



Voluntary Carbon Standard Project Description Template

19 November 2007

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1 Description of Project:

1.1 Project title

5.0 MW small scale wind based power generation for captive use by Balkrishna Industries Limited (BIL) in Rajasthan, India.

Version 03

1.2 Type/Category of the project

- Project type: Energy Industries (renewable-/non-renewable sources)
- This project is not a grouped project

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

Year	Annual estimation of Emission Reductions (t CO ₂ e)
28/03/2006 to 27/03/2007	8059
28/03/2007 to 27/03/2008	8059
28/03/2008 to 27/03/2009	8059
28/03/2009 to 27/03/2010	8059
28/03/2010 to 27/03/2011	8059
28/03/2011 to 27/03/2012	8059
28/03/2012 to 27/03/2013	8059
28/03/2013 to 27/03/2014	8059
28/03/2014 to 27/03/2015	8059
28/03/2015 to 27/03/2016	8059
Total estimated reductions (tonnes of CO₂e)	80590
Total number of crediting years	10

The annual emission reduction from the project is more than 5000 tCO₂/year, but it is also less than 1000000 tCO₂/year. Hence as per VCS Standard 2007.1 it is in the category of 'Project'.

1.4 A brief description of the project:

Balkrishna Industries Limited (BIL) has installed and operates a state electricity grid-connected wind farm in Jaisalmer District, Rajasthan, India. The wind farm consists of four Suzlon make Wind Turbine Generators (WTGs) of 1250 kW rated capacity each, for a total capacity of 5.0 MW. The investment also includes civil and electrical infrastructure of the wind farm. The wind project will reduce the GHG emissions

generated by the current energy mix in India's NEWNE power grid, which is dominated by power generated from other conventional sources such as coal.

The proposed project activity generates electricity by converting the kinetic energy of the wind into mechanical energy that is used to turn a generator. Thus wind energy is converted to electrical energy. The power generated in the Wind Turbine Generators (WTG) is thereafter evacuated to the electrical grid. The information on age and average lifetime of these WTGs as well as their technical specification are provided in Annexure 2 Table I of this VCS-PD.

Wind energy based power generation systems are passive systems and therefore no pollutants are emitted that can have harmful impact on the environment. Hazardous waste is also not produced as a result of power generation using WTGs. Natural resources such as coal, oil, or gas are conserved and hence environmental damage through extraction of such natural resources and transportation of fuel to power stations for generation of electrical power is also avoided. Hence, power generation using wind energy is an environmentally safe technology.

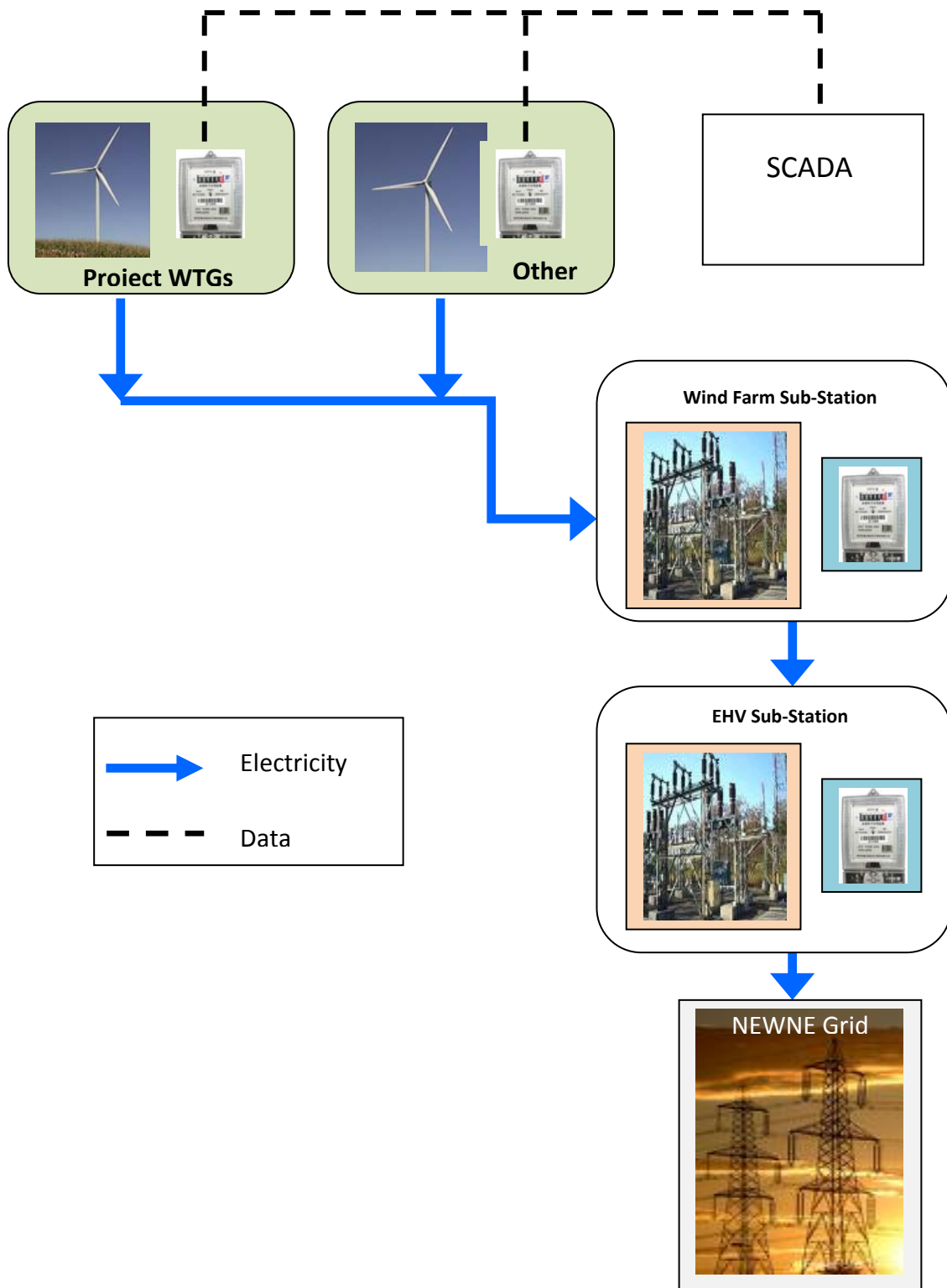
The WTGs have the main rotor shaft and electrical generator at the top of the tower. A wind sensor coupled with a servo motor allows the rotor to be always pointed in the direction of the wind. The main rotor shaft is coupled to a gearbox, which converts the slow rotation of the blades into a quicker rotation to drive the electrical generator.

The hydraulic system provided by the equipment supplier ensures that the rotor gathers the maximum power from the prevailing wind, while minimising loads and controlling output. This system provides failsafe protection in all conditions and, above its rated wind speed, maintains a steady output of from the WTGs. The information on plant load factor (PLF) considered for this project is provided in Table I in Section 2.5 of this VCS-PD.

The wind energy generated from the project activity is evacuated to the NEWNE Grid System through Extra High Voltage (EHV) sub-station. There are High Voltage (HV) transmission lines and complete installation of allied equipments from individual wind turbines to the wind farm facility's switchyard and from the switchyard up to the EHV sub-station.

The project boundary encompasses the physical, geographical site of the Wind Turbine Generators (WTGs) at Mada village near Jaisalmer town. It includes the wind turbine installations, the common meters on the feeders through which power is evacuated to the NEWNE Grid and the NEWNE Grid

A pictorial depiction of the project boundary is given in the figure below



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

Sr.No.	WTG	Location	Latitude	Longitude
1	J-270	<i>Khasara No. 186/P1; Village: Mada; Tehsil Fatehgarh; Dist Jaisalmer; Rajasthan</i>	<i>26° 39' 57.1" N</i>	<i>70° 51' 45.2" E</i>
2	J-275	<i>Khasara No.187/P2, 188/P2; Village: Mada; Tehsil Fatehgarh; Dist Jaisalmer; Rajasthan</i>	<i>26° 39' 48.1" N</i>	<i>70° 51' 21.9" E</i>
3	J-276	<i>Khasara No. 187/P1, 188/P1; Village: Mada; Tehsil Fatehgarh; Dist Jaisalmer; Rajasthan</i>	<i>26° 39' 37.9" N</i>	<i>70° 51' 21.3" E</i>
4	J-280	<i>Khasara No. 202/P1; Village: Mada; Tehsil Fatehgarh; Dist Jaisalmer; Rajasthan</i>	<i>26° 39' 38.6" N</i>	<i>70° 50' 59.42" E</i>

1.6 Duration of the project activity/crediting period:

- *Project start date:*

<i>Sr. No.</i>	<i>WTG</i>	<i>Date of financial commitment</i>	<i>Date of commissioning</i>
<i>1</i>	<i>J-270, J-275, J-276, J-280</i>	<i>03-Aug-04</i>	<i>29-Dec-04</i>

- *Crediting period start date:*

<i>Sr. No.</i>	<i>WTG</i>	<i>Crediting period start date</i>	<i>Crediting period</i>
<i>1</i>	<i>J-270, J-275, J-276, J-280</i>	<i>28-Mar-06</i>	<i>10 years</i>

1.7 Conditions prior to project initiation:

BIL operates a tyre manufacturing unit at Bhiwadi, Rajasthan. Prior to the project activity the power requirement of this facility was being met by power drawn from the state power grid. DG sets available at site are used to generate and supply power to critical sections of the manufacturing unit during times when there are problems with availability of power from the state grid.

The Indian electricity system is divided into two regional grids, viz. NEWNE grid and the Southern grid. Each grid covers several states under its regional boundaries. The NEWNE Grid is supplied predominantly by fossil fuel based thermal power plants which comprises of 68.4% of the total power supplied by the grid. The additional power requirement is thus met by newly installed capacity according to business as usual, which means predominantly new fossil fuel based power plants.

BIL has attempted to reduce GHG emission due to its activities by setting up a renewable energy project based on wind energy and wheeling the power generated there to partially replace the power received from the state power grid. Power generated by the WTGs in the project activity will be provided to the RVPN¹/JVNL² under a 20 year Wheeling and Banking Agreement.

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

¹ Rajasthan Rajya Vidyut Prasaran Nigam Limited

² [Jaipur](#) Vidyut Vitran Nigam Limited

The project activity is a new facility for generating power from a renewable source of energy and evacuating this power to the NEWNE Grid.

In the baseline scenario, the fossil fuel dominated NEWNE Grid would have continued to meet the power demand from the existing generation sources. The project activity involves power generation from a renewable source with no emission. Thus the project activity achieves reduction in GHG emission that would have otherwise occurred due to generation of equivalent power from fossil fuel sources.

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

The proposed project activity generates electricity by converting the kinetic energy of the wind into mechanical energy that is used to turn a generator for converting this mechanical energy into electrical energy. The power generated in the Wind Turbine Generator (WTG) is thereafter evacuated to the electrical grid.

The WTG has the main rotor shaft and electrical generator at the top of the tower. A wind sensor coupled with a servo motor allows the rotor to be always pointed in the direction of the wind. The main rotor shaft is coupled to a gearbox, which converts the slow rotation of the blades into a quicker rotation to drive the electrical generator. The specifications of the WTGs are given in Annexure 2 Table I.

The electrical power generated from the project activity is evacuated to the NEWNE Grid System through Extra High Voltage (EHV) sub-station. There are High Voltage (HV) transmission lines and complete installation of allied equipments for evacuation of the generated power to the NEWNE grid through the EHV substation.

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

There is no law or regulation in India that makes it mandatory for the project proponent to put up a power generation facility of this capacity based on renewable (wind) energy, nor does any law or regulation prohibit the same.

The project was approved by the Rajasthan Renewable Energy Corporation (RREC), the Nodal Agency of the State Government of Rajasthan for promotion and

popularization of Renewable Energy and Energy Conservation in the state of Rajasthan. Thus, the project activity is in line with prevailing laws and regulations of India.

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

The risks affecting GHG reduction due to the project activity are

Availability of wind

Wind is an infirm source of power. The project activity is entirely dependant on the availability of wind, wind velocity and direction to generate power and thereby reduce GHG emissions. Hence, as is normal in such circumstances, a change in the wind pattern will change the power generated and thereby the emission reduction due to the project activity.

Locational risk

The wind farms are located in remote areas. In case of a breakdown this results in delays in assembling resources required for the necessary maintenance activities. The resultant increase in breakdown hours causes reduction of GHG emissions possible from the project activity.

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 involves power generation from a renewable source and does not contribute in any way to GHG emissions. Hence, 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).

The project has not created any other form of environmental credit.

However, if REC trading schemes are enforced in India, the project proponent will withdraw from the VCS Program from the date of enforcement of such schemes.

In the eventuality that there is an option available to the project participant, then the latter will provide a letter from the REC program operator that the credit has not been used and has been cancelled from the relevant program.

The project proponent will also ensure that there is no double accounting of emission reduction with any other GHG program during the VCS crediting period.

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

The project has not applied for credit from any other GHG programme.

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

The project proponent is responsible for the operation and maintenance of the project activity. BIL has appointed SEL as the agency to operate and maintain the WTG, its auxiliaries and all monitoring equipment upto the point of evacuation of power on its behalf. BIL is also responsible for maintaining all documents required in monitoring and verification of the project activity.

The contact information of the project proponent is given below

Organization:	Balkrishna Industries Limited (BIL)
Street/P.O.Box:	72 N.M. Joshi Marg
Building:	418, Creative Industrial Estate
City:	Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400011.
Country:	India
Telephone:	+91-22-66663800
FAX:	+91-22-66663897
E-Mail:	abjain@bkt-tires.com
URL:	www.bkt-tires.com
Represented by:	Senior General Manager – Legal & Compliances
Title:	Mr.
Salutation:	
Last Name:	Jain
Middle Name:	B
First Name:	Ashok
Department:	Legal Department
Mobile:	+91 99 8706 6130

Direct FAX:	
Direct tel:	+91-22-66663805
Personal E-Mail:	

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.):

In calculating the emission reduction due to the project activity, the Combined Margin emission factor for the electricity distribution grid has to be calculated using the 'Tools to calculate the emission factor for an electricity system' Ver 01.1. Central Electricity Authority, the National Authority on electrical systems in India has calculated the emission factors using the same tool and has published their result in User's Guide Ver 4 of 'CO2 Baseline Database for The Indian Power Sector' Ver 4³. The Combined Margin emission factor for wind energy systems has been calculated as per equation (13) on Pg 14 of 'Tools to calculate the emission factor for an electricity system' Ver 01.1 using the Simple Operating Margin emission factor and Build Margin emission factor as given in Table B Appendix C - Grid Emission Factors of User's Guide Ver 4 of 'CO2 Baseline Database for The Indian Power Sector' Ver 4.

The contribution of the project towards sustainable development are as below:

- Reduction in the consumption of fossil fuels in the grid for generating additional electricity equivalent to that generated by the wind mills;
- Reduction of GHG emission through development of renewable energy based technology.
- The project has reduced air pollutants and environmental impacts due to increased share of electricity generation through wind power.
- Since the project uses renewable wind resources for power generation, it does not lead to any emissions in the environment.
- Generation of employment opportunities for the people during the construction phase of the project leading to improvement in living standards of the local population.
- The project has created business opportunity in the nearby area

The economic well being of the nation is improved by the project activity due to reduced dependence on fossil fuel in power generation.

³ http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

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:

Methodology applied: UNFCCC Clean Development Mechanism approved small scale methodology AMS-I.D Ver 13.

The project activity is

- a) installation and operation of four renewable energy generation units that use wind energy to generate electricity that is supplied to the electricity distribution system, i.e. the NEWNE Grid,
- b) the total rated generation capacity of the project activity is 5.0 MW that is less than 15MW as stipulated by the methodology AMS-I.D Ver 13,
- c) the generating units are also new installations and not capacity addition in an existing renewable energy generation facility of the project proponent,
- d) there is no combined heat and power (co-generation) generation involved in the project activity.

Hence, application of approved small-scale methodology AMS-I.D Ver 13 is justified for the project activity..

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

The project activity comprises of renewable energy generation utilising wind energy. The electricity generated is supplied to the electricity distribution system, i.e. the NEWNE Grid. The total rated generation capacity of the project activity is 5 MW that is less than 15 MW as stipulated by the methodology AMS-I.D Ver 13. The generating unit is also a new installation and not capacity addition in an existing renewable energy generation facility of the project proponent. Hence, application of approved small-scale methodology AMS-I.D Ver 13 is justified for the project activity.

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

The GHG sources and sinks for the baseline scenario and the project activity have been identified below:

	Sources	Gas	Included?	Justification / Explanation
Baseline	Electricity generation from power plants connected to the State Grid	CO2	Yes	Main emission source
		CH4	No	Excluded for simplification. This is conservative.
		N2O	No	Excluded for simplification. This is conservative.
Project Activity	No emission from the Wind Turbine Generator	CO2	No	Wind energy generation does not have any direct GHG emissions.
		CH4	No	
		N2O	No	

In the baseline scenario, an equivalent amount of power would have otherwise been generated by operation of existing power plants in the NEWNE Grid and by addition of new fossil fuel based generation sources.

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

The project activity is a new installation for supplying electricity generated from renewable energy to the electricity distribution system, i.e. the NEWNE Grid, and subsequently wheeling the power for consumption in the manufacturing unit of BIL at Bhiwadi, Rajasthan. In the baseline scenario, the power demand on the NEWNE grid would have been met from the existing power plants supplying power to the NEWNE grid that is dominated by fossil fuel based power plants. The project activity involves power generation from a renewable source with no emission. Hence, the emission reduction due to the project activity is the baseline emission.

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):

In accordance with paragraph 28 of the simplified modalities and procedures for small scale CDM projects, a simplified baseline and monitoring methodology listed in Appendix B may be used if the project participant can demonstrate that project

activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in the Attachment A to Appendix B.

Project participant has chosen to demonstrate additionality of the project activity due to presence of investment barrier by means of a benchmark analysis. The benchmark analysis shows that there are constraints in achieving the internal rate of return on investment made in the project activity and the additional revenue from VCUs will assist the project participant in partially overcoming this constraint. The benchmark analysis has been done with data that is specific to the project activity.

A benchmark analysis has been done with project IRR as the financial indicator and the existing commercial lending rate at the time of the investment decision serving as the benchmark for additionality check.

In case of the project activity, issues such as transmission unavailability, back-down of generation or part-load operations, which are beyond the control of the project proponent are likely to affect the project activity severely and therefore a higher rate of return is required to compensate for these additional risks.

Based on the above-mentioned benchmark, the calculation and benchmark analysis of financial indicators are carried out for the project activity.

The basic parameters for calculation of the financial indicators of the project activity are listed below in Table I. The post-tax project IRR was calculated on the basis of the information presented below:

Table I

Basis		Source	
Plant Capacity	5	MW	Offer document dated 10/02/2004 from equipment supplier
CUF (also known as PLF)	22.37%	per annum	Table 7, Paragraph 58, RERC Order In the matter of amendments to RERC (Power Purchase & Procurement Process of Distribution Licensees) Regulations 2004 and RERC (Terms & Conditions for Determination of Tariff) Regulations 2004 under Section 61 & 86 of the Electricity Act 2003
Line losses	4.6%		Paragraph 56 of Rajasthan Electricity Regulatory Commission ARR & Tariff for transmission of electricity and SLDC charges for FY-05 of RVPNL dated 17/04/2004
Generation at WTG (annual)	9798	MWH	Calculated

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Commercial Operation Date	29-Dec-04		Commissioning Certificate
End of First year of Financial Operation	31-Mar-05		
Plant Life	20	Years	Equipment supply Agreement
Operation and Maintenance expenses			
O&M exp.	4,000,000	Rs per annum from 4th Year to 10 th year	Offer document dated 10/02/2004 from equipment supplier
O&M exp.	5.00%	escalation every year	Offer document dated 10/02/2004 from equipment supplier
Wheeling charges for power	10%	Net power supplied to grid	Wheeling and Banking Agreement
Annual administrative charges	200,000	INR	Estimated by project proponent
RVNL's 1st Year Tariff	4.01	INR	RERC Order dated 24-Mar-2001 http://www.rerc.gov.in/index1.htm
Depreciation Norms			
Depreciation Life of project	18	Years	Calculated
Maximum Depreciation Allowed-Books	95%	of the project cost	As per I-T Act 1962
Maximum Depreciation Allowed-IT	100%	of the project cost	As per I-T Act 1962
Depreciation Rate-Books			
Plant and Machinery	5.28%		As per Companies Act 1956
Civil Works	3.34%		As per Companies Act 1956
Depreciation Rate (IT Act)-WDV	80.00%	of the depreciable project cost	As per I-T Act 1962
Salvage Value	5%	of the project cost	As per notification of Central Electricity Regulatory Commission
Tax			
Year of starting for 80IA benefit	1		As per I-T Act 1962
Duration of 80IA benefit	10	years	As per I-T Act 1962
Deduction Available under 80 IA	100%	of taxable profits	As per I-T Act 1962
Income Tax	33.99%	per annum	As per I-T Act 1962
Base Rate	30.00%	per annum	As per I-T Act 1962
Surcharge	10.00%	per annum	As per I-T Act 1962
Education Cess	3.00%	per annum	As per I-T Act 1962
MAT	7.5%	per annum	As per I-T Act 1962
Base Rate	7.5%	per annum	As per I-T Act 1962
Surcharge	0%	per annum	As per I-T Act 1962
Education Cess	0%	per annum	As per I-T Act 1962
Consider MAT Credit	yes		As per I-T Act 1962
MAT Credit availability Period	5	years	As per I-T Act 1962
Service Tax	10.2%	per annum	As per Finance Act 1994
RREC charges			
Application fee @ Rs 50000/MW	250,000	INR	Paragraph 13.2 Policy for promoting generation of electricity through non-conventional energy

			sources 2004
RVNL/Jaipur discom charges			
Receiving station charges @Rs 2 lac/MW	1,000,000	INR	Paragraph 5.1.2 Policy for promotng generation of electricity through non-conventional energy sources 2004
Charges for transmission facility @Rs 15 lac/MW	7,500,000	INR	Paragraph 5.1.4 Policy for promotng generation of electricity through non-conventional energy sources 2004
Interest rate			
BPLR	10.25%		Pg 248, Appendix Table 1.2: Interest Rate Structure of Scheduled Commercial Banks, RBI Annual Report 2003-04 ⁴

Table II

	Without carbon credits
Post tax Project IRR	7.77%

As observed from the investment analysis above, the post tax project IRR is significantly less than benchmark prime lending rate of 10.25% published in Pg 248 Table 1.2 of Annual Report 2003-2004 of the Reserve Bank of India.

The purpose of the sensitivity analysis is to examine whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumption. The investment analysis provides a valid argument in favor of additionality if it consistently supports the conclusion that the project activity is unlikely to be the most financially attractive or is unlikely to be least financially attractive. As for the proposed project, the Plant Load Factor (PLF) is identified as the variable factor to conduct the sensitivity analysis.

Change in PLF directly affects the earnings from the project activity as it reflects the utilization of the installed capacity of the regeneration unit. Since earning from wheeling of power to the Bhiwadi unit of BIL constitutes a major portion of the project revenue, hence, variation in PLF has been considered in the sensitivity analysis of the project activity. RREC, in the Policy for power generation from non-conventional energy source in April 2003 had considered a PLF of 22.37% in its consideration of parameters of tariff determination for Wind Power Plants. The same has been adopted for the benchmark analysis.. This is also corroborated by the actual power generation from the WTGs J-270, J-275, J-276 and J-280 as recorded and

⁴ <http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/56253.pdf>

presented in Table VI.a and Table VI.b below. Hence, an increase in PLF beyond the base PLF of 22.37% is unlikely to occur.

Table III

Case No.	Description	Project IRR (Post Tax)
	Base Case Without VCU	7.77%
1	Reduction in PLF by 2%	7.42%
2	Reduction in PLF by 4%	7.07%
3	Reduction in PLF by 6%	6.72%
4	Reduction in PLF by 8%	6.36%
5	Reduction in PLF by 10%	5.99%
6	Increase in PLF by 2%	8.11%
7	Increase in PLF by 4%	8.45%
8	Increase in PLF by 6%	8.79%
9	Increase in PLF by 8%	9.12%
10	Increase in PLF by 10%	9.45%

The sensitivity of project IRR towards change in O&M costs is less. As seen in Table IV the change in project IRR ranges from 7.38% to 8.13% for a $\pm 10\%$ variation in O&M cost.

In the calculation for project IRR, the actual O&M cost considered is as given in the purchase order issued to the equipment manufacturer. Hence, the sensitivity analysis is from the 11th year onwards. It can be observed that the project IRR varies from 7.38% to 8.13% for a $\pm 10\%$ variation in cost of O&M. However, with increasing years of operation, due to wear and tear of rotating equipments and weathering, the expenditure on maintenance and operation of the WTG is only expected to increase. Hence, after the initial agreement period is over the possibility of a lower O&M cost for the new agreement period is remote and therefore increase in project IRR due to decrease in O&M cost is an unlikely scenario.

Table IV

Case No.	Description	Project IRR (Post Tax)
	Base Case Without VCU	7.77%
1	Reduction in O&M cost by 2%	7.84%
2	Reduction in O&M cost by 4%	7.92%
3	Reduction in O&M cost by 6%	7.99%
4	Reduction in O&M cost by 8%	8.06%
5	Reduction in O&M cost by 10%	8.13%
6	Increase in O&M cost by 2%	7.69%
7	Increase in O&M cost by 4%	7.62%
8	Increase in O&M cost by 6%	7.54%
9	Increase in O&M cost by 8%	7.46%
10	Increase in O&M cost by 10%	7.38%

The Tariff on energy charge is a regulated item and is not prone to escalation on a year on year basis. However, in keeping with the guidelines for investment analysis, a sensitivity of

project IRR to change in energy charge has been worked out wherein it is seen that for a $\pm 10\%$ variation in energy charge, the project IRR varies between 5.99% and 9.45%.

Table V

Case No.	Description	Project IRR (Post Tax)
	Base Case Without VER	7.77%
1	Reduction in Tariff by 2%	7.42%
2	Reduction in Tariff cost by 4%	7.07%
3	Reduction in Tariff cost by 6%	6.72%
4	Reduction in Tariff cost by 8%	6.36%
5	Reduction in Tariff cost by 10%	5.99%
6	Increase in Tariff cost by 2%	8.11%
7	Increase in Tariff cost by 4%	8.45%
8	Increase in Tariff cost by 6%	6.70%
9	Increase in Tariff cost by 8%	9.12%
10	Increase in Tariff cost by 10%	9.45%

Table VI.a *Monthly power generation & capacity*

Month	Power Generation	Capacity
	kWh	
Part I		
Jan-05	276269	3720000
Feb-05	466709	3360000
Mar-05	470281	3720000
Apr-05	307788	3600000
May-05	711479	3720000
Jun-05	1060708	3600000
Jul-05	1103437	3720000
Aug-05	999449	3720000
Sep-05	503184	3480000
Oct-05	421204	3720000
Nov-05	223383	3600000
Dec-05	297455	3720000
Total	6841346	43680000
Part II		
May-07	1058572	3720000
Jun-07	1312609	3600000
Jul-07	1114751	3720000
Aug-07	1064306	3720000
Sep-07	655799	3600000
Oct-07	306414	3720000
Nov-07	143514	3600000
Dec-07	349565	3720000
Jan-08	491533	3720000
Feb-08	303535	3480000
Mar-08	650363	3720000
Apr-08	517734	3600000
May-08	1657612	3720000
Jun-08	893671	3600000
Jul-08	1386409	3720000
Aug-08	1038564	3720000
Sep-08	783023	3600000
Oct-08	475791	3720000
Nov-08	337478	3600000
Dec-08	424973	3720000

Jan-09	511857	3720000
Feb-09	309975	3360000
Mar-09	514944	3720000
Apr-09	634929	3600000
Total	16937921	87720000

Table VI.b Consolidated PLF

PLF – Part I	
Total generation (kWh)	6841346
Total capacity (kWh)	43680000
PLF (%)	15.66%
PLF – Part II	
Total generation (kWh)	16937921
Total capacity (kWh)	87720000
PLF (%)	19.31%

The sensitivity analysis clearly shows that financially the project activity is unattractive compared to the benchmark commercial lending rate of 10.25%,

The above calculations are conservative as it is based on the assumption that a Plant Load Factor (PLF) of 22.37% will be available to the operating WTGs.

In view of the above, it is clearly evidenced that the project activity is not financially attractive without CDM revenue. Hence, the project activity is additional.

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:

AMS-I.D Ver 13: Grid connected renewable electricity generation.

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

The purpose of monitoring is to ensure

- the performance of the project activity as per the agreement concluded with the equipment supplier,
- data collected for calculation of reduction in GHG emission are accurate, adequate and consistent with the operation of the project activity
- the reduction in GHG emissions is accounted for in a manner that is credible and verifiable

- documents and sources of verifiable data are maintained such that they are easily traceable and archived for future reference

The type of data recorded, their source, monitoring frequency and data that are to be recorded are

Table A

Type of data	Unit of measurement	Source	Monitoring frequency	Data quality assurance
Net power exported to NEWNE Grid from the project activity	KWh	Monthly Report from SEL	Monthly	Main Meters are calibrated annually as given in Section 6 of Wheeling & Banking Agreement and readings are taken jointly by representatives from RVPNL, JVVN and representative of project proponent. On-board meters on the WTGs are integrated electronic meters and do not require calibration.

The baseline emission considering only CO₂ from fossil fuel based power plants on the NEWNE Grid is given as

$$BE_y = EG_y * EF_{Grid,CM,y}$$

Following the direction given on paragraph 9a of AMS-I.D Ver 13, the Combined Margin emission factor for the electricity distribution grid has to be calculated using the 'Tools to calculate the emission factor for an electricity system' Ver 01.1. Central Electricity Authority, the National Authority on electrical systems in India has calculated the emission factors using the same tool and has published their result in User's Guide Ver 4 of 'CO₂ Baseline Database for The Indian Power Sector' Ver 4⁵. The Combined Margin emission factor for wind energy systems has been calculated as per equation (13) on Pg 14 of 'Tool to calculate the emission factor for an

⁵ http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

electricity system' Ver 01.1 using ex-ante option for the Simple Operating Margin emission factor, and Option 1, i.e. ex-ante Build Margin emission factor as given in Table B Appendix C - Grid Emission Factors of User's Guide Ver 4 of 'CO2 Baseline Database for The Indian Power Sector' Ver 4.

$$EF_{\text{Grid,CM,y}} = (EF_{\text{Grid,OM,y}} * w_{\text{OM}}) + (EF_{\text{Grid,BM,y}} * w_{\text{BM}}),$$

Where,

$EF_{\text{Grid,CM,y}}$	Combined Margin emission factor of NEWNE Grid, tCO2/MWh
$EF_{\text{Grid,OM,y}}$	Simple Operating Margin emission factor of NEWNE Grid, 1.01 tCO2/MWh
$EF_{\text{Grid,BM,y}}$	Build Margin emission factor of NEWNE Grid, 0.60 tCO2/MWh
w_{OM}	Operating Margin weighting factor for wind power projects, 0.75
w_{BM}	Build Margin weighting factor for wind power projects, 0.25

The calculation for emission reduction is given below.

Table B

Emission Reduction due to Power Supply from WTG to Grid				
Sr No.	Description	UoM	Parameter/Equation	Value
1.0	Total rated power generation of 4 nos. WTGs each of 1250 kW	kW	$EG_{\text{rated}} = 4 * 1250$	5000
2.0	Power Load factor specified by Government of Rajasthan	%	PLF	22.37%
3.0	Line Loss	%	L_{loss}	4.6%
4.0	Grid availability	%	G_{avlbl}	95.0%
5.0	Net annual electricity supplied to grid from the project activity	MW	$EG_y = (EG_{\text{rated}} * \text{PLF} * 8760 / 1000) * (1 - L_{\text{loss}}) * G_{\text{avlbl}}$	8879.982
6.0	Calculation of Combined Margin emission factor			
6.1	Simple Operating Margin emission factor for NEWNE grid (Refer Table B Appendix C - Grid Emission Factors, CO2 Baseline Database for The Indian Power Sector Ver 4 and Table C Annex 3 of this VCS-PD)	tCO2/MWh	$EF_{\text{Grid,OM,y}}$	1.01
6.2	BuildMargin emission factor for NEWNE grid (Refer Table B Appendix C - Grid Emission Factors, CO2 Baseline Database for The Indian Power Sector Ver 4)	tCO2/MWh	$EF_{\text{Grid,BM,y}}$	0.6
6.3	Weighting factor for		w_{OM}	0.75

	Simple Operating Margin emission factor (<i>Refer 'Tool to calculate the emission factor for an electricity system' Ver 01.1</i>)			
6.4	Weighting factor for Build Margin emission factor (<i>Refer 'Tool to calculate the emission factor for an electricity system' Ver 01.1</i>)		W_{BM}	0.25
6.5	Combined Margin emission factor for NEWNE Grid	tCO2/MWh	$EF_{Grid,CM,y} = (EF_{Grid,OM,y} * W_{OM}) + (EF_{Grid,BM,y} * W_{BM})$	0.9075
7.0	Calculation for emission reduction due to project activity			
7.1	Baseline emission (<i>Refer Clause 9a of AMS-I.D Ver 13</i>)	tCO2/yr	$BE_y = EG_y * EF_{Grid,CM,y}$	8058.583
7.2	Project emission	tCO2/yr	PE_y	0
7.3	Leakage emission	tCO2/yr	LE_y	0
7.4	Emission reduction	tCO2/yr	$ER_y = BE_y - PE_y - LE_y$	8059

Note 1: Project Emissions The project activity uses wind power to generate electricity and hence the emissions from the project activity are taken as nil.

Note 2: Leakage Leakage emissions on account of the project activity is considered as zero as neither the Wind Energy Generators are transferred from another activity nor any existing equipment of the project site would be transferred from the project site in accordance with the applied methodology.

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

Describe each data and parameter using this table.

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net annual electricity supplied to the grid by the Project
Source of data to be used:	Monthly Report "Break-up of Net Export Units (kWh) as recorded at Main Meter of RVPNL"
Value of data applied for the purpose of calculating expected emission reductions	Annual electricity supplied to the grid by the Project Activity $= 5 \text{ MW (Capacity)} \times 23.74\% \text{ (PLF)} \times (1-8\%) \text{ (Line loss)} \times 8760 \text{ (hours) MWh}$ $= 9566 \text{ MWh}$
Description of measurement methods and procedures to be applied:	Net electricity supplied to the NEWNE grid will be calculated based on the difference between measured values of "export" and "import" on the RVPNL meter. The procedures for metering and meter reading will be as per the provisions followed by the RVPNL. The joint reading is taken by representative of the project proponent or the Operation & Maintenance contractor employed by the project proponent on one hand, and RVPNL officials on the other. On the basis of these readings, the annual electricity supplied to the grid will be calculated.

QA/QC procedures to be applied:	The quantity of net electricity supplied can be cross-verified from the invoice raised on JVVNL by the project proponent and the readings available from the check meter available at site. The meters will be calibrated once a year.
Any comment:	The data will be archived for the entire crediting period and an additional period of two years after the crediting period is over or the last issuance of VCU for the project, whichever occurs later.

Data / Parameter:	EF _{Grid, BM_y}
Data unit:	tCO ₂ e/MWh
Description:	Build Margin Emission Factor of NEWNE Grid
Source of data to be used:	Applicable version of “User’s Guide - CO ₂ Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India. The User’s Guide CO ₂ Baseline Database for Indian Power Sector” is available at www.cea.nic.in
Value of data applied for the purpose of calculating expected emission reductions	0.60 tCO ₂ /MWh
Description of measurement methods and procedures to be applied:	Central Electricity Authority, the National Authority on electrical systems in India has calculated the emission factors using the ‘Tools to calculate the emission factor for an electricity system’ Ver 01.1 and publishes their result in User’s Guide of ‘CO ₂ Baseline Database for The Indian Power Sector’
QA/QC procedures to be applied:	Not required
Any comment:	The ex-ante Build Margin Emission Factor, i.e. Option 1 as given on Pg 13 of Tool to calculate the emission factor for an electricity system Ver 01.1, has been considered for calculating the emission factor of the grid. This value will remain constant throughout the crediting period.

Data / Parameter:	EF _{Grid, OM_y}
Data unit:	tCO ₂ e/MWh
Description:	Operating Margin Emission Factor of NEWNE Grid
Source of data to be used:	Applicable version of “User’s Guide - CO ₂ Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India. The User’s Guide CO ₂ Baseline Database for Indian Power Sector” is available at www.cea.nic.in
Value of data applied for the purpose of calculating expected emission reductions	1.01 tCO ₂ /MWh
Description of measurement methods and procedures to be applied:	Central Electricity Authority, the National Authority on electrical systems in India has calculated the emission factors using the ‘Tools to calculate the emission factor for an electricity system’ Ver 01.1 and publishes their result in User’s Guide of ‘CO ₂ Baseline Database for The Indian Power Sector’
QA/QC procedures to be applied:	Not required
Any comment:	The ex-ante option for Simple Operating Margin as given on Pg 4 of Tool to calculate the emission factor for an electricity system Ver 01.1, has been chosen for calculating the emission factor of the grid. The calculation is provided in Section 3.2 of this VCS-PD. This value will remain constant throughout

	the crediting period
Data / Parameter:	W_{BM}
Data unit:	Percentage
Description:	Weighting of Build Margin emission factor for wind power generation project activities
Source of data to be used:	'Tool to calculate the emission factor for an electricity system' Ver 01.1
Value of data applied for the purpose of calculating expected emission reductions	25%
Description of measurement methods and procedures to be applied:	Weighting factor to be used as per the guidelines of UNFCCC
QA/QC procedures to be applied:	Not required
Any comment:	This value will remain constant throughout the entire crediting period.

Data / Parameter:	W_{OM}
Data unit:	Percentage
Description:	Weighting of Operating Margin emission factor for wind power generation project activities
Source of data to be used:	'Tool to calculate the emission factor for an electricity system' Ver 01.1
Value of data applied for the purpose of calculating expected emission reductions	75%
Description of measurement methods and procedures to be applied:	Weighting factor to be used as per the guidelines of UNFCCC
QA/QC procedures to be applied:	Not required
Any comment:	This value will remain constant throughout the entire crediting period.

3.4 Description of the monitoring plan

The Monitoring and Verification (M&V) procedures define a project-specific standard against which the project's performance (i.e. GHG reductions) and conformance with all relevant criteria will be monitored and verified. It includes

- suitable data collection, collation and archiving methods
- data interpretation with respect to its accuracy, adequacy and consistency

These provide for a clear, credible and accurate monitoring for arriving at the key performance indicator of the project activity, i.e. reduction in GHG emissions, which can be reviewed and verified.

The general monitoring principles are based on

- Frequency of monitoring
- Minimising uncertainty and improving performance reliability of the project
- Reporting, reviewing and archiving the data used for accounting of emission reduction due to the project activity

Frequency of monitoring

The applied small-scale methodology, AMS-I-D, requires monitoring of the electricity supplied to the grid.

The electricity generated by the WTGs is measured through a two step procedure wherein the first metering is carried out continuously at the controller of the machine with on-board meter. The monitoring of the WTGs is done from a common monitoring station as a part of central monitoring system. The system consists of a state-of-the-art controlling and monitoring system of O&M contractor,

Project proponent has appointed an 'Operation and Maintenance' contractor for five years to operate the WTGs. The performance of the WTGs, safety in operation and scheduled /breakdown maintenance are organized and monitored by the O&M contractor. The O&M contractor appointed by BIL will monitor the electrical power generation of the WTGs daily on regular basis and will maintain a log book recording daily generation details for each WTG connected to the JVVNL meters to which the WTGs are connected.

A long term (20 years) wheeling and banking agreement (W&BA) has been signed with RVPN/JVVNL. The meter readings at the Metering Point are undertaken jointly by the representatives of the State Grid/JVVNL on one hand and the representative of M/s Suzlon Energy Limited and/or the appointed contractor for Operation & Maintenance of the WTGs every month. Thereafter, JVVNL submits a monthly report that among other things also contain the apportioned values of power supplied to and drawn from the NEWNE Grid by the individual WTGs. The method of apportioning is given in Annexure 1.

These values of the measured parameters are thereafter entered in the project monitoring worksheet, a MS Excel based spreadsheet for calculation of emission reduction due to the project activity.

Uncertainties and Reliability

The amount of emission reduction is directly proportional to the amount of power generated in the project activity. The reliability of the monitoring system is dependant on the quality of the measurement devices. Hence all measuring instruments are calibrated and maintained as per the planned frequency as given in Section 3.2 for ensuring reliability of the data used for calculating emission reduction.

In the event of failure of any equipment in the project activity, the project participant and the O&M contractor will take all necessary steps to make the WTG available for power generation at the earliest.

In case of failure or errors in any of the main meters used for arriving at the final power generation figure, the officials of RVPNL would immediately rectify the meter or replace it with a calibrated meter. The generation of wind power during the meter replacement would be considered from the back-up meters available and provided for such an eventuality. In case if both meters, main and back-up meters, are out of order for the same period, then there will not be any emission reduction accruing due to the project activity.

In the event that any on-board meter on the WTGs, including those that are external to the project activity, fails, the average daily generation of the rest of the month, or of thirty days immediately preceding the period of failure, whichever is lower, will be taken to compute the total generation of the WTG in the period that the meter is down. The on-board meters

are connected to the SCADA system and the power generation of each WTG can be monitored in real-time at the Central Monitoring Station (CMS) of the wind farm. The snapshot of generation for the month will be taken on the last day of every calendar month and will be kept as a record both in electronic as well as printed (paper) form.

In the event that the crediting period of the project activity falls in-between the billing cycle of RVPNL, the same would be recorded and made available during verification of emission reduction due to the project activity. The following apportioning procedure will be followed to arrive at the generation of power in that crediting period:

Description	Unit	Calculation
Power generation at Controller of WTG for the specific part of the Month included in the crediting period(kWh)	kWh	EG_P
Total generation at Controller for the same month	kWh	EG_C
Generation as per RVPNL generation report for the month	kWh	EG_M
Power generation used for calculating emission reduction for the specific part of the Month included in the crediting period(kWh)		$EG_M * (EG_P / EG_C)$

Reporting and Archiving

Verification is done on the basis of power export and import figures available from the Monthly Report submitted by M/s Suzlon Energy Limited (SEL) on the basis of the Joint Meter Reading undertaken with JVVNL. Power generation in WTGs in the project activity is demonstrated from data logged in SCADA, and in the event of unavailability of such data, from Log Book maintained for the purpose.

It will also be demonstrated that power generation as recorded by the on-board meters are higher than the power export from the project activity to the NEWNE Grid.

Roles and Responsibilities

The representative of BIL will be responsible for

- Monitoring the project activity for smooth operation of the WTGs,
- Coordination with the O&M contractor to ensure highest possible availability of the WTGs for generation,
- Collection and updation of all data in the project monitoring worksheet,
- Generation and distribution of monthly reports to the Management of the Project Proponent accounting for
 - The actual emission reduction achieved
 - Any specific event affecting the performance of the project
- Annual internal audit to verify the data updated in the emission reduction calculation worksheet against the Monthly Report “Break-up of Net Export Units (kWh) as recorded at Main Meter of RVPNL” as submitted by RVPNL.

- Archiving all data from their respective sources for the purpose of verification for the entire crediting period and an additional period of two years after the end of the crediting period, or the last issuance of VCU for the project, whichever occurs later.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

The calculation for baseline emissions, project emissions, leakage emissions and emission reductions are based on the equations for the same and relevant procedures given in AMS-I.D Ver 13.

The project activity is a new installation for supplying electricity generated from renewable energy to the electricity distribution system, i.e. the NEWNE Grid.

The baseline emission considering only CO₂ from fossil fuel based power plants on the NEWNE Grid is

$$BE_y = EG_y * EF_{Grid,CM,y}$$

Following the direction given on paragraph 9a of AMS-I.D Ver 13, the Combined Margin emission factor for the electricity distribution grid has to be calculated using the 'Tools to calculate the emission factor for an electricity system' Ver 01.1. Central Electricity Authority, the National Authority on electrical systems in India has calculated the emission factors using the same tool and has published their result in User's Guide Ver 4 of 'CO₂ Baseline Database for The Indian Power Sector' Ver 4⁶. The Combined Margin emission factor for wind energy systems has been calculated as per equation (13) on Pg 14 of 'Tool to calculate the emission factor for an electricity system' Ver 01.1 using ex-ante option for the Simple Operating Margin emission factor, and Option 1, i.e. ex-ante Build Margin emission factor as given in Table B Appendix C - Grid Emission Factors of User's Guide Ver 4 of 'CO₂ Baseline Database for The Indian Power Sector' Ver 4.

$$EF_{Grid,CM,y} = (EF_{Grid,OM,y} * w_{OM}) + (EF_{Grid,BM,y} * w_{BM}),$$

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

Where,

$EF_{Grid,CM,y}$	Combined Margin emission factor of NEWNE Grid, tCO ₂ /MWh
$EF_{Grid,OM,y}$	Simple Operating Margin emission factor of NEWNE Grid, 1.01 tCO ₂ /MWh
$EF_{Grid,BM,y}$	Build Margin emission factor of NEWNE Grid, 0.60 tCO ₂ /MWh
W_{OM}	Operating Margin weighting factor for wind power projects, 0.75
W_{BM}	Build Margin weighting factor for wind power projects, 0.25

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

The GHG emissions in the baseline scenario is given below:

Emission Reduction due to Power Supply from WTG to Grid				
Sr No.	Description	UoM	Parameter/Equation	Value
1.0	Total rated power generation of 4 nos. WTGs each of 1250 kW	kW	$EG_{rated} = 4 * 1250$	5000
2.0	Power Load factor specified by Government of Rajasthan	%	PLF	22.37%
3.0	Line Loss	%	L_{loss}	4.6%
4.0	Grid availability	%	G_{avlbl}	95.0%
5.0	Net annual electricity supplied to grid from the project activity	MW	$EG_y = (EG_{rated} * PLF * 8760 / 1000) * (1 - L_{loss}) * G_{avlbl}$	8879.982
6.0	Calculation of Combined Margin emission factor			
6.1	Simple Operating Margin emission factor for NEWNE grid (Refer Table B Appendix C - Grid Emission Factors, CO ₂ Baseline Database for The Indian Power Sector Ver 4 and Table C Annex 3 of this VCS-PD)	tCO ₂ /MWh	$EF_{Grid,OM,y}$	1.01
6.2	BuildMargin emission factor for NEWNE grid (Refer Table B Appendix C - Grid Emission Factors, CO ₂ Baseline Database for The Indian Power Sector Ver 4)	tCO ₂ /MWh	$EF_{Grid,BM,y}$	0.6
6.3	Weighting factor for Simple Operating Margin emission factor (Refer 'Tool to calculate the emission factor for an electricity system' Ver 01.1)		W_{OM}	0.75
6.4	Weighting factor for Build Margin emission factor (Refer 'Tool to calculate		W_{BM}	0.25

	<i>the emission factor for an electricity system' Ver 01.1)</i>			
6.5	Combined Margin emission factor for NEWNE Grid	tCO2/MWh	$EF_{Grid,CM,y} = (EF_{Grid,OM,y} * w_{OM}) + (EF_{Grid,BM,y} * w_{BM})$	0.9075
7.0	Calculation for emission reduction due to project activity			
7.1	Baseline emission (<i>Refer Clause 9a of AMS-I.D Ver 13</i>)	tCO2/yr	$BE_y = EG_y * EF_{Grid,CM,y}$	8058.583

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

Project Emissions The project activity uses wind power to generate electricity and hence the emissions from the project activity are taken as nil.

Leakage Leakage emissions on account of the project activity is considered as zero as neither the Wind Energy Generators are transferred from another activity nor any existing equipment of the project site would be transferred from the project site in accordance with the applied methodology.

The net GHG emission reduction for the project activity is tabulated below

Emission Reduction due to Power Supply from WTG to Grid				
Sr No.	Description	UoM	Parameter/Equation	Value
1	Baseline emission (<i>Refer Clause 9a of AMS-I.D Ver 13</i>)	tCO2/yr	$BE_y = EG_y * EF_{Grid,CM,y}$	8058.583
2	Project emission	tCO2/yr	PE_y	0
3	Leakage emission	tCO2/yr	LE_y	0
4	Emission reduction	tCO2/yr	$ER_y = BE_y - PE_y - LE_y$	8059

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

Procedure for calculating emission reduction due to the project activity:

Step 1: Combined Margin emission factor of NEWNE Grid

$$EF_{Grid,CM,y} = (EF_{BM,y} * w_{BM}) + (EF_{OM,y} * w_{OM}) \quad (1)$$

Step 2: Baseline emission reduction of the project activity

$$BE_y = EG_y * EF_{Grid,CM,y} \quad (2)$$

Step 3: GHG emission due to the project activity

$$PE_y = 0 \tag{3}$$

Step 4: GHG emission due to leakage as a result of the project activity

$$LE_y = 0 \tag{4}$$

Step 5: GHG emission reduction due to the project activity

$$ER_y = BE_y - PE_y - LE_y \tag{5}$$

where

- ER_y Net emission reduction by project activity, tCO₂
- BE_y Baseline emission reduction by project activity, tCO₂
- PE_y Project emission from project activity, tCO₂
- LE_y Leakage emission due to project activity, tCO₂
- EG_y Net electricity supplied to the grid by the Project, MWh
- EF_{BM_y} Build Margin emission factor of state power grid, tCO₂/MWh
- EF_{OM_y} Operation Margin emission factor of state power grid, tCO₂/MWh
- w_{BM} Weighting factor for Build Margin emission factor, 25%
- w_{OM} Weighting factor for Operating Margin emission factor, 75%

The year-wise estimated GHG emission reduction for the project activity is provided in the table below:

Year	Estimation of Project Activity Emissions (tCO ₂ e)	Estimation of Baseline Emissions (tCO ₂ e)	Estimation of leakage (tCO ₂ e)	Emission Reductions (tCO ₂ e)
28/03/2006 to 27/03/2007	0	8059	0	8059
28/03/2007 to 27/03/2008	0	8059	0	8059
28/03/2008 to 27/03/2009	0	8059	0	8059
28/03/2009 to 27/03/2010	0	8059	0	8059
28/03/2010 to	0	8059	0	8059

27/03/2011				
28/03/2011 to 27/03/2012	0	8059	0	8059
28/03/2012 to 27/03/2013	0	8059	0	8059
28/03/2013 to 27/03/2014	0	8059	0	8059
28/03/2014 to 27/03/2015	0	8059	0	8059
28/03/2015 to 27/03/2016	0	8059	0	8059
Total	0	80590	0	80590

Wind power is one of the cleanest sources of renewable energy. There is no emission of atmospheric contaminants and waste products from operation of WTGs. As per the Schedule 1 of Ministry of Environment and Forests (Government of India) notification⁷ dated September 14, 2006, wind power projects do not require an Environmental Impact Assessment. However, certain foreseen impacts due to the project activity are discussed below:

Noise Pollution

The wind turbines are in isolated areas and any human habitat is more than 3-4 Km away. Hence these WTGs do not cause any concern to the residents of that area. Construction activities also have also not caused noise pollution due to the remoteness of the site from any human habitat.

Water Pollution

There is no gaseous, liquid or solid effluent from the WTGs. Hence, contamination of water bodies due to operation of WTGs is ruled out.

Air Pollution

There might have been some air pollution resulting from transportation of machinery and installation of the WTGs. However, these were not found to affect the surrounding persons nor the environment in any significant manner. Wind energy plants do not contribute to atmospheric pollution as no fuel combustion is involved during any stage of their operation.

It can therefore be concluded that there are no negative impacts associated with the mentioned Project.

5 Environmental Impact:

The project activity is a clean energy project using renewable source of energy, wind, to generate power. It has already been approved by the Ministry of Environment & Forests, Government of India and has received permission from Rajasthan Renewable

⁷ Source: <http://envfor.nic.in/legis/eia/eianot.pdf>

Energy Corporation (RREC) which is a department of the State Government of Rajasthan.

The project activity is exempted from carrying out any EIA as per the notification S.O.1533 dated 14/09/2006 of Ministry of Environment and Forests, Government of India.

6 Stakeholders comments:

A stakeholder consultation meeting was organized at Jaisalmer on 21/08/2009. Invitations to stakeholders were sent out through advertisement in newspaper and through public notice. Before that no formal meeting had been held, though informal consultation with the local residents had taken place before the meeting. It should be noted that the residents in the neighbourhood where the wind park is located are very familiar with the wind parks due to the other wind parks constructed in the nearby area.

Generally the stakeholder comments are invited at the initial stage of the project. Wind energy being an environment friendly process of electricity generation, the project proponent did not envisage any adverse effect on the local stakeholders, instead it was expected to improve the rural infrastructure and bring in socio-economic development in the locality. Hence, the project participant decided to conduct a meeting to collect feedback and suggestions for further improvement after operating the mills.

Copy of the public advertisement issued inviting stakeholders to the meeting is attached in Annexure 3. Representatives of a wide cross section of the society of the local inhabitants were present to express their views. The supplier of the wind mill, who also operates and maintains them, alongwith the representatives of the project participant, were present to clarify their queries and receive their feedback on the project activity. The issues that were discussed centred on an introduction to the Project, the potential costs and benefits involved for the community and the local area, which was followed by an interactive session.

The local populace welcomed wind power projects and the associated benefits like creation of employment, improvement of basic infrastructure and improvement of

electricity supply. The members concluded that they will encourage more such projects in the area.

There were no specific negative comments. Since there were no negative comments, there were no changes to the Project.

The list of stakeholders attending the meeting is attached in Annexure 3.

Rajasthan Renewable Energy Corporation (State Government of Rajasthan Undertaking) has also given their infrastructure clearance for setting up the project activity.

7 Schedule:

Sr No.	Event	Date
1	Proposal for WTGs from equipment supplier	10-Feb-04
2	Purchase order released for WTGs	03-Aug-04
3	Commissioning of WTGs	29-Dec-04
4	Frequency of monitoring generation and supply to grid	Monthly
5	Calibration of meters	Annual
6	Verification of emission reduction	Annual

8 Ownership:

8.1 Proof of Title:

The proof of title is established through ownership of the WTGs that is responsible for emission reduction. BALKRISHNA INDUSTRIES LIMITED is the rightful owner of the WTGs used for power generation using wind energy.

All documents, viz. purchase and work orders, establishing ownership rights are available with the project proponent for validation and verification.

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

Not Applicable

Annexure 1

Procedure for apportioning power generation from WTGs:

Step 1: Net annual electricity generated and exported to grid by WTG

$$EG_{WTGi,exp} = (EG_{WTGi} / EG_{Fj}) * EG_{Fj,exp} \quad (1)$$

$$EG_{WTGi,imp} = (EG_{WTGi} / EG_{Fj}) * EG_{Fj,imp} \quad (2)$$

$$EG_y = EG_{WTGi,exp} - EG_{WTGi,imp} \quad (3)$$

where

$EG_{WTGi,exp}$	Electricity supplied to NEWNE Grid by WTG _i , MWh
$EG_{WTGi,imp}$	Electricity drawn from NEWNE Grid by WTG _i , MWh
EG_{WTGi}	Power generation from WTG _i , Kwh
EG_{Fj}	Total power generated and supplied from wind farm through Feeder-j and metered at the wind farm sub-station, Kwh
$EG_{Fj,exp}$	Power exported to NEWNE Grid through Feeder j and metered as import at meter in HV substation, Kwh
$EG_{Fj,imp}$	Power exported by NEWNE Grid through Feeder j and metered at HV substation, Kwh
EG_y	Net electricity supplied to the grid by the Project, MWh

Annexure 2

Table I

Technical specification of Wind Turbine Generators		
1.0	Operational conditions	
1.1	Calculated lifetime	20 years
1.2	Cut-in wind speed	3.0 m/s
1.3	Rated wind speed	14 m/s
1.4	Cut-out wind speed	25 m/s
2.0	WTG Specification	
2.1	Rotor diameter	66 m
2.2	Number of blades	3
2.3	Rotational speed	20.7 / 13.8 rpm
2.4	Rotor position	Upwind
2.5	Hub height	74 m
2.6	Swept area	3421.19 m ²
3.0	Operating brakes	
3.1	Aerodynamic brake	3 independent systems with blade pitching
3.2	Mechanical brake	Spring powered disc brakes, hydraulically release, fail safe
3.3	Blade profile	FFA-W3, NACA 63.4
4.0	Yaw drive	
4.1	Method of operation	4 active electrical yaw motors
4.2	Bearing type	Polyamide slide bearing
5.0	Hub	
5.1	Type	Spherical
5.2	Material	EN-GJS-400-18U-LT
6.0	Generator	
6.1	Rated output	250/1250 KW
6.2	Type	Asynchronous 4/6 poles
6.3	Rotational speed	1006/1506 rpm
6.4	Rated voltage	690 V
6.5	Frequency	50 Hz
6.6	Insulation	Class "H"
6.7	Enclosure class	IP 56
6.8	Cooling system	Air cooled
7.0	Tower	
7.1	Type	Tubular
8.0	Control system	
8.1	Type	SUZLONS Microprocessor based control system

