Voluntary Carbon Standard
Project Description

19 November 2007

Date of PD: 10th November 2009
Version: 2

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1 Description of Project:

1.1 Project title

Positive Climate Care 4.67 MW Bundled Grid connected Wind Power Project Activity in Jaisalmer, Rajasthan, India

Date: 10th November 2009
Version 2

1.2 Type/Category of the project

Project has applied approved methodology available for small-scale CDM project at UNFCCC website under Appendix B of the simplified modalities and procedures for small-scale CDM project activities.
Type I: Renewable Energy Projects
Category ID: Grid connected renewable electricity generation
Reference: I.D./Version 14
Scope: 1
EB48
Valid from 31st July 2009

The project activity is a Wind energy based power generation project of capacity 4.67 MW consists of 7 Wind Turbine Generators (WTGs) that includes 3.75 MW (1250 kW X 3 machines) and 0.92 MW (230 kW X 4 machines). The WTGs are located in District Jaisalmer in the state of Rajasthan. The project is promoted by M/s Rajesh Construction Company, M/s Savla Twisters Pvt. Ltd., M/s Vijay Industries Ltd. & M/s Saurabh Agrotech Pvt. Ltd. M/s Vijay Industries & M/s Saurabh Agrotech Pvt. Ltd. are sister concerns.

The project is not a grouped project as per VCS 2007.1 standard.

1.3 Estimated amount of emission reductions over the crediting period including project size:

The project activity is expected to generate 8293 tonnes CO_2 equivalent (tCO_2e) emissions reductions per year. Total Estimated Emission reductions are 82930 tCO_2e over the ten year crediting period.

Table 1: Estimated amount of emission reductions over the chosen crediting period

Year	Annual Emission Reduction (metric tonnes CO_2e)
01April 2006 - 31 December 2006	6,220
01January 2007 – 31 December 2007	8,293
01January 2008 – 31December 2008	8,293
01January 2009 – 31 December 2009	8,293
01January 2010 – 31 December 2010	8,293
01January 2011 – 31 December 2011	8,293
01January 2012 – 31 December 2012	8,293
01January 2013 – 31 December 2013	8,293
01January 2014 – 31 December 2014	8,293
01January 2015 – 31 December 2015	8,293

01January 2016 – 31 March 2016	2,073
Total Estimated Reductions (tonnes of CO_2e)	**82930**
Total number of Crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**8293**

1.4 A brief description of the project:

The purposes of the project activity are:

- Harnessing wind energy potential for generation of power.
- Increasing the share of renewable energy power generation in the regional as well as national grid.
- Reducing the gap between demand and supply of electricity in the state of Rajasthan and indirectly in India.

Besides, the project activity will achieve the following macro objectives:

- Contributing positively towards energy economy by conservation of natural resources like Coal, oil.
- Essentially reducing GHG emission at thermal power generation end.

Therefore, the main objective of the present project activity is to generate renewable electricity using wind power resources and to sell and wheel the generated electricity to the State Electricity Utility RVPNL (RRVPNL –Rajasthan Rajya Vidyut Prasaran Nigam Limited).

The project activity consists of 7 numbers of Wind Turbine Generators (WTGs) comprising of 3 machines of 1250 kW capacity each (Suzlon make) and 4 machines of 230 kW capacity each (Enercon make) with aggregate installed capacity of 4.67 MW located in the state of Rajasthan. The bundled project activity is expected to generate 9151 MWh per annum. Had this amount of electricity been produced by conventional fuel dominated power plants, it would lead to net emission of 8293 tons of CO_2 per annum. Therefore, Project Proponents (PPs) have decided to harness renewable energy entailing to the establishment of these winds farms.

Table 2 provides phase wise installations, location and capacity of wind turbine generators of the project activity.

Table 2: Investor wise- Locational details of Project Activity and Project Commissioning Date

Project Site	Name of Project Proponent	WTG make and Capacity	No. of Machines	Total capacity	Location	Project commissioning Date
1	**Rajesh Construction Company Limited (formerly Rajesh Construction Co.)**	Suzlon Energy Ltd, 1250 kW	2	2.5 MW	Village – Akal, District – Jaisalmer, State - Rajasthan	October 31st, 2003

2	**Savla Twisters Pvt. Ltd.**	Suzlon Energy Ltd, 1250 kW	1	1.25 MW	Village – Soda-Mada, District – Jaisalmer, State - Rajasthan	April 30th, 2004
3	**Vijay Industries Ltd.**	Enercon (India) Ltd, 230 kW	2	0.46 MW	Village – Themdarai, near Gorera side, District – Jaisalmer, State - Rajasthan	March 29th, 2003
4	**Saurabh Agrotech Pvt. Ltd.**	Enercon (India) Ltd, 230 kW	2	0.46 MW	Village – Themdarai, near Hansuwal side, District – Jaisalmer, State – Rajasthan	March 29th, 2003

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

The geographical location of the project can be depicted from the maps as shown below:

Figure 1: Location of Rajasthan in India

Figure 2: State Map of Rajasthan showing Districts

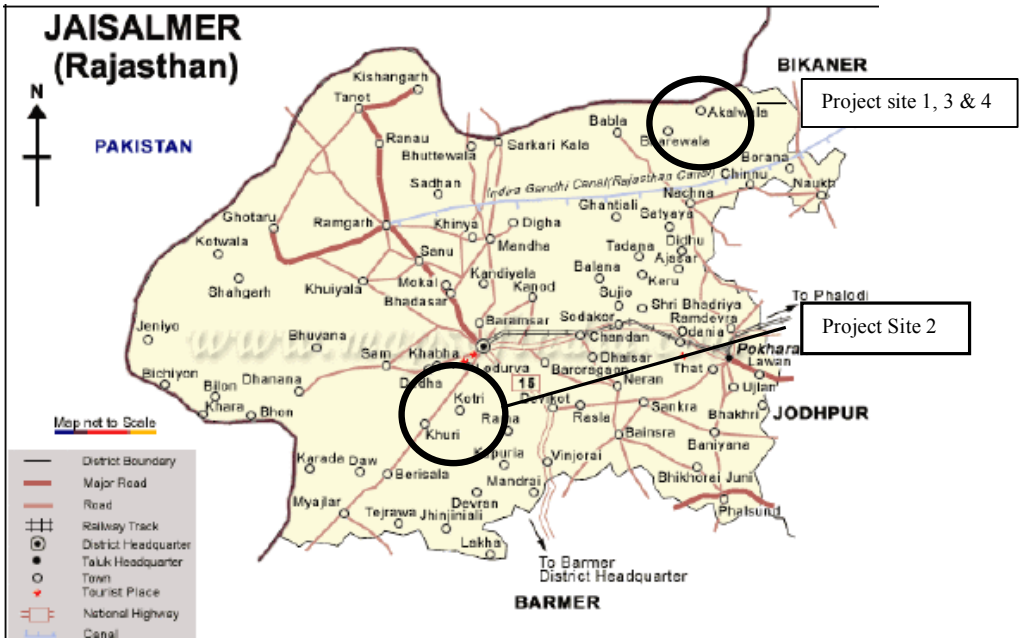

Figure 3: District Map Jaisalmer

The following table provides Location number and Latitude & Longitude details of the wind turbine generators of the project activity.

Table 3: Latitude & Longitude details of the Project Activity

Project Proponent	WTG Location	Latitude & Longitude	Village	District
Rajesh Construction Company Ltd. (formerly Rajesh Construction Co.)	J-137	N26° 46' 37.5" & E71° 05' 33.5"	Akal	Jaisalmer
	J-132	N26° 46' 52.0" & E71° 05' 41.5"		
Savla Twisters Pvt. Ltd	J-224	N26° 40' 55.1" & E70° 52' 49.6"	Soda Mada	Jaisalmer
Vijay Industries	VIKL-01	N26° 45' 24.5" & E70° 53' 25.7"	Themdarai, near Gorera side	Jaisalmer
	VIKL-02	N26° 45' 30.5" &		

		E70° 53' 25.8"		
Saurabh Agrotech Pvt. Ltd.	SAPL-01	N26° 45' 48.5" & E70° 53' 27.1"	Themdarai, near Hansuwal side	Jaisalmer
	SAPL-02	N26° 45' 52.4" & E70° 53' 25.4"		

The nearest railway station is Jaisalmer Junction and the nearest airport is at Jaisalmer. The airport is opened for flights only during tourist season.Nearest Highway is NH-15 (Jaisalmer – Barmer).

1.6 Duration of the project activity/crediting period:

Project Start Date:
As per VCS 2007.1, the project start date shall not be before 1st January, 2002. The first WTG of the project activity was commissioned on 29th March 2003 which is also the start date of the present project activity. The Crediting Period will last for ten years starting from 1st April 2006 up to 31st March 2016.

1.7 Conditions prior to project initiation:

Electricity in Rajasthan is mainly generated from the fossil fuel dominated power plants. The electricity grid is power deficit and hence the new capacity has to be added in the grid system which would be fossil fuel dominated electricity generation. The land on which the current project activity took place was barren and the WTGs installed are all new installations.

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The project activity is a bundled wind power project activity with a totalled installed capacity of 4.67 MW and is expected to generate 9151MWh per annum. The electricity thus generated is sold and wheeled to Jaipur/Jodhpur DISCOM. In the absence of the project activity, equivalent amount of electricity would have been generated by the operation of existing/proposed grid connected fossil fuel dominated power plants. The Project activity will thus reduce the anthropogenic emissions of greenhouse gases (GHGs) in to the atmosphere associated with the equivalent amount of electricity generation from the fossil fuel dominated grid connected power plant.

1.9 Project technologies, products, services and the expected level of activity:

Technology

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy.

Wind blowing at high speeds, has considerable amount of kinetic energy. When this kinetic energy passes through the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity. The technology is a clean technology since, there are no GHG emissions associated with the electricity generation.

The employed technology converts wind energy to electricity using a Wind Electric Generator. Until recent past, the Indian WEG industry was using kW class turbines for conversion of wind energy into electricity. The use of kW category WEGs was occupying same amount of space whereas the generation of electricity was comparatively less and the wind energy potential of the site was not harnessed to its optimum extent. The new state-of-the-art MW class WEGs is more efficient and technologically sound. Supplier wise details of WTGs are given in following table:

Table 4: WTGs Capacity, Make (Supplier) & their Model No.

Project Proponent	Region	Number of WTG	Make
Rajesh Construction Co. Ltd.	Akal	2 no. of 1250 kW	Suzlon S-66
Savla Twisters Pvt. Ltd	Soda – Mada	1 no. of 1250 kW	Suzlon S-66
Vijay Industries Ltd.	Gorera	2 no. of 230 kW	Enercon E-30
Saurabh Agrotech Pvt. Ltd.	Hansua	2 no. of 230 kW	Enercon E-30

Technical details of Wind Turbine Generators of Project Proponents are as follows:

Table 5: Technical Specifications of WTGs

S. No.	Item	Description	
1.	Make	Suzlon	Enercon
2.	Model no.	S66	E-30
3.	Rating in kW	1250	800
4.	Rotor diameter	66m	30m
5.	Rotor Swept area	3217 m^2 / 3421.19 m^2	707 m^2
6.	Cut-in wind speed	3 m/s	2.5 m/s (Start –up)
7.	Wind speed	65 m/s / 67 m/s (Survival)	13 m/s (Rated)
8.	Cut-out wind speed	25 m/s	25 m/s (Shut-down)
9.	Generator Type	Asynchronous	Ring Generator –Synchronous
10.	Gear Ratio	74.917:1	
11.	Gearbox Type	Integrated 3 stage gearbox	Gear less
12.	Yaw Drive Bearing type	Polyamide Slide Bearing	
13.	Yaw Drive system	4 active electrical yaw motors	Active via adjusting gears, damped via friction bearing
14.	Brake system	Spring applied hydraulically released disc brake	Three independent pitch control

Power evacuation facility for the project activity is as per following table:

Table 6: Power Evacuation Facility

S.No.	Project Proponent	Power Evacuation Facility
1.	**Rajesh Construction Co. (2.5 MW)**	These WEGs are connected to Suzlon Metering No. 6, tapped from 33 KV Devikot Feeder near village Akal, Dist. Jaisalmer
2.	**Savla Twisters Pvt. Ltd. (1.25 MW)**	WEGs are interconnected to 33/220 KV end of Mada GSS with Metering Arrangement No. 7.
3.	**Vijay Industries Ltd. (0.46 MW)**	The energy generated from the WEG is fed to the 33 KV feeder Jaisalmer- Khuri, which is radiating from 132 KV Temderai GSS to Amarsagar RRVPNL GSS at Jaisalmer.
4.	**Saurabh Agrotech Pvt. Ltd. (0.46 MW)**	The energy generated from the WEG is fed to the 33 KV feeder Jaisalmer- Khuhari, which is radiating from 132 KV Temderai GSS to Amarsagar RRVPNL GSS at Jaisalmer.

The generated electricity is being supplied to the RVPNL/DISCOM(s). The Rajasthan State grid forms part of the NEWNE (Northern, Eastern, Western and North-Eastern) Regional Grid of India (Since August 2006, all regional grids except the Southern grid have been integrated and are operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grid are treated as a single grid and is being named as NEWNE grid).

1.10 Compliance with relevant local laws and regulations related to the project:

The project has been executed after receiving the necessary consent of the involved state government agency Rajasthan Renewable Energy Corporation Limited (incorporating formerly Rajasthan Energy Development Authority (REDA) and Rajasthan Renewable Energy Corporation Limited (RRECL)) which is responsible for executing the state electricity policy as per Rajasthan Electricity Regulatory Commission in the state of Rajasthan. PPs have signed power purchase/ Wheeling & Banking agreement with the state power utility Jaipur Vidyut Vitran Nigam Limited (JVVNL/ Jaipur DISCOM) and/or Jodhpur Vidyut Vitran Nigam Limited (JdVVNL/ Jodhpur DISCOM) for power purchase/ Wheeling & Banking of electricity.

As power utilities are under the domain of the state government, the standard application procedure followed by meeting the stipulated requirements of the state government was carried out. The final outcome of the procedure resulted in the following licences & permissions:

Table 7: Permission to commission / implement the project by State Government

Permission by State Government		
Rajesh Construction Company Limited		
1.	Transfer/ sub lease of land to the investor for the wind farm being set up by Suzlon Energy Ltd. at Jaisalmer	Vide letter Reference No. RREC/2004-05/D-7366-70 dated: 14-12-2004
2.	Power Purchase agreement between Rajesh Construction Company and Rajasthan Rajya Vidyut Prasaran Nigam Limited and Suzlon Energy Ltd.	Dated 10-10-2003
3.	Commissioning Certificate	Vide letter Ref. No. JVVNL / XEN / O&M / JSM /S:TECH/F:D.1246 dated 31-10-2003
Savla Twisters Pvt. Ltd.		
1.	Letter from RRECL to RVPNL informing about the authorisation to Suzlon for setting up of 1.25 MW wind power project in Soda Mada for Savla Twisters.	Vide letter Reference No. RREC/Wind/2003-04/12229-12235 dated 16-02-2004
2.	Power Purchase agreement between Savla Twisters Pvt. Ltd. and Rajasthan Rajya Vidyut Prasaran Nigam Limited and Suzlon Energy Ltd.	Dated 19-02-2004
3.	Commissioning Certificate	Vide letter Ref. No. RRVPNL/XEN/TCCIV / BMR/D:64 dated 30-04-2004
Saurabh Agrotech Pvt. Ltd.		
1.	Wheeling & Banking Agreement between Saurabh Agrotech Pvt.Ltd., RRVPNL, JdVVNL, JVVNL and Enercon India Ltd.	Dated 19-03-2003
2.	Commissioning Certificate	Vide letter Ref. No. JVVNL /XEN /O&M / JSM /S:TECH/F:D.1982 dated 29-03-2003

Vijay Industries Ltd.		
1.	Wheeling & Banking Agreement between Vijay Industries Ltd., RRVPNL, JdVVNL, JVVNL and Enercon India Ltd.	Dated 19-03-2003
2.	Commissioning Certificate	Vide letter Ref. No. JVVNL/ XEN/O&M /JSM/S:TECH/F:/D.1988 dated 29-03-2003

The copy of above mentioned documents will be povided to Validator.

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

Variation in power generation data due to non-consistent Capacity utilization factor –

The major risk faced by the promoters is the uncertainty in the electricity generation. Rajasthan suffers from low capacity utilization factor. The Capacity utilization factor is defined as effective available generation time as a percentage of ideal case and can be used as a thumb rule to determine the financial returns of the project activity. As wind power generation is dependent on many factors like machine availability, grid availability, wind availability, climatic factors etc., the capacity utilized is less than best case scenario. Even though wind farm developers promise about 25-30% of CUF per WTG during a year, this much generation is always questionable. Effective CUF depends upon the availability of the wind and is not under the control of supplier or owner of the WEGs. Depending upon the pattern, the CUF is estimated. Hence, there is always a chance for fluctuation in CUF which would affect the production of electricity and in turn the associated returns from the wind farm.

Grid Evacuation Facility

Power generation in wind turbines due to its inherent feature depends on climatic conditions and is beyond the control of project proponents. Due to this reason, power from WTGs is considered to meet demand only in the event when it can't be met with conventional power sources. Often, wind turbines in Rajasthan have been asked to back down as power generation in thermal power stations had been running at their peak resulting in high frequency in the grid. Thus the state electricity grid is not able to evacuate power that the windmill units are generating. The wind pattern in Rajasthan is such that the maximum generation is achieved during the nights, when the load on the system is very low. The inadequate evacuation facility coupled with the maximum generation during off peak hours leads to low sales realization, which results in low returns for the project promoters.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

The project activity is a Greenfield project activity. The project activity is a bundled wind power project activity with a totalled installed capacity of 4.67 MW and is expected to generate 9151 MWh per annum. The Wind Energy is a renewable energy source and hence the GHG emissions due to the electricity generation from the WTG are Zero. Therefore, it is confirmed that the project was not

implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

Rajesh Construction Company Limited

Rajesh Construction has applied for registration under the Chicago Climate Exchange (CCX) from date of Commissioning up to March 27th, 2006 and the registration is awaited. The evidence for the same has been provided to Validator.

Project Proponent, Rajesh Construction has not created GHG emission reduction or removal credits through any other GHG Program for any form of environmental credit for the period which will be accounted under VCS. A letter of undertaking from the PP has been provided to Validator for the same.

Savla Twisters Pvt. Ltd.

Project Proponent, Savla Twisters has applied for Registration under CDM process and the project is in validation stage. The crediting period under VCS will last till the date of Registration of project under CDM.

PP has got registration under the Chicago Climate Exchange (CCX) program since December 1st, 2004 up to March 31st, 2006. The evidence for the same has been provided to Validator

A letter of undertaking from the PP has been provided to Validator for the same, in which PP has declared that GHG reduction credit would be claimed under only one GHG program for a particular period of time (Monitoring period) to avoid double counting of GHG credits, in line with VCS 2007.1 standard and the, "Further Guidance for projects that are Registered in two GHG Programs" dated 19 March, 2008 issued by VCS Association.

Vijay Industries Ltd. & Saurabh Agrotech Pvt. Ltd.

The PP has not created GHG emission reduction or removal credits through any other GHG Program for any form of environmental credit for the period (Monitoring period) which will be accounted under VCS.

1.14 Project rejected under other GHG programs (if applicable):

The present project activity is not rejected in any other GHG program.

1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:

List of Project Proponents	Roles

• **M/s Rajesh Construction Company Ltd. (formerly Rajesh Construction Co.)** • **M/s Savla Twisters Pvt. Ltd.** • **M/s Vijay Industries** • **M/s Saurabh Agrotech Pvt. Ltd.**	Project Development Project monitoring Supervision of O&M Activities Data monitoring

Project Consultant	
Organization	**M/s Positive Climate Care Private Limited**
Street/P.O.Box:	108
Building:	Ashirwad Complex, Central Spine, Vidyadhar Nagar
City:	Jaipur
State/Region:	Rajasthan
Postfix/ZIP:	302023
Country:	India
Tele –Fax:	+91-141-2338078
URL:	www.positiveclimatecare.com
Represented by:	**Ms. Meenakshi Jain**
Title:	Miss
Salutation:	Chief Managing Director
Last Name:	Jain
First Name:	Meenakshi
Department:	Carbon Emissions Solutions
Mobile Number:	+91-9413203573
Direct Telephone:	+91-141-2338078
Personal E-mail:	meenakshi@positiveclimatecare.com

Organization:	**M/s Rajesh Construction Company Limited (formerly Rajesh Construction Co.)**
Street/P.O.Box:	M.I.D.C. Cross Road "B", Off Andheri Kurla Road,
Building:	R B House,
City:	Andheri (E), Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400059
Country:	India
Represented by:	**Mr. Jignesh P. Waghela**
Title:	Mr.
Salutation:	General Manager Finance
Last Name:	Waghela
Middle Name:	Pravinbhai
First Name:	Jignesh
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Direct tel:	+91-22-67359900
Personal E-Mail:	jigneshwaghela@rajeshbuilders.com

Organization:	**M/s Savla Twisters Pvt. Ltd.**
Street/P.O.Box:	202 A,
Building:	"PASHAKA", Ring Road
City:	Surat
State/Region:	Gujarat
Postfix/ZIP:	395002
Country:	India
Represented by:	**Mr. Dimpesh S. Savla**
Title:	Mr.
Salutation:	Director
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Middle Name:	S.
First Name:	Dimpesh
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Direct tel:	+91-261-2334051
Personal E-Mail:	dimpeshsavla@yahoo.co.in

Organization:	**M/s Vijay Industries**
Street/P.O.Box:	D-47
Building:	Hanuman Nagar, Vaishali Nagar
City:	Jaipur
State/Region:	Rajasthan
Postfix/ZIP:	302021
Country:	India
Represented by:	**Mr. Deepak Data**
Title:	Mr.
Salutation:	Managing Director
Last Name:	Data
First Name:	Deepak
Direct FAX:	+91-141-2554975
Direct tel:	+91-141-2554974
Personal E-Mail:	aks@datagroup.in

Organization:	**M/s Saurabh Agrotech Pvt. Ltd.**
Street/P.O.Box:	Plot 20-21 & 22
Building:	Old Industrial Area
City:	Alwar
State/Region:	Rajasthan
Postfix/ZIP:	301001
Country:	India
Represented by:	**Mr. Damodar Lal Gupta**

Title:	Mr.
Salutation:	Director
Last Name:	Data
Middle Name:	Lal
First Name:	Damodar
Direct FAX:	+91-141-2554975
Direct tel:	+91-141-2554974
Personal E-Mail:	aks@datagroup.in

An appropriate co-ordinating agency of the bundle will be communicated to the VCS Registry.

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):

The project activity follows all the legislation and it is not mandatory to take up wind project activity.

Contribution of the project activity to sustainable development

Out of the total coal production in India, most of the coal is used to produce power/electricity to meet the basic requirement of various sectors. This results in excessive demands for electricity and place immense stress on the environment. Changing coal consumption patterns will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the optimum use of Renewable Energy (RE) sources. This particular project activity is a step in the same direction. Government of India has stipulated following indicators for sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects[1], which is in accordance of VCS guidelines.

1. Social well-being
2. Economic well-being
3. Environmental well-being
4. Technological well-being

Social well being

The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources, to bank and wheel through the NEWNE Regional Grid for wheeling as well as sale to Grid and thereby contributing to climate change mitigation efforts. The project is located in the rural areas of Jaisalmer and implementation of the project activity has contributed positively towards the 'Sustainable Development' in this region.

- Employment opportunities have increased marginally for both skilled and unskilled labours in the surrounding areas due to the implementation of the project. The increased income level has improved the living standards of the people. Local people in the surrounding villages have

[1] http://cdmindia.nic.in/host_approval_criteria.htm

been employed for civil and mechanical works during the implementation of the project and permanent employment for some local people was given by O&M contractors (Enercon, Suzlon Energy Ltd.) for operation and maintenance of the wind farm.

- Electricity facilities are improved comparatively and expected to improve further in future due to the upcoming installations in the villages. Due to implementation of the project activity, certain developments have occurred in the surrounding area and the stakeholders admitted that the project activity has contributed towards the improvement of the socio economic conditions of the local area to some extent.
- Other infrastructural and communication facilities in the area have also improved considerably due to the project.

Economic well being

- The project activity generates various employment opportunity which leads to increase in their daily wages in the local area.
- Use of wind energy for electricity generation instead using fossil fuels like coal reduces stress on the economy of the country.
- The project activity has led to a good investment to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is led into the regional grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.

Environmental well being

- There is considerable wind resource in Rajasthan that has not been harnessed. This Project acts as a catalyst towards sustainable wind energy development in the state of Rajasthan.
- The wind energy based electricity generation helps in less fossil-fuel burning in the system and thus less GHG emissions in the atmosphere. Use of renewable energy source (wind energy) also helps in conservation of natural resources like coal and petroleum fuels.
- As wind power projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power.
- Also, as there is no fuel used for electricity generation, there aren't any effluents discharged into the water.

Technological well being

The technology used in the power plant is proven and safe. Increased interest in wind energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future.

1.17 List of commercially sensitive information (if applicable):

Not Applicable.

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

Project has applied approved methodology available for small-scale CDM project at UNFCCC website under Appendix B of the simplified modalities and procedures for small-scale CDM project activities:

Type I: Renewable Energy Projects
Category ID: Grid connected renewable electricity generation
Reference: I.D./Version 14
Scope: 1
EB48
Valid from 31st July 2009
Methodological Tool: "Tool to calculate the emission factor for an electricity system"
EB 35, Annex 12, version 01.1
Valid from 29th July 2008

Wind power is one among the various sources of renewable energy. The total installed capacity of the project activity is 4.67 MW which is less than the eligibility limit of 15 MW to qualify as a small scale project activity under Type I of the small- scale methodologies.

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

The project activity involves generation of electricity by the means of renewable energy, wind. The project activity falls under the small scale projects. The methodology chosen for the project activity and its applicability to the project activity is discussed below.

Type I: Renewable Energy Projects
Category D: Grid Connected Renewable Electricity Generation

Table 8: Applicability of Chosen Methodology AMS ID

S. No.	Technology/measure	Applicability
1.	This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.	The project activity involves electricity generation using renewable energy which is based on wind power and wheel & sale of the electricity generated to the DISCOM(s). This project activity displaces the equivalent amount of electricity generation through the operation of existing/proposed fossil fuel dominated power plants connected to the Grid.
2.	If the unit added has both renewable and non-renewable components (e.g. a	The project activity involves installation of renewable energy generation units only

	wind/diesel unit), the eligibility limit of 15MW for a small- scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel[2], the capacity of the entire unit shall not exceed the limit of 15MW.	(Wind Turbine Generators). The total installed capacity of the project activity is 4.67 MW which is less than the eligibility limit of 15 MW to qualify as a small scale project activity under Type I of the small scale methodologies.
3.	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct[3] from the existing units.	The project activity doesn't involve addition of renewable energy generation units at existing power generation facility.
4.	Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	The project activity doesn't seek to retrofit or modify an existing facility for renewable energy generation.

Hence, it can be concluded that the selected methodology, AMS I D – Grid Connected Renewable Electricity Generation is applicable to project activity.

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

In line with VCS 2007.1 standard, GHG sources, sinks and reservoirs for the baseline scenario have been identified as per following table:

Table 9: Baseline and Project Emission sources

	Source	**Gas**	**Included/ Excluded**	**Justification/Explanation**
Baseline	Fossil fuel fired power plants connected to the grid	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded.
		N_2O	Excluded	Excluded.
	Electricity generation through	CO_2	Excluded	The project activity is renewable energy project which will not create any emissions itself.

[2] Co-fired system uses both fossil and renewable fuels.

[3] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

Project Activity	wind energy	CH_4	Excluded	The project activity is renewable energy project which will not create any emissions itself.
		N_2O	Excluded	The project activity is renewable energy project which will not create any emissions itself.
Leakage	This is not applicable as the renewable energy technology used is not equipment transferred from another activity. Therefore, as per the simplified procedures for SSC project activities, no leakage calculation is required.			

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

The project activity is a renewable electricity generation activity that displaces fossil fuel dominated electricity generation. The baseline for the project activity is given by paragraph 9 in the methodology AMS I.D / version 14 which is, "the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in tCO_2e/MWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.
OR
(b) The weighted average emissions (in kg CO_2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used."
Hence, electricity baseline emission factor of the applicable grid has to be determined for estimating the emission reductions due to the grid electricity generation that is displaced by the project activity.

The option A has been used which prescribes use of "Tool to calculate the emission factor for an electricity system." This methodological tool determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "operating margin" (OM) and "Build Margin" (BM) as well as "Combined Margin" (CM) through a step wise approach. The steps required are as follows:

Step 1. Identify the relevant electric power system

Grid Selection

This approach is based on the assumption that the renewable energy project is displacing the average electricity mix in the grid. In India, power is a concurrent subject between the state and the central governments. The perspective planning, monitoring of implementation of power projects is the responsibility of Ministry of Power, Government of India. At the state level, the state utilities or state electricity boards (SEBs) are responsible for supply, transmission, and distribution of power. With power sector reforms, there have been unbundling and privatization of this sector in many states. Many of the state utilities are engaged in power generation also. In addition to this, there are different central / public sector organizations involved in generation like National Thermal Power Corporation

(NTPC), National Hydro Power Corporation (NHPC), etc. in transmission e.g. Power Grid Corporation of India Ltd. (PGCIL) and in financing e.g. Power Finance Corporation Ltd. (PFC).

The management of generation and supply of power within the regional grid is undertaken by the load dispatch centres (LDC). Different states within the regional grids meet the demand from their own generation facilities plus generation by power plants owned by the central sector i.e. NTPC and NHPC etc. Specific quota is allocated to different states from the central sector power plants. Depending on the demand and generation, there are exports and imports of power within different states in the regional grid. Thus, there is trading of power between states in the grid. Similarly, there are imports and export of power between regional grids. In August 2006, Northern Regional Grid was synchronised with the integrated Eastern, North Eastern and Western Grid in and the four regional grids have since been operating in synchronous mode. Hence there exist two regional grids i.e. NEWNE and Southern Grid.
Since the present VCS project is connected to the NEWNE grid it is also preferred to take the NEWNE grid as project boundary than the state boundary. It also minimizes the effect of inter state power transactions, which are dynamic and vary widely.

The installed capacity of power utilities in the states located in Northern Region at the end of financial year 2002-03 as per Ministry[4] of Power was 28452.56 MW. The total installed capacity comprised the following grid mix-

Hydro	Coal	Diesel	Natural Gas	Wind	Nuclear
8596.57 MW	15469.50 MW	14.99 MW	3175.40 MW	16.10 MW	1180.00 MW
30.21%	54.37%	0.05%	11.16%	0.057%	4.15%

The present project activity lies in Rajasthan which is a part of NEWNE grid. Rajasthan had energy (MU) shortages[5] of 2.10% and peak (MW) shortages of 1.5% in 2002-03.

Step 2. Select an operating margin (OM) method

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods: (a) Simple OM, (b), Simple adjusted OM, (c) Dispatch Data Analysis, or (d) Average OM. The two variants "Simple adjusted operating margin" and "Dispatch data analysis operating margin" cannot currently be applied in India due to lack of necessary data.

In India, hydro and nuclear stations qualify as low-cost / must-run sources and are excluded. The operating margin, therefore, can be calculated by dividing the region's total CO_2 emissions by the net generation of all thermal stations. Thus, Simple OM has been chosen.

For the simple OM, the simple adjusted OM and the average OM, the emission factor can be calculated using either of the two following data vintages:

[4] Ministry of Power, Annual Report 2002-03; http://www.powermin.nic.in/reports/pdf/ar02-03.pdf

[5] Northern Region Power Sector Profile, September 2005, Ministry of Power http://www.powermin.nic.in/indian_electricity_scenario/pdf/NR01005.pdf.

- Ex ante option: A 3-year generation weighted average, based on the most recent data available at the time of submission of the PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or
- Ex-post option: The year, in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

The ex-ante option has been selected for the Project.

Electricity Emission factor from CEA Data

Central Electricity Authority, (CEA) (www.cea.nic.in) is the statutory organization and its main objective is to advise the Government of India (Host Party) on the matters relating to the national electricity policy, formulate short-term and perspective plans for development of the electricity system and coordinate the activities of the planning agencies for the optimal utilization of resources to sub serve the interests of the national economy and to provide reliable and affordable electricity to all consumers. CEA has made an elaborate study and has determined electricity baseline emission factor for all grids in India for both the options of weighted average emissions and on combined margin approach which is as per AMS I.D. The latest emission factor of the NEWNE regional grid has been considered for estimation of emission reductions of the project activity. CEA: CO_2 baseline database[6] Version 4.0 dated October 2008 data have been publicised and the simple OM has been referred for the OM calculation.

Step 3. Calculate the operating margin emission factor according to the selected method (OM)

The Operating Margin is calculated considering of the average of Operating Margin data for the NEWNE Grid as published by CEA during the years 2005-2006, 2006-2007 and 2007-2008. The average value for the NEWNE Grid is 1.0090 tCO_2/MWh.

Table 10: Simple Operating Margin

Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
Grid	**2005-06**	**2006-07**	**2007-08**
NEWNE	**1.01949**	**1.00835**	**0.99917**
Southern	1.00567	0.99912	0.99062
India	1.01657	1.00635	0.99735

Step 4. Identify the cohort of power units to be included in the build margin (BM)

The build margin is calculated as the generation-weighted average emission factor of a sample of power plants. As per the Tool, the sample group to calculate BM consists of either:

(a) The set of five power units that have been built most recently, or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

The option (b) has been chosen for the BM calculation. As per the Annex 12, EB 35 **"Tool to calculate the emission factor for an electricity system"**
In terms of vintage of data, project participants can choose between one of the following two options:

[6] http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The option (1) ex-ante calculation option has been chosen. This has been established by CEA.

Step 5. Calculate the build margin emission factor

The build margin considered is for the year 2007-2008 for the NEWNE grid and the value is 0.5977 tCO_2/MWh. The data for the build margin and the operating margin is taken from the Central Electricity Authority CO_2 Baseline Data base Version 04 dated October 2008.

Table 11: Build Margin

Build Margin (tCO_2/MWh) (not adjusted for imports)			
Grid	**2005-06**	**2006-07**	**2007-08**
NEWNE	**0.6725**	**0.6313**	**0.5977**
South	0.7067	0.7013	0.7133
India	0.6808	0.6485	0.6253

Step 6. Calculate the combined margin emission factor

The combined margin emission factor is calculated as follows:

Input values and data sources for the calculation of $EF_{y,grid,CM}$

Table 12: Combined Margin Emission Factor

Parameter	Description	Unit	Source
$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,\mathbf{BM,y}} \times w_{BM}$			"Tool to calculate the emission factor for an electricity system" version 0.1.1, equation 13
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor in year y. This equals to $EF_{y,grid.}$	tCO_2/MWh	Calculated
$EF_{grid,OM,y}$	Simple operating margin	tCO_2/MWh	1.0090

	CO_2 emission factor in year y.		
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y	tCO_2/MWh	0.5977
w_{OM}	Weighting of operating margin emission factor	0.75	"Tool to calculate the emission factor for an electricity system" version 0.1.1, equation 13
w_{BM}	Weighting of build margin emission factor	0.25	"Tool to calculate the emission factor for an electricity system" version 0.1.1, equation 13

Baseline Emission Factor: Combined Margin OM & BM = 0.9062 tCO_2e/MWh.

Hence, the emissions in the baseline scenario would be the emissions from the equivalent amount of electricity generated by the prevailing generation mix of the NEWNE grid.

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

The project activity is a voluntary initiative by project proponents and is not mandatory by law. In line with VCS 2007.1 requirements based on VCS Program approved methodology; the project proponents propose to demonstrate that the project activity is additional through Attachment A to Appendix B as per simplified modalities and procedures for small scale CDM project activities. The CDM additionality tool guideline is applied to demonstrate that the project is not a baseline scenario.

1) Investment Barrier

Though the project faces a number of barriers, the most important among them is the investment barrier. To prove the financial unattractiveness (without VCS benefits) of the wind power project, the PPs had undertaken a detailed Investment analysis of the project activity.

Parameters for Investment analysis

Project proponents carried out financial analysis prior to decision making stage to ascertain financial viability of the project. Parameters considered for computing investment analysis are given in Table 13. Parameters such as depreciation rate are considered as per standard rate. Project proponents considered prevailing loan rates from the Prime Lending Rate (PLR) published by the Reserve Bank of India (RBI). The PLR is the benchmark interest rate at which commercial banks in India lend to their most credit worthy customers. The RBI publishes the average PLR of the five major nationalized banks in India in its weekly/yearly publication.

Typically, projects in India would be borrowing debt at a rate equal to or higher than the PLR. In order to keep this lending rate conservative, no risk premium associated with the project type or the

project developer was added to it. Further, RBI's PLR is in itself a conservative as it does not take into account the commercial lending rates of private sector banks which are typically higher than that of nationalized banks.

Other parameters such as WTG cost and land cost are in accordance with Suzlon offer for investment in wind energy. Individual IRR analysis has been done for each project proponent based on the time of investment. M/s Vijay Industries and M/s Saurabh Agrotech are sister concerns and the time of investment was same for both proponents, hence, the IRR computation is combined for both project proponents. Results of Investment analysis are given in Table 14.

Sub-bundle 1: 0.92 MW- Vijay Industries Ltd. & Saurabh Agrotech Pvt. Ltd. (same group companies)
Sub-bundle 2: 2.5 MW- Rajesh Constructions Company Limited
Sub-bundle 3: 1.25 MW- Savla Twisters Private Limited

Table 13: Assumptions made in IRR Analysis

Parameter	Sub bundle 1 (December 2002) Vijay Industries – Saurabh Agrotech (same group companies)	Sub bundle 2 (July 2003) Rajesh Construction Co.	Sub bundle 3 (December 2003) Savla Twisters	Basis of assumption
Capacity of Machines in kW	230	1250	1250	As per the Purchase Order (PO)
Number of Machines	4	2	1	
Project Capacity in MW	0.92	2.5	1.25	As per the POs
Project Cost (Rs. Million)	50	118	51.49	As per the POs
Project Cost per MW (Rs. in Millions)	54.35	47.20	41.19	
Operations				
Plant Load Factor	22.37%[7]	22.37%	22.37%	As per the Government of Rajasthan (GOR) Wind policy April 2003
Wheeling Charges	2%	NIL	NIL	As per the Government of Rajasthan (GOR) Wind policy February 2000
Insurance Charges Mn/year	Rs. 0.08 Million/year	Rs. 0.24 Million/year	Rs. 0.13 Million/year	As per actual Insurance costs

[7] Vijay Industries/ Saurabh Agrotech PLF - As per wind power policy February 2000, Government of Rajasthan with the help of MNES set up a 2 MW wind Demonstration Farm at Jaisalmer. For the year 2000-01, the plant load factor from this wind farm was stated at 18.5%. However, PPs assumed the higher PLF of 22.37% as per revised Government of Rajasthan wind power policy 2003 for conservativeness. And the same has been assumed for investment analysis.

				incurred
Operation & Maintenance Cost (@1.67% of the Capex) Rs. Million/year	0.84	1.94	0.84	As per the Government of Rajasthan (GOR) Wind policy April 2003
% of escalation per annum on O & M charges	5.0%	5.0%	5.0%	As per the Government of Rajasthan (GOR) Wind policy April 2003
Tariff				
Base year (2003-04)Tariff for 10 years - Rs./kWh	4.01[8]	3.32	3.39 (for 2004-05)	For Wheeling – electricity invoices For Sale of power - As per the GORWind policy April 2003
Annual Escalation (%)	Rs. 0.05/ kWh / year	2%	2%	As per the Government of Rajasthan (GOR) Wind policy April 2003
Tariff applicable after 10 years from base year 2003-04 (Rs/kWh)	-	3.92 (fixed)	3.92 (fixed)	As per the Government of Rajasthan (GOR) Wind policy April 2003
Own Source (Equity component)	30%	30%	30%	As per the RREC Wind policy April 2003
Term Loan (Debt component)	70%	70%	70%	As per the RREC Wind policy April 2003
Terms of Loan Years				
Interest Rate	11.00 %	10.5%	10.5%	As per prime lending rate from Reserve Bank of India for the reference year
Tenure Years	7	7	7	Years
Moratorium (Months)	12	12	12	Months
Income Tax Depreciation Rate (Written Down Value basis)				
On Wind Energy Generators	80%	80%	80%	As per Income tax rule
Book Depreciation Rate (Straight Line Method basis)				
On all assets	5.28%	Not applicable	5.28%	As per Companies Act 1956
Book Depreciation up to (% of asset value)	100%	Not applicable	100%	As per Companies Act 1956
Income Tax				

[8] As per electricity purchase invoices

Income Tax rate with Surcharge	36.75%	35.87%	35.87%	Applicable rate as per IT Act 1961 for the reference year
Minimum Alternate Tax	7.5%		7.69%	Applicable rate as per IT Act 1961 for the reference year

Selection of benchmark:
As per the **Guidance on the Assessment of Investment Analysis, Version 02, EB 41, Annex 45,** *Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR.*

As in the project activity, project IRR has been chosen as the financial indicator, Weighted Average Cost of Capital (WACC) is the suitable benchmark.

The project IRR, computed based on the above assumptions, is compared to benchmark return. Weighted Average Cost of Capital (WACC) has been taken as the benchmark. Since the project is financed by *both* equity and loan, the appropriate cut-off rate is the WACC, because *WACC alone* represents the weighted average of the costs of various sources of financing in the financial structure of the project. In other words, WACC represents the minimum rate of return which the project should earn to merit consideration, as failure to earn the minimum rate of return is indicative of the erosion in the value of shareholders' investment.

Weighted Average Cost of Capital:

WACC = [D/ (D+E)]*[Cost of Debt * (1-Tax rate)] + [E/ (D+E)]*[Cost of Equity]

Cost of Debt:

Cost of debt is defined as the rate at which lenders agree to lend money to a project. The Reserve Bank of India prime lending rate[9] prevailing at the time of project conceptualization has been considered as the cost of debt.

Calculation of Cost of Equity:

The Cost of equity has been determined using the Capital Asset Pricing Model (CAPM)[10]. The CAPM economic model is used worldwide to determine the required/expected return on equity based on potential risk of an investment. The CAPM framework is the Nobel award winning work of financial economist Dr. William Sharpe.

As per the model, Cost of Equity can be estimated as below –

Re = Rf + Beta x (Market Return – Risk Free Return)

Where,

[9] Reserve bank of India, Handbook of Statistics 2008-09, Table 74 for the reference year (http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/74T_HB150909.pdf)

[10] The Capital Asset Pricing Model (CAPM) was published in 1964 by William Sharpe. http://www.investopedia.com/articles/06/CAPM.asp

Re = Rate of return on equity capital
Rf = Risk- free rate of return

Estimation of benchmark:
As discussed above, Capital Asset Pricing Model (CAPM) is used which is well accepted methodology for estimating the expected return on equity. As per CAPM, the required return on equity investment is the return of risk free security plus beta times the difference between market return and risk free return.

Risk Free Return:
The risk free rate is understood as the rate of return on an asset that is theoretically free of any risks. Reserve Bank of India[11] provides information on Weighted Average Yield on Market Loans, which is actually risk free return.

Market Return and risk premium:
Equity indices are indicator of expected market return. With a view to eliminating the unsystematic risk associated with the projects totally, BSE index published[12] by RBI (difference in Sensex between since the year of inception of BSE Sensex, i.e. 1978-79 up to reference year) has been taken to calculate the market return. Therefore, the risk premium has been calculated as the difference in Market Return and Risk Free Return. The detailed calculations are presented in the attached excel sheet.

Beta:
Beta (B) indicates the sensitivity of the company to market risk factors. For companies that are not publicly listed, the beta is determined by referring beta values of publicly listed companies that are engaged in similar types of business. The project activity type is wind power generation; the approach therefore should be to base the beta for the project on the beta values of listed wind power generation companies in India. However, there was no wind energy or renewable energy power generation or electricity generation company listed on BSE- Bombay Stock Exchange in India in year 2003. Therefore, in the absence of adequate data on companies which are exclusively into the exactly same type of business (i.e wind power projects), the next best option for assessing the risk of these projects is to consider the data available on companies which are involved in similar businesses. Therefore, we have considered beta values of electricity integrated companies in India in year 2003.

The applicable Beta value has been determined on the basis of the average of Beta values of all electricity integrated companies in India namely Ahmadabad Electricity company, BSES Ltd, Gujarat INDS power and Tata power which were listed on the stock exchange at the time of investment. Beta values of individual companies have been sourced from Aswath Damodaran[13] Data for the January 2003.

Individual WACC calculation has been done for each project proponent according to time of investment.

[11] http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/72295.pdf

[12] http://www.bseindia.com/histdata/hindices2.asp

[13] Beta values - http://pages.stern.nyu.edu/~adamodar/

Benchmark (December 2002) : Vijay Industries Limited & Saurabh Agrotech Private Limited (same group companies):

Cost of Debt: The prime lending rate at the time of investment decision was 11.00% for the year 2002-03 published by RBI.

Risk free return for the year 2001-02 was 9.44%.
Market Return was 15.812% (based on difference in BSE Sensex 1979 to November 2002)
Hence, Market risk premium = 15.812% - 9.44% = 6.372%

The applicable beta value is 0.926.

Therefore,
WACC = [D/ (D+E)]*[Cost of Debt* (1-Tax rate)] + [E/ (D+E)]*[Cost of Equity]

For calculation of WACC, a debt: equity ratio of 70:30 has been considered, as per RERC wind power policy 2003.

Cost of Debt = 11.00% *(1-Tax Rate %); Due to tax exemption under section 80IA is allowed for 10 years for renewable energy projects, and the accelerated depreciation benefit, taxable income is nil for the first fifteen years of the project (life time of the project is twenty years), therefore, the only tax applicable is Minimum Alternative Tax (MAT).

For the year 2002-03, MAT = 7.5%

Therefore, cost of Debt *(1-tax rate) = 10.175%

Cost of Equity = (9.44% +0.926* 6.372%) = 15.34%

Hence, WACC = 70% * 10.175% + 30% * 15.34% = **11.72%**

Benchmark (July 2003) : Rajesh Constructions Company Limited

Cost of Debt: The prime lending rate at the time of investment decision was 10.50% for the year 2003-04 published by RBI.

Risk free return for the year 2002-03 was 7.34%.
Market Return was 16.117% (based on difference in BSE Sensex 1979 to July 2003)
Hence, Market risk premium = 16.117% - 7.34% = 8.777%

The applicable beta value is 0.926

Therefore,
WACC = [D/ (D+E)]*[Cost of Debt* (1-Tax rate)] + [E/ (D+E)]*[Cost of Equity]

For calculation of WACC, a debt: equity ratio of 70:30 has been considered, as per RERC wind power policy 2003.

Cost of Debt = 10.50% *(1-Tax Rate %); Due to tax exemption under section 80IA is allowed for 10 years for renewable energy projects, and the accelerated depreciation benefit, taxable income is nil for the first fifteen years of the project (life time of the project is twenty years), and at the time of investment, Rajesh Constructions was a partnership firm, therefore, no Minimum Alternative Tax (MAT) is applicable, therefore, Tax Rate is zero.

Therefore, cost of Debt = 10.50%

Cost of Equity = (7.34% +0.926* 8.777%) = 15.47%

Hence, WACC = 70% * 10.5% + 30% * 15.47% = **11.99%**

Benchmark (December 2003) : Savla Twisters Private Limited

Cost of Debt: The prime lending rate at the time of investment decision was 10.50% for the year 2003-04 published by RBI.

Risk free return for the year 2002-03 was 7.34%.
Market Return was 17.860% (based on difference in BSE Sensex 1979 to December 2003)
Hence, Market risk premium = 17.860% - 7.34% = 10.52%

The applicable beta value is 0.926.

Therefore,
WACC = [D/ (D+E)]*[Cost of Debt* (1-Tax rate)] + [E/ (D+E)]*[Cost of Equity]

For calculation of WACC, a debt: equity ratio of 70:30 has been considered, as per Government of Rajasthan wind power policy 2003.

Cost of Debt = 10.50% *(1-Tax Rate %); Due to tax exemption under section 80IA is allowed for 10 years for renewable energy projects, and the accelerated depreciation benefit, taxable income is nil for the first fifteen years of the project (life time of the project is twenty years), therefore, the only tax applicable is Minimum Alternative Tax (MAT).

For the year 2003-04, MAT = 7.69%

Therefore, cost of Debt = 9.69%

Cost of Equity = (7.34% +0.926* 10.52%) = 17.08%

Hence, WACC = 70% * 9.69% + 30% * 17.08% = **11.91%**

Summary			
Project Proponent/ WTG No.	**Time of Investment/ type of agreement**	**Benchmark IRR**	**Project IRR**

Vijay Industries & Saurabh Agrotech Pvt. Ltd.(same group companies)VIKL-01, VIKL-02, SAPL-01, SAPL -02	December 2002 wheeling	11.72%	9.68%
Rajesh Constructions Company Limited J-132, J-137	July 2003/ sale to grid	11.99%	9.85%
Savla Twisters Pvt. Ltd. J-224	December 2003/ sale to grid	11.91%	11.51%

Table 14: Results of Sensitivity Analysis

Sensitivity Analysis Sub Bundle 1- Vijay Industries Ltd. & Saurabh Agrotech Pvt. Ltd.(same group companies) = Total 0.92 MW				
	Base PLF and wheeling tariff	**5% higher PLF**	**10% higher PLF**	**10% higher wheeling tariff benefit on base conditions**
Project IRR (Without Carbon Revenue)	9.68%	10.53%	11.36%	11.23%
Benchmark (December 2002)	11.72%			

Sensitivity Analysis of Sub Bundle 2- Rajesh Constructions Company Limited 2.5 MW			
	Base PLF	**5% higher PLF**	**10% higher PLF**
Project IRR (Without Carbon Revenue)	9.85%	10.58%	11.45%
Benchmark (July 2003)	11.99%		

Sensitivity Analysis of Sub Bundle 3- Savla Twisters Pvt. Ltd. 1.25 MW			
	Base PLF	**5% higher PLF**	**10% higher PLF**
Project IRR (Without Carbon Revenue)	11.51%	12.43%	13.34%
Benchmark (December 2003)	11.91%	However stated increase in PLF is Less likely as prevailing PLF was much lower at site	

The project IRRs for each project proponent without carbon benefits is lower than the benchmark IRR considered for this project activity. Therefore, the incentive through sale of the emission reductions would improve the returns from the project activity and will make the project activity viable

Sensitivity analysis: For the project, capital cost is based on purchase orders and tariff for sale to grid has been fixed for 20 years as per power purchase agreements. Therefore, PLF for all WTGs and wheeling tariff for Vijay Industries/ Saurabh Agrotech are the only major variable influencing the IRR, hence, sensitivity analysis has been carried out for +5% / +10% PLF and +10% wheeling tariff to show the variation of the financial analysis.

Plant Load Factor is the key variable encompassing variation in wind profile, variation in off-take (including grid availability) including machine downtime. The Project IRRs at the stated PLFs does not cross the benchmark. Although, for Savla Twisters, Project IRR at the stated increase in PLF cross the benchmark; but is less likely as actual generation prevailing at the site was much below the base PLF assumed at 22.37%.

Therefore, the project is not financially attractive and the carbon revenue from the project activity would improve returns from the sale of the emission reductions credits accrued from the project activity.

2) Other Barriers

Technological barrier - Hot climatic conditions & harsh environment

Jaisalmer has very hot and dusty climate. Sandy storms, hot climatic conditions are very frequent in the region. Dust increases wear and tear on machinery which requires more maintenance and ultimately burden on investors in the form of maintenance cost.

The nacelle of the turbine has many moving parts like bearing, gear box & couplings. At high temperature conditions, nacelle cooling fan becomes the most critical component for wind turbine as it is operated once the temperature rises in the vicinity of over and above 25^{o}C. Given that the Conditions at the Jaisalmer site are predominantly hot during the peak summer season (May-September), the criticality of running condition of cooling fan comes into importance. Even if it stops for an hour, site people have to attend the machine immediately. The trouble shooting Manual prepared for Jaisalmer site has been provided to Validator.

With growing dust on the surface of wind turbine blades, the drag force of the airfoil increases, but the lift force decreases diminishing the power output of the turbine. The dusting on the rotor's blades wind turbines may lead among others to long time stops due to heavy accumulated dust and Safety demands, decreased power production and increased maintenance costs.

Whereas, the cost of repairing the generators or grid can be recovered by insuring them, the loss in revenue due to the turbine not generating electricity when it is damaged or the grid not functioning cannot be recovered as insurance companies normally do not provide liquidated damages in their insurance cover.

It is evident that along with investment barrier, other barriers were also prevailing at the site at the time of commissioning of the project activity and *hence the additionality of the project is demonstrated as per small scale CDM additionality tool.*

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

Title: "Grid connected renewable electricity generation" AMS I D
Reference: Appendix B to the simplified M&P for Small-scale CDM project activities
Version 14
Valid from 31st July 2009

This is in accordance with the Appendix B of the Simplified modalities and procedures for small-scale CDM project activities. The reference to the proposed monitoring methodology is Clause 31 of Appendix B of simplified modalities and procedures for small-scale CDM project activities. The installed capacity of the project is 4.67 MW, which is less than the limiting capacity of 15 MW and is thus eligible to use small-scale simplified methodologies. The project is a grid-connected wind energy generation, and thus belongs to the category "Renewable electricity generation for a grid".

The monitoring shall be done as per the approved methodology AMS I.D Version 14. As per the methodology:

- Monitoring shall consist of metering the electricity generated by the renewable technology. - *The electricity generated by wind turbine will be metered by Electronic Meter.*
- If fossil fuel is used the electricity generation metered should be adjusted to deduct electricity generation from fossil fuels using the specific fuel consumption and the quantity of fossil fuel consumed. – *The project activity doesn't involve the use of fossil fuels.*

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

The project activity essentially involves generation of electricity from wind, the employed WEGs can only convert wind energy into electrical energy and cannot use any other input fuel for electricity generation. Thus, no special ways and means are required to monitor leakage from the project activity.

1. The proposed project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state power utility (RVPNL). The generated electricity shall be purchased by the state electricity utility (Jaipur/Jodhpur DISCOM) of Rajasthan. The meters shall therefore be calibrated, sealed and managed by the state electricity utility (RVPNL/DISCOM(s)).

2. The electricity generation measurements are required by the utility and the investors to assess electricity sales revenue and / or wheeling charges.

3. The project activity has therefore envisaged two independent measurements of generated electricity from the wind turbines.

4. The primary recording of the electricity fed to the state utility grid shall be carried out jointly at the incoming feeder of the state power utility (RVPNL).

5. The joint measurements shall be carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility).
   - The RVPNL/DISCOM(s) and the developer's representative shall jointly read the Metering System on the first (1^{st}) day of every month at the interconnection point.
   - Meter readings taken jointly at the appointed date and time will be signed by the representatives of RVPNL/DISCOM(s) and the developer.

6. As per the monitoring methodology, the electricity generated by wind turbine will be metered by Electronic Meter. There are two energy meters installed at the grid sub station. In the event that the main metering system is not in service as a result of maintenance, repairs or testing, then the

backup metering system shall be used during the period, main metering system is not in service. Due to any unforeseen events if both the meters fail, the generation can be monitored at the controller end as explained below in point no.8.

7. These energy meters are the export import meters. Since, these meters are installed at the receiving end; they thus absorb the losses from the generation point (wind machine controller) until the grid interconnection point (sub station). These losses include the line losses from point of generation to the point of metering and the transformer losses (losses due to stepping up of generation voltage to meet grid discipline and transmission losses until interconnection point). The WEGs also does not produce any units of electricity during non availability of wind and during planned and unplanned maintenance, however, they will draw current from the grid during initial phase of operation from stand still condition. Thus, the grid code has made provisions for metering system at the receiving end adopted at wind sites to measure both import and export of electricity. The figures from these meters will be taken to measure the exact amount of electricity produced by a wind machine against which the state electricity utility is liable to make payments to the owner of wind machine or to make adjustment in electricity invoices in case of wheeling.

8. The monitoring at WEG end is equipped with an integrated electronic controller meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through a wireless Radio Frequency (RF) network. The generation data of individual machine can be monitored as a real-time entity at CMS. The snapshot of generation on the last day of every calendar month will be kept as a record both in electronic as well as printed (paper) form.

Calibration of Controllers:

Suzlon- SCS Controller is a micro-processor based intelligent controller which has been specially designed for control of wind turbines. It uses a Woodward Multi function Relay that has three current inputs from CT and three direct voltage inputs (690 Volts). The analog values of current/ voltage is converted into digital signal internally using A/D Converters at very high sampling rate. A software program reads these values and displays instantaneous parameters such as voltage, current, power factor, kVAh, kVArh and kWh. These instantaneous values are then time integrated and displayed / stored. Woodward relay is having no display and needs special protocol to view energy readings as this relay is communicating digital signal through special communication protocol. Moreover, turbine can not run without this relay.

Enercon- The individual WEG come with installed panel meters and no calibration is required for these meters. There is quality procedure incorporated in software, which react to deviations higher than range of 10 units. Main processor unit of WEG compares the converter output & energy meter out put if difference is greater than 20kw for 1 hour, machine stops with fault status 62:07- diff. P-actual/kWh measurement. Replacement of the WEGs panel meter with new one solves the problem.

The project activity supplies electricity to DISCOM(s). As per the methodology AMS I D, EGy is the electricity supplied by the project activity to the grid (MWh). Accordingly, the EGy has been defined as per the law applicable and implemented in practice to the wind farm in the state of Rajasthan and the provisions of the Power Purchase Agreement (PPA)/ Wheeling & Banking Agreement (WBA).

Input values and data sources for emission reductions associated with electricity displacement are explained in section 4.2

Monitoring team, their role and responsibilities are explained in section 3.4 of the PDD.

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

The project activity supplies electricity to DISCOM(s) through RVPNL grid. Electricity supplied to the grid by the project is measured through national standard electricity metering instruments recorded monthly by the project entity. The following parameter will be monitored during the project activity:

Data and parameters those are available at validation:

Data / Parameter:	**$EF_{OM,y}$**
Data unit:	tCO_2/MWh
Description:	Operating Margin emission factor for NEWNE grid
Source of data to be used:	Referred from CO_2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority
Value of data applied for the purpose of calculating expected emission reductions	1.0090 Details of the calculations have been shown in the section 2.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002 ("Consolidated Baseline Methodology for grid connected electricity generation from renewable sources").
Any comment:	Calculated ex-ante as indicated in the simple OM baseline method.

Data / Parameter:	**$EF_{BM,y}$**
Data unit:	tCO_2/MWh
Description:	Build Margin emission factor for NEWNE grid.
Source of data to be used:	Referred from CO_2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority.
Value of data applied for the purpose of calculating expected emission reductions	0.5977 Details of the calculations have been shown in the section 2.4.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002.
Any comment:	Calculated ex-ante as indicated in the simple BM baseline method.

Data / Parameter:	EF_y
Data unit:	tCO_2/MWh
Description:	Combined Margin CO_2 emission factor for NEWNE grid.
Source of data to be used:	Estimated figure based on 75% of OM and 25% of BM values, Version 4.0.
Value of data applied	0.9062 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Combined Margin Emission Factor has been calculated in accordance with ACM0002. To be applied ex-ante throughout the crediting period.

Data and parameters to be Monitored:

Data / Parameter:	EGy
Data unit:	kWh
Description:	The Total Net Electricity supplied to DISCOM(s).
Source of data to be used:	Net Electricity generated will be calculated from Export-Import Meter Readings.
Value of data applied for the purpose of calculating expected emission reductions	9,151,000/Annum
Description of measurement methods and procedures to be applied:	The Joint Meter Reading is taken at common evacuation system together with meter readings of individual WTG controller readings. Based on this break-up, limited to total energy export, the power purchase from the individual power plant will be regulated for the purpose of payment. The total net electricity generated from the project activity will be calculated as the summation of the annual net electricity generation of the wind turbines in the project activity.
QA/QC procedures to be applied:	Annual calibration of the joint meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The data will be cross checked with sales receipts.
Any comment:	The data will be archived on paper and electronically for two years after the end of the last crediting period.

Data / Parameter:	EG_{Export}
Data unit:	kWh
Description:	The Total Electricity Exported by the WEG units.
Source of data to be used:	Meter Readings measured from the Export

	Meter.
Value of data applied for the purpose of calculating expected emission reductions	9,151,000/Annum
Description of measurement methods and procedures to be applied:	The electricity exported by the each individual WEG of the project activity is measured using the export meter installed at the Grid sub station (GSS).
QA/QC procedures to be applied:	Annual calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The data will be cross checked with sales receipts.
Any comment:	The data will be archived on paper and electronically for two years after the end of the last crediting period.

Data / Parameter:	**EG_{Import}**
Data unit:	kWh
Description:	The Total Electricity Imported by the WEG units.
Source of data to be used:	Meter Readings measured from the Import Meter.
Value of data applied for the purpose of calculating expected emission reductions	0
Description of measurement methods and procedures to be applied:	The electricity imported by the each individual WEG of the project activity is measured using the import meter installed at the Grid sub station (GSS).
QA/QC procedures to be applied:	Annual calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The data will be cross checked with sales receipts.
Any comment:	The data will be archived on paper and electronically for two years after the end of the last crediting period.

Data / Parameter:	**$EGy_{Controller}$**
Data unit:	kWh/ year
Description:	Electricity Generation at WTG measured and as reported in the joint meter reading reports signed by representatives of state electricity board
Source of data to be used:	Controller reading as provided in joint meter reading reports signed by representatives of state electricity board for each WTG

Description of measurement methods and procedures to be applied:	As per standard operating procedure manual of the technology supplier/O&M contractor
QA/QC procedures to be applied:	The electronic controllers are self calibrated to ensure and maintain online system diagnostics.
Any comment:	The data will be archived on paper and electronically for two years after the end of the last crediting period

3.4 Description of the monitoring plan

The monitoring plan is being devised as per approved methodology AMS I.D Version 14. For the project activity to establish its creditable emission reduction, it has to record the actual electricity generation, which would displace equivalent units of electricity at the operating and build margin of the grid. Since the simple OM emission factor is calculated based on a 3 year average, based on the most recent statistics available at the time of PDD preparation, its updation based on ex post monitoring is not required. For BM calculation, option 1 (refer section 2.4) has been chosen, which is calculated ex ante based on the most recent information, so its monitoring is also not required. Hence, under the monitoring protocol for the project, it is required to: Monitor and record the electricity generated and exported by the wind farm to the NEWNE grid.

To ensure trouble free operations and efficient generations through all the wind turbines, PPs has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines for a period of 10 years. The contractor Suzlon & Enercon, under the O&M contract with PPs would be responsible for the operation and maintenance of the project activity for the entire crediting period.

The authority and responsibility of project management as well as registration, monitoring, and supervising O & M activities lies with PPs. PPs have formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power. The wind power project abides and will abide by all regulatory and statutory requirements as prescribed under the state and central laws and regulations. The project team is delegated with the responsibility of monitor and document the electricity generated and also safe keeping of the recorded data. The project team is also responsible for calculation of actual creditable emission reduction in the most transparent and relevant manner. The same has been outlined as follows:

Table 15: Project Monitoring Team- Roles and Responsibilities

Designation	Responsibilities
Project Head	• Registration • Project Execution
Project Executor and Controller	• Recording • Verification • Storage of Data
Site Incharge	• Operation, Monitoring and Verification of Data • Data Recording • Storage of data

Operation and Maintenance Contractor	• Suzlon Infrastructure Services Limited (for Rajesh Construction Co., Savla Twisters Pvt. Ltd.) • Enercon India Ltd. (for Vijay Industries Ltd. & Saurabh Agrotech Pvt. Ltd.)

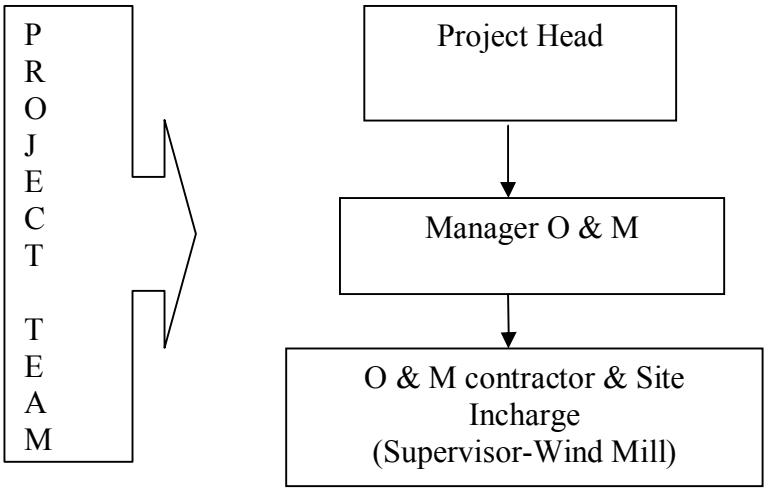


Figure 4: Project Monitoring Team

Sealing and Maintenance of Meters:

1. The RVPNL/DISCOM(s) shall seal the main metering system and the back up metering system in the presence of representatives of Power Producer/Developer.

2. When the main metering system and/or back up metering system and/or any component thereof is found to be outside the acceptable limits of accuracy or otherwise not functioning properly, it shall be repaired, re-calibrated or replaced as soon as possible by the Power Developer or by the RVPNL/DISCOM(s).

3. RVPNL/DISCOM(s) will ensure that metering system is tested for accuracy at least once in a year and report furnished along with joint meter reading.

4. Any meter seal(s) can be broken only by authorized officer of RVPNL's / DISCOM's in the presence of representatives of Power Producer/Developer, whenever the main metering system or the backup metering system is to be inspected, tested, adjusted, repaired or replaced.

Records:

PP' representatives will maintain an accurate and up-to-date operating log at the project site with records of:

i. 24 Hours logs of real and reactive power generation, frequency, transformer tap position, bus voltage(s), Main meter and other meter readings and any other data mutually agreed.

ii. Any unusual conditions found during operation/inspections.
iii. All the records will be kept for two years after the end of the crediting period or the last issuance of VCUs for this project activity, whichever occurs later.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

This section offers a detailed description of the application of the AMS ID ("Grid Connected Renewable electricity Generation", Version 14, Sectoral scope: 1.) methodology to the PP's wind power project, where the project emissions, the baseline emissions and the emission reductions are estimated. For methodological choice, refer section 2.2.

According to the approved methodology AMS ID (Version 14), Emission Reductions are calculated as:

ERy = BEy – PEy – Ly

Where:

BE**y** Baseline Emissions in year *y* (t CO_2e/yr)

PE**y** Project Emissions in year *y* (t CO_2e/yr)

L**y** Leakage Emissions in year *y* (t CO_2e/yr)

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

Baseline emission due to electricity displacement

The baseline for power generation is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kgCO_2e/kWh) calculated in a transparent and conservative manner as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system (version 01.1)" (Refer section 2.4).

Input values and data sources for emission reductions associated with electricity displacement are as follows:

Table 16: Input values and Data sources

Parameter	Description	Value	Source
$BE_{y,electricity} = EG_{y,electricity} \times EF_{grid,CM,y}$			
$BE_{y,electricity}$	Baseline Emission in year *y* (tCO_2/year)		Calculated
$EG_{y,electricity}$	Quantity of electricity that has been displaced by the project activity (MWh/year)	9151	Electricity Invoices
$EF_{y,grid}=EF_{grid,CM,y}$	The grid CO_2 emission factor in year *y* (tCO_2/MWh)	0.9062	Calculated

$BE_{y,electricity}$ = 9151 (MWh/year) * 0.9062 (tCO_2e/MWh) = 8293 tCO_2e/year.

4.3 Quantifying GHG emissions and/or removals for the project:

Project Emissions (PE_y)
The methodology clearly states that for all renewable projects other than geothermal power plants and Hydro power plants, Project emissions (*PEy*) = 0.
Therefore, (*PEy*) for the project = 0

Leakage Emissions (LEy)
The proposed VCS project activity engages neither transferring the energy generating equipment from another activity, nor is the existing equipment transferred to another activity. The project is installation of 7 WTG units comprising in total of 4.67 MW capacities. So the leakage emissions are not applicable and hence not considered.
Ly = 0
Where, Ly - Leakage Emissions in the yth year

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. The emission reduction *ERy* by the project activity during a given year y is the difference between baseline emissions (*BEy*), project emissions (*PEy*) and emissions due to leakage (*Ly*), as follows:

ERy = BEy − PEy – Ly

Since, both PEy and Ly are 0; Ex-ante calculation of emission reductions is equal to ex-ante calculation of baseline emissions.

Baseline Emission Factor (Combined Margin) (*EFy*): 0.9062 tCO_2e/MWh

Annual electricity supplied to the grid by the Project Activity *(EGy)*
= 4.67 MW (Capacity) x 22.37% (PLF) x 8,760 (hours)
= 9151 MWh

Annual Baseline Emissions Reduction: ERy = EFy * EGy
= 0.9062 tCO_2e/MWh X 9151 MWh = 8293 tCO_2e

Table 17: Estimation of Overall Emission Reduction from the Project Activity

Year	Estimation of baseline emissions (tonnes CO_2e)	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
April 2006 – Dec. 2006	6,220	0	0	6,220
Jan. 2007 – Dec. 2007	8,293	0	0	8,293
Jan. 2008 – Dec. 2008	8,293	0	0	8,293
Jan. 2009 – Dec. 2009	8,293	0	0	8,293
Jan. 2010 – Dec. 2010	8,293	0	0	8,293

Jan. 2011 – Dec. 2011	8,293	0	0	8,293
Jan. 2012 – Dec. 2012	8,293	0	0	8,293
Jan. 2013 – Dec. 2013	8,293	0	0	8,293
Jan. 2014 – Dec. 2014	8,293	0	0	8,293
Jan. 2015 – Dec. 2015	8,293	0	0	8,293
Jan. 2016 – Mar. 2016	2,073	0	0	2,073
Total Estimated Reductions (tonnes of CO_2e)				**82930**

5 Environmental Impact:

According to Indian regulation, the implementation of the wind park does not require an environmental impact assessment. The Ministry of Environment and Forests (MoEF), Government of India notification S.O. 60 (E) dated 27th January 1994 applicable at the time of commissioning regarding the requirement of Environment Impact Assessment (EIA) studies as per the Environment Protection Rule, any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list[14].Wind parks are not included in this list and thus an EIA is not required. Although an EIA is not required, the possible environmental impacts listed below were analyzed:

Impact on Soil Use
The minor quantity of solid / liquid discharge, generated during the construction phase which had no noticeable impact on soil use and the project proponents made arrangements to dispose them in an environmentally acceptable manner.

Impact on Land use
The project site is a barren land and unproductive area with no application and habitat. There are no migratory birds / endangered species in the region of project activity. Therefore, no harm on the ecological environment is envisaged.

Impact on Air and Water
Wind energy is renewable electricity generation; hence there would be no release of GHG into the atmosphere. Also as there is no fuel used for electricity generation, there aren't any effluents discharged into the water.

Socio- economic impact
The project activity helps the upliftment of skilled and unskilled manpower in the region. The project provided employment opportunity not only during the construction phase, but also is providing during its operational life time. The project activity improves employment rate and livelihood of local populace in the vicinity of the project. Moreover, the project generates eco-friendly, GHG free power, which contributes to sustainable development of the region.

[14] http://www.envfor.nic.in/legis/eia/so-60(e).pdf

6 Stakeholders comments:

For Rajesh Construction Co. & Savla Twisters Pvt. Ltd.

Brief description how comments by local stakeholders have been invited and compiled:

PPs organized a stakeholder consultation meeting with the local villagers on 21st August 2009 to inform them on the environmental and social impacts of the project activity and discuss their concerns regarding the project activity. The venue of the meeting was Learning and Development centre, Suzlon Infrastructure Services Ltd., Jaisalmer city Rajasthan. The Local Stakeholders were intimated of the stakeholder consultation on 04.08.2009 by Public Notice and on 08.08.2009 by Newspaper Advertisement to Local Stakeholders.

People Present at the Meeting:

1. Representatives of surrounding villages – Mr. Deep Singh, Mr. Bahadur khan, Mr. Maga Ram, Mr. Peer Mohammed., amongst others.
2. Representatives of Suzlon Group
   - Mr. Gaurav Jain
   - Mr. Kishan Lal Jakhar
3. Ms. Meenakshi Jain of M/s Positive Climate Care Pvt. Ltd., representing all Project Promoters.

Agenda of the meeting was as follows:

1. Welcome Speech by the organizers.
2. Introduction to 'Clean Development Mechanism' by Suzlon.
3. Speech by Ms. Meenakshi Jain representative of PPs.
4. Interactive session with the Stakeholders.
5. Vote of Thanks.

Welcome Speech:

Mr. Kishan Lal Jakhar, Suzlon

Mr. Kishan Lal Jakhar started with brief introduction and welcomed all Stake Holders. He explained that meeting has been convened for discussing opinion, concerns and benefits from the wind power projects established in this region by the aforementioned corporate houses.

Introduction to 'Clean Development Mechanism' by Suzlon

Mr. Gaurav Jain, Suzlon, explained about CDM to all the stakeholders and in his speech, he explained, how Carbon Level in the atmosphere is increasing and to reduce the green house gas emissions various Non-Polluting initiatives are to be initiated. He further explained how wind farm Projects generates pollution free energy and helps in creating employment opportunities to the villagers. He further added wind power projects also helps in catering the power shortages faced by the nation.

Speech by Representative of PPs

Ms. Meenakshi Jain from Positive Climate Care, representing all investors, explained that through renewable, and more specifically in this area- wind energy, leads to protection of the environment. She said that the reasons for the encouragement of wind energy projects are that it is a pollution free

source and also helps the government on the energy front. It adds to national resources and above all it generates employment to the local villagers and helps in increasing the standard of living of the society. She said that since these investors had their wind turbines in the village land, she felt it was necessary to discuss this with villagers and inform them of the same. It was for this reason that these investors had requested her to represent their organizations. Other source of energy such as diesel, coal etc. is polluting sources but in case of wind there is no pollution. Also, her experience with wind had taught her that with such developments happenings in villages, it is also followed by employment generation, better amenities such as good roads, etc.

Common Queries from the Stakeholders and responses by the project proponents are listed below:

1. **Will the Project help in improving the electricity supply to the villagers/village school?**

   Yes. It has definitely improved the electricity supply in the surrounding region as power generated from wind is fed to state electricity grid. It has improved the energy efficiency in the region. Wind energy is powering the homes, protecting the environment and improving the living standard of the people of surrounding villages.

   The villagers are getting benefitted as now they are getting light in night too. Since last few years, Literacy rate has increased in the region as now children can study in evening hours too. Due to improved electricity supply, villagers can save money which was earlier spent on Kerosene for lighting purposes. Also, the project activity produces electricity without any greenhouse gas (GHG) emissions. On the one hand, it is contributing towards meeting the energy deficit in Rajasthan, on the other, by reducing green house gas emissions; it is helping in mitigating climate change at national and at global level.

2. **Do these Projects affect the rainfall?**
   No, such projects do not affect the rainfall by any chance. Clouds bearing rainfall are usually at the height of 300m and the WTG is not higher than 80m.

Discussions between representative of Project Proponents and the Stakeholders are as follows:

1. **Are there any other benefits of wind power projects that you have observed? If yes, please list below.**

   - Lots of villagers have got employment – either as security guards, drivers, etc. Apart form this; contracts from civil works have also been given to local villagers. Other work pertaining to these projects have helped the local villagers also such as hiring of transport services, civil contracts, couriers, office automation facilities such as photocopying/ printing/fax services etc.
   - There is also a 24 hour round the clock dispensary for the villagers. A doctor, assistants and medicines are routinely available and dispensed amongst the villagers.
   -There is also a well - equipped ambulance made available for the villagers whether they used to facilities of the dispensary or not, and to transport them quickly in case of an emergency.
   -Facilitated such as oxygen cylinders have also been made available which were not here earlier.

Suzlon has also supported the villagers by getting involved and holding drives such as Veterinary Camps where in inoculation of livestock, animal Husbandry techniques, etc. are dispensed for the betterment of the villagers.

2. **Do the project personnel and authorities maintain a good relationship with villagers?**

   Yes, they all maintain a very good relationship with us.

Summary of the comments received:
The overall response to the Project, from local stakeholders, was encouraging and positive. In all, no adverse reaction/comments/clarifications have been received during the hearing. The participants of the meetings have not raised any significant concerns related to potential impacts of the Project. The stakeholders admitted the sustainability of the project and sought more projects of a similar nature which would contribute towards regional and national growth.

Vote of Thanks
Representatives of Suzlon along with all the Representative of the various companies who had participated thanked the villagers for their time and the effort taken to come to the venue of the meeting, and also that the villagers shared their frank opinion. These representatives were happy that the villagers also thought in the same manner as them that wind power was a clean source of energy and therefore beneficial to the environment. (Photographs & Attendance sheet of the meeting are enclosed as Annex-I & II.

For Vijay Industries Ltd. & Saurabh Agrotech Pvt. Ltd.

Brief description how comments by local stakeholders have been invited and compiled:

PPs organized a stakeholder consultation meeting with the local villagers on 5th September 2009 to discuss their concerns regarding the project activity. The meeting was organized with the help of the developer Enercon India Ltd. at Enercon Bhu substation. The Local Stakeholders were intimated of the stakeholder consultation by personal invitations.

People Present at the Meeting:

1. Representatives of surrounding villages – Mr. Jugat Singh, Mr. Sujan Singh, Mr. Hindal khan, Mr. Jitendra Kumar, amongst others.
2. Representatives of Enercon Group
   - Mr. Satish Patil
   - Mr. Ravindra Singh
3. Ms. Meenakshi Jain of M/s Positive Climate Care Pvt. Ltd., representing both Project Promoters'.

The agenda of the meeting was fixed as follows:

- Welcome
- Description of the project details
- Queries and responses from the proponent and the stakeholders
- Vote of Thanks

- **Mr. Satish**, appraised and gave description of the project to the stakeholders, and communicated the benefits of Enercon Wind Farm Projects at Jaisalmer.

The salient benefits communicated have been as follows:

- Mr. Patil said that the best use of land is made through the project which otherwise was barren. He explained function of windmill to the people and advantages of the windmill.

- **Ms. Meenakshi** from PCC, representative of PPs, briefed the environmental benefits of wind power generation as compared to that of thermal power generation based on coal. Similarly, a briefing on GHG and its role in global warming / increasing temperatures on the earth was given. The benefits in terms of pollution free environment and safeguard to human health were also communicated to the stakeholders while comparing coal based generation to wind based generation. She explained about VCS to all the stakeholders and in her speech, she explained, how Carbon levels in the atmosphere is increasing and to reduce green house gas emission various Non-Polluting initiatives are to be initiated. She further added wind power projects also helps in catering the power shortages faced by the Nation.

Summary of the comments received:
Majority of the comments from the stakeholder were actually queries by nature which were clarified to their satisfaction on the spot. Stakeholders wanted to know how the project benefits them, how it affects the water availability, change in migratory pattern of birds or fauna and grazing of local cattle. They also wanted to know occurrence of any incident or accident during construction and erection.

Report on how due account was taken of any comments received:

When enquired by the stakeholders on the different issues, Representatives clarified the following:

Benefits of the locality:
- Employment opportunity to the educated villagers.
- Economic opportunities in terms of small shops and as construction workers.
- Increase in connectivity to the nearest town with improvement in transportation system.
- Improvement in water availability from project site.

Effect on environment:
- The project has improved the accessibility of cattle to areas for grazing and drinking water.
- The project does not fall under migratory patterns of the birds, hence not expected to affect them.
- Water availability has improved.

Accident during construction and erection:
- Enercon has taken all safety precautions during construction and erection which prevented any incident of accident. Even blastings were done under control supervision and ground blasting was preferred in majority of the time.

All the people who had attended the meet were happy about people setting up wind turbines in their villages, moreover in most of the cases they have also been provided with employment opportunities say the old farmers are now working as watchmen in the wind farm site which also gives them some extra earning to run their livelihood. People are also being employed to paint the tower structures.

Vote of Thanks
Representatives of Enercon along with representative of PPs who had participated thanked the villagers for their time and the effort taken to come to the venue of the meeting, and also that the villagers shared their frank opinion. These representatives were happy that the villagers also thought

in the same manner as them that wind power was a clean source energy and therefore beneficial to the environment. (Photographs & Attendance Sheet of the meeting is enclosed as Annex-I & II).

7 Schedule:

As per VCS 2007.1 standard, Chronological plan for the date of initiating project activity, date of terminating the project, frequency of monitoring and reporting and the project period is as shown below:

Table 18: Chronological Plan for the GHG Project Cycle

M/s Rajesh Construction Co. Ltd	Project Commissioning Date	October 31st, 2003
	Validation & Verification contract with Perry Johnson	10th November 2008
	Frequency of monitoring the Electricity Generation data	Continuous and aggregated on Monthly basis
	Frequency of reporting of the Electricity Generation data	Annually
	Project crediting Period	10 years (1st April 2006 to 31st March 2016)
	Project Termination Date (lifetime)	September 2023
M/s Savla Twisters Pvt. Ltd	Project Commissioning Date	April 30th, 2004
	Validation & Verification contract with Perry Johnson	10th November 2008
	Frequency of monitoring the Electricity Generation data	Continuous and aggregated on Monthly basis
	Frequency of reporting of the Electricity Generation data	Annually
	Project crediting Period	10 years (1st April 2006 to 31st March 2016)
	Project Termination Date (lifetime)	March 2024
M/s Vijay Industries Ltd.	Project Commissioning Date	March 29th, 2003
	Validation & Verification contract with Perry Johnson	14th November 2008
	Frequency of monitoring the Electricity Generation data	Continuous and aggregated on Monthly basis
	Frequency of reporting of the Electricity Generation data	Annually
	Project crediting Period	10 years (1st April 2006 to 31st March 2016)
	Project Termination Date (lifetime)	February 2023

M/s Saurabh Agrotech Pvt. Ltd	Project Commissioning Date	March 29th, 2003
	Validation & Verification contract with Perry Johnson	14th November 2008
	Frequency of monitoring the Electricity Generation data	Continuous and aggregated on Monthly basis
	Frequency of reporting of the Electricity Generation data	Annually
	Project crediting Period	10 years (1st April 2006 to 31st March 2016)
	Project Termination Date (lifetime)	February 2023

8 Ownership:

8.1 Proof of Title:

The evidence for the proof of the title has been provided to Validator through Ownership of the plant, PPA, and other documents provided in section 1.10 which are summarised as follows:

Table 19: List of Documents provided to Validator

Document		Date
Rajesh Construction Co. Ltd.		
1.	Purchase Order for 2 no. of WTG with Suzlon Energy Ltd.	Dated 28.08. 2003
2.	Power Purchase agreement	Dated 10-10-2003
3.	Commissioning Certificate	Vide letter Ref. No. JVVNL / XEN / O&M / JSM /S:TECH/F:D.1246 dated 31-10-2003
4.	Others	Please refer Table 7 for details
Savla Twisters Pvt. Ltd.		
1.	Purchase Order for 1 no. of WTG with Suzlon Energy Ltd.	Dated 01.01.2004
2.	Power Purchase agreement	Dated 19-02-2004
3.	Commissioning Certificate	Vide letter Ref. No. RRVPNL/XEN /TCCIV / BMR/D:64 dated 30-04-2004
4.	Others	Please refer Table 7 for details
Vijay Industries Ltd.		
1.	Purchase Order for 2 no. of WTG with Enercon India Ltd.	Dated 30.12.2002
2.	Commissioning Certificate	Vide letter Ref. No. JVVNL/ XEN/O&M /JSM/S:TECH/F:/D.1988 dated 29-03-2003
3.	Others	Please refer Table 7 for details
Saurabh Agrotech Pvt. Ltd.		
1.	Purchase Order for 2 no. of WTG with Enercon India Ltd.	Dated 30.12.2002
2.	Wheeling & Banking Agreement	Dated 19-03-2003
3.	Commissioning Certificate	Vide letter Ref. No. JVVNL /XEN /O&M / JSM /S:TECH/F:D.1982 dated 29-03-2003
4.	Others	Please refer Table 7 for details

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

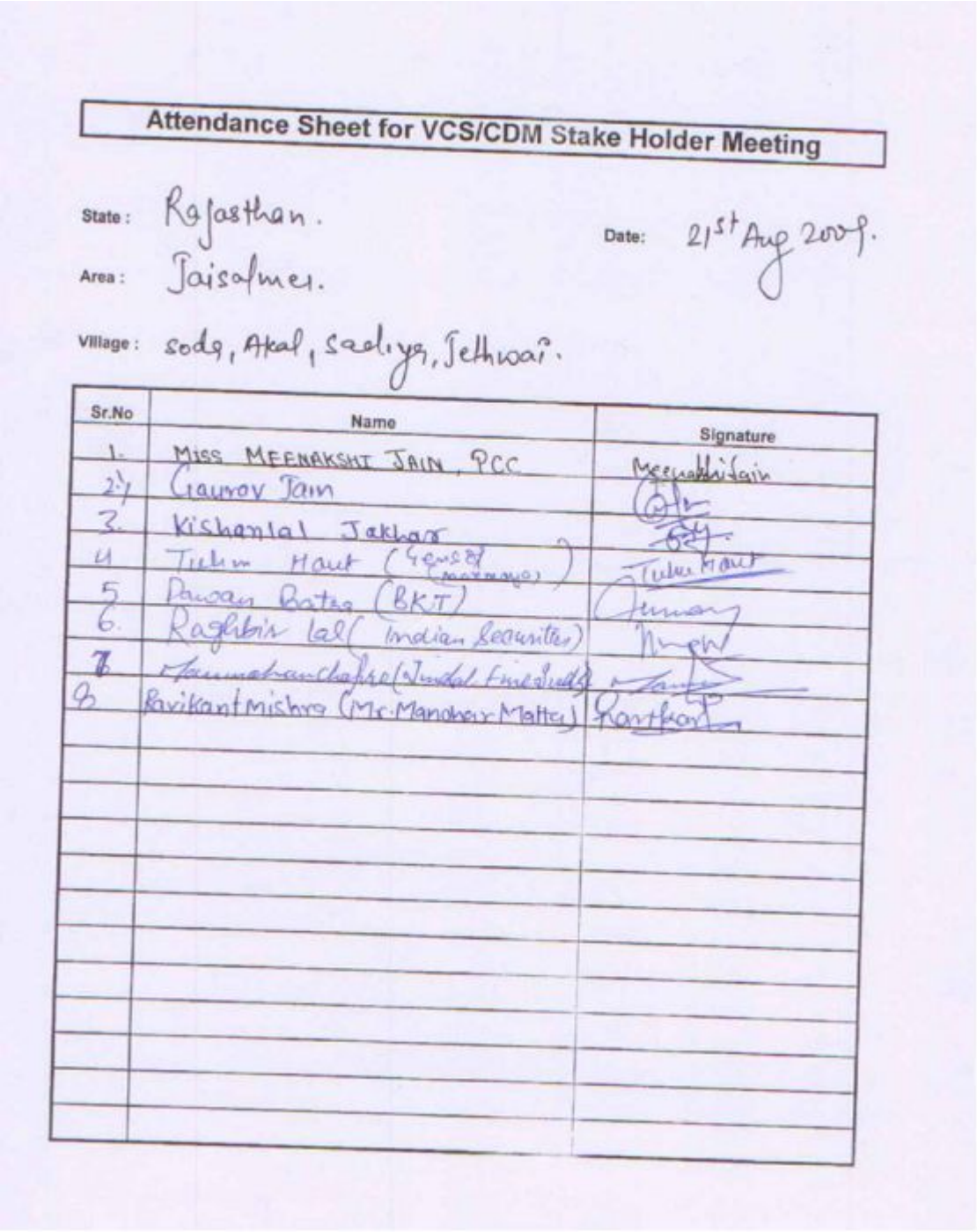
Not Applicable

Annex-I

Stakeholder Meeting Photographs

Annex-II

Attendance sheet of Stakeholder Meeting held in Jaisalmer on 21.08.2009



Attendance Sheet for VCS/CDM Stake Holder Meeting

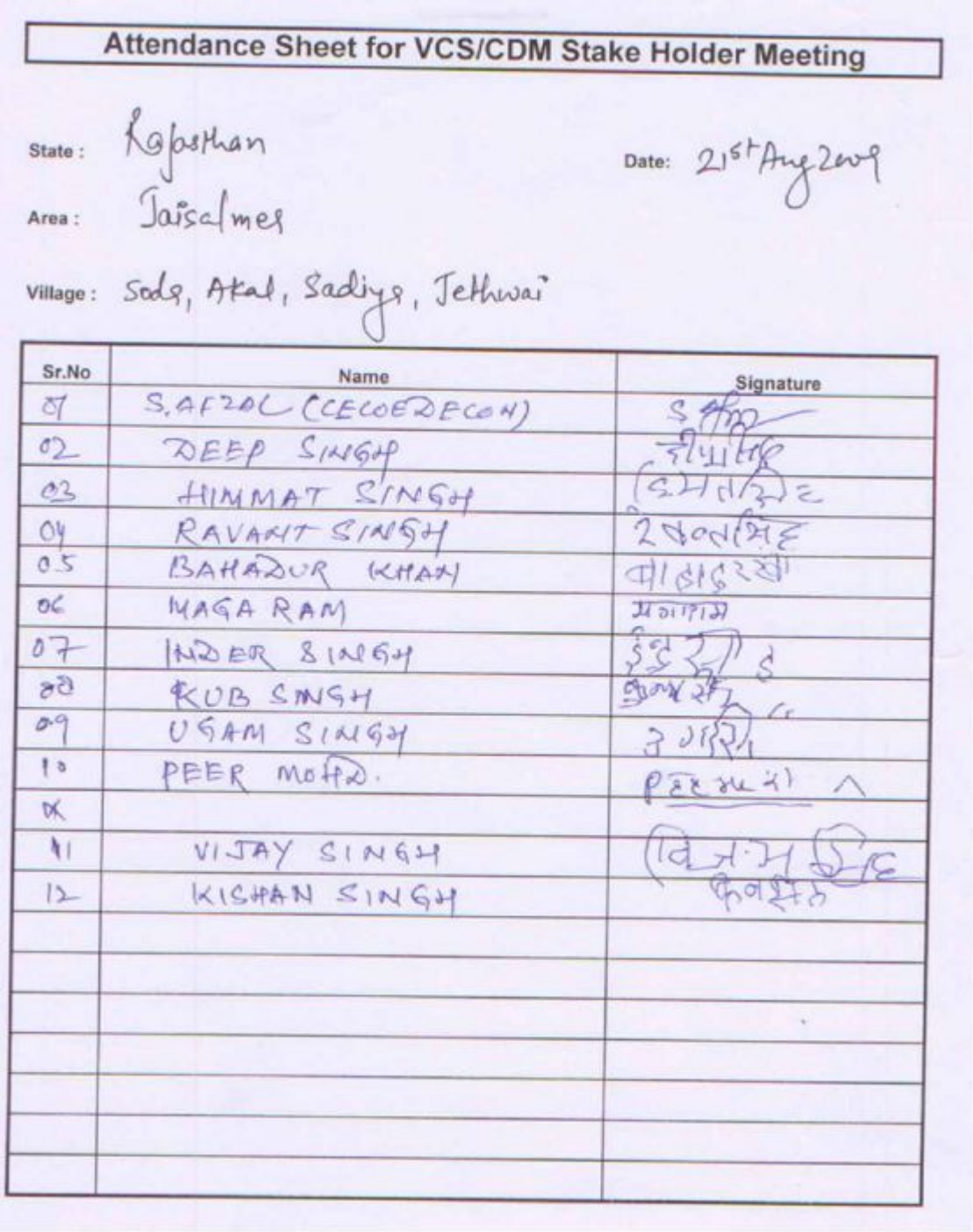
State : Rajasthan. Date: 21st Aug 2009.

Area : Jaisalmer.

Village : sodo, Akal, saoliya, Jethwai.

Sr.No	Name	Signature
1.	Miss MEENAKSHI JAIN, PCC	Meenakshi Jain
2.	Gaurav Jain	
3.	Kishanlal Jakhar	
4	Tulsi Mout (Gems of Rajasthan)	Tulsi Mout
5	Pawan Batra (BKT)	
6.	Raghbir lal (Indian Securities)	
7	Manmohan Chaghra (Jindal Fine Steel)	
8	Ravikant Mishra (Mr. Manohar Mattoo)	Ravikant

Signatures of project proponent consultant and Suzlon officials who participated in Stakeholder Meeting



Attendance Sheet for VCS/CDM Stake Holder Meeting

State : Rajasthan

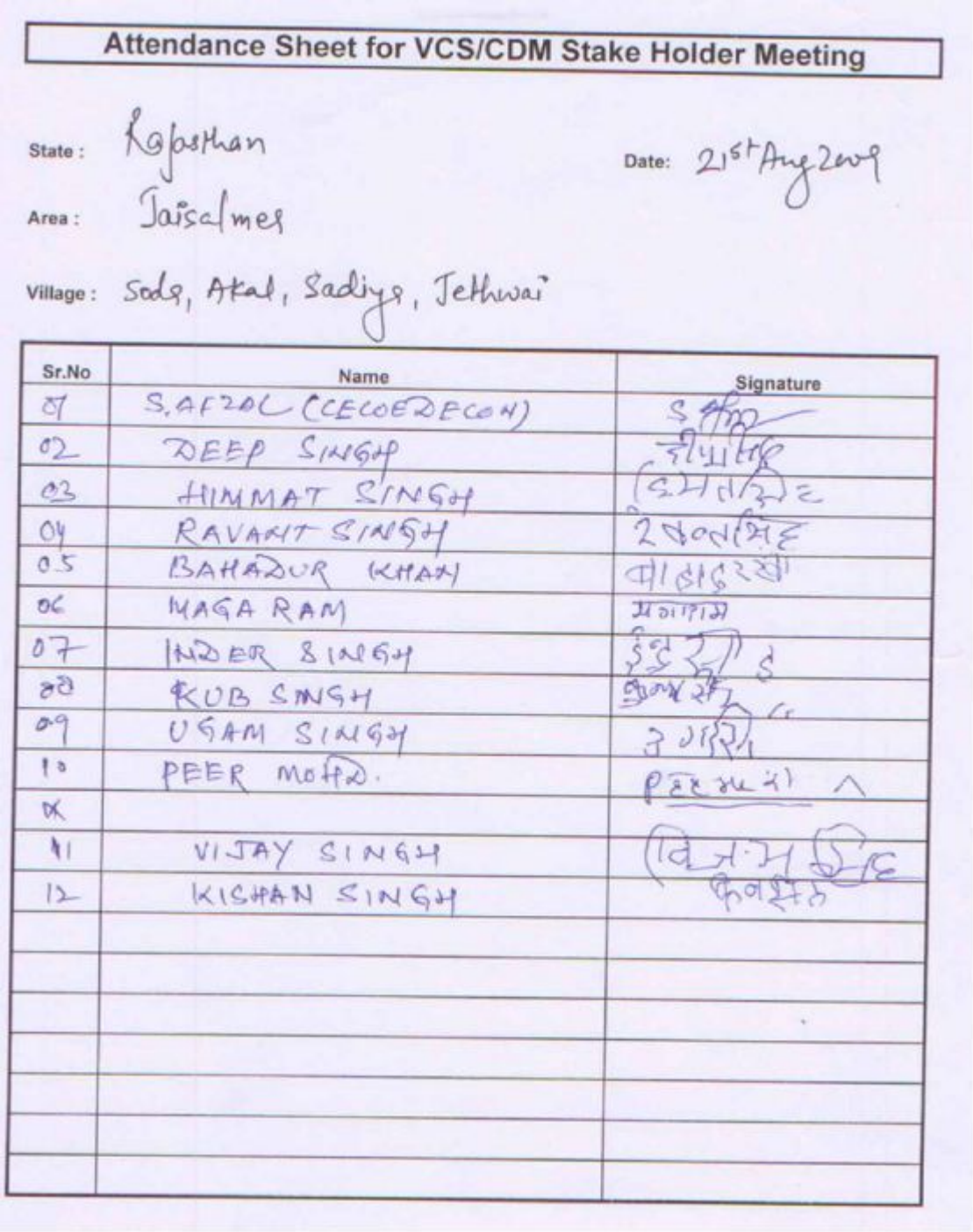
Date: 21st Aug 2009

Area : Jaisalmer

Village : Sodi, Akal, Sadiya, Jethwai

Sr.No	Name	Signature
01	S. AFZAL (CEO ZEDCON)	
02	DEEP SINGH	
03	HIMMAT SINGH	
04	RAVANT SINGH	
05	BAHADUR KHAN	
06	MAGA RAM	
07	INDER SINGH	
08	KUB SINGH	
09	USAM SINGH	
10	PEER MOHD.	
11	VIJAY SINGH	
12	KISHAN SINGH	

Signatures of village members who participated in Stakeholder Meeting



Attendance Sheet for VCS/CDM Stake Holder Meeting

State : Rajasthan Date: 21st Aug 2009

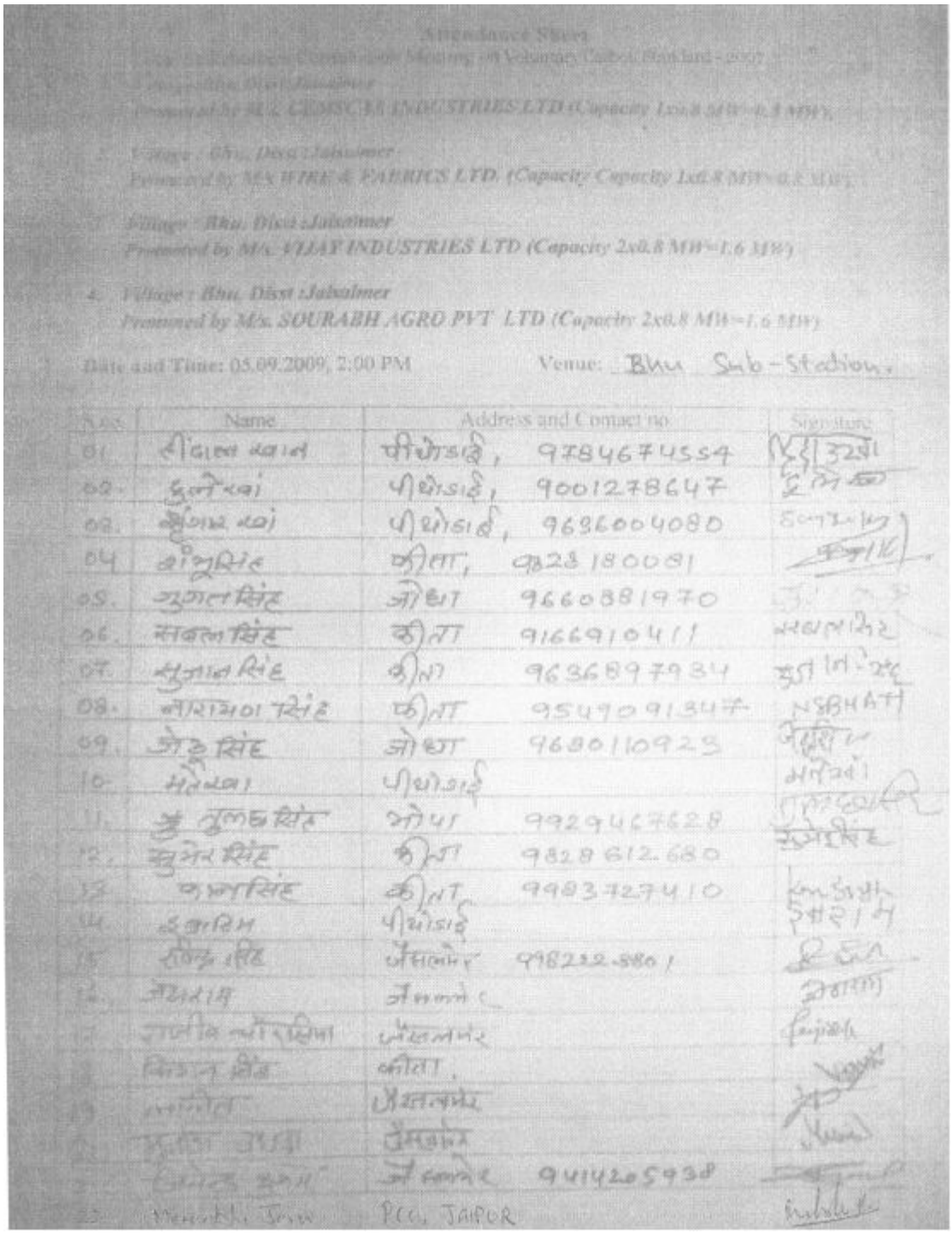
Area : Jaisalmer

Village : Sodi, Akal, Sadiya, Jethwai

Sr.No	Name	Signature
01	S. AFZAL (CECOEDECON)	
02	DEEP SINGH	
03	HIMMAT SINGH	
04	RAVANT SINGH	
05	BAHADUR KHAN	
06	MAGA RAM	
07	INDER SINGH	
08	KUB SINGH	
09	USAM SINGH	
10	PEER MOHD.	
11	VIJAY SINGH	
12	KISHAN SINGH	

Signatures of village members who participated in Stakeholder Meeting

Attendance sheet for stakeholder meeting held in Jaisalmer on 05.09.2009



Attendance Sheet

Proposed by M/s. GLOSCAB INDUSTRIES LTD (Capacity 1x0.8 MW=0.8 MW)

Village : Bhu, Distt :Jaisalmer
Promoted by M/s. WIRE & FABRICS LTD. (Capacity Capacity 1x0.8 MW=0.8 MW)

Village : Bhu, Distt :Jaisalmer
Promoted by M/s. VIJAY INDUSTRIES LTD (Capacity 2x0.8 MW=1.6 MW)

4. Village : Bhu, Distt :Jaisalmer
Promoted by M/s. SOURABH AGRO PVT LTD (Capacity 2x0.8 MW=1.6 MW)

Date and Time: 05.09.2009, 2.00 PM Venue: Bhu Sub-Station.

S.No.	Name	Address and Contact no.	Signature
01.	लीलाल खान	पीथोडाई, 9784674554	
02.	दुलेखां	पीथोडाई, 9001278647	
03.	खुमाण खां	पीथोडाई, 9636004080	
04	हांमूसिंह	कीता, 9828180081	
05.	शुगटसिंह	जोधा 9660881970	
06.	सबलसिंह	कीता 9166910411	
07.	सुजानसिंह	कीता 9636897934	
08.	नारायण सिंह	कीता 9549091347	
09.	जोहू सिंह	जोधा 9680110925	
10.	मेहबा	पीथोडाई	
11.	शु तुलछसिंह	जोधा 9929467628	
12.	खुमेर सिंह	कीता 9828612.680	
13	पन्नसिंह	कीता 9983727410	
14	इकरिम	पीथोडाई	
15	रविंद्र सिंह	जैसलमेर 9982328801	
16.	[illegible]	[illegible]	
17	[illegible]	जैसलमेर	
18	[illegible]	कीता.	
19	[illegible]	जैसलमेर	
20	[illegible]	जैसलमेर	
21	[illegible]	जैसलमेर 9414205938	
22	[illegible]	RCC, JAIPUR	