Voluntary Carbon Standard 2007.1

VALIDATION REPORT

BUNDLED WIND PROJECT

15 MW Bundled grid-connected wind electricity generation project in Radhapuram Taluk of Tirunelveli District in Tamil Nadu, India

Project No/ Rev. No.: V-3-I-01-B-0012/ 01

Name of Validation company:	Date of issue:
Perry Johnson Registrars CDM Inc.	2009-11-06
Report Title:	**Approved by:**
VCS Validation Report for "15 MW Bundled grid-connected wind electricity generation project in Radhapuram Taluk of Tirunelveli District in Tamil Nadu, India"	S. V. Jamble
Client(s):	**Project Title:**
Sangeeth Textiles Limited Sri Mookambiga Spinning Mills Private Ltd CAV Cotton Mills Limited Sri Vasudeva Textiles Coordinating Agency: Sangeeth Textiles	PD – "15 MW Bundled grid-connected wind electricity generation project in Radhapuram Taluk of Tirunelveli District in Tamil Nadu, India' Version : 05 Date : 2009-11-03

Summary:

Sangeeth Textiles Limited, Sri Mookambiga Spinning Mills Private Limited, CAV Cotton Mills Limited and Sri Vasudeva Textiles Limited have commissioned Perry Johnson Registrars Clean Development Mechanism Inc. (PJRCDM) to perform validation of their bundled project – "15 MW Bundled grid-connected wind electricity generation project in Radhapuram Taluk of Tirunelveli District in Tamil Nadu, India" 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 1.25 MW x 3 machines by each of the four project proponents. The machines were commissioned during the years 2003 to 2006 and the power generated is sold to the Southern 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 be 25,305 tonnes of CO_2 e per annum.

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

Report Number/ Version	Number of pages
V-3-I-01-B-0012/01	26
Work carried out by:	**Work reviewed by**
Umashankar S.	Mathsy Kutty

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
PD	Project Description (VCS)
PJRCDM	Perry Johnson Registrars Clean Development Mechanism Inc.
PLF	Plant Load Factor
PP	Project Proponent
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

Sangeeth Textiles Limited, Sri Mookambiga Spinning Mills Private Limited, CAV Cotton Mills Limited and Sri Vasudeva Textiles Limited (hereinafter referred to individually or collectively as the "client" or "project proponent") have contracted Perry Johnson Registrars Clean Development Mechanism Inc. (PJRCDM) to perform validation of the bundled project "15 MW Bundled grid-connected wind electricity generation project in Radhapuram Taluk of Tirunelveli District in Tamil Nadu, India", (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 15 MW capacity at Tamil Nadu (TN) state of India by the four project proponents combined. The power generated from the WTGs is exported to the Tamil Nadu State Electricity Board (SEB) connected to the Southern Regional grid network of India. The WTGs are expected to generate power with a

plant load factor (PLF) of 25.9%. The unique identification details of the machines are as under:

Project owner	WTG Location HT Sc No*.	Make	Capacity (MW)	Village/ Town	District	Commissioning date
Sangeeth Textiles Limited	1783	Suzlon	1.25	Levenjipuram	Tirunelveli	31/03/2006
	550	Suzlon	1.25	Irrukkandurai	Tirunelveli	31/03/2003
	830	Suzlon	1.25	Dhanukarkulam	Tirunelveli	31/03/2004
Sri Mookambig-a Spinning Mills Ltd	1749	Suzlon	1.25	Chettikulam	Tirunelveli	30/03/2006
	675	Suzlon	1.25	Dhanukkarkulam	Tirunelveli	04/03/2004
	676	Suzlon	1.25	Dhanukkarkulam	Tirunelveli	04/03/2004
CAV cotton Mills Limited	655	Suzlon	1.25	Dhanukkarkulam	Tirunelveli	24/12/2003
	656	Suzlon	1.25	Dhanukkarkulam	Tirunelveli	24/12/2003
	1659	Suzlon	1.25	Irrukkandurai	Tirunelveli	24/03/2006
Sri Vasudeva Textiles ltd	1660	Suzlon	1.25	Chettikulam	Tirunelveli	24/03/2006
	548	Suzlon	1.25	Irrukkandurai	Tirunelveli	31/03/2003
	745	Suzlon	1.25	Dhanukkarkulam	Tirunelveli	29/03/2004

**HT Sc No. – High Tension Service Connection Numbers – issued by the grid operator*

The geographical coordinates of location of the WTGs are as mentioned in the PD. 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
Mathsy Kutty	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 4th May 2009.

2.2 Follow-up Interviews

After reviewing the project documents, a site visit was carried out to Tirunelveli, Tamil Nadu state, India on 18th June 2009 where the physical inspection was made to verify the project details. During the visit and the follow-up meeting, interviews were conducted with the following project representatives:

Name / Designation / Company	Interviewed on
Mr. Tamil Selvam/ Site Incharge/ Sangeeth Textiles group	Project details, Proof of title, statutory clearances, additionality, monitoring system
Mr. R K S Pillai/ Assistant Manager - Customer Relations / Suzlon (O&M contractor for the clients)	Project technical details, Monitoring system, calibration practice and frequency
Ms. Suhasini G and Mr. Vishwa Mathad/ CDM Consultants/ Deloitte Touche Tohmatsu	Baseline, additionality and emission reduction calculations

During the site visit, PJRCDM verified the actual operation of the project as described in the PD. The system of main meters used for monitoring the sale to grid and the

calibration practice adopted were examined. The monthly records system of energy meter readings was 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 participants 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 during validation, CAR#1 was raised for the revision of crediting period start date to comply with the start date guidelines of VCS 2007.1 standard. The PD had applied investment analysis route with individual Internal rate of return (IRR) to demonstrate the additionality of the project. Since there was inconsistency between the type of IRR calculated and the appropriate benchmark applied as per the CDM EB 'Guidance on the Assessment of Investment Analysis' CAR#8 was raised and later resolved. Equity IRR has now been compared with the equity cost of capital as benchmark. Since the individual IRRs have been presented, it was request to clarify under CAR#6 whether the assumptions used are as per prevailing circumstances for each machine and later resolved. Further, clarity was lacking on the assumptions applied and their conservativeness for investment analysis and hence CAR#6 and CAR#7 were issued. Detailed assumptions and elaboration on conservativeness have now been discussed in the revised version#5 of the PD along with the sensitivity analysis.

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 15 MW in Tirunelveli district of Tamil Nadu state, India. Details of unique identification and commissioning dates are as provided in section 1.3 of this report. An estimated 27.29 Million kWh/ year is expected to be sold to the country's Southern regional grid. Plant Load Factor stated was 25.9% and CAR#7 was raised to justify the assumption. This was found as per the May 2006 Tamil Nadu state electricity regulatory commission order and hence subsequently resolved.

The start date of the project has been stated as the commissioning date of the first WTG, i.e. 31st March 2003. Version 1 of the PD stated crediting period start date as the commissioning date of the first machine in the bundle. CAR#1 was raised to correct this as per VCS 2007.1 standard. The VCS crediting period for the project is now 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 VCS requirements, proof of title of the proponents of the bundle was sought (CAR#15). These were evidenced through ownership documents like purchase orders, commissioning certificates and power purchase agreements (see Appendix-I for document references) and hence resolved.

To ensure that the environmental credits generated by the project are not double counted, CAR#2 was raised to transparently declare the status. The project has been found not to have applied for other schemes like CDM. A declaration letter has also been separately furnished by each of the project proponent.

Details of compliance with national and local laws and environmental regulations were sought in CL#4 and later resolved.

Lastly, the VCS 2007.1, section 5.2.1 criteria of the contracting deadline for validation was checked (CAR#16) and found to meet the requirement.

3.2 Baseline and demonstration of additionality

The project proponent had applied approved baseline methodology AMS I.D., version 13 which has been approved by the CDM Executive Board. CAR#4 was raised to apply the latest approved version of the methodology. The total installed capacity of the bundle is 15 MW which is equal to the qualifying limit of 15 MW 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 equal to 15 MW. The installed capacity has been verified from the commissioning certificates and power purchase agreements of the proponents.

- The grid boundary selected for the project activity is the Southern 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 ID version 14, where the baseline emissions are renewable energy generated times the emission factor of the grid. The grid emission factor has been determined as Option a, the combined margin grid emission factor (0.927 tCO_2/ MWh) in line with the 'Tool to calculate the emission factor for an electricity system' (Version 1.1).

Additionality: The additionality was demonstrated through the investment analysis route with individual IRR. The benchmark (weighted average cost of capital) used in version 1 of the PD was not found consistent with the equity IRR and hence CAR#8 was raised as per the latest CDM EB 'Guidance on the assessment of Investment Analysis'. The project now compares equity IRR with equity cost of capital (expected equity return) as benchmark.

Since the additionality tool requires investment analysis to be based at the time of investment, CAR#6 was raised to correct all the applicable assumptions and data used based on the investment timing of individual machines. The plant load factor (PLF) used for the IRR estimation were not justified adequately. CAR#7 was raised to justify the conservativeness 20% PLF assumed as per Tamil Nadu electricity Board data for 2003-04. The revised higher PLF of 25.9% which has been based on the May 2006 Tamil Nadu state electricity regulatory commission tariff order for wind energy has been now applied. CAR#6 and CAR#8 were raised to make transparent the capital cost, subsidies and wheeling tariff applied and found in order.

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

Input Parameter	Value Applied	Source of information verified from
Book depreciation under Companies Act	5.28%	Straight Line Method, Schedule XIV of Companies Act, 1956, item II (b).
Accelerated Depreciation under IT Act	80%	Written Down Value (WDV) basis - Under Income Tax Act 1961
Minimum Alternate Tax (MAT)	7.87%	Under Income Tax Act 1961 for the year
Plant Load Factor	25.9%	Based on TNERC Order No3. Dated 15/05/2006
Regular Income Tax	33.66%	Under Income Tax Act 1961
Industrial High Tension Tariff Rate in Tamil Nadu	Rs.3.50 per unit	http://www.tneb.in/TariffDetailsNew.php
Capital Cost for WTGs	As per actuals	Cross-checked with purchase orders (see Appendix-1 for details) Cost/ MW works out at Rs. 40.4 Million/ MW, and is based

		on actuals.
Reactive Power Charges	Rs 0.40 Per Unit	Power Purchase Agreement with Tamil Nadu Electricity Board (Wheeling Agreement)
Operation and Maintenance Cost	2% of project cost from third year onwards	As per Suzlon O&M agreement in purchase orders
Wheeling Charges	5%	As per Wheeling Agreements with the Tamil Nadu Electricity Board
Losses due to machine availability	3%	As per Suzlon O&M agreement in purchase orders

The benchmark was identified based on the equity cost of capital, where cost of equity was determined using the capital asset pricing model as,

Equity Cost of Capital = Risk Free Return + Beta * (Market Returns - Risk Free Returns)

The market return was verified with the equity returns for the different period of investment. Beta value has been verified as the average for a set of power sector companies in India from the data published for the relevant years at Aswath Damodaran (http://pages.stern.nyu.edu/~adamodar/). The set of the companies considered were Ahemadabad Electricity Company Limited, BSES Limited, Gujarat Industries Power and Tata Power Company. The Risk Free Return for the respective years was determined from the Reserve Bank of India Handbook of Statistics 2008-09. Accordingly, the benchmark was determined based on economic data prevailing for the respective time of 2003 and 2006 as shown in the section 2.5 of the version 5 of the PD.

The results of Equity IRR and the applicable benchmark were as follows:

S.No	Proponent	WTG No. (HT SC No.)	Wind Capacity (MW)	Time of investment	Applicable Equity Return benchmark %	Equity IRR % (Without VCS)
1	Sangeeth Textiles Limited	550	1.25	Jan 2003	16.17	15.17
		830	1.25	Oct 2003	16.46	12.47
		1783	1.25	Jan 2006	17.21	11.25
2	Sri Mookambiga Spinning mills Limited	1749	1.25	Jan 2006	17.21	10.94
		675,676	2.5	Oct 2003	16.46	12.58
3	CAV cotton Mills Limited	655, 656	2.5	Jul 2003	15.87	13.00
		1659	1.25	Jan 2006	17.21	11.22
4	Sri Vasudeva Textiles Limited	548	1.25	Jan 2003	16.17	14.36
		745	1.25	Oct 2003	16.46	14.77
		1660	1.25	Jan 2006	17.21	11.13

The tariff being fixed and the capital cost incurred as per the purchase orders, the only major variable identified was the plant load factor. Sensitivity analysis for 10% higher PLF shows that the equity IRR does not cross the benchmark for the machines, except

for machine # 548, 550 and 745. For these machines even though the equity 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 20.5%. The verification was done against the historical monthly generation records for the machines. 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 the step 2 of CDM Tool for the demonstration and assessment of additionality' Version 5.2 and the CDM EB 41 "Guidance on the Assessment of Investment Analysis".

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 site visit, it was observed that each machine had only a main meter installed as against the system of main and check meter as mentioned in version 1 of the PD. Hence, CAR#12 was raised and subsequently resolved. The monitoring system consists of measuring energy generation at the individual wind turbine generator with a main meter wherefrom the power is exported to the grid.

Based on the prevailing system in Tamil Nadu, the responsibility of uncertainty management of the main meter at WTG lies with the state electricity board. The accuracy of the main meter installed is of 0.5% accuracy class. Frequency of monitoring is continuous, and the data is aggregated for a month. The data is archived on paper and electronically and the retention time for keeping of records is defined in the PD as two years beyond the crediting period.

The calibration procedure for the meters at site was not clear and hence CL#9 was raised to elaborate with evidence on these calibration practices and was subsequently closed after checking the adequacy.

Given that the final emission reductions are based on the third party data sourced from the main meter reading of grid operator Tamil Nadu Electricity Board, PJRCDM is of the opinion that it is reasonable to assume that the same will be credible.

The grid emission factor will be applied ex-ante throughout the 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 0.927 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 bundled project is based on wind energy alone, no project emissions and leakage have been considered in accordance with the baseline methodology AMS ID, 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 bundled project is expected to sell net electricity of 27.29 Million kWh/ year. The GHG emission reduction accruable from the project activity has therefore been estimated as 25305 tCO_2 equivalent per year.

3.5 Environmental Impact

The project activity is a renewable energy project with a cumulative capacity of 15 MW of WTGs being implemented in Tirunelveli district of Tamil Nadu, India. CL#4 was raised for further elaboration on environmental and legal compliance. The project being set up on a barren land, the wind turbine generator does not warrant any environmental impact assessment or environmental permits as per then prevailing notification S.O. 60 (E) dated 27th November 1994 in India. However, the project proponent needs to obtain clearance from the state electricity authority 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#14 was raised for providing complete details with evidences of the stakeholder meeting. A stakeholders' meeting was organized by the project proponents at Sankaneri, Tamil Nadu state India on 13th July 2009. The identified stakeholders were the local villagers, employees of the Sangeeth textiles group and the O&M contractor. The details of the stakeholder meeting have been included as an annex of the version 5 PD. The information provided was cross checked with the evidences (see Appendix-I for details).

No negative comments have been received for the project activity.

4 VALIDATION CONCLUSION

PJRCDM Inc. has performed the validation of the project '15 MW Bundled grid-connected wind electricity generation project in Radhapuram Taluk of Tirunelveli District in Tamil Nadu, India'. 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 15 MW 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 25305 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 the version 05 of the VCS PD '15 MW Bundled grid-connected wind electricity generation project in Radhapuram Taluk of Tirunelveli District in Tamil Nadu, India' dated 3rd 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 4th May 2009
2. PD Version 5 dated 3rd 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. Individual Internal rate of return calculation sheets of the project, Version 05
7. Emission Reduction calculation of the project

B. Project related supporting documents

1. Commissioning certificates for 2 Nos. of 1.25 MW machines of CAV Cotton Mills Ltd., letter dated 21st January 2004 and for 1 WTG of 1.25 MW letter dated 12th April 2006, all issued by TNEB to CAV Cotton Mills Ltd
2. Commissioning certificate for WTG of 3 Nos. of 1.25 MW of Sangeeth Textiles Ltd., each WTG letter dated 28th April 2004, 8th April 2003 and 12th April 2006.
3. Commissioning certificates for WTG of 2 Nos. of 1.25 MW of Shri Mookambiga Spinning Mills Ltd., letter dated 27th March 2004.
4. Commissioning certificates for WTG of 1 No. of 1.25 MW of Shri Mookambiga Spinning Mills Ltd., letter dated 10th April 2006.
5. Commissioning certificates for WTG of 3 Nos. of 1.25 MW of Sri Vasudeva Textiles Ltd., each WTG letter dated 23rd April 2004, 8th April 2003 and 10th April 2006.
6. Purchase order for WTG of 2 Nos. of 1.25 MW and 1 No. of 1.25 MW between CAV Cotton Mills Ltd. and Suzlon Energy Ltd. dated 21st July 2003 and 16th January 2006 respectively.
7. Purchase order for WTG of 3 Nos. of 1.25 MW between Sangeeth Textiles Ltd. and Suzlon Energy Ltd., dated 31st January 2003, 16th January 2006 and 1st October 2003.
8. Purchase order for WTG of 2 Nos. of 1.25 MW and 1 No. of 1.25 MW between Shri Mookambiga Spinning Mills Ltd. and Suzlon Energy Ltd. dated 1st October 2003 and 16th January 2006 respectively.
9. Purchase order for WTG of 1 No. of 1.25 MW between Sri Vasudeva Textiles Ltd. and Suzlon Energy Ltd. dated 1st October 2003.
10. Purchase order for WTG of 2 Nos. of 1.25 MW between Sri Vasudeva Textiles Ltd. and Suzlon Energy Ltd. dated 31st January 2003.
11. Power Purchase Agreement for WTG of 2 Nos. of 1.25 MW of Suzlon make between CAV Cotton Mills Ltd. and Tamilnadu Electricity Board dated 24th December 2003 and 24th March 2006.

12. Power Purchase Agreement for WTG of 3 Nos. of 1.25 MW of Suzlon make between Sangeeth Textiles Ltd. and Tamilnadu Electricity Board dated, and 31st March 2003, 31st March 2004 and 31st March 2006.
13. Power Purchase Agreement for WTG of 2 Nos. of 1.25 MW of Suzlon make between Shri Mookambiga Spinning Mills Ltd. and Tamilnadu Electricity Board dated 4th March 2004.
14. Power Purchase Agreement for WTG of 1 No. of 1.25 MW of Suzlon make between Shri Mookambiga Spinning Mills Ltd. and Tamilnadu Electricity Board dated 30th March 2006.
15. Power Purchase agreement for WTG of 3 Nos. of 1.25 MW of Suzlon make between Sri Vasudeva Textiles Ltd. and Tamilnadu Electricity Board dated 29th March 2004, 28th April 2004 and 24th March 2006.
16. Purchase order for Land for WTG of 1 No. of 1.25 MW between CAV Cotton Mills Ltd. and Shubh Reality (South) Pvt. Ltd. dated 16th January 2006.
17. Purchase order for Land for WTG of 1 No. of 1.25 MW between CAV Cotton Mills Ltd. and Shubh Realty (South) Pvt. Ltd. dated 16th January 2006.
18. Purchase order for Land for WTG of 1 No. of 1.25 MW between Shri Mookambiga Spinning Mills Ltd. and Shubh Realty (South) Pvt. Ltd. dated 16th January 2006.
19. No objection certificate of CAV Cotton Mills Ltd. for WTG of 2 Nos. of 1.25 and 1 No. of 1.25MW from Tamilnadu Electricity Board dated 10th December 2003 and 24th February 2006.
20. No objection certificate of Sangeeth Textiles Ltd. for WTG of 3 Nos. of 1.25MW from Tamilnadu Electricity Board dated 31st March 2004, 15th February 2003 and 17th February 2006.
21. No objection certificate of Shri Mookambiga Spinning Mills Ltd. for WTG of 2 Nos. of 1.25 MW and 1 No. of 1.25 MW from Tamilnadu Electricity Board dated 24th February 2004 and 16th February 2006.
22. No objection certificate of Sri Vasudeva Textiles Ltd. for WTG of 3 Nos. of 1.25 from Tamilnadu Electricity Board dated 15th March 2003, 16th February 2006 and 23rd March 2004.
23. Documents related to stakeholder meeting discussions, dated 13th July 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 In line with Section 5.2.1 of the VCS 2007.1 standard, the crediting period start date cannot be earlier than 28 March 2006.	1.6	Necessary corrections have been made in the PD as per the section 5.2.1 of Voluntary carbon standard 2007.	Starting date revised and found OK. CAR closed.
CL 1 The term "wheeling" is not clear in section 1.4 of the PD	1.4	Wheeling means the operation whereby the distribution system and associated facilities of a transmission Licensee or distribution Licensee, as the case may be, are used by another person for the conveyance of electricity on payment of charges to be determined under section 62 of the Electricity Act 2003.An agreement entered into with the state electricity utility with respect to wheeling is wheeling agreement. The definition had been inserted as a foot note in section 1.4 of the VCS PD	OK. CL closed
CL 2 A consolidated sheet of unique identification numbers project location, size, make and commissioning date is suggested.	1.4, 1.5 and 1.6	The same has been inserted in the VCS PD. Please refer to table # 1.1 and table # 1.2 in section 1.5 and 1.6 respectively of the VCS PD.	Consolidated sheet provided in revised PD. CL closed.
CL 3		Necessary technical details have been inserted and elaborated wherever required in section 1.9 of VCS PD	OK. CL closed.

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
Further details are sought on the technology of the Wind Turbine Generators and the power evacuation system.	1.9		
CL 4 Status on Environmental clearance needs to be clearly stated in section 1.10 on compliance with relevant local laws and regulations.	1.10	Since wind energy generation project is clean and does not lead to any kind of waste, there is no environmental clearance required as per the environmental regulations of the host country. A brief description on the same has been mentioned in section 5 of the VCS PD.	OK. CL closed
CAR 2 Clear statement is required as to whether the project participants have applied for other GHG programs. It is also be clearly demonstrated that there will not be double counting of emission reductions for the past as well as future credits.	1.13	The project promoters have appointed Indian Wind Power Association (IWPA) as early as in 2005 for carrying out the CDM process for their wind turbine generators. IWPA in turn, appointed a CDM consultant to take up the project for getting it registered under CDM. However, since the present project activity was a part of a bundle and since there was a substantial delay in the submission of documents by other project promoters of the proposed bundle, the consultant could not go ahead with the project activity. The necessary communication with IWPA, w.r.t carbon credits would be submitted to the validator. Further, the project proponents also conclude that they shall not apply for any other kind of GHG programmes which may result in the double counting of past as well as future credits. An undertaking letter from the project proponent stating the	Declaration letters to avoid double counting provided by individual project proponents. CAR closed.

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
		above mentioned point would be submitted to the validator.	
CAR 3 Letter of Authorization for coordinating agency Suzlon Energy Limited on behalf of project participants has not been provided. Further, substantiation is sought on the nature of relationship between the project participants, if any.	1.15	Sangeeth Textiles Ltd would be acting as a coordinating agency on behalf of the four project proponents. Letter of authorization of the same would be provided to the validator. Further, the companies Sangeeth Textiles Ltd, CAV Cotton Mills Ltd, Shree Mookambiga Spinning Mills Ltd, Sri Vasudeva Textiles Ltd are owned by the members of a same family. Each of them owns one company and acts as the Managing Director of the company, and as one of the Directors for the other three. Further, each of them have controlling interest in one of the companies and marginal shareholding (3 to 5%) in the rest of the three companies.	Letter of authorization furnished and found OK. CAR closed.
CAR 4 Section 2.1 of PD needs to provide clearly all relevant tools used as per the methodology.	2.1	The tools referenced as per methodology AMS ID that is used to determine the baseline of the project activity, have been mentioned in the VCS PD.	OK. CAR closed.
CL5 The baseline scenario has not been discussed in line with the AMS I D Version 14 guidelines.	2.5	The necessary corrections pertaining to the baseline scenario have been done as per the AMS-1D version 14 in the revised PD.	OK. CL closed.

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 5 The VCS PD template has not been applied correctly. A new Section 2.5 has been added in the VCS PD and the current 2.5 is changed to Section 2.6"	2.5	Necessary corrections have been made in line with the VCS PD template.	OK. CAR closed.
CAR 6 Assumptions for investment analysis for the additionality demonstration need to be clearly stated in this section of the PD. Further, as different wind turbine generators were installed at different periods of time between 2003 and 2006, substantiation with evidence is sought on whether circumstances were similar for project proponents during various periods in the additionality discussion.	2.5	The assumptions for investment analysis for additionality demonstration have been included in the revised PD. Different wind turbine generators were installed at different periods of time between 2003 and 2006 by different project promoters. Hence equity IRR has been calculated for each project proponent based on the year of investment. The equity cost of capital is considered as a benchmark.. The benchmark has been calculated for different years based on the data and assumptions applicable for that particular year and prevailing conditions and compared with the equity IRR The necessary changes pertaining to the IRR analysis have been made in the section 2.5 of the revised PD. Supporting documents have been submitted to the validator	All assumptions have been clearly stated and evidence of data submitted. CAR closed.
CL 6 The project description provides Investment analysis for individual	2.5	The IRR analysis has been revised to 20 years and the necessary changes have been incorporated in the section 2.5 of the revised PD. The revised IRR analysis spreadsheets would be submitted to the validator.	IRR computation revised for 20 years. OK. CL closed.

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
project proponents. It has been found that while the life time of the project is 20 years, the IRR calculation is done only for 10 years. Clear substantiation is required for the same.			
CAR 7 The basis for PLF provided for individual wind turbines in the IRR analysis is not transparent. Justification is sought on the methodology of PLF's used	2.5	The PLF used in the IRR calculation is revised as per the TNERC order No.3 dated 15/05/2006. The necessary information pertaining to the PLF calculation has been included in the section 2.5 of the revised PD	The Tamil Nadu electricity Board has stated a PLF at 20% for the year 2003-04 based on the generation data for that year. This was applied for the IRR computation for the machines based on the time of investment. However, later TNERC in May 2006 stated in its tariff order that the PLF to be applied for existing wind machines is 25.9%. The higher PLF data has therefore been used in

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
			the revised PD to ensure conservativeness. Further, sensitivity analysis is done at +10% generation to check whether the assumption is reasonable. CAR closed.
CL 7 The IRR sheet estimates revenues based on applicable wheeling tariff at the time of project implementation. The source of this data is not substantiated with adequate evidence.	2.5	The industrial high tension tariff rate taken for the project is as per the tariff rates as approved by the Tamil Nadu State Electricity Regulatory Commission (TNERC) with effect from 16th March 2003, in Tariff order dated 15th March 2003. The same can be found at http://www.tneb.in/TariffDetailsNew.php	Applicable wheeling tariff has been applied correctly. CL closed.
CAR 8 The project uses WACC as the benchmark. Clarity is sought on the appropriateness of benchmark applied and the basis of equity returns used for different project IRRs.	2.5	The benchmark applied for the project activity has been revised to equity cost of capital at the time of investment for each machine. The WTG wise Equity Internal Rate of Return (IRR) has been calculated for each project proponent independently and the same is compared with the benchmark applicable for that year. The equity cost of capital has been calculated for the projects of individual project promoters using	Equity IRR has been computed and compared with the benchmark of equity cost of capital. The benchmark is determined based on data at the time of

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
		Capital Asset Pricing Model. Necessary details about the benchmark calculations have been provided in section 2.5 of the revised VCS PD and in the IRR spreadsheets	investment for each machine. Further assumptions related to beta values of CAPM have been found conservative. CAR closed.
CAR 9 The wheeling agreement for HT SC No.830 is not provided.	2.5	Scanned copy of wheeling agreement of 830 is being provided	Wheeling agreement submitted and found OK. CAR closed.
CAR 10 Evidence is required for the cost of the land for HT SC No.1783 as mentioned in the IRR sheet.	2.5	The land sale document is being provided as an evidence	Land purchase agreement submitted and found OK. CAR closed.
CAR 11 Discussion of additionality on 'right of way' and other barriers needs to be specific to the VCS project activity with adequate documentary evidence.	2.5	Since the barrier mentioned Right of way is not a project specific one, the same has been removed as a barrier from the PD.	OK. CAR closed.
CAR 12 The monitoring plan needs to clearly specify the type of meter reading, frequency of reading, % error for meter reliability and internal audit procedures.	3.2	The frequency of meter reading at the wind power project activity is continuous and aggregated once in a month, i.e. 15th of every month. Further, the meter is of accuracy class of 0.5%. The energy records(EB bills) will be maintained at the registered office of the project promoter.	OK. CAR closed.

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
CL 8 Does the description for parameter in section 3.3 refer to net or gross power exported?		The parameter refers to Net power exported. Necessary changes have been made in the PD.	OK. CL closed.
CL 9 From the site visit, it is not clear on the exact calibration procedure carried out in the site and as stated in the VCS PD.	3.3, 3.4	The energy meter located at the wind turbine generators would be calibrated using portable meter periodically by the personnel from the state utility, Tamil Nadu State Electricity Board (TNEB). Necessary details have been incorporated in the revised VCS PD	Calibration practice revised and found OK. CL closed.
CL 10 Clarity is sought on whether the ex-ante or ex-post grid emission factor will be used for arriving at emission reductions from the VCS project activity during the crediting period.	3.3	Ex-ante grid emission factor is used for determining the emission reductions from the project activity during the crediting period.	OK. CL closed
CL 11 Simple OM has been used for arriving at combined margin emission factor. However, the restriction to use Simple OM has not been clearly stated in the PD.	4.2	As per the tool to calculate the emission factor for an electricity system, any of the four methods (Simple OM, Simple adjusted OM, Dispatch Data Analysis, Average OM) can be used to calculate the operating margin emission factor. However, since the low-cost, must run resources constitute less than 50% of total grid generation in average of five most recent years and based on long term averages for hydroelectricity production, simple OM has been chosen. Necessary details have been mentioned in the PD.	OK. CL closed

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 13 The exact years should be clearly specified in section 4.4 of the PD	4.4	Necessary corrections have been made in the PD	Changes found OK. CAR closed.
CAR 14 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 meeting was conducted on 13th July 2009 at Madhakovil Kalyana Mandapam, Vadakkankulam, Sankenari, Tamil Nadu. The documents related to the Stakeholder meeting would be submitted to the validator. Necessary details pertaining to the stakeholder consultation process has been incorporated in the section 6 of revised PD.	Stakeholder meeting has been conducted on 13th July 2009 and evidences for the meeting were found in order. CAR closed.
CAR 15 Evidence of proof of title for individual project participants to be provided.	8.1	The commissioning certificates pertaining to each of the WTGs in the project activity, issued by the Tamil Nadu State Electricity Board are being provided as proof of title.	Proof of ownership documents found OK. CAR closed.
CAR 16 Article 5.2.1 of the VCS2007.1 standard, requires that proof of contracting prior to 19 November 2008 shall be provided. The same is to be stated with evidence in the PD.	7	Necessary details have been inserted in the PD and proof of contracting would be submitted to the validator.	OK. CAR closed.