Voluntary Carbon Standard 2007.1

VALIDATION REPORT

YAMUNA POWER AND INFRASTRUCTURE LIMITED

2.45MW Wind Power Project in Rajasthan, India by Yamuna Power and Infrastructure Ltd.

Project No/ Rev. No.: V-3-I-01-S-0070/ 01

Name of Validation company:	Date of issue:
Perry Johnson Registrars CDM Inc.	2009-11-18
Report Title:	**Approved by:**
VCS Validation Report for "2.45MW Wind Power Project in Rajasthan, India by Yamuna Power and Infrastructure Limited."	S. V. Jamble
Client:	**Project Title:**
Yamuna Power and Infrastructure Limited Contact person: Mr. G. S. Chawla Technical Adivisor	PD – "2.45MW Wind Power Project in Rajasthan, India by Yamuna Power and Infrastructure Limited" Version : 02 Date : 2009-11-05

Summary:

Yamuna Power and Infrastructure Limited has commissioned Perry Johnson Registrars Clean Development Mechanism Inc. (PJRCDM) to perform validation of the project – "2.45MW Wind Power Project in Rajasthan, India by Yamuna Power and Infrastructure Limited" under Voluntary Carbon Standard (VCS) 2007.1.

The validation is an independent assessment to determine the conformance of the project activity to the requirements of VCS 2007.1, including applicable baseline methodology, demonstration of additionality, monitoring plan and the greenhouse gas (GHG) emission reduction potential.

The project activity involves installation and operation of wind turbine generators (WTGs) of 2.45MW capacity at Jaisalmer district, Rajasthan state, India. The machines were commissioned during the year 2004 and the power generated is exported to the Rajasthan state grid, which in turn is connected to the integrated Northern Eastern Western North Eastern (NEWNE) regional grid of India.

The project activity has correctly applied the AMS I D methodology version 14 and relevant tools from Clean Development Mechanism (CDM) to determine baseline, establish additionality and frame the monitoring plan.

PJRCDM conducted a physical verification of the WTGs, interviewed representatives of the project proponent and carried out a review of relevant documents. A number of Clarification Requests (CLs) and Corrective Action Requests (CARs) were issued which were subsequently resolved by the project proponent.

Total GHG emission reduction achievable by the project activity has been estimated at 4133 tonnes of CO_2 e per annum.

Based on the documentation verified, it is PJRCDM's opinion that the GHG emission reductions from the project activity would be real, measurable, additional and permanent.

Report Number/ Version	Number of pages
V-3-I-01-S-0020/01	27
Work carried out by:	**Work reviewed by**
Umashankar S.	S. V. Jamble

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEA	Central Electricity Authority, Ministry of Power, Government of India
CL	Clarification Request
FAR	Forward Action Request
GHG	Greenhouse gases
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
kWh	kilo watt-hour
MW	Mega Watt
NEWNE	Northern Eastern Western North Eastern (NEWNE) Grid of India
PD	Project Description (VCS)
PJRCDM	Perry Johnson Registrars Clean Development Mechanism Inc.
PLF	Plant Load Factor
PP	Project Proponent
PPA	Power Purchase Agreement
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCU	Voluntary Carbon Unit
WTG	Wind Turbine Generator

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1 INTRODUCTION

Yamuna Power and Infrastructure Limited (hereinafter referred to as the 'client' or 'project proponent') has contracted Perry Johnson Registrars Clean Development Mechanism Inc. (PJRCDM) to perform validation of the project "2.45MW Wind Power Project in Rajasthan, India by Yamuna Power and Infrastructure Limited", (hereinafter referred to as the project/project activity) under the Voluntary Carbon Standard (VCS) 2007.1 standard. This report describes the validation work undertaken.

1.1 Objective

The purpose of Validation is to perform an independent, third party assessment of whether the project activity conforms to the qualification criteria set out in the VCS 2007.1 standard to attain real, measurable, additional and permanent emission reductions.

The validation statement/opinion is a written assurance that the project complies with all the applicable VCS requirements and has the ability to generate the emission reductions stated over the project's crediting period.

1.2 Scope and Criteria

The validation scope includes an independent and objective review of the project's VCS project description (PD). In particular, the specific objectives of the validation work involve:

- To verify that the project activity meets the requirements of VCS 2007.1 standard including additionality, proof of title and compliance with local laws
- To assess whether the baseline and monitoring plan are in conformance with the methodology applied from the VCS approved GHG program.
- To certify that the information presented are complete, consistent, transparent and free of omission or material error.

The information in the PD is reviewed against the criteria of VCS 2007.1 standard, the VCS program guidelines, and the applied CDM methodology - AMS I D, version 14. PJRCDM has performed the validation based on a risk based approach focusing mainly on the significant risks to meet the qualification criteria and the ability to generate Voluntary Carbon Units (VCUs).

The work carried out by PJRCDM is free from any conflict of interest.

1.3 VCS project Description

The project activity involves installation and operation of wind turbine generators (WTGs or machines) totalling 2.45 MW capacity at Rajasthan state of India. The power generated from the WTGs is sold to the Rajasthan state electricity grid, which is inter-connected with the integrated Northern Eastern Western North Eastern (NEWNE) grid network of India. The WTGs are expected to generate power with a

plant load factor (PLF) of 22.37%. The commissioning dates and unique identification details of the machines are as under:

Project owner	WTG No.	Make	Capacity (MW)	Village/ Town	District/ State	Location	Commissioning date
Yamuna Power and Infrastructure Limited	YGCL - 01	Enercon	0.6	Gorera	Jaisalmer/ Rajasthan	Latitude 26°44'29"N Longitude 70°51'20"E	3rd March 2004
	YGCL - 02	Enercon	0.6			Latitude 26°44'29"N Longitude 70°51'20"E	
	J-215	Suzlon	1.25	Soda Mada	Jaisalmer/ Rajasthan	Latitude 26° 41'15.0" N Longitude 70° 53' 23.6" E	14th March 2004

The lifetime of the machines stated is 20 years.

1.4 Level of assurance

In line with VCS 2007.1 requirements and as per ISO 14064-3:2006 para A.2.3.2, a reasonable level of assurance is defined for the validation of the project.

This implies that, based on the process and procedures conducted, PJRCDM should state whether the information in the PD

- is materially correct and is a fair representation of the actual project details, and
- is prepared in accordance with VCS requirements and the applied CDM methodology for information pertaining to additionality, GHG quantification, monitoring and reporting.

The validation work is carried out as per this requirement and details are presented in the Validation statement in section 4 below.

2 METHODOLOGY

The project activity applies approved small scale CDM methodology AMS I D version 14 categorised under sectoral scope 1 'Energy Industries (renewable/non renewable sources)'. For validation, PJRCDM's approach involves broadly three steps:

1. Completeness check and desktop review of the project description (PD)
2. Onsite inspection, interview with project representatives and issuance of findings
3. Resolution of the findings followed by preparation of the validation report

The following team members from PJRCDM were involved in these steps:

Name	Role	Areas covered
Umashankar S.	Validator	Completeness check, desk top review, site visit, issuance and closure of findings, report preparation
S. V. Jamble	Technical Reviewer	Technical review

2.1 Review of Document

On receipt of the project description from the client, the completeness of information made available as per VCS2007.1 standard requirements is reviewed. A desktop review is further carried out to assess the following:

- the project details as per VCS PD template
- appropriateness of methodology applied
- compliance with relevant laws and regulations
- correctness of application of baseline and monitoring methodology
- demonstration of additionality
- monitoring plan
- stakeholder comments
- proof of title
- other external documents like grid emission factor, IPCC emission factor, etc. where applicable

A complete list of all documents reviewed is attached in Appendix-I of this report. The first version of the PD was received on 28th July 2009.

2.2 Follow-up Interviews

After reviewing the project documents, a site visit was undertaken to Jaisalmer district, Rajasthan state, India on 3rd August 2009 where the physical inspection was made to verify the project details. During the site visit and the follow-up meeting, interviews were conducted with the following project proponent representatives:

Name / Designation / Company	Interviewed on
Mr. Gaurav Jain/ Customer Relations Jaisalmer / Suzlon (the O&M contractor for client)	Project technical details, ,monitoring system, calibration practice and frequency
Mr. Jaideep Rathore/ CDM Consultant/ Deloitte	Baseline, additionality and emission reduction calculations

PJRCDM verified the actual operation of the project as described in the PD during the site visit. The metering system used to monitoring the export of power to grid and the calibration practice was studied. The monthly energy receipt bills issued by the Rajasthan state electricity grid operator were also reviewed.

2.3 Resolution of any material discrepancy

Based on the site inspection and review of documents including the monitoring plan, issues that need to be further elaborated upon, researched or added in order that the

project activity meets the VCS 2007.1 requirements and can achieve credible emission reductions is identified, clarified and to be resolved by the project proponent. A Corrective Action Request (CAR) is raised if one of the following occurs:

a. The project participant(s) have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;

b. The VCS 2007.1 standard requirements, including the specific requirements of the methodology applied, have not been met;

c. There is a risk that emission reductions cannot be monitored or calculated

If information made available is insufficient or not clear/ transparent enough to determine whether the applicable VCS requirements have been met, a Clarification request (CL) is raised and communicated to the project proponent.

Observations may also be raised which are for the benefit of future verification period- called as Forward Action Requests (FARs). These, however, have no impact upon the completion of the current validation activity.

On receipt of response and revised PD from the project proponent, the adequacy of compliance with VCS and the methodology requirements is checked. Closure of comments raised occurs only if the response provided and corrections made fully comply with the stated requirements of the VCS2007.1 standard and the methodology applied.

The list of CARs/ CLs/ FARs raised and the response provided, the means of validation, reasons for their closure, and references to correction in the PD are provided Appendix-II to this report.

Summary of major findings: Among the major findings, it was found that the project is currently under CDM validation. To ensure avoidance of double counting with other GHG programs CAR#4 was raised to declare the status of application to other GHG programs transparently. The revised PD states that the project's VCS crediting period will only last till the date of CDM registration. A declaration letter has been furnished by the project proponent stating avoidance of double counting of carbon credits with other GHG programs. Hence, CAR#4 was closed. The PD has applied investment analysis with project Internal Rate of Return (project IRR) as indicator to demonstrate the additionality of the project. Since the benchmark – prime lending rate was not clear as per the time of investment of the project in the year 2003-04, clarification was sought under CAR#7 and subsequently resolved. Further, as the input parameters like plant load factor, capital cost, tariff and operating costs for the IRR computation were not substantiated, clarification was sought under CAR#7 and CL#2 to furnish evidence on the same. Capital cost and Operating and Maintenance (O&M) costs are based on purchase orders from the equipment suppliers. While PLF and tariff has been assumed as per the Government of Rajasthan April 2003 policy order for wind energy projects. Detailed assumptions and elaboration on evidences have now been discussed in the revised version#2 of the PD along with the sensitivity analysis and found in order.

The revised PD with changes incorporated as per the issues raised were rechecked with the documentary evidences and found to be in order.

3 VALIDATION FINDINGS

3.1 Project Design

The VCS project activity involves installation and operation of wind turbine generators with total capacity of 2.45 MW at Jaisalmer district of Rajasthan state, India. Details of unique identification and commissioning dates are as provided in section 1.3 of this report. An estimated 4.56 Million kWh/ year is expected to be sold to the Rajasthan state grid which is a part of the integrated Northern Eastern Western North Eastern (NEWNE) grid of India. Plant Load Factor (generation potential) was stated as 22.37% and CAR#7 was raised to justify the same. This was evidenced as per the prevailing Government of Rajasthan tariff policy order dated April 2003 and hence resolved. The renewable energy project is estimated to reduce 4133 tCO_2e per year by displacing equivalent electricity from the grid-connected power plants. As the emissions reductions per year are less than 5000 tCO_2e, the project falls under 'Micro' category of the VCS 2007.1 standard.

The VCS project start date is 3rd March 2004 - the commissioning dates of the machines YGCL-01 and YGCL-02. As per the revised version 2 of the PD, the VCS crediting period for the project is 10 years fixed from 28th March 2006 to 27th March 2016. Operational lifetime of the machines under the project has been defined as 20 years.

In line with the VCS requirements, proof of title of the proponent was sought in CAR#11. These were verified through ownership documents like purchase order, commissioning certificates and power purchase agreements (see Appendix-I for document references) and hence resolved.

The project was found to be currently under CDM validation. To ensure that the environmental credits generated by the project are not double counted, CAR#4 was raised to transparently declare the status in section 1.13 of the PD. Further, the crediting period of the project states that the VCS crediting period will last till the date of registration of the project under CDM. A declaration letter has also been separately furnished by the project proponent for the avoidance of double counting during the VCS crediting period and hence CAR#4 was closed.

The project complies with national and local laws and environmental regulations.

Lastly, as per VCS 2007.1 section 5.2.1 criteria of contracting deadline for VCS validation, the date was sought under CAR#12 to be clearly stated in section 7.0 of the PD and subsequently closed.

3.2 Baseline and demonstration of additionality

The project proponent had applied approved baseline methodology AMS I.D., version 13. CAR#2 was raised to revise as per the latest applicable version of the methodology and later resolved. The total installed capacity of the project is 2.45MW which is less than the 15 MW limit for type I small scale project activities. The application of baseline methodology is justified as follows:

- The project generates electricity using the renewable source i.e. wind energy.
- The total installed capacity of the project is less than 15 MW. The installed capacity has been verified from the commissioning certificates and power purchase agreements of the proponent.
- The grid boundary selected for the project activity is the NEWNE regional grid of India to which the project exports generated power. The selection is appropriate for a large country like India and is in line with CDM guidelines and the Tool to calculate the emission factor for an electricity system (Version 1.1). The project proponent has committed not to replace the technology during the crediting period.

Baseline for the project has been identified in line with the small scale methodology AMS I D version 14, where the baseline emissions are renewable energy power generated times the emission factor of the grid. The grid emission factor has been determined as Option a, the combined margin grid emission factor of the NEWNE grid as 0.906 tCO_2/ MWh in line with the 'Tool to calculate the emission factor for an electricity system' (Version 1.1).

Additionality: The additionality of the project was demonstrated as per investment barrier of the Attachment A to Appendix B of simplified modalities and procedures of small scale project activities. The project compares project IRR with the commercial lending rates benchmark in line with the guidelines of the CDM Additionality Tool and the EB 'Guidance on the assessment of Investment Analysis'.

Since the basis of lending rate assumed were not clear, CAR#7 was raised to substantiate the same with evidence. It was verified that the lending rate for the year 2003-04 was considered as prime lending rate at 10.5% from the Reserve Bank of India data and hence the issue was resolved.

The applicable debt:equity ratio of 70:30 was assumed actual loan document which is also in line with Rajasthan State Electricity Regulatory Commission (RERC) tariff order dated April 2003.

The parameters like capital cost, plant load factor (PLF), Operating and Maintenance (O&M) cost, tariff and other input assumptions applied for the IRR computation were not clearly justified, and this was raised under CAR#7 and CL#2. Capital cost and O&M costs have been verified as per the purchase orders raised to technology providers and were found reasonable. Plant load factor was assumed at 18.5% in version 1 of the PD based on the demonstration plant performance installed and operated by the Rajasthan State Power Corporation Limited (now Rajasthan Renewable Energy Corporation Limited) as referred to in the Government of Rajasthan February 2000 policy for wind energy projects. However, since the Rajasthan state government stated a higher PLF of 22.37% in its April 2003 tariff order, it was sought under CAR#7 to apply the revised PLF to ensure conservativeness of the IRR computation and subsequently resolved. Further, certain miscellaneous charges and reactive charges were accounted in the version 1 of the PD. Since they were not clearly substantiated the same was sought to be removed under CAR#7 and later the issue was closed. Details of assumptions with evidences have been included in the revised PD and hence CAR #7 and CL#2 were closed.

The following assumptions have been verified and found reasonable for the IRR computation:

Input Parameter	Value Applied	Source of information verified from
Lifetime of machines	20 years	Technical specifications of the WTG supplier
Accelerated Depreciation under IT Act	80%	Written Down Value (WDV) basis – Under Income Tax Act 1961
Tax exemption	10 years in the first 15 year period	Under section 80IA of Income tax Act 1961
Plant Load Factor	22.37%	Based on Government of Rajasthan April 2003 tariff policy for wind projects
Income Tax applicable (with surcharge)	35.88%	Under Income Tax act 1961 applicable rate for the year 2003-04
Sale price for power	Rs. 3.32/ kWh (base year 2003-04) with escalation of 2% per year for first 10 years and Rs. 3.92/kWh fixed thereafter till the 20th year	Based on Government of Rajasthan April 2003 tariff policy for wind projects
Capital Cost for the project	As per actuals	Cross-checked with purchase orders (see Appendix-1 for details of reference). Cost/ MW was at Rs. 50.8/ Million/ MW for Enercon machines and Rs. 42.8/ MW for Suzlon machine, and is based on actuals.
Operation and Maintenance (O&M) Cost	As per actuals, with escalation of 5% per annum for the Suzlon machine and 7.5% per annum for Enercon machines	Verified as per O&M agreements with Suzlon and Enercon respectively
Service tax for O&M costs	8%	As per rates in 2003-04
Grid and machine availability losses	5%	

The results of the project IRR computation and applicable benchmark were found as follows:

Benchmark (Prime Lending rate for 2003-04)	10.5%		
Variable	Base project IRR	+5% higher PLF	+10% higher PLF
Project IRR (without VCS Revenue)	9.59%	10.45%	11.29%

The basis of sensitivity was not clear and hence CAR#6 was raised. As per the revised PD, capital cost assumed is based on actual purchase order and the tariff is fixed for the project as per the power purchase agreement signed with the state electricity board in line with the April 2003 Rajasthan Government tariff order for 20 years. Therefore, it is sufficiently justified that the only major variable influencing the project IRR is the plant load factor. Sensitivity analysis was made for +5% and +10% higher PLF.

For the project, even though the project IRR crosses the benchmark when the PLF is increased by 10%, the likelihood of generation increasing was checked and found that the probability of occurrence is low after verifying the actual PLF or the machines at site, which is around 19%. The verification was done against the historical monthly generation records for the machines under the project. It is thus concluded that the PLF at +10% higher over and above the base PLF of 22.37% is deemed unlikely for the machines at the location. The supplementary check was carried out as per para 17 of the EB 41 'Guidance on Assessment of Investment Analysis' document and found in order.

Based on the above discussion, it is concluded that the investment in the project is not financially attractive as per step 2 of the CDM 'Tool for the demonstration and assessment of additionality' Version 5.2 and the CDM EB 41 "Guidance on the Assessment of Investment Analysis".

It is thus concluded that the additionality of the project is adequately demonstrated and project is not the baseline scenario.

3.3 Monitoring Plan

In line with the AMS ID methodology applied, the monitoring plan of the project involves monitoring of the net electricity sold to the grid by the wind machines.

During the site visit it was observed that the WTGs under the project activity are connected to a grid substation feeder with other machines not belonging to the project activity. Therefore, CL# 3 was raised to transparently present the monitoring plan on how the accounting is done accurately for power exported from the machines in the project activity. This has been elaborated in version 2 of the PD and found OK.

It was verified that the power export is based on the monthly joint meter reading made by the Rajasthan state electricity board personnel along with the Operations and Maintenance (O&M) contractor. The monitoring system consists of measuring energy generation at the individual wind turbine generator - by controller energy meters; and a joint meter at the substation end of the feeder where the power is exported to the grid.

The responsibility of quality assurance of the meter recording rests with the project proponent through its O&M contractor for individual WTG controllers. For the joint meter, the Rajasthan state electricity grid operator is responsible for testing and calibration. Frequency of monitoring is continuous, and the data is aggregated for a month. The data is archived on paper (in the form of electrical energy receipts from the state electricity board) and electronically and the retention time for keeping of records is defined in the PD as two years beyond the crediting period.

The joint meter at the substation consists of main and check meters with 0.2% accuracy class. The calibration is done annually by the state electricity grid operator Rajasthan Rajya Vidyut Prasaran Nigam Limited (RVPNL). As per the technology supplier, the WTG controller energy meters are digital meters with electronic self calibration relays to ensure continuous system diagnostics. CAR#8 was raised to elaborate with evidence on these calibration practices and was subsequently closed after checking the adequacy. The organisational structure, information flow and performance assessment have also been clarified in the revised PD.

Given that the net power exported are based on the third party energy receipts in the form of joint meter readings by the state grid operator, PJRCDM is of the opinion that it is reasonable to assume that the same will be reliable.

The grid emission factor has been determined ex-ante and is not monitored. The ex-ante grid emission factor value will be applied throughout the VCS crediting period.

3.4 Calculation of GHG Emissions

The GHG source for baseline of the project has been chosen as CO_2 and no other sinks and/or reservoirs for either the baseline or project activity have been identified. This is justified as per the applicable methodology.

The baseline of the project activity is kWh produced by the renewable generating unit multiplied by an emission coefficient (kg CO_2/kWh). The emission coefficient is the combined margin of the grid, calculated as a weighted average 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 1.1. The OM and BM emission factors have been sourced from the Central Electricity Authority (CEA) database version 04, dated September 2008. While OM has been calculated as average of the years 2005-06, 2006-07 and 2007-08, the BM has been selected for the latest year 2007-08. For wind projects, weights of 0.75 and 0.25 have been applied as per the tool. The CEA data is an official source of Ministry of Power, Government of India and calculated in accordance with the ACM0002 methodology and the "Tool to Calculate the Emission Factor for an Electricity System", Version 1.1. PJRCDM confirms that grid emission factor 0.906 tCO_2/MWh is in line with the latest CDM tool and guidelines.

In line with the methodology, the baseline emissions is determined as

$$BE_y = EG_y * EF_{CO2}$$

where:

BE_y	Baseline Emissions in year y; tCO_2
EG_y	Net Energy supplied to the grid in year *y*; kWh
EF_{CO2}	Emission Factor of the grid in year y; $kgCO_2e$/kWh

Further, emission reductions for the project have been calculated as:

Emission reductions $(ERy) = BE_y - PE_y - LE_y$

where:

ER_y	Emission reductions in year *y* (tCO_2e/y)
BE_y	Baseline Emissions in year *y* (tCO_2e/y)
PE_y	Project emissions in year *y* (tCO_2/y)
LE_y	Leakage emissions in year *y* (tCO_2/y)

Since the project is based on wind energy alone, no project emissions and leakage have been considered in accordance with the baseline methodology AMS I D, version 14. Hence, the final emission reductions resulting from the project is equivalent to the baseline emissions.

Thus, Emission reductions (ER_y) = BE_y

The project is expected to sell net electricity of 4.56 Million kWh/ year. The GHG emission reduction accruable from the project activity has therefore been estimated as 4133 tCO_2 equivalent per year.

3.5 Environmental Impact

The project activity is a wind energy project with a capacity of 2.45 MW implemented in Jaisalmer district of Rajasthan state, India. It was confirmed during site visit that the project does not come under forest land. Further, the project being a wind energy project does not warrant any environmental impact assessment or environmental permits as per the then notification S.O. 60 (E) dated 27th January 1994 by Ministry of Environment and Forests in India. Further, no environmental permit is required. However, the project proponent needs to obtain clearance from the state electricity renewable energy development agency prior to setting up of the machines and signing of the power purchase agreement. PJRCDM was able to verify the projects compliance with local laws and regulation with these documents (see Appendix-I for details). Environmental impact of the project is found insignificant.

3.6 Comments by stakeholders

VCS 2007.1 requires discussion on relevant outcomes from stakeholder consultations and mechanisms for on-going communication for the project activity. CAR#8 was raised for providing complete details with evidences of the stakeholder meeting. Stakeholder meeting was organized by the project proponent at Soda Mada, Jaisalmer, Rajasthan, India on 11th May 2009. The identified stakeholders were the villagers, representatives of the project proponent and the employees of O&M contractors. The details of the stakeholder meeting have been included in version#2 of the PD. The information provided was cross checked with the evidences (see Appendix-I for details) and were found in order.

No negative comments have been received for the project activity.

4 VALIDATION CONCLUSION

PJRCDM Inc. has performed the validation of the project '2.45MW Wind Power Project in Rajasthan, India by Yamuna Power and Infrastructure Limited'. The validation was carried out to independently assess whether the project conforms to the qualification criteria and requirements of Voluntary Carbon Standard (VCS) 2007.1, including the baseline and monitoring methodology applied. The VCS Program provides the standards and framework for independent validation based on ISO 14064-2:2006 and ISO14064-3:2006 standards.

PJRCDM's approach is risk-based, drawing on an understanding of the risks associated with the meeting of VCS 2007.1 standard requirements. The assessment was based on the review of project description (PD), supporting evidences, site interview, including other explanations where necessary to enable PJRCDM to provide reasonable assurance that the information reported in the PD is complete and materially correct. Our scope and conclusion is thus limited to the above evaluation.

The project involves sale of electricity from wind turbine generators with total capacity of 2.45MW to the grid, thereby displacing grid power. The VCS approved CDM baseline and monitoring methodology AMS I D, version 14 has been correctly applied to determine the baseline and the emission reductions.

In our opinion, it is sufficiently demonstrated that the project is not the baseline scenario and emission reductions resulting from the project activity are real, permanent and are additional to what would have occurred in the absence of VCS project activity. Further, the monitoring plan makes adequate provision for ensuring transparency and accuracy during project monitoring.

The total GHG emission reduction achievable from the project is estimated at 4133 tonnes of CO_2 equivalent per year over the 10 year crediting period starting from 28th March 2006. This estimate is fair given that the underlying assumptions do not change.

To summarize, it is PJRCDM's opinion that the project as described in version 02 of the VCS PD '2.45MW Wind Power Project in Rajasthan, India by Yamuna Power and Infrastructure Limited' dated 5th November 2009 meets the VCS 2007.1 requirements and correctly applies the baseline and monitoring methodology AMS-I.D, version 14.

Project Manager	Site Program Manager
PJRCDM	PJRCDM

APPENDIX I: DOCUMENTS REVIEWED

A. Key documents

1. VCS Project Description (PD) Version 1 dated 28th July 2009
2. PD Version 2 dated 5th November 2009
3. VCS 2007.1 Standard, Program Guidelines and the Registration and Issuance Guidance Document
4. CDM approved small scale methodology, AMS I D Version 14
5. CEA grid emission factor database, version 04, September 2008
6. Internal rate of return calculation sheet of the project proponent
7. Emission Reduction calculation of the project

B. Project related supporting documents

1. Rajasthan State Electricity Regulator Commission Tariff order (September 2006) which includes April 2003 tariff order policy details http://www.rerc.gov.in/Order/Final%20order_NES_Chairman.pdf
2. Purchase order of WTG(s) between
   - Yamuna Gases & Chemicals Ltd. (now Yamuna Power and Infrastructure Limited) and Enercon India Ltd. on 27th November 2003.
   - Yamuna Gases & Chemicals Ltd. (now Yamuna Power and Infrastructure Limited) and Suzlon Energy Ltd. on 27th November 2003
3. Work order for Erection and Commissioning between
   - Yamuna Gases & Chemicals Ltd. (now Yamuna Power and Infrastructure Limited) and Enercon India Ltd. on 27th November 2003.
   - Yamuna Gases & Chemicals Ltd. (now Yamuna Power and Infrastructure Limited) and Suzlon Developers (P) Ltd. on 27th November 2003.
4. Operation and Maintenance Cost agreement between
   - Yamuna Gases & Chemicals Ltd. (now Yamuna Power and Infrastructure Limited) and Enercon India Limited on 3rd March 2004
   - Yamuna Gases & Chemicals Ltd. (now Yamuna Power and Infrastructure Limited) and Suzlon Infrastucture Services Limited dated 27th November 2003
5. Power Purchase Agreement between
   - Yamuna Gases & Chemicals Ltd. (now Yamuna Power and Infrastructure Limited) and Rajasthan Rajya Vidyut Prasaran Nigam Ltd. on 19th February 2004.
   - Yamuna Gases & Chemicals Ltd. (now Yamuna Power and Infrastructure Limited) and Rajasthan Rajya Vidyut Prasaran Nigam Ltd. on 24th January 2004
6. Commissioning Certificates for WTG of Yamuna Gases & Chemicals Ltd. (now Yamuna Power and Infrastructure Limited) letter dated 4th March 2004 (Enercon WTGs) and 16th March 2004 (Suzlon WTG)
7. Reserve Bank of India Prime Lending Rate data http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/74T_HB150909.pdf
8. Loan document from IREDA to Yamuna Gases and Chemicals (now Yamuna Power and Infrastructure Limited) date 2nd November 2004
9. The Companies Act, 1956 India SCHEDULE XIV (section205) - Rates of depreciation
10. Documents related to stakeholder meeting dated 11th May 2009

APPENDIX- II: Resolution of Corrective Action and Clarification Requests

Draft report clarification requests and corrective action requests by validation team	Ref. To the section of the PD	Summary of project owner response	Validation team conclusion
CAR 1 Date of PD missing. Abbreviation terms used in many places in the PD are not clearly elaborated.	Entire PD	Date of PD has been mentioned in the PD Ver 02. The Abbreviations terms has been elaborated when used for the first time in PD Ver 02	OK. CAR closed.
CAR 2 The official documents of the proponent Yamuna Power and Infrastructure Limited are in the name of Yamuna Gases and Chemicals Limited. Clarity is sought on the exact name of project proponent.	1.3, 1.5 and 8.0	The entity has gone for a change of name from Yamuna Gases & Chemicals Ltd. to Yamuna Power & Infrastructure Ltd. The fresh Certificate of Incorporation Consequent upon change of name for the same is being submitted to the DoE. The present name of the company is Yamuna Power & Infrastructure Ltd.	Letter of Authorization for name change to Yamuna Power and Infrastructure Limited issued by Registrars of Companies, National Capital Territory of Delhi and Haryana has been furnished and found OK. CAR closed.
CL 1 A consolidated sheet of unique identification numbers project location,	1.4, 1.5 and 1.6	Consolidate table for the required details has been added section 1.5 in the PD Ver 02.	Commissioning dates verified and found in order. GPS coordinates have been

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size, make and commissioning dates is suggested. Evidences for Commissioning dates to be furnished. GPS coordinates missing for few project proponents.		Evidence (Commissioning certificates) supporting the commissioning dates for each of the WTGs is being resubmitted to the DoE. The GPS coordinates for the YGCL-01 & 02 are provided in the PD ver 02.	provided in the revised PD. CL Closed.
CAR 3 The crediting period mentioned is not clear as per VCS 2007.1 standard. The table on crediting period with estimate of emission reductions is missing. The crediting period start date is not clearly stated in the PD.	1.6	The crediting period of the project is for 10 years from 28th March 2006 to 27th March 2016. The table on crediting period with estimate of emission reduction has been included in the Sec 1.6 PD Ver 02. Correction in crediting period start date has been made in Sec 4.4 PD Ver 02	Crediting period for the project is for 10 years from 28th March 2006 to 27th March 2016. CAR closed.
CAR 4 Clear statement is required as to whether the project participants have applied for other GHG programs. It is	1.13 and 1.14	The WTGs under the ownership of Yamuna Power & Infrastructure Ltd. have applied under CDM, as detailed in section 1.13. In case the said WTGs gets registered under CDM, the project proponent will claim VCUs only from the start date of project activity till the date of CDM	Project was found to have applied under CDM. The revised PD states that the VCS crediting period will last till the date of

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also be clearly demonstrated that there will not be double counting of emission reductions for the past as well as future credits.		registration. At any point of time during the crediting period, the project proponent will abide by the "Further Guidance for Projects that are Registered in Two GHG Programs" dated 19 March 2008 issued by VCS Association and will claim credits from one GHG program to avoid double counting. The project proponents also provided a written undertaking in this regard for avoidance of double counting. This is mentioned in section 1.6 and 1.13 of the revised PD.	CDM registration. A letter of undertaking has been provided by the project proponent stating avoidance of double counting with other GHG programs. CAR closed.
CAR 5 Section 2.1 of PD needs to list clearly all relevant tools used as per the methodology.	2.1	Relevant tools as per the applied methodology "Approved Small Scale Methodology AMS –I.D. / Version 14" has been made in the PD Ver 02.	The applicable methodology AMS ID version 14 is applied in the revised PD. CAR closed.
CAR 6 The sensitivity analysis has to be made available for all major variables affecting the cash flows of the project.	2.5	As per guideline provided by EB in meeting no. 41 annex 45; para 16, the three major parameters affecting the cash flows of the project are (i) variation in the initial investment cost , (ii) variation of PLF and (iii) Tariff. As the cash flow has been calculated based on the actual cost of the project paid by project proponents and the tariff is fixed for the lifetime of project activity as per the power purchase agreement signed with the state electricity board, sensitivity analysis based on the variation in PLF has been carried out	Justification of considering only PLF as variable found adequate. CAR closed.

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		in section 2.5 in line with the EB guidelines.	
CAR 7 Justify the following: ➢ The lifetime of project activity needs to be provided. ➢ The PP has claimed miscellaneous expenses in the profitability statement. Substantiate with evidence for considering this cost. ➢ The basis for PLF provided for individual wind turbines in the IRR analysis is not transparent. Justification is sought on the PLF used.	2.5	• Life time of the project activity is considered to be 20 years as indicated in the purchase order of the WTGs, under the Operation and Maintenance contract. Further to support the life time of project activity, a letter from Suzlon Energy Ltd., the largest wind manufacturer in India, is enclosed mentioning that the lifetime of wind power project is considered to be 20 years. • Miscellaneous expenses has not be considered in the revised calculations to have a conservation analysis • As per the "Govt. of Rajasthan" policy 2000 for promoting the renewable energy projects (including wind projects) there was a mention of demonstration wind project installed by Rajasthan Renewable Energy Corporation during the year 1999. The PLF generated by the demo wind project was about 18.5% (http://www.rrecl.com/wind.htm) and was considered as PLF for the project activity.	Miscellaneous expenses, reactive charges have been removed. The PLF of 22.37% is considered as per Government of Rajasthan April 2003 tariff policy to ensure conservativeness of the IRR computation. Calculations have been revised for the total project cost for depreciation. Benchmark applies is verified as prime lending rate as per Reserve Bank of India data for the year 2003-04. CAR closed.

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		However as per the April 2003 policy, the PLF for Rajasthan was considered as 22.37% (as mentioned in the RREC tariff Orders dated 29th Sep 2006). Therefore the PLF of 22.37 % is considered for IRR calculation to maintain the conservativeness.	
➢ The reactive energy withdrawal charges are not considered in the profitability statement. Justify.		• The reactive charges are quite negligible and have not been considered in IRR calculation for a conservative estimate.	
➢ The depreciation as per Companies Act and as per Income tax Rules has been written off on the equity investment made by the PP. Justify.		• The depreciation has been revised to consider the total project cost in the revised PD and IRR spread sheets.	
➢ The salvage value of 5% of equity cost has been considered as an inflow in the 20th year. The total cost considered for		• Salvage value has been corrected in revised IRR calculations. Only the land cost has been considered as salvage value	

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depreciation has been written off completely in 19 years. Substantiate for considering salvage value when 100% of the cost is depreciated. ➢ Basis of the benchmark the benchmark applied.		• The Benchmark for Project IRR has been arrived based on the Reserve Bank of India (RBI) "Benchmark Prime Lending Rates (BPLR)" for the period during which the decision to implement the project was taken by the project proponent. (Web link for reference : http://rbidocs.rbi.org.in/rdocs/Wss/PDFs/40728.pdf) Hence the below parameters are not applicable.	
CL 2 Substantiate the following assumptions: • Provide relevant evidence for insurance cost considered.	2.5	• Supportive document for insurance cost as referenced with insurance papers is enclosed herewith.	Insurance and loan documents were verified and found

Draft report clarification requests and corrective action requests by validation team	Ref. To the section of the PD	Summary of project owner response	Validation team conclusion
• Provide relevant loan sanction documents and justify th 70:30 debt equity ratio considerd: . • The estimated escalation in tariff rate is 2%. Justify for considering 2 paisa as estimated escalation. • The IRR calculations are calculated from the year 2008-09. However the date of commissioning is March 2004. Substantiate for the different years of calculation.		• Supportive document for loan cost is submitted to the validator. Tin he IRR calculations the Debt: Equity ratio of 70%:30% has been considered as per actuals which was also in line with the prevailing Rajasthan State April 2003 tariff order for wind projects applicable at the time of investment in the project. The interest rate for debt is 9 % and considered as per actuals. • Correction has been made for the escalation in tariff as per RERC guidelines reflected in the power purchase agreement in the revised IRR calculations. • The years of IRR calculations has been changed as applicable chronological years • O&M cost has been considered as per purchase	OK. Debt:equity ratio of 70:30 is considered as per then prevailing Rajasthan state April 2003 policy for wind projects. Tariff escalation has been revised as per power purchase agreement. O&M costs have been revised based on purchase orders. Preliminary expenses have been removed in the revised IRR spreadsheets and PD. CL closed.

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• The basis of O&M considered. The O & M cost as per agreement is Rs.9 lakhs/ year for the Suzlon machine J-215. Justify for considering Rs.10.78 lakhs/ year as O & M cost. • Substantiate with evidence cost of preliminary & pre-operative expenses considered.		orders issued to Enercon and Suzlon respectively. Correction has been made for O&M in the revised IRR calculations for the Suzlon WTG to Rs. 9 Lakh/ year. • The preliminary & pre-operative expenses have been removed in the revised IRR calculations.	
CL 3 The monitoring plan states **"**The monitoring involves two independent measurements of generated electricity from the wind turbines - Main Metering System and Back-Up Metering System." However, from the site visit, such monitoring systems have not been evidenced. The monitoring plan has to reflect the monitoring system carried out as per the site.	3.2, 3.3, and 3.4	The project activity consists of two parallel measurements of generated electricity from the wind turbines. The joint meter reading of the electricity fed to the state utility grid is carried out jointly at the incoming feeder of the substation state power utility every month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading. The reading at each WTG is carried out through an integrated electronic meter (SCS/LCS Controller) installed along with individual WTG to measure the gross electricity	Revised monitoring plan elaborates on the monitoring practices at site and was found in order. CL closed.

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		generated by each WTG. Based on the above data, the net electricity exported to the grid by each of the wind mill is calculated based on apportioning for the individual WTGs. This is reflected in monthly joint meter reading reports and accordingly invoices are raised by the project proponent against the net electricity generated and exported by individual machines. The monitoring has been revised as per the actual conditions in the site in the PD Ver 02.	
CAR 8 From the site visit, the exact calibration procedure carried out at the site and as stated in the VCS PD is not in line.	3.2, 3.3 and 3.4	The calibration of the joint meters (main and check meter) at substation end is carried out by RVPNL once in a year. Other than annual/periodic calibration of the meters, the reading of both meters is matched every month to ensure errors are within permissible limits. The WEG Controller/SCS (LCS) Controller installed at WTGs are micro-processor based intelligent controller which have 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 are converted into digital signal internally using A/D Converters at very high sampling rate. A software program reads these values and displays instantaneous parameters	Joint Meters at substation are calibrated annually by the state grid operator. Controllers are based on self calibration. CAR closed.

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		such as voltage, current, power factor, kVAh, kVArh and kWh. These instantaneous values are then time integrated and displayed/stored. Calibration of controller is based on inbuilt calibration relays. The calibration procedure has been accordingly revised as per the actual conditions in the PD Ver 02	
CAR 9 The exact years should be clearly specified in section 4.4 of the PD in line with the crediting period. Further, the emission reduction figures provided in section 4.3 and 4.4 needs to be checked for consistency.	4.3 and 4.4	Exact years of the crediting period have been mentioned in the section 4.4 of PD Ver 02. The emission reduction figures have been corrected in PD Ver 02.	OK. CAR closed.
CAR 10 The details of stakeholder comments , the means for invitation, the method of taking into account the comments received and mechanism for ongoing communication are not clear	6	The stakeholder consultation meeting was conducted on 11/05/2009 in Soda Mada village in Jaisalmer, Rajasthan. The scanned copy of the attendance sheet is attached in the Annex-I of revised PD. The stakeholders shared their views on the project activity. No negative comments were received in context of each of the project activity. Issues raised by some of the local residents were clarified. Details of the stakeholder meeting are provided in section 6 of PD. Minutes of the meeting, attendance sheet and stakeholder's	Stakeholder meeting was conducted on 11 May 2009. Evidences for the meeting were checked and found in order. CAR closed.

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		comments have been provided to the Validator.	
CAR 11 Details of specific references of proof of title documents and letter of authorization stating the coordinating agency has to be provided.	8.1	The owner of the wind farms are the project proponent for the project activity. The ownership of the project promoter of the wind-farms and the WTGs can be established by purchase orders, clearance and commissioning certificates or power purchase agreements. Supporting documents for the same have been submitted to the validator.	Proof of title was verified as per the relevant documents. CAR closed.
CAR 12 As per Article 5.2.1 of the VCS2007.1 standard, the schedule of contracting prior to 19 November 2008 shall be provided.	7	As per requirement of Article 5.2.1 of the VCS2007.1 standard, the date of contracting the validator was on 10th Nov 2008. The same is mentioned in the schedule given in section 7 of revised PD.	OK. CAR closed