.6"E
11.	Village-Rampuriya, Taluka-Ratlam, District-Ratlam (Madhya Pradesh)	600	PR-09	23°22'25.6"N	74°55'24.6"E
		600	PR-10	23°21'59.1"N	74°55'34.4"E
		600	PR-11	23°21'25.3"N	74°55'11.9"E
		600	PR-12	23°21'34.5"N	74°55'30.8"E
		600	PR-13	23°21'41.6"N	74°55'31.2"E
		600	PR-14	23°21'47.8"N	74°55'32.0"E
		600	PR-15	23°21'53.8"N	74°55'32.6"E
		600	PR-16	23°21'28.2"N	74°55'29.2"E
		600	PR-18	23°21'21.8"N	74°55'23.6"E

Geo-graphical locations of the project activity can be viewed in the following maps:



1.8 Title and Reference of Methodology

Title of the approved baseline and monitoring methodology:

"Consolidated baseline methodology for grid-connected electricity generation from renewable sources";

Reference of the methodology applied to the project activity: ACM0002; Version 12.1.0 (EB 58).

<http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNV3LTK1BP3OR24Y5L>

Title and reference of tools applied to the project activity:

"Tool for the demonstration and assessment of additionality"; Version: 05.2.1 (EB 39)

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.1.pdf>

"Tool to calculate the emission factor for an electricity system"; Version: 02.2.1 (EB 63)

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf>

1.9 Other Programs

- **Emission Trading Programs and Other Binding Limits:**

The project proponent has not claimed any credits under any other mechanism in current monitoring period i.e. 26-02-2010 to 12-12-2012.

- **Other Forms of Environmental Credit:**

The project proponent has not claimed any credits under any other mechanism in current monitoring period i.e. 26-02-2010 to 12-12-2012.

- **Participation under Other GHG Programs:**

The project activity is registered with UNFCCC as two CDM projects as detailed below:

Sr. No.	Ref. No.	Date of Registration	Project Title
1.	8592	13/12/2012	35.10 MW Wind Energy Project by Ruchi Soya Industries Limited, India
2.	8818	20/12/2012	Grid Connected Wind Power Generation Project by Ruchi Soya Industries Limited in Madhya Pradesh

Crediting Period: Fixed crediting period of 10 years.

The current monitoring period is from 26-02-2010 to 12-12-2012, i.e. prior to start date of crediting period for registered CDM projects. Therefore, no GHG credit is claimed under CDM program during the current monitoring period.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The project activity is commissioned as per Appendix-I. During the current monitoring period that is from 26-02-2010 to 12-12-2012, the project activity was operational. Please refer Appendix-II for the summary of breakdown of the WTGs during current monitoring period.

2.2 Deviations

The project activity has been implemented as described in the VCS-PD and there was no deviation during the monitoring plan.

2.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

2.2.2 Project Description Deviations

No project description deviation is applied during the monitoring period.

2.3 Grouped Project

Not applicable as the project is non-grouped.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor for NEWNE grid in the year y
Source of data	"Baseline Carbon Dioxide Emission Database ¹ Version 6.0" published by the Central Electricity Authority, Ministry of Power, Government of India.
Value applied:	0.9941
Justification of choice of data or description of measurement methods and procedures applied	Calculated using "Tool to calculate the emission factor for an electricity system, version 02.2.1" as 3-year generation-weighted average of latest three years, 2007-2008, 2008-2009, 2009-2010, data obtained from "CO ₂ Baseline Database for Indian Power Sector" version 6.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of the data	As required by the applied tool data from the official source need to be used for the calculation of emission factor and emission reductions. To meet this requirement here, the value applied is evaluated using data taken from CEA database.
Comments	Computed once during PD finalization (ex-ante) and remain same throughout the crediting period.

Data / Parameter	EF _{grid,BM,y}
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor for NEWNE grid in the year y
Source of data	"Baseline Carbon Dioxide Emission Database ² Version 6.0" published by the Central Electricity Authority, Ministry of Power, Government of India.
Value applied:	0.8123
Justification of choice of	Calculated ex ante as per "Tool to calculate the emission factor for an electricity system, ver. 02.2.1" based on the most recent year

¹ http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

version 6.0

² http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

version 6.0

data or description of measurement methods and procedures applied	(2009-10) data available on “Baseline Carbon Dioxide Emission Database Version 6.0”.
Purpose of the data	As required by the applied tool data from the official source need to be used for the calculation of emission factor and emission reductions. To meet this requirement here, the value applied is taken from CEA database.
Comments	Computed once during PD finalization (ex-ante) and remain same throughout the crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for NEWNE grid in the year y
Source of data	Calculated weighted average combined margin using equation – $EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$ The default values for w_{OM} and w_{BM} are taken as applicable to solar power generation project activities as $w_{OM} = 0.75$ and $w_{BM} = 0.25$. Reference: Page 18 of “Tool to calculate the emission factor for an electricity system”, Version 02.2.1 ³ .
Value applied:	0.94865
Justification of choice of data or description of measurement methods and procedures applied	Calculated ex ante as per “Tool to calculate the emission factor for an electricity system, ver. 02.2.1” as follows: $EF_{grid,CM,y} = 0.75 \times EF_{grid,OM,y} + 0.25 \times EF_{grid,BM,y}$
Purpose of the data	As required by the applied tool data from the official source need to be used for the calculation of emission factor and emission reductions. To meet this requirement here, the value applied is calculated as per “Tool to calculate the emission factor for an electricity system”.
Comments	Computed once during PD finalization (ex-ante) and remain same throughout the crediting period.

3.2 Data and Parameters Monitored

Data / Parameter	$EG_{export, y}$
Data unit	MWh (Mega-watt hour)
Description	Electricity exported to the grid by the project activity in year y
Source of data	The main meter located at common metering point at

³ <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v2.2.1.pdf>

	each project location.												
Description of measurement methods and procedures to be applied	The main meter installed at each of the common metering point measure the export of electricity on continuous basis. Main meter reading will be taken and verified, once in a month, jointly by the representatives of the state utility and the contractor (SISL).												
Frequency of monitoring/recording	Continuous measurement and monthly recording.												
Value monitored:	<i>For Rajasthan</i> <table border="1"> <tr> <td>2010</td><td>19292.16</td></tr> <tr> <td>2011</td><td>28016.84</td></tr> <tr> <td>2012</td><td>30050.80</td></tr> </table> <i>For Madhya Pradesh</i> <table border="1"> <tr> <td>2010</td><td>12500.33</td></tr> <tr> <td>2011</td><td>20540.20</td></tr> <tr> <td>2012</td><td>51499.88</td></tr> </table>	2010	19292.16	2011	28016.84	2012	30050.80	2010	12500.33	2011	20540.20	2012	51499.88
2010	19292.16												
2011	28016.84												
2012	30050.80												
2010	12500.33												
2011	20540.20												
2012	51499.88												
Monitoring equipment	Energy Meter (Main Meter)												
QA/QC procedures to be applied	<i>Calibration:</i> Once in a year. <i>Accuracy:</i> 0.5% (Main meter)												
Purpose of the data	Calculation of Baseline Emissions												
Calculation method	Not applicable												
Comments	The data is archived for the crediting period + 2 years.												

Data / Parameter	EG _{import, y}								
Data unit	MWh (Mega-watt hour)								
Description	Electricity imported from the grid by the project activity in year y								
Source of data	The main meter located at common metering point at each project location.								
Description of measurement methods and procedures to be applied	The main meter installed at each of the common metering point measures the import of electricity on continuous basis. Main meter reading is taken and verified, once in a month, jointly by the representatives of the state utility and the contractor (SISL).								
Frequency of monitoring/recording	Continuous measurement and monthly recording.								
Value monitored:	<i>For Rajasthan</i> <table border="1"> <tr> <td>2010</td><td>119.55</td></tr> <tr> <td>2011</td><td>160.77</td></tr> <tr> <td>2012</td><td>174.61</td></tr> </table> <i>For Madhya Pradesh</i> <table border="1"> <tr> <td>2010</td><td>113.66</td></tr> </table>	2010	119.55	2011	160.77	2012	174.61	2010	113.66
2010	119.55								
2011	160.77								
2012	174.61								
2010	113.66								

	<table> <tr> <td>2011</td><td>152.87</td></tr> <tr> <td>2012</td><td>274.59</td></tr> </table>	2011	152.87	2012	274.59
2011	152.87				
2012	274.59				
Monitoring equipment	Energy Meter (Main Meter)				
QA/QC procedures to be applied	Calibration: Once in a year. Accuracy:0.5% (Main meter)				
Purpose of the data	Calculation of Baseline Emissions				
Calculation method	Not applicable				
Comments	The data is archived for the crediting period + 2 years				

Data / Parameter	EG _{PJ, y}												
Data unit	MWh (Mega-watt hour)												
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the project activity in year y												
Source of data	Joint meter reading report / Credit report (Madhya Pradesh & Rajasthan)												
Description of measurement methods and procedures to be applied	The main meter installed at each of the common metering point measures the export and import of electricity on continuous basis. Main meter readings are taken and verified, once in a month, jointly by the representatives of the state utility and the contractor (SISL). The net electricity supplied to the grid is calculated by subtracting the import of the electricity from the export of the electricity.												
Frequency of monitoring/recording	Monthly												
Value monitored:	<i>For Rajasthan</i> <table> <tr> <td>2010</td><td>19172.60</td></tr> <tr> <td>2011</td><td>27856.07</td></tr> <tr> <td>2012</td><td>29876.19</td></tr> </table> <i>For Madhya Pradesh</i> <table> <tr> <td>2010</td><td>12386.67</td></tr> <tr> <td>2011</td><td>20387.33</td></tr> <tr> <td>2012</td><td>51225.29</td></tr> </table>	2010	19172.60	2011	27856.07	2012	29876.19	2010	12386.67	2011	20387.33	2012	51225.29
2010	19172.60												
2011	27856.07												
2012	29876.19												
2010	12386.67												
2011	20387.33												
2012	51225.29												
Monitoring equipment	Energy Meter (Main Meter)												
QA/QC procedures to be applied	The data is cross-checked with the invoices raised in case sale of the electricity and electricity bills in case of captive use.												
Purpose of the data	Calculation of Baseline Emissions												
Calculation method	Net electricity fed to the grid is calculated as $EG_{PJ, y} = EG_{\text{export}, y} - EG_{\text{import}, y}$												

Comments	The data is archived for the crediting period + 2 years
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3.3 Monitoring Plan

Monitoring of emission reductions is carried as per the applied methodology in the project activity i.e. ACM0002, version 12.1.0, which requires monitoring of the following relevant parameters:

- $EF_{grid,CM,y}$: Combined margin CO_2 emission factor for NEWNE grid in the year y
- $EG_{PJ,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y

Since the project proponent has chosen *ex-ante* determination of CO_2 emission factor for the grid, the monitoring of operating margin emission factor and build margin emission factor is not required. Further, wind based electricity generation is not associated with any kind of leakages. Hence, the sole parameter for monitoring is the electricity produced and supplied to the grid by the project activity.

The general conditions set out for metering, recording, meter readings, meter inspections, test & checking and communication shall be as per the Power Purchase/ Wheeling Agreement signed by the project proponent with the respective state electricity utility.

The project proponent has undertaken maintenance and services agreement with Suzlon Infrastructure Services Limited (SISL), the contractor. The performance of the WTGs, safety in operation and scheduled / breakdown maintenances are organized and monitored by the contractor. Hence the authority and responsibility of project management lies with the contractor.

Monitoring Plan:

Metering arrangement:

Measuring and metering arrangement has been done as per Power Purchase / Wheeling Agreement signed by the project proponent with the respective state electricity utility. The main meter installed at each site is connected with several WTGs of that site. The main meter readings are taken monthly by the representatives of the state electricity utility and the Contractor (SISL).

Metering Equipment:

The project activity has the following metering systems:

Controller:

The controller installed on each WTG records export of the electricity by that WTG. Its primary use is to gather data from the anemometer (weather station) located on the top of the wind turbine. With the collected data the controller points the turbine in the most desired direction with respect to wind direction. It controls the operations of the WTG to optimize working of the WTG through Central Monitoring System (CMS). The controller does not require calibration as it operates with the software.

Main and check meters:

The main and check meters are connected with several WTGs installed at each site of the project activity.

Monitoring of power generation at the WTGs:

Power generated by the WTGs is monitored continuously and measured hourly at the Central Monitoring Station (CMS) of the technology supplier-Suzlon. The controller/CMS records the electricity generation daily at end of the day 00.00 hrs. This generation is then uploaded on the portal of the project proponent, which remains there for three years. All WTGs are connected to the CMS located at the project site from where every connected WTG is accessible. Monthly data are compiled and stored electronically.

Monitoring of electricity supplied to the grid by the WTGs:

The electricity supplied to the grid by the WTGs connected to the main / check meter is recorded monthly. The main/ check meter reading is taken and certified jointly by the representatives of the respective state utility and the contractor (SISL). The main meter readings are noted by the authorities of the state utility and sent to its office. Individual statements are generated by the office after apportioning and sent to the each of the project proponent and concerning regional accounts officer in form of electricity credit report. The project proponent generates the invoice as per credit report for the electricity sold. The regional accounts officer after deducting the wheeling charges provides the credit of the electricity in the electricity bill of the plant where the wheeling takes place. The main meter readings as mentioned in the joint meter reading report (Madhya Pradesh & Rajasthan) and/ or invoices / adjusted in the electricity bills (before deducting wheeling charges) shall form the basis of estimation of emission reductions in the project activity.

The main meter readings can be cross-checked with the invoices raised / electricity adjusted in the electricity bills before deducting wheeling charges by the state electricity utility.

Apportioning Procedure to calculate net electricity supplied to the grid by individual WTG:

Several WTGs are connected to the main / check meter which is capable to recording import, export and RKVAH consumption of electricity. Net electricity exported to the grid is calculated as follows:

Line diagram to show metering arrangement of at **Osiyan** site in Rajasthan

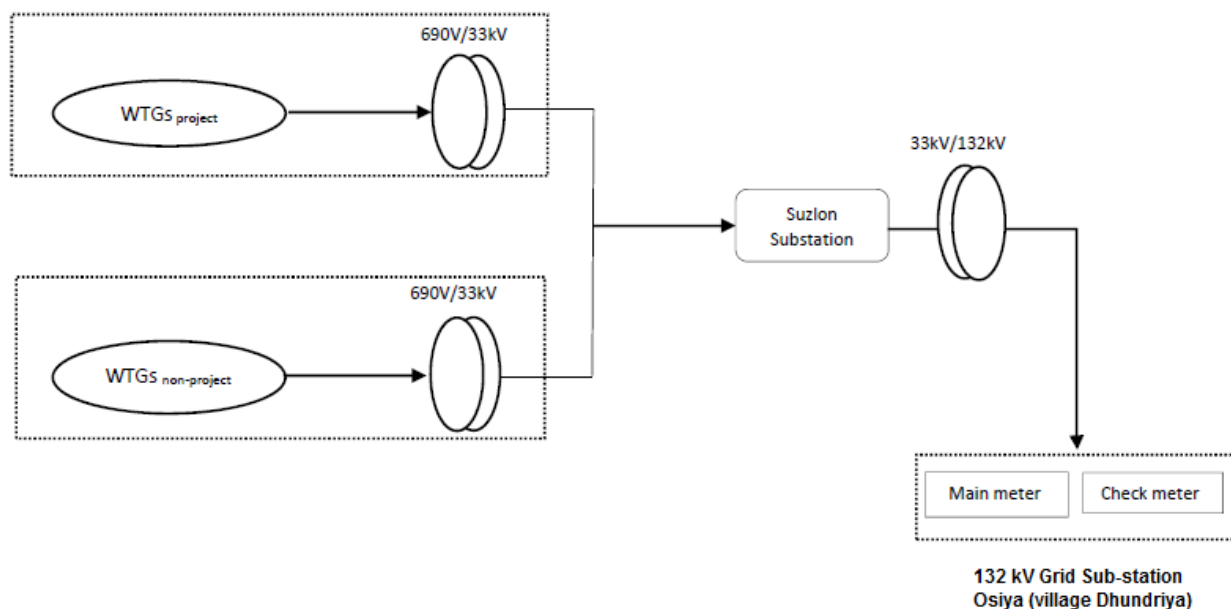
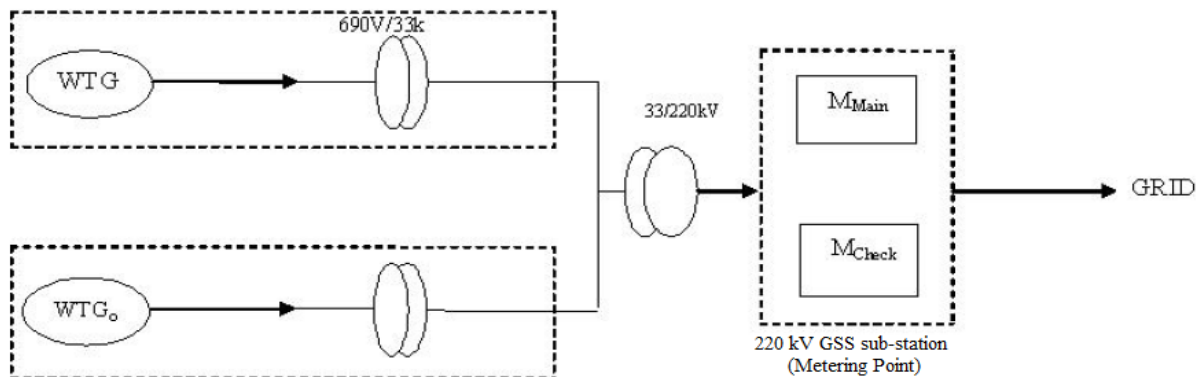
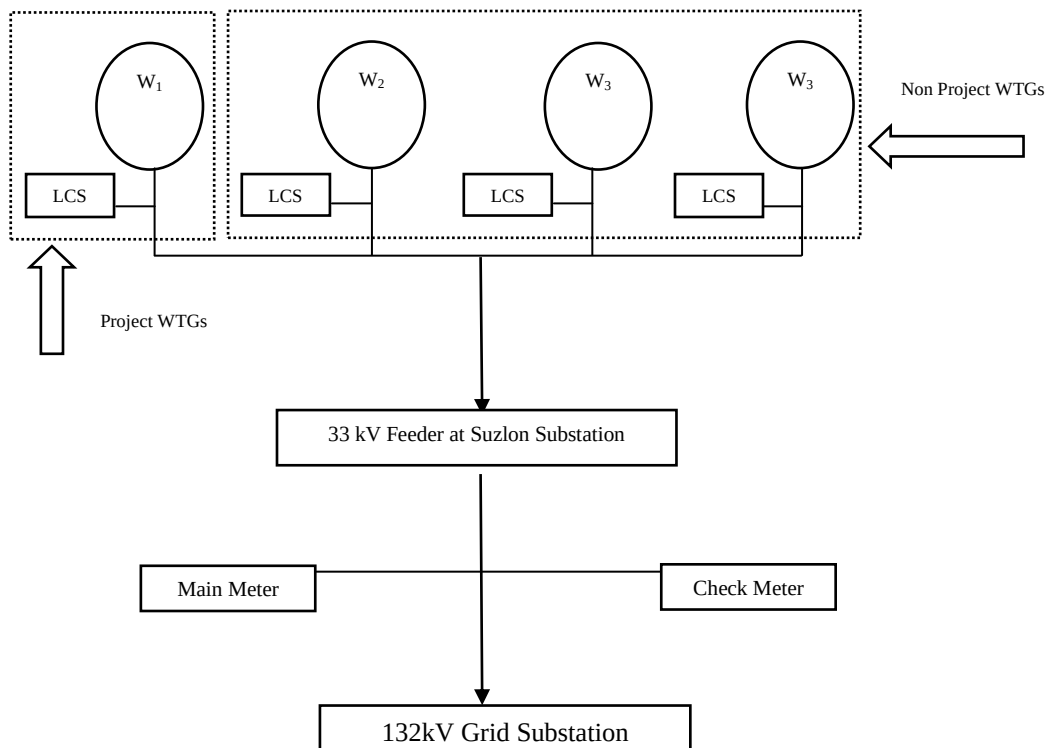


Figure: Metering arrangement of WTGs

Line diagram to show metering arrangement of at **RKB, AKAL I and II site** in Rajasthan



Line diagram showing **Palsodi & Jaora site** in Madhya Pradesh



Procedure to calculate export of electricity by individual WTG

EG export_i = Electricity exported to the grid from i^{th} WTG (share of main meter reading)

EG export = Electricity exported to the grid by all WTGs as recorded at the main meter.

EG_{1,i} = Electricity exported by i^{th} WTG as recorded at the controller

(Note: Electricity generated by WTG at the controller is monitored at the Central Monitoring Station (CMS) and recorded daily in electronic form)

$EG_{1,sum}$ = Sum of the electricity exported by all WTGs connected to the main meter as recorded at their controllers

Calculation of Multiplication Factor for export of electricity to the grid by individual WTG:

The export multiplying factor is calculated as the ratio of electricity exported by all WTGs connected to the main meter as recorded at the main meter to the sum of individual export by all the WTGs connected to the billing meter as recorded on their controllers. Thus,

Export multiplying factor (M_i) = $EG_{export} / EG_{1,sum}$

Electricity exported to the grid from i^{th} WTG is evaluated as:

$EG_{export_i} = M_i \times EG_{1,i}$

Procedure to calculate multiplying factor for import of electricity from the grid by individual WTG

EG_{import_i} = Import of electricity by i^{th} WTG at main meter

EG_{import} = Electricity imported (consumed) by all WTGs from the grid as recorded at the main meter

Calculation of Multiplication Factor for import:

The controller meter does not record import. Therefore, apportioning for energy imported by each WTG is also done on the basis of electricity exported and recorded at controller of each WTG and the total electricity imported by all WTGs as recorded at the main meter. The import multiplication factor is calculated as the ratio of electricity imported (consumed) by all WTGs from the grid as recorded at the main meter to the sum of individual export by all the WTGs connected to the main meter as recorded on their controllers. Thus,

Import multiplying factor (m_i) = $EG_{import} / EG_{1,sum}$

Electricity imported from the grid by i^{th} WTG is evaluated as:

$EG_{import_i} = m_i \times EG_{1,i}$

Net electricity exported to grid by i^{th} WTG ($EG_{y,i}$) = $EG_{export_i} - EG_{import_i}$

Procedure for apportioning of electricity supplied to the grid where dates of monitoring period are not matching with dates of joint meter reading reports:

There are instances when the claim of emission reductions is in middle of any month and apportioning is to be done to arrive at electricity supplied reading for that certain period. The following apportioning procedure is followed, for the instances when crediting period date of the project activity falls in between the meter reading cycles:

The apportioning is done as per the ratio of net electricity generated at controllers by the WTGs of the project activity to all WTGs connected with the main meter. The daily net electricity generated at controller / CMS is measured by the contractor and sent to the project participant. In case of any problem related to the controller, the WTG automatically get shut down and the controller is replaced by a new controller immediately. However no such even occurs during the current verification period. Furthermore, if any change happening in controller will be reported in the concerned monitoring report during verification. Controller data is used for deriving a ratio for apportioning.

Example: Let us assume,

X = Sum of the net electricity generation at controller of the WTG(s) of the project activity during the partial period of the corresponding period of main meter reading (kWh)

Y = Sum of the net electricity generation at controller of the WTG(s) of the project activity during the corresponding full period of main meter reading (kWh)

Therefore, ratio of the net electricity generation during the partial period (Z) = X/Y

If G = Net electricity supplied by the WTG(s) of the project activity to the grid during the corresponding full period of main meter reading as per credit notes (kWh).

Then net electricity supplied by the WTG(s) of the project activity to the grid during the partial period (for calculating emission reduction for partial period) = G*Z.

Thus in line to the above example electricity supplied to the grid where dates of monitoring period are not matching with dates of joint meter reading reports are elaborated in appendix III of the monitoring report and ER sheet for the months. December 2010, January 2011, December 2011, January 2012 & December 2012.

Troubleshooting Contingency Plan:

-If electricity readings at the main meter in any month differs from the readings of the check meter by more than $\pm 0.5\%$ both the meters shall be tested. If on such testing the main meter error is found to exceed the permissible limit but check meter reading error found within the limit, the check meter reading will be used in calculating the electricity supplied. If error in both main and check meters are found beyond permissible limits, the main and the check meters shall be immediately repaired and recalibrated and correction will be applied, as agreed between the parties, to the monthly main meter readings to arrive at the correct energy for billing purpose for the period of the month up to the time of such test repair and recalibration. The correction factor means the percentage of error between standard check meter and main meter. The meters will be used only after calibration.

-If both main and check meter fail to record energy due to any reason whatsoever, the energy net exported during the period of outage will be calculated by apportioning the net export of the electricity recorded at the energy meter, owned by the state electricity utility and located at the sub-station as follows:

*Net supply of the electricity by i^{th} WTG = (Total net supply of the electricity by entire wind farm as recorded at energy meter installed at the sub-station) * (Net generation of the electricity by i^{th} WTG as recorded on its controller / Sum of net generation by all WTGs of the wind farm as recorded on their controllers).*

However during the current verification cycle no such event occurred, all the energy meters were working within the permissible limits. Furthermore, for the delayed calibration period error factor is been applied to the export and import values.

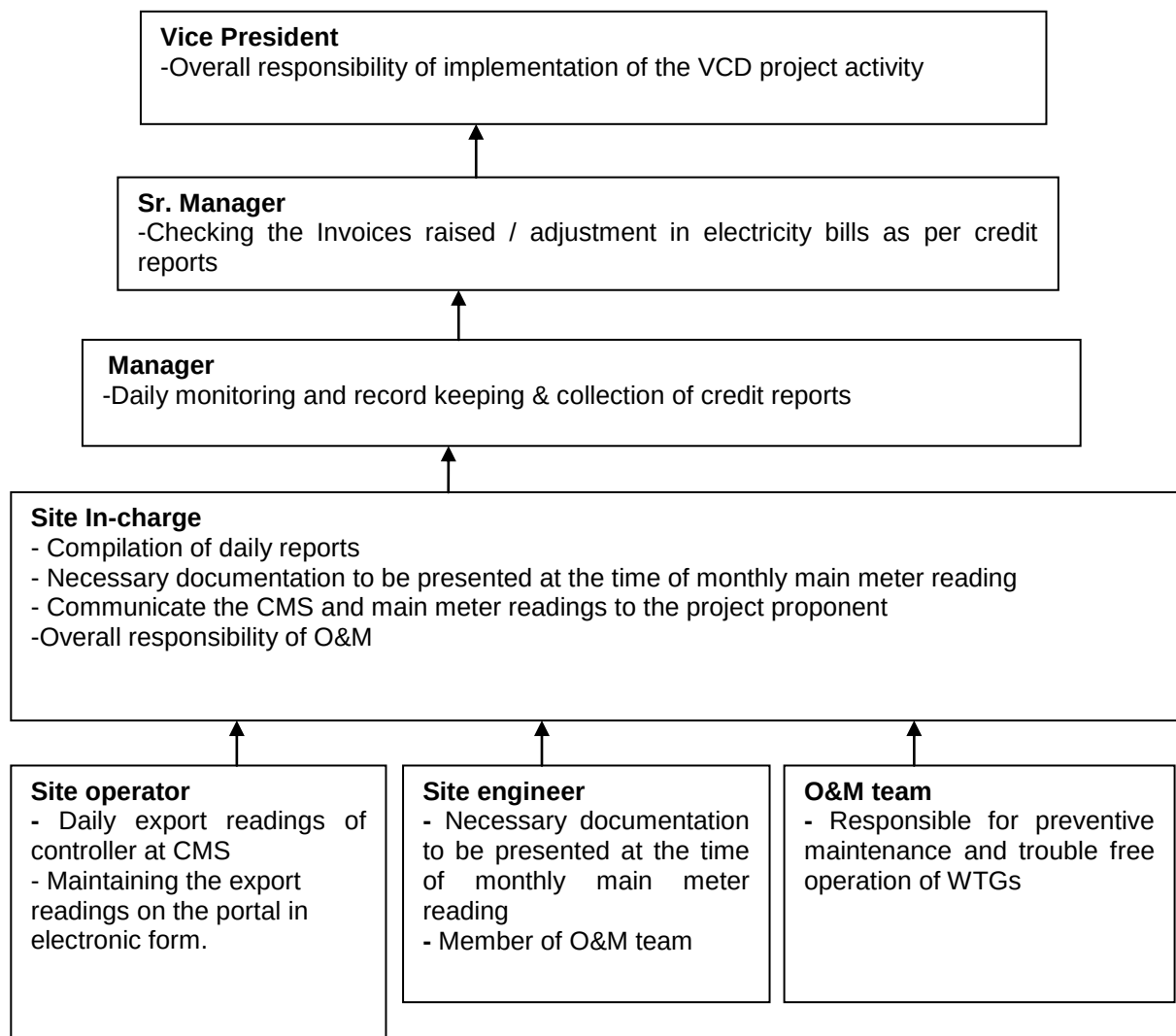
QA/QC procedures:

The energy main/ check meter installed at the project site is having the accuracy class of 0.5%. The main/ check meter shall be jointly inspected and sealed by the utility and shall not be interfered by either utility or project proponent except in the presence of the accredited representatives of both utility and SISL. The meters are calibrated by the state electricity utility once in a year.

Data archiving:

Monthly data shall be archived and stored for the entire crediting period plus two years.

Operational and organizational chart for monitoring:



4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The baseline emissions are calculated using the following formula:

$$\text{Baseline Emissions (BE}_y\text{)} = \text{EG}_{\text{PJ},y} \times \text{EF}_{\text{Grid,CM},y}$$

Where:

BE_y = Baseline emissions in year y (tCO_2/yr)

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

$\text{EF}_{\text{grid,CM},y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system, ver. 02.2.1” (tCO_2/MWh)

As per the VCS PD, the baseline emissions factor ($\text{EF}_{\text{Grid,CM},y}$) is $0.94865 \text{ tCO}_2/\text{MWh}$

The net electricity exported to the grid and baseline emissions are given below:

Period	Export (EG _{export}) (MWh)	Import (EG _{import}) (MWh)	Net Export (EG _y) (MWh)	Baseline Emissions (tCO ₂ e)
26-02-2010 to 31-12-2010	31792.49	233.21	31672.93	30046.53
01-01-2011 to 31-12-2011	48557.04	313.64	48396.27	45911.13
01-01-2012 to 12-12-2012*	81550.68	449.20	81376.07	77197.41
Total	161900.20	996.05	161445.28	153155⁴

*Calculation details are provided in worksheet.

4.2 Project Emissions

The project uses wind energy for power generation which leads to zero net GHG on-site emissions. Hence, there is no net emission within the project boundary.

Hence, PE_y = 0.

4.3 Leakage

The project proponent has not identified any anthropogenic greenhouse gases by sources outside the project boundary that are significant, measurable and attributable to the project activity. Hence, no leakage is considered from the project activity.

LE_y = 0

4.4 Net GHG Emission Reductions and Removals

The emission reductions are calculated as per the equation:

$$ER_y = BE_y - PE_y - LE_y$$

ER_y – Emission Reduction (tCO₂e)

BE_y - Baseline Emissions (tCO₂e)

PE_y – Project Emissions (tCO₂e)

LE_y - Leakage Emissions (tCO₂e).

$$ER_y = BE_y - PE_y - LE_y = 153,155 - 0 - 0 = 153,155 \text{ tCO}_2\text{e}$$

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)
Year 2010	30046.53	0	0	30046.53
Year 2011	45911.13	0	0	45911.13
Year 2012	77197.41	0	0	77197.41

⁴ Round down values

Total	153155	0	0	153155
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The ex-ante emission reductions estimates, as per the VCS PD, are 81,853 tCO₂ per annum. As per this value, the estimated emission reductions during the current monitoring period from 26-02-2010 to 12-12-2012 are 228,964 tCO₂e. The actual emission reductions achieved in the current monitoring period are 153,155 tCO₂e. The actual emission reductions obtained in the monitoring period are less than the estimated emission reductions as mentioned in the VCS PD. These lower emission reductions achieved due to lower PLF recorded during the monitoring period.

APPENDIX-I: DATES OF COMMISSIONING:

S. No.	Site	Location Nos.	Date of Commissioning	Installed Capacity
1.	Osiyan	OS-48, OS-49	26/02/2010	3.00 MW
2.	RKB	RKB-075, RKB-076	08/03/2010	3.00 MW
3.	Akal	AK-400, AK-401, AK-414, AK-415, AK-416, AK-417	26/03/2010	9.00 MW
4.	Jaora	NL-01, NL-02, NL-03, NL-04, NL-05, NL-06, NL-07, NL-08, NL-09, NL-10, JO-19	27/03/2010	6.60 MW
5.	Jaora	JO-10, JO-12	30/03/2010	1.20 MW
6.	Jaora	JO-13, JO-14, JO-15	31/05/2010	1.80 MW
7.	Akal	AK-253	24/01/2011	1.50 MW
8.	Akal	AK-308	15/02/2011	1.50 MW
9.	Jaora	JO-08, JO-16, JO-17, JO-18, JO-20, JO-21, JO-22	29/03/2011	4.20 MW
10.	Jaora	JO-03, JO-04, JO-05,	30/03/2011	1.80 MW
11.	Palsodi	PR-01, PR-02, PR-03, PR-04, PR-05, PR-06, PR-08, PR-09, PR-17, PR-19	30/03/2011	6.00 MW
12.	Palsodi	PR-10, PR-12, PR-13, PR-15, PR-16, PR-18	04/06/2011	3.60 MW
13.	Palsodi	PR-11, PR-14	17/06/2011	1.20 MW
Total Installed Capacity				44.40 MW

APPENDIX-II: DETAILS OF BREAKDOWN:

Sr. No.	Site	Installed Capacity (MW)	Location Nos.	Breakdown (Hours)		
				2010	2011	2012
1.	Akal-I	9	AK-400, AK-401, AK-414, AK-415, AK-416, AK-417	3564.40	2000.90	1501.60
2.	Akal-II	3	AK-253, AK-308	NA	822.60	842.90
3.	Osiyan	3	OS-48, OS-49	369.90	366.10	423.00
4.	RKB	3	RKB-075, RKB-076	231.30	378.90	669.20
5.	Jaora	15.60	NL-01, NL-02, NL-03, NL-04, NL-05, NL-06, NL-07, NL-08, NL-09, NL-10, JO-03, JO-04, JO-05, JO-08, JO-10, JO-12, JO-13, JO-14, JO-15, JO-16, JO-17, JO-18, JO-19, JO-20, JO-21, JO-22	972.10	5221.60	7824.19
6.	Palsodi	10.80	PR-01, PR-02, PR-03, PR-04, PR-05, PR-06, PR-08, PR-09, PR-10, PR-11, PR-12, PR-13, PR-14, PR-15, PR-16, PR-17, PR-18, PR-19	NA	842.70	3505.70
Total		44.40		7147.7	11643.8	16778.59

APPENDIX-III: DETAILS OF CALIBRATION OF ENERGY METERS:

Site	Sr. No. of Energy Meter	Date of Calibration of Energy Meter
Akal-I	Main meter: MSB 10293 Check meter: MSB 10292	12/03/2011 ⁵ , 15/03/2012 12/03/2011, 15/03/2012
Akal-II	Main meter: MSB 10307 Check meter: MSB 10309	12/03/2011 ⁶ , 15/03/2012 12/03/2011, 15/03/2012
Osian	Main meter: RJB 74505 Check meter: RJB 74506	20/03/2012 ⁷ 20/03/2012
RKB	Main meter: RJB 00315 Check meter: RJB 00324	19/03/2012 ⁸ 19/03/2012
Jaora	Feeder-III Main meter: 34413 Check meter: 34412	09/12/2009, 18/07/2011, 17/11/2012 ⁹ 09/12/2009, 18/07/2011, 17/11/2012
Jaora	Feeder-IV Main meter: 3475859 Check meter: 3475860	17/11/2012 ¹⁰ 17/11/2012
Palsodi	Feeder-I: Main meter: MPE 15233 Check meter: MPE 15232	20/02/2010, 18/07/2011, 04/06/2012 ¹¹ 20/02/2010, 18/07/2011, 04/06/2012
Palsodi	Feeder-II: Main meter: MPE 20352 Check meter: MPE 20353	20/02/2010, 23/07/2011, 04/06/2012 ¹² 20/02/2010, 23/07/2011, 04/06/2012

⁵ Energy meters (main and check) for all WTGs at **Akal 1** site were not calibrated for the year 2010, thus error factor is been applied to the net generation values from 31-03-2010 to 31/03/2011. However, conservatively error factor is applied for complete month of March 2011. Further in 2012 calibration was delayed by 3 days thus error factor for the complete month of March 2012 is applied.

⁶ Energy meters (main and check) for all WTGs at **Akal 2** site were not calibrated for the month February 2011 and March 2011, thus error factor is been applied to the net generation values from 01-02-2011 to 31/03/2011. However, conservatively error factor is applied for complete month of March 2011. Further in 2012 calibration was delayed by 3 days thus error factor for the complete month of March 2012 is applied.

⁷ Calibration of the energy meter was not carried out for the monitoring period duration 01/02/2010 to 20/03/2012, thus error factor is been applied to the generation values beyond due date of calibration validity. Also, for the month March 2012 the error factor is been applied for the complete month conservatively.

⁸ Calibration of the energy meter was not carried out for the monitoring period duration 01/02/2010 to 20/03/2012, thus error factor is been applied to the generation values beyond due date of calibration validity. Also, for the month March 2012 the error factor is been applied for the complete month conservatively.

⁹ Calibration of the energy meter was not carried out for the monitoring period duration 19/12/2010 to 18/07/2011, thus error factor is been applied to the generation values beyond due date of calibration validity. Further in 2012 calibration was delayed from 18/07/2012 to 17/11/ 2012. Thus error factor for the complete delayed period is applied.

¹⁰ Calibration of the energy meter was not carried out since commission to 17/11/2012, thus error factor is been applied to the generation values beyond due date of calibration validity.

¹¹ Calibration of the energy meter was not carried out since commission to 18/07/2011, thus error factor is been applied to the generation values beyond due date of calibration validity.

¹² Calibration of the energy meter was not carried out since commission to 23/07/2011, thus error factor is been applied to the generation values beyond due date of calibration validity.

Palsodi	Feeder-III: Main meter: MPE 57983 Check meter: MPE 57984	19/03/2010, 18/07/2011, 04/06/2012 ¹³ 20/02/2010, 23/07/2011, 04/06/2012
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¹³ Calibration of the energy meter was not carried out since commission to 23/07/2011, thus error factor is been applied to the generation values beyond due date of calibration validity.

APPENDIX-IV: DETAILS OF APPORTIONING DATA:

Apportioning for 2010

Apportioning:			
Osian	Net export	Export	Import
Net generation as per credit report during period 01-12-2010 to 04-01-2011 (kWh)	277000	280226	3226
Net generation as per DGR during period 01-12-2010 to 31-12-2010 (kWh)	288247		
Net generation as per DGR during period 01-01-2011 to 04-01-2011 (kWh)	16054		
Ratio of generation as per DGR during period 01-12-2010 to 31-12-2010	0.95		
Net generation as per apportioning of the credit report reading during period 01-12-2010 to 31-12-2010 (kWh)	262386	265442	3056

RKB			
	Net export	Export	Import
Net generation as per credit report during period 01-12-2010 to 03-01-2011 (kWh)	279079	282651	3572
Net generation as per DGR during period 01-12-2010 to 31-12-2010 (kWh)	292896		
Net generation as per DGR during period 01-01-2011 to 03-01-2011 (kWh)	11064		
Ratio of generation as per DGR during period 01-12-2010 to 31-12-2010	0.96		
Net generation as per apportioning of the credit report reading during period 01-12-2010 to 31-12-2010 (kWh)	268920	272362	3442

Akal-I			
	Net export	Export	Import
Net generation as per credit report during period 02-12-2010 to 03-01-2011 (kWh)	658518	666876	8358
Net generation as per DGR during period 02-12-2010 to 31-12-2010 (kWh)	684196		
Net generation as per DGR during period 01-01-2011 to 03-01-2011 (kWh)	45688		
Ratio of generation as per DGR during period 02-12-2010 to 31-12-2010	0.94		
Net generation as per apportioning of the credit report reading during period 02-12-2010 to 31-12-2010 (kWh)	617297	625132	7835

Jaora-III			
	Net export	Export	Import
Net generation as per credit report during period 24-12-2010 to 25-01-2011 (kWh)	839054	861353	22299
Net generation as per DGR during period 24-12-2010 to 31-12-2010 (kWh)	258046		
Net generation as per DGR during period 01-01-2011 to 25-01-2011 (kWh)	631173		
Ratio of generation as per DGR during period 24-12-2010 to 31-12-2010	0.29		
Net generation as per apportioning of the credit report reading during period 24-12-2010 to 31-12-2010 (kWh)	243488	249959	6471

Apportioning for 2011

Osian	Net export	Export	Import
Net generation as per credit report during period 01-12-2010 to 04-01-2011 (kWh)	277000	280226	3226
Net generation as per DGR during period 01-12-2010 to 31-12-2010 (kWh)	288247		
Net generation as per DGR during period 01-01-2011 to 04-01-2011 (kWh)	16054		
Ratio of generation as per DGR during period 01-01-2011 to 04-01-2011	0.05		
Net generation as per apportioning of the credit report reading during period 01-01-2011 to 04-01-2011 (kWh)	14613	14783	170
	Net export	Export	Import
Net generation as per credit report during period 01-12-2011 to 02-01-2012 (kWh)	322162	324924	2762
Net generation as per DGR during period 01-12-2011 to 31-12-2011 (kWh)	333641		
Net generation as per DGR during period 01-01-2012 to 02-01-2012 (kWh)	35791		
Ratio of generation as per DGR during period 01-12-2011 to 31-12-2011	0.90		
Net generation as per apportioning of the credit report reading during period 01-12-2011 to 31-12-2011 (kWh)	290950	293444	2494

Akal-I	Net export	Export	Import
Net generation as per credit report during period 02-12-2010 to 03-01-2011 (kWh)	658518	666876	8358
Net generation as per DGR during period 02-12-2010 to 31-12-2010 (kWh)	684196		
Net generation as per DGR during period 01-01-2011 to 03-01-2011 (kWh)	45688		
Ratio of generation as per DGR during period 01-01-2011 to 03-01-2011	0.06		
Net generation as per apportioning of the credit report reading during period 01-01-2011 to 03-01-2011 (kWh)	41220	41743	523
	Net export	Export	Import
Net generation as per credit report during period 01-12-2011 to 02-01-2012 (kWh)	407208	416925	9717
Net generation as per DGR during period 01-12-2011 to 31-12-2011 (kWh)	433250		
Net generation as per DGR during period 01-01-2012 to 02-01-2012 (kWh)	16292		
Ratio of generation as per DGR during period 01-12-2011 to 31-12-2011	0.96		
Net generation as per apportioning of the credit report reading during period 01-12-2011 to 31-12-2011 (kWh)	392450	401815	9365

RKB	Net export	Export	Import
Net generation as per credit report during period 01-12-2010 to 03-01-2011 (kWh)	279079	282651	3572
Net generation as per DGR during period 01-12-2010 to 31-12-2010 (kWh)	292896		
Net generation as per DGR during period 01-01-2011 to 03-01-2011 (kWh)	11064		
Ratio of generation as per DGR during period 01-01-2011 to 03-01-2011	0.04		
Net generation as per apportioning of the credit report reading during period 01-01-2011 to 03-01-2011 (kWh)	10158	10288	130

Net generation as per credit report during period 02-12-2011 to 03-01-2012 (kWh)	349280	353380	4100
Net generation as per DGR during period 02-12-2011 to 31-12-2011 (kWh)	364527		
Net generation as per DGR during period 01-01-2012 to 03-01-2012 (kWh)	41121		
Ratio of generation as per DGR during period 01-12-2011 to 31-12-2011	0.90		
Net generation as per apportioning of the credit report reading during period 01-12-2011 to 31-12-2011 (kWh)	313873	317557	3684

Akal-II	Net export	Export	Import
Net generation as per credit report during period 01-12-2011 to 02-01-2012 (kWh)	192943	196104	3161

Net generation as per DGR during period 01-12-2011 to 31-12-2011 (kWh)	204348		
Net generation as per DGR during period 01-01-2012 to 02-01-2012 (kWh)	7081		
Ratio of generation as per DGR during period 01-12-2011 to 31-12-2011	0.97		
Net generation as per apportioning of the credit report reading during period 01-12-2011 to 31-12-2011 (kWh)	186481	189536	3055

Palsodi	Net export	Export	Import	Net export	Export	Import	Net export	Export	Import
	Feeder-I			Feeder-II			Feeder-III		
Net generation as per credit report during period 10-12-2011 to 10-01-2012 (kWh)	259316	260849	1533	685689	690872	5183	409970	413184	3214
Net generation as per DGR during period 10-12-2011 to 31-12-2011 (kWh)	199653			522491			315321		
Net generation as per DGR during period 01-01-2012 to 10-01-2012 (kWh)	112760			291808			185671		
Ratio of generation as per DGR during period 10-12-2011 to 31-12-2011	0.64			0.64			0.63		
Net generation as per apportioning of the credit report reading during period 10-12-2011 to 31-12-2011 (kWh)	165720	166700	980	439969	443294	3325	258032	260055	2023

Jaora	Net export	Export	Import			
	Jaora-III			Net export	Export	Import
Net generation as per credit report during period 24-12-2010 to 25-01-2011 (kWh)	839054	861353	22299			
Net generation as per DGR during period 24-12-2010 to 31-12-2010 (kWh)	258046					
Net generation as per DGR during period 01-01-2011 to 25-01-2011 (kWh)	631173					
Ratio of generation as per DGR during period 01-01-2011 to 25-01-2011	0.71					
Net generation as per apportioning of the credit report reading during period 01-01-2011 to 25-01-2011 (kWh)	595565	611393	15827	Net export	Export	Import
				Jaora-IV		
Net generation as per credit report during period 24-12-2011 to 24-01-2012 (kWh)	974255	986300	12045	617400	626400	9000
Net generation as per DGR during period 24-12-2011 to 31-12-2011 (kWh)	232548			144687		
Net generation as per DGR during period 01-01-2012 to 24-01-2012 (kWh)	804632			510186		
Ratio of generation as per DGR during period 24-12-2011 to 31-12-2011	0.22			0.22		
Net generation as per apportioning of the credit report reading during period 24-12-2011 to 31-12-2011 (kWh)	218439	221140	2701	136407	138396	1988

Apportioning for 2012

Osian	Net export	Export	Import
Net generation as per credit report during period 01-12-2011 to 02-01-2012 (kWh)	322162	324924	2762
Net generation as per DGR during period 01-12-2011 to 31-12-2011 (kWh)	333641		
Net generation as per DGR during period 01-01-2012 to 02-01-2012 (kWh)	35791		
Ratio of generation as per DGR during period 01-01-2012 to 02-01-2012	0.10		
Net generation as per apportioning of the credit report reading during period 01-01-2012 to 02-01-2012 (kWh)	31211	31479	268

Net generation as per credit report during period 03-12-2012 to 02-01-2013 (kWh)	286298	289102	2804
Net generation as per DGR during period 03-12-2012 to 12-12-2012 (kWh)	52083		
Net generation as per DGR during period 13-12-2012 to 02-01-2013 (kWh)	230026		
Ratio of generation as per DGR during period 03-12-2012 to 12-12-2012	0.18		
Net generation as per apportioning of the credit report reading during period 03-12-2012 to 12-12-2012 (kWh)	52856	53374	518

Akal-I	Net export	Export	Import
Net generation as per credit report during period 01-12-2011 to 02-01-2012 (kWh)	407208	416925	9717
Net generation as per DGR during period 01-12-2011 to 31-12-2011 (kWh)	433250		
Net generation as per DGR during period 01-01-2012 to 02-01-2012 (kWh)	16292		
Ratio of generation as per DGR during period 01-01-2012 to 02-01-2012	0.04		
Net generation as per apportioning of the credit report reading during period 01-01-2012 to 02-01-2012 (kWh)	14757	15109	352

Net generation as per credit report during period 01-12-2012 to 01-01-2013 (kWh)	561161	569718	8557
Net generation as per DGR during period 01-12-2012 to 12-12-2012 (kWh)	143310		
Net generation as per DGR during period 13-12-2012 to 01-01-2013 (kWh)	447007		
Ratio of generation as per DGR during period 01-12-2012 to 12-12-2012	0.24		
Net generation as per apportioning of the credit report reading during period 01-12-2012 to 12-12-2012 (kWh)	136231	138309	2077

RKB	Net export	Export	Import
Net generation as per credit report during period 02-12-2011 to 03-01-2012 (kWh)	349280	353380	4100
Net generation as per DGR during period 02-12-2011 to 31-12-2011 (kWh)	364527		
Net generation as per DGR during period 01-01-2012 to 03-01-2012 (kWh)	41121		
Ratio of generation as per DGR during period 01-01-2012 to 03-01-2012	0.10		
Net generation as per apportioning of the credit report reading during period 01-01-2012 to 03-01-2012 (kWh)	35406	35822	416

Net generation as per credit report during period 01-12-2012 to 02-01-2013 (kWh)	350736	353656	2920
Net generation as per DGR during period 01-12-2012 to 12-12-2012 (kWh)	114035		
Net generation as per DGR during period 13-12-2012 to 02-01-2013 (kWh)	268999		
Ratio of generation as per DGR during period 01-12-2012 to 12-12-2012	0.30		
Net generation as per apportioning of the credit report reading during period 01-12-2012 to 12-12-2012 (kWh)	104419	105288	869

Akal-II	Net export	Export	Import
Net generation as per credit report during period 01-12-2011 to 02-01-2012 (kWh)	192943	196104	3161
Net generation as per DGR during period 01-12-2011 to 31-12-2011 (kWh)	204348		
Net generation as per DGR during period 01-01-2012 to 02-01-2012 (kWh)	7081		
Ratio of generation as per DGR during period 01-01-2012 to 02-01-2012	0.03		
Net generation as per apportioning of the credit report reading during period 01-01-2012 to 02-01-2012 (kWh)	6461	6567	106

Net generation as per credit report during period 01-12-2012 to 01-01-2013 (kWh)	199115	201268	2153
Net generation as per DGR during period 01-12-2012 to 12-12-2012 (kWh)	61620		
Net generation as per DGR during period 13-12-2012 to 01-01-2013 (kWh)	148261		
Ratio of generation as per DGR during period 01-12-2012 to 12-12-2012	0.29		
Net generation as per apportioning of the credit report reading during period 01-12-2012 to 12-12-2012 (kWh)	58459	59091	632

Net export	Export	Import	Net export	Export	Import	Net export	Export	Import
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Palsodi	Feeder-I			Feeder-II			Feeder-III		
Net generation as per credit report during period 10-12-2011 to 10-01-2012 (kWh)	259316	260849	1533	685689	690872	5183	409970	413184	3214
Net generation as per DGR during period 10-12-2011 to 31-12-2011 (kWh)	199653			522491			315321		
Net generation as per DGR during period 01-01-2012 to 10-01-2012 (kWh)	112760			291808			185671		
Ratio of generation as per DGR during period 01-01-2012 to 10-01-2012	0.36			0.36			0.37		
Net generation as per apportioning of the credit report reading during period 01-01-2012 to 10-01-2012 (kWh)	93595	94148	553	245719	247577	1857	151937	153128	1191

Net generation as per credit report during period 09-12-2012 to 09-01-2013 (kWh)	257325	258948	1623	650154	655853	5699	397888	401493	3605
Net generation as per DGR during period 09-12-2012 to 12-12-2012 (kWh)	7359			14357			9696		
Net generation as per DGR during period 13-12-2012 to 09-01-2013 (kWh)	270599			686224			421042		
Ratio of generation as per DGR during period 09-12-2012 to 12-12-2012	0.03			0.02			0.02		
Net generation as per apportioning of the credit report reading during period 09-12-2012 to 12-12-2012 (kWh)	6812	6855	43	13323	13440	117	8956	9037	81

Jaora	Net export	Export	Import	Net export	Export	Import
	Jaora-III			Jaora-IV		
Net generation as per credit report during period 24-12-2011 to 24-01-2012 (kWh)	974255	986300	12045	617400	626400	9000
Net generation as per DGR during period 24-12-2011 to 31-12-2011 (kWh)	232548			144687		
Net generation as per DGR during period 01-01-2012 to 24-01-2012 (kWh)	804632			510186		
Ratio of generation as per DGR during period 01-01-2012 to 24-01-2012	0.78			0.78		
Net generation as per apportioning of the credit report reading during period 01-01-2012 to 24-01-2012 (kWh)	755815	765159	9344	480992	488003	7011

Net generation as per credit report during period 24-11-2012 to 24-12-2012 (kWh)	538323	555278	16955	331380	345600	14220
Net generation as per DGR during period 24-11-2012 to 12-12-2012 (kWh)	362691			231605		
Net generation as per DGR during period 13-12-2012 to 24-12-2012 (kWh)	233281			141099		
Ratio of generation as per DGR during period 24-11-2012 to 12-12-2012	0.61			0.62		
Net generation as per apportioning of the credit report reading during period 24-11-2012 to 12-12-2012 (kWh)	327607	337925	10318	205925	214762	8837

APPENDIX-IV: DETAILS OF STAFF TRAINING:

Staff Training Details:

Training date	Training Program	Training Venue	No. of Staff Members Trained
02-11-2010	Behavioral Based Safety	Palsodi	3
25-11-2010	Basic Safety	Ratlam	1