Voluntary Carbon Standard 2007.1
Validation Report Template

19 November 2007

Validation Report:

Name of Verification company:	Date of the issue:
SIRIM QAS International Sdn. Bhd.	28th March 2010
Report Title:	**Approved by:**
VCS Validation Report for "Grid-connected wind electricity generation project in Tamil Nadu, India." (SQAS-VCS-ES12880022)	Parama Iswara Subramaniam Authorised Representative
Client:	**Project Title:**
National Enterprises	Grid-connected wind electricity generation project in Tamil Nadu, India.

Summary:

SIRIM QAS International Sdn Bhd was engaged by National Enterprises, Barabil, Keonjhar, Orissa state, India to undertake the validation of their project "Grid-connected wind electricity generation project in Tamil Nadu, India"under the Voluntary Carbon Standard (VCS) 2007.1. The purpose of the validation was to perform an independent, third party assessment of whether the project activity confirms to the qualification criteria set in the VCS 2007.1 standard and related requirements to attain real, measurable, additional, and permanent emission reduction. The validation exercise was not meant to provide any consulting to the project participants. However, the stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

The validation consisted of three phases;
i) a document review of the project documents and preparation of validation protocol, ii) on-site visit to the project activity and interviews with the project developer and the project consultant, and, iii) resolution of outstanding issues and the issuance of final validation report and validation opinion

The project activity is a renewable wind energy generation of 3.30 MW capacity by installation of 2 WTGs, each of 1.65 MW capacity at Samurangapuram Village, Tirunelveli, Tamil Nadu, India connected to southern regional grid of India. The electricity generated will replace the equivalent amount of fossil fuel dominated grid electricity.

The validation process, from contract review to the issuance of validation report and validation opinion was conducted in accordance with SIRIM QAS Intl.'s internal procedures. The first output of the validation process was a list of corrective action requests and clarification requests (CAR and CL) which is presented in Appendix II of this report. As a result of these findings, the PDD was revised by the client.

In summary, it is the opinion of SIRIM QAS Intl. that the proposed VCS project activity has correctly applied the baseline and monitoring methodology (AMS I.D. version 15) for the project activity and meets the relevant VCS 2007.1 requirements. Total GHG emission by the project is 7,402 tCO2e per annum and the estimated GHG reductions from the project would be real, measurable, permanent and additional.

Work carried out by:	Number of pages:
Dr.D.Siddaramu Mr. Ravi Shankar Dr.G.Vishnu	26

Abbreviations

AMS	Approved small-scales methodologies
CAR	Corrective Action Request
CEA	Central Energy Authority
CL	Clarification Request
CMS	Central Monitoring Station
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
EB	Executive Board
EF	Emission Factor
GHG	Greenhouse gas(ses)
HT	High Tension
HTSC	High Tension Service Connection
INR	Indian Rupees
IRR	Internal Rate of Return
IT	Income Tax
JMR	Joint Meter Reading
kW	Kilowatt
kWh	Kilowatt hour
LCS	Local Control System
m	Meter
MAT	Minimum Alternative Tax
MoEF	Ministry of Environment and Forests
PD	Project Description
PLF	Plant Load Factor
PPA	Power Purchase Agreement
QA/QC	Quality Assurance/Quality Control
SIRIM QAS Intl.	SIRIM QAS International Sdn Bhd
TNEB	Tamil Nadu Electricity Board
TNERC	Tamil Nadu Electricity Regulatory Commission
VCS	Voluntary Carbon Standard
VCU	Voluntary Carbon Unit
WTG	Wind Turbine Generator

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1 Introduction

National Enterprises, (hereinafter referred to as the 'Project Proponent') contracted SIRIM QAS Intl. to undertake the validation of their project "Grid-connected wind electricity generation project in Tamil Nadu, India (hereinafter referred to as the project activity) under the Voluntary Carbon Standard (VCS) 2007.1 standard. This report describes the validation work undertaken.

1.1 Objective

The purpose of the validation was to perform an independent, third party assessment of whether the project activity confirms to the qualification criteria set in the VCS 2001.1 standard to attain real, measurable, additional, and permanent emission reduction.

The validation 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 projects crediting period.

1.2 Scope and Criteria

The validation scope included an independent and objective review of the Project VCS project description (PD), the project's baseline study, monitoring plan and other relevant documents. Specifically, the objectives of the validation work were:

- To verify that the project activity met 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 were in conformance with the methodology applied from the VCS approved GHG program.
- To certify that the information presented were complete, consistent, transparent and free of material error.

The PD (/1/ and /2/ of Appendix 1) was reviewed against VCS 2007.1 standard and the VCS program guidelines (/3/ of Appendix 1) and the applied CDM methodology, AMS I.D. version 15 (/4/ of Appendix 1). SIRIM QAS Intl. 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 VCUs.

The work carried out by SIRIM QAS Intl. is free from any conflict of interest.

1.3 VCS project Description

The VCS project activity by National Enterprises involved installation of 2 WTG each of 1.65 MW capacities totaling to 3.30 MW capacity at Samurangapuram Village, Tirunelveli, Tamil Nadu, India (/5/ and /5.1/ of

Appendix 1). The electricity generated by this project is fed to the southern regional grid.

The sold energy displaced an equivalent amount of energy from the fossil fuel dominated southern grid contributing significantly in avoidance of green house gases emission. The details of the individual WTGs are as follows:

Sl No.	HTSC No.	Latitude			Longitude			Commissioning date
		Degree	Minute	Second	Degree	Minute	Second	
1	2570	08	19	32.7	77	40	59.2	30.03.2008
2	2595	08	19	59.4	77	19	27.4	31.03.2008

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 had been followed for the validation of the project. Based on the desired level of accuracy SIRIM QAS Intl. had established an internal quality control process and assures that the information given in the PD is materially correct and is a fair representation of the of the actual project details, and was prepared in accordance with the VCS requirements and the applied CDM methodology for information pertaining to additionality, GHG quantification, monitoring and reporting.

This validation report is prepared as per the VCS 2007.1 Validation Report Template. The finial validation conclusion of the project is presented in section 4 of this report.

2 Methodology

The SIRIM QAS Intl.'s validation process consisted of the following phases:

- A document review of the project description documents and preparation of validation protocol;
- On-site visit to the project activity and interviews with project developer, project consultant; and relevant stakeholders
- Resolution of outstanding issues and the issuance of final validation report and opinion

In order to ensure transparency, a validation protocol was customised for the project according to the VCS 2007.1 guidelines. The protocol describes criteria (requirements), means of verification, results from the validating and how the identified criteria had been met in a transparent manner. The validation protocol serves the following purposes :

- it organizes, details and clarifies the requirements that a VCS project are expected to meet;
- it ensures a transparent validation process where the validator documents how a particular requirement had been validated and the result of the validation.

The validation protocol consists of Appendix II (not attached to this report),

where findings established during the validation were classified as non-fulfilment of validation protocol criteria or where risks to the fulfilment of project objectives were identified.

Corrective Action Request (CAR) was issued, where:

- mistakes have been made that directly impact on the project results; or
- validation protocol requirements have not been met; or
- there was a risk that the project would not be accepted as a VCS project or that emission reductions will not be certified.

The validation team also raised "Clarification" (CL), where additional information was needed to fully clarify an issue.

APPENDIX II : RESOLUTION OF CORRECTIVE ACTION AND CLARIFICATION REQUESTS			
Draft report clarifications and corrective action requests by validation team	Ref. to Section of the PD	Summary of project owner response	Validation team conclusion
If the conclusions from the draft Validation are either a CAR or CL, these should be listed in this section.	Reference to the Section of the PD where the relevant CAR or CL is raised.	The responses given by the project participants during the communications with the validation team should be summarized in this section.	This section should summarise the validation team's responses and final conclusions.

The name of SIRIM QAS Intl.'s team members involved and their roles and responsibilities are as follows:

Name	**Role**	**Components reviewed**
Dr. D. Siddaramu	Validation Team Leader	Completeness check, desk review, onsite inspection, Interview with project representatives & stakeholders, issuance of findings, report preparation.
Mr. Ravi Shankar	Auditor	Completeness check, desk review, onsite inspection, Interview with project representatives & stakeholders, issuance of findings, report preparation.
Dr. G. Vishnu	Auditor	Desk review, onsite inspection, Interview with project representatives, report preparation.
Mr. S. Sudheendra	Technical Reviewer	Technical issues related to the project.
Mr. CA G.N.Jayaram	Financial Expert	Financial issues related to the project.

2.1 Review of Document

The first PD version (/1/ of Appendix 1) submitted by the client and additional background documents related to the project description and baseline were reviewed as an initial step of the validation process.

A desk review was further done to assess the following parameters:

1. Project details as per VCS PD template.
2. Applicability and appropriateness of methodology used.
3. Compliance with relevance laws and regulation
4. Correctness of application of baseline and monitoring methodology
5. Demonstration of additionality
6. Monitoring Plan
7. Stakeholders comment
8. Proof of title
9. Supporting documents mentioned in the PD (Grid emission factor, TNERC guidelines, commissioning certificate etc.)

A complete list of all the documents reviewed is attached in Appendix 1 of this report.

2.2 Follow-up Interviews

After the review of the project description and documents a site visit was carried out from 17th to 18th March 2010. During the site visit, physical inspection of the project components followed by interviews with the on-site personnel was carried out to verify the project details. A follow-up meeting was also conducted with the project representatives. The names and the designation of the persons interviewed and the areas covered in the interview with each of them are as detailed below:

Name & Designation	**Company**	**Details of Interview**
Site Visit: Mr. J. Subramanian Sr.Engineer	Vestas	Technical Details, Monitoring system, calibration frequency, Grid connectivity & power evacuation system / Infrastructure.
Interview: Mr. Jagajit Mohanty Assistant Officer	WTG, National Enterprises	Project Details, Power Purchase Agreement, Land Ownership details, Purchase Order details, Overall Project management
Follow-up meeting: 1. Mr. Rohit Gupta Business Analyst 2. Mr. Chandan Roy Analyst	Deloitte Touche Tohmatsu India Pvt Ltd.	Project Details, Baseline, Additionality, ER calculations, Financial calculations, Proof of title

During the site visit, the actual on-site practices adopted and followed for the operation of the project were compared with the description given in the PD. The grid-connectivity, metering practices, calibration status and level of accuracy of meters were examined. The archived data of the energy generated was also reviewed.

2.3 Resolution of Corrective Action Requests and Clarifications

The objective of this phase of the validation was to resolve the request for corrective actions and clarification and any other outstanding issues which needed to be clarified prior to SIRIM QAS Intl.'s conclusion on the project description based on the site inspection and review of documents, such that the project activity meets the VCS 2007.1 requirements. Six (06) Corrective Action Requests and Four (04) Clarification Requests raised by validation team were resolved through communication between the client and the validation team. In order to ensure transparency of the validation process, the concerns raised and responses received were documented and have been included in Appendix II of this report

2.4 Internal Quality Control

SIRIM QAS Intl. has an established internal quality control process. A Technical Reviewer was appointed to review the final draft validation report. The final draft report after all findings had been resolved was then submitted to the Authorised Representative for final review and approval.

3 Validation Findings

3.1 Project Design

Project identification, design & development and implementation were evaluated as per the requirements of VCS 2007.1. The project involves 2 wind turbine generators (WTGs) of Vestas (Model V 82) of 1650 kW capacity each (/6/ and /6.1/ of Appendix 1). The project uses state of the art technology which will result in a significantly better performance than any commonly used technologies in the host country as evidenced from the technical specifications described in section 1.9 of the PD. The salient features of the state-of-art-technology are:

- The WEG NM82/ 1650 (1.650 MW) has features of variable speed and active pitch control. The generator is flanged directly to the hub.
- A direct grid-connected high-speed generator, in combination with the multiple-stage combined spur/planetary gearbox of NEG MICON (WTG machine manufacturer and supplier).
- The Enercon E-30's rotors have three blades mounted on the same shaft without any Gear Box.
- Starts generation of power at wind speed of 3 m/s.

The project start date is 30/03/2008 (The project start date is the earliest commissioning date amongst the two WTGs). This was confirmed by the

review of the commissioning certificate of the individual WTGs (/7/ of Appendix 1). The crediting period for the project is from 30 March 2008 – 29 March 2018, which can be renewed once (considering 20 year life of WTGs). The VCS crediting period will be terminated in between if the project activity achieves CDM registration. Operational lifetime of the WTGs has been estimated to be 20 years (/6/ of Appendix 1). This was verified during the discussion with the PP, compared with the expected operational life time of project (also evaluated as per EB 50, Annex 15) and considered reasonable.

In line with the VCS requirements, proof of title of the project proponent was verified with the Supply Agreement and PPA (/8/, /9/ and /9.1/ of Appendix 1). In both the documents PPs name (i.e., National Enterprises) was found to be consistent and will own the VERs generated by the project.

To ensure that the environmental credits generated by the project are not double counted under VCS, an undertaking letter was provided by National Enterprises mentioning that the project activity is under CDM validation where the crediting period starts from the date of registration and that the present verification term for VCS does not overlap with the expected date of CDM activity registration and has not been rejected under other GHG programme (/10/ of Appendix 1).

The project meets the general requirements of VCS 2007.1 with respect to project start date, project scope and crediting period according to clause 5.1, 5.2 and 5.3.

Four CARs (CAR 1, 2, 4 and 6) and a CL (CL 1) were raised for issues related to project identification, project clearance, project description template, stakeholder consultations, project schedule, and commissioning date, all of which have been adequately addressed, resolved and closed as reflected in revised PD version 01. The resolution of each CAR and CL is represented in Appendix II: Resolution of Corrective Action and Clarification Requests.

3.2 Baseline

The project applies the approved consolidated baseline and monitoring methodology AMS I.D. version 15.

AMS I.D. is applicable to renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.

Project activity involves installation and operation of 3.30MW capacity WTGs connected to the southern regional grid of India. Grid connectivity was verified through the PPA (/9/ and /9.1/ of Appendix 1), and physical connection to the grid at sites. The commissioning certificates and supply agreement (/7/ and /8/ of Appendix 1) for the windmills indicate that the project activity, which is the installation of wind power plant/unit is a Greenfield project and did not involve

retrofitting or modification of any existing facility for renewable energy generation. The project activity is neither a co-generation system nor a hydro power plant and hence complies with the applicability criteria of AMS I.D.

The project boundary encompasses the physical and geographical site of the 3.30MW project. It includes the wind turbine installations, transformers, transmission lines, metering equipment and connected grid sub-stations. The project boundary is clearly defined and is in accordance with the requirements of the applicable methodology AMS I.D, Version 15.

A CAR (CAR 3) was raised on the issue related to the description of how the baseline had been identified and arrived in the section 2.4 of the PD. This has been adequately addressed, resolved and closed in revised PD version 01. The resolution of the CAR is represented in Appendix II: Resolution of Corrective Action and Clarification Requests.

The project activity is the installation of a new grid-connected renewable (wind based) power plant. As per the applied methodology the baseline is the electrical energy baseline $EG_{BL,y}$ expressed in kWh of electricity produced by the renewable generating unit multiplied by an emission factor.

Baseline emission reductions have been estimated using combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in 'Tool to calculate the emission factor for an electricity system Version 01.1 (EB 35)' (/14/ of Appendix 1). In the proposed baseline, the Southern Regional Grid of India is used as the reference for estimating the current generation mix. Data from the CO2 Baseline Database for the Indian Power Sector – Central Electricity Authority (Version 5.0) has been used in the PD (/13/ of Appendix 1).

Additionality

The guidance provided in the document 'Guidance on the Assessment of Investment Analysis'/ Version 02/ EB 41 available at http://cdm.unfccc.int/EB/041/eb41_repan45.pdf, (/14.1/ of Appendix 1) is used for the justification of additionality of the concerned project activity.

The project has proved additionality based on the investment analysis. A useful life of 20 years has been considered for the projections of cash flow

Investment Analysis

At the project conceptualisation stage, the equity IRR for the project activity was calculated and compared with the benchmark or hurdle rate of investment for the approval of project of the project participant. However, the equity IRR was found to be lesser than the hurdle rate of investment IRR for the project approval. The equity IRR for the project was compared with the cost of equity calculated under the Capital asset pricing model (CAPM). This benchmark is considered to be an appropriate one in the given context since the firm has used only equity for funding the project.

The common parameters used for calculation of IRR were the WTG cost and the O&M costs, verified through the proposal (offer letter) submitted by Vestas (/6.1/ of Appendix I), HT (High Tension) tariff in Tamil Nadu for sale to grid, verified through the PPA agreements (/9/ and /9.1/ of Appendix I), the Insurance cost proposal submitted by Vestas to the PP (/6.1/ of Appendix I), and the IT (Income Tax) rate was verified from http://ezinearticles.com/?Direct-Tax-Rates-in-India-for-AY-2008---2009&id=906600. As National Enterprises is a sole proprietorship firm, hence MAT (Minimum Alternative Tax) rate is not applicable to this project activity. The book depreciation of 4.5% has been applied based on TNERC guidelines (/22/ of Appendix 1). The PLF has been taken in a conservative way as 39.14% based on the proposal submitted by Vestas (/6.1/ of Appendix 1) which is in line with para 3 of EB 48, annex 11 guidelines.

The hurdle rate of investment (cost of equity) has been determined using the Capital Asset Pricing Model (CAPM) considering Beta values of power generating companies in India that were listed in the stock market at the time of this investment (/12/ of Appendix 1). 0.62, minimum value of the companies considered has been considered for calculating benchmark of the project activity.

Accordingly, the risk free rate has been taken from long dated Indian government bond rates available at the time of project approval by the project promoter. The data on government bond rates is published by Reserve Bank of India. (Web-link: http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/79542.pdf) The applicable risk free rate is 7.89%.

The risk premium has been calculated as the difference in compounded annual return between the BSE-Sensex (Indian stock exchange market) and the Government bond rates for the period 1999 – 2007. The detailed calculations as presented in the Excel sheet (/12/ of Appendix 1). The applicable risk premium of 22.70% applied is appropriate.

The applicable Beta value (0.62, minimum value of the companies considered) has been determined on the basis of the calculated Beta values of power generating companies in India which were listed on the stock exchange at the time of this investment. The table below summarises the Beta values:

Company Name	Beta
CESC LTD	1.04
JAIPRAKASH HYDRO	0.66
NEYVELI LIGNITE	0.95
RELIANCE INFRASTRUCTURE	0.72
TATA POWER	0.95
NTPC LTD	0.62
GUJARAT INDUSTRIES POWER COMPANY LTD	0.98

Company Name	Beta
BF UTILITIES LIMITED	1.21
Minimum	0.62

The IRR for the current project activity is 13.39% against the benchmark of 21.93%. The values of Beta have been checked with the values in BSE index and have been found correct. Further, these betas have been levered and only the minimum of all the betas have been adopted for the calculations. Hence this is considered to be conservative.

IRR of the project was taken as equity IRR and the benchmark compared was the cost of equity which was appropriate as per EB 41 (paragraph 11) applied benchmark was appropriate to the type of IRR calculated.

Sensitivity Analysis:

Sensitivity Analysis was conducted to ensure the credibility and robustness of the IRR calculation. As per the provisions of para 17 of guidance to investment analysis in EB 51, those variables which constitute 20% or more of the total project cost/ revenues have to be varied by a range of 10%. The variables as per the guidance are the Tariff Rate, Plant Load Factor (PLF) and the project cost. These parameters were varied by a range of 10% and the resultant equity IRR was found to be within the benchmark levels.

Percentage Change in Tariff	-10%	0%	10%
Tariff Rate (Rs./unit)	2.61	2.90	3.19
IRR without CDM benefits	11.37%	13.39%	15.30%

Percentage Change in PLF	-10%	0%	10%
PLF	35.23%	39.14%	43.05%
IRR without CDM benefits	11.38%	13.39%	15.29%

Percentage Change in the Project Cost	-10%	0%	10%
Total Project Cost (in Lakhs INR)	1971	2190.00	2409
IRR without CDM benefits	15.91%	13.39%	11.44%

The sensitivity analysis shows that the project IRR does not exceed the benchmark even after considering a 10% increase in Tariff Rate, Plant Load Factor (PLF) and variation in the project cost. Hence additional support through VCS registration is required for the project and based on the financial discussions, it is evident that the project faces significant barriers and is additional.

3.3 Monitoring Plan

The project uses the monitoring methodology based on "Grid connected renewable electricity generation, AMS I.D. version 15"

The justification and correct application of selected monitoring methodology is explained in section 3.2. With respect to the project activity, the only parameter that requires a continuous measurement and monthly recording is the amount of electricity (EGy in MWh) that is generated by the project activity. The generated electricity is continuously measured at LCS (Local Control System), at the 33 kV step up stage and 220 kV step up transformer. As all the WTGs in Tamil Nadu, have individual main meter from the electricity board. The net electricity supplied from the WTGs is arrived directly from this import/export meter (main meter) by the electricity board based on monthly recording of JMR (Joint Meter Reading) which is cross checked with the records of the invoice of electricity board. The on-site visit confirmed that net electricity supplied to the grid is measured through the meter readings of the energy meters installed by electricity board, which have the facility to measure export and import of energy on an hourly basis.

Description of the monitoring plan

The project uses approved monitoring methodology "grid connected renewable electricity generation", AMS I.D. version 15.

With respect to the project activity, only one parameter i.e. the amount of electricity supplied to the grid (EGy in MWh) is continuously monitored and recorded on a monthly basis. The generated electricity is continuously monitored and hourly recorded at LCS (local control system), stepped up twice, first to 33 KV and second to 220 KV. The electricity is sold (fed to grid) at 220 KV based on the main meter reading (JMR, Joint Meter Reading) which is verified from check meter. The on-site visit confirmed that net electricity supplied to the grid is measured through the meter readings of the energy meters installed by TNEB (Tamil Nadu Electricity Board), which have facility to record export and import of energy.

The monitoring plan describes requirements for calibration of all the measuring equipment used for monitoring the project activity variables. The main and check meters will be calibrated once a year, as per TNEB practice, as meter is owned by TNEB. The monitoring frequency for EGy matches with that of the methodology, viz. hourly measurement and monthly recording. The cross checking is provided through the use of the sales receipts. Project participant has included a few other variables in the monitoring plan (total electricity imported, total electricity exported and electricity generated by each WTG) to account for the uncertainty where the dates of the recorded data may not coincide with the verification period. The PD also describes additional procedures to deal with data uncertainty, to address the failure of measuring and monitoring equipment etc. The validation team therefore agrees that the project activity meets all the applicability conditions and all other stipulations of the selected approved methodology AMS I.D.

The validation team physically verified the metering system installed at the WTG and at the substation of the project activity. The validation team confirmed that the description in the revised PD version 01 represents the metering system available at the project activity sites.

The generated electricity data will be directly used for calculation of baseline emissions after cross checking with the electronic records maintained by Vestas in the CMS (Central Monitoring Station) in electronic format. $EFgrid_{,CM,y}$ is fixed on ex-ante basis for the first renewable crediting period which is in line with the Emission Factor tool as required by the methodology.

PP has provided for the electronic archiving of all the monitored data and its availability 2 years after the end of the last crediting period. The validation team therefore concludes that the monitoring plan adequately describes the collection and archiving of the data used for the calculation of the baseline emission.

The Project Description describes the responsibility and authority for registration, monitoring, measurement, reporting and archiving in Section 3.4 of the PD.

One CAR (CAR 5) and a CL (CL 3) were raised based on monitoring practices followed for calculation of energy supplied (EGy) to the grid, accuracy class and the billing procedure. The issues have been adequately addressed, resolved and closed as reflected in revised PD version 01. The resolution of each CAR and CL is represented in Appendix II: Resolution of Corrective Action and Clarification Requests.

3.4 Calculation of GHG Emissions

The GHG source for calculation of the baseline has been chosen as CO_2 and no other sinks or reservoirs for either the baseline or the project activity have been identified. As per AMS I.D., the baseline emission sources considered are CO_2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity. As required under AMS I.D., project participant has calculated the baseline emissions by multiplication of the electricity supplied by the project activity and the grid emission factor.

As described in AMS I.D., the project emissions are to be considered as zero. Project participant has however, indirectly accounted for project emissions by subtracting the measured electricity imported from the grid with the electricity exported by the project activity. And leakage is not to be considered, since it is a small scale renewable energy project (i.e., $LE_y = 0$). The validation team assessed the calculations of estimated VCUs as provided by the project participant in the spreadsheet (/21/ of Appendix I) and found that the parameters and values chosen were appropriate, transparent and conservative. The validation team also verified that the formulae used were correctly applied in the spreadsheets and the project emissions had been determined using guidance provided by the approved methodology (AMS I.D

version 15) and tool to calculate the emission factor for an electricity system (version 02). All assumptions and data used by the project participant are listed in the revised PD, including their references and sources. The values are considered reasonable in the context of the proposed VCS project activity. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the revised PD.

The estimated annual average emission reduction of approximately 7,402 tCO_2e over the crediting period represents a reasonable estimation using the assumptions given by the project. All the assumptions for this estimate either come from the assumptions used for investment analysis or grid emission factor as taken from CEA (Central Electricity Authority) website (/13.1/ of Appendix 1). The validation team confirms that the estimates of baseline emissions can be replicated using the information provided and the formulas are correctly applied and the calculations done in a transparent way.

A CL (CL 4) was raised on the issue of transparency of the GHG calculations used in the PD based on review of the emission reduction calculation sheet (/21/ of Appendix 1). The issue has been adequately addressed, resolved and closed as reflected in the revised PD version 01. The resolution of the relevant CL is represented in Appendix II: Resolution of Corrective Action and Clarification Requests.

The only identified parameter contributing to uncertainty of GHG calculations is the PLF. For calculation of VCU's, PLF of 27.46% has been assumed, which is as per the TNERC Order (/15/ of Appendix 1). But for IRR calculation PLF of 39.14% has been taken which is based on proposal submitted by Vestas (/6.1/ of Appendix 1). Hence the value of PLF taken is conservative, and the anticipated emission reductions are also not over estimated.

3.5 Environmental Impact

Based on the Environmental Impact Assessment (EIA) notification S.O. 1533, dated 14th September 2006 issued by Ministry of Environment & Forests (MoEF), Government of India, wind projects are not included in the list of projects that are required to get Prior Environmental Clearance (EC) either from State or Central Government authorities. As the project activity under consideration is a wind power generation project, it does not fall under the purview of EIA notification. However, PP had obtained the required clearance from the authorities as recommended by the procedures followed by the host government (/5/ and /5.1/ of Appendix I).

3.6 Comments by stakeholders

A local stakeholder consultation meeting was conducted on 24th November 2009, at Thandiyarkulam, Tirunelveli (/19.1/ of Appendix 1) in order to identify the concerns of the people regarding the implementation of the project activity.

The stakeholders identified for the project were: the usual occupants of the villages around the project activity and the local communities, and contractors and consultants/advisors, who were assumed to have an interest in the emission reductions project activity. Their views were sought to understand their opinion on the proposed emission reductions project activity. Public notice and personal letters of invitation to the individual stakeholders were given well in advance of the stakeholder consultation meeting, informing about the venue, time and the agenda of the meeting. The information regarding the stakeholders meeting was verified during the on-site visit by interviewing the relevant members who participated and were present at the meeting. The interviewed persons confirmed the information provided in the PD and the documents / record of the local stakeholder consultation process.

National Enterprises initiative towards emission reductions was appreciated by all eminent entities present there who looked forward to taking up similar GHG emission reduction projects in the near future. Thus, the stakeholders did not identify any negative impact of the project activity and the session ended up with a unanimous decision that National Enterprises should go ahead with the project activity.

4 Validation conclusion

SIRIM QAS Intl. performed a validation of the proposed VCS project "Grid-connected wind electricity generation project in Tamil Nadu, India". The validation was carried out to independently assess whether the project confirms to the qualification criteria and requirements of the Voluntary Carbon Standard (VCS) 2007.1, including the baseline and monitoring methodology applied. The VCS program provides the standard and framework for independent validation based on ISO 14064-2:2006 and ISO14064-3:2006 standards.

The validation was performed using a risk based approach. The review of the project design documentation and the subsequent follow-up interviews provided SIRIM QAS Intl. with sufficient evidence to determine the fulfilment of the stated criteria.

The project participant is National Enterprises. The project applies the approved baseline and monitoring methodology "Grid connected renewable electricity generation", AMS I.D. version 15.

The project activity is a singled VCS project activity by National Enterprises which involves the setting up of two numbers of WTGs of cumulative capacity of 3.3 MW (2 X 1.65 MW).

The project will result in the reduction of greenhouse gas emissions that are real, measurable and give long term benefits to the mitigation of climate change. It is demonstrated that the project faces an investment barrier that would prevent its implementation without the VCU revenue, as the project IRR is lower than the financial benchmark. Emissions reductions from the project

are hence additional to any that would occur in the absence of the project activity.

The GHG emission calculations are documented in a complete and transparent manner. The formulae and methodologies for accounting GHG emissions are appropriate and emission factors are deemed to be of sufficient accuracy. The total emission reductions from the project if implemented as envisaged in the PD version 01 dated 24th March 2010 are 74,020 tCO2e over the 10-year crediting period. The emission reductions forecast has been checked and it is deemed likely that the stated amount is achievable on the basis that the underlying assumptions do not change.

The monitoring plan is line with the approved monitoring methodology of AMS I.D. version 15. The plan adequately addresses all necessary information for monitoring and reporting of emissions reductions due to the project activity. Responsibilities and authorities for project management, monitoring and reporting, and the data quality control and quality assurance procedures have been described in the PD.

There is no requirement for an EIA by the host country. The project is not likely to create any significant adverse environmental impacts. The project complies with all environmental regulations of India.

In summary, it is SIRIM QAS Intl.'s opinion that the "Grid connected renewable electricity generation", as described in the PD version 01 dated 24th March 2010, meets all relevant VCS 2007.1 requirements, is eligible as category I of the Small scale renewable energy generation project type and correctly applies the baseline and monitoring methodology specified in AMS I.D. version 15.

As such, SIRIM QAS Intl. recommends the registration of the project as a VCS project activity.

Prepared by :	Approved by :
	
(Dr. D. Siddaramu) Validation Team Leader	(Parama Iswara Subramaniam) Authorised Representative

Appendix I

References

Ref. No.	Document or Type of Information
/1/	VCS Project Description (PD) Version 00 dated 3rd March 2010.
/2/	VCS Project Description (PD) Version 01 dated 24th March 2010.
/3/	VCS 2007.1 Standard, Program guidelines, Registration and Issuance guidance document dated 18/11/2008.
/4/	CDM approved consolidated baseline methodology AMS ID Version 15
/5/	TNEB permission letter dated 5032008 for Survey number 814
/5.1/	TNEB permission letter dated 5032008 for Survey number 699
/6/	NE VCS DPR dated 04/01/2008.
/6.1/	NE VCS proposal from Vestas and Technical specification of the Wind Turbines Generator
/7/	Commissioning certificate from TNEB for 2 WTGs 19/04/2008.
/8/	Supply Agreement dated 07/01/2008
/9/	PPA of 2570, SF No.699 dated 30/03/2008.
/9.1/	PPA of 2595, SF No.814
/10/	Undertaking from National enterprises dated 03/03/2010 that no other form of environmental credits is generated from project and there is no transfer of any equipment.
/11/	IRR calculation sheet
/12/	National Enterprises Benchmark Analysis CAPM
/13/	Central Electricity Authority: CO_2 Baseline Database for the Indian Power Sector. Version 05
/13.1/	www.cea.nic.in
/14/	Tool to calculate the emission factor for an electricity system (Version 1.1)
/14.1/	Guidance on the Assessment of Investment Analysis
/15/	TNERC Tariff order-15-5-2006-RE for PLF
/15.1/	TNERC AMENDED ORDER 18-5-2006 for PLF
/16/	O & M Agreement dated 11012008
/17/	NE Land Docs dated 19/02/2008
/17.1/	NE Land Docs1 dated 19/02/2008
/18/	Insurance dated 29/04/2009
/19/	Invitation letters to the individual stakeholders, 02/11/2009
/19.1/	Minutes of Stakeholders-National Enterprise
/19.2/	Attendance Sheet1-national enterprise
/19.3/	Attendance Sheet2-national enterprise
/20/	NE VCS Invoices from June 2008 to March 2009
/20.1/	NE VCS Invoices from April 2009 to January 2010
/21/	Emission Reduction calculation sheet
/22/	TNERC guidelines for Book depreciation

Appendix II: Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to Section of the PD	Summary of project owner response	Validation team conclusion
CAR 1 The project location (geographic information represented pictorially) given in the PD does not match with actual on-site description and representation at district level (Radhapuram).	**Section 1.5**	The relevant map showing the site location within the Tirunelvelli district has been updated in the section 1.5 of the revised PD version 01.	The project location including the pictorial representation in the revised PD version 01 accurately describes the actual on-site location. Conclusion CAR CLOSED
CAR 2 The Clearances / NOC are not provided for the SF no.699 WTG and it also not mentioned in section 1.10 of the PD.	**Section 1.10**	The relevant Clearances/NoC has been provided to the validator and desired information has been updated in the section 1.10 of the revised PD version 01.	The Clearances / NOC of SF no.699 has now been mentioned in the relevant section of the revised PD version 01 and the same have been provided now. Conclusion CAR CLOSED
CAR 3	**Section 2.4**	The relevant details have been updated in the section 2.4 of the	The section 2.4 of the revised PD (version 01)

Draft report clarifications and corrective action requests by validation team	Ref. to Section of the PD	Summary of project owner response	Validation team conclusion
The description of how the baseline has been identified and arrived has not been provided in the section 2.4 of the PD.		revised PD version 01.	has now been modified, with a clear description on baseline identification and describes the identified baseline scenario. Conclusion CAR CLOSED

CAR 4 The process and details of stakeholder consultations is not clear from the PD.	**Section 6**	The relevant details have been updated in the section 6 of the revised PD version 01.	The details of stakeholder consultations process is now clear from the revised PD version 01. Conclusion CAR CLOSED

CAR 5 The total electricity generation calculation (JMR billing) described in the PD do not reflect actual practices adopted at the site.	**Section 3.4**	Relevant changes have been incorporated in the section 3.4 of the revised PD version 01.	The relevant section of the PD version 01 has been revised and JMR billing procedure now reflects the actual on-site practices. Conclusion

Draft report clarifications and corrective action requests by validation team	Ref. to Section of the PD	Summary of project owner response	Validation team conclusion
			CAR CLOSED

CAR 6 The Schedule section of the PD is not as per the VCS Project Description Template.	**Section 7**	The relevant details have been updated in the section 7 of the revised PD version 01.	The relevant section of the revised PD version 01 has now been modified to include Chronological plan for the date of initiating project activities. Conclusion CAR CLOSED

CL 1 The commissioning date of WTG at HTSC No: 2595 is 31/3/2008 and for the WTG at HTSC No: 2570 is 30/3/2008, as per the commissioning certificates provided by the PP. While in the PD the commissioning date of both the WTG's is mentioned as 30/3/2008. Kindly clarify.	**Section 1.4 and Section 1.10**	The relevant changes have been made in section 1.4 and 1.10 of the revised PD version 01.	The relevant section of the PD version 01 has been revised and the commissioning dates of both the WTGs have now been included. Conclusion CL CLOSED

CL 2 Please Clarify;	**Section 2.5**		

Draft report clarifications and corrective action requests by validation team	Ref. to Section of the PD	Summary of project owner response	Validation team conclusion
1. COST OF THE PROJECT: Project cost as per TNERC – is 4.00 Cr INR per MW. This is taken as Rs.6.63 cr. INR per MW. This is stated to be as per the POs which are also not attached for verification. **2. PLF:** Has been assumed as per the TNERC Order @ 27.46%. But the applicable PLF has to be in line with para 3 of EB 48, annex 11 guidelines. **3. O & M CHARGES:** It is observed that O & M charges escalation @ 7.50% has been applied. As per TNERC guidelines, O & M charges escalation are prescribed @ 5%. This was not in vogue at the time of investment decision. A provision for annual escalation has been given in assumptions sheet pl. explain. As per the guidance to investment analysis, all the parameters should correspond to the date of investment decision and		1. The Total Project Cost has been considered as 21.9 Crores INR as per the proposal (Offer letter) provided by Vestas. The proposal from Vestas has been submitted to the validator for verification. 2. The PLF has been calculated and considered as per the Vestas proposal is 39.14% and which is on a conservative side and in line with the guidelines of EB 48. 3. The escalation for O&M charges has been considered @7.50% as per the proposal (Offer letter) from Vestas. The inputs obtained from the proposal from Vestas have been taken as the basis for calculation of financial feasibility of the project activity and which became the major force for investing in the project activity. And the same is in line with the guidelines to investment analysis.	1. The total project cost considered has been taken by proposal (Offer letter) provided by Vestas and the same has been submitted now. 2. The assumed PLF of 39.14% for the project activity is in line with para 3 of EB 48, annex 11 guidelines. 3. The O & M charges taken @7.50% as per the proposal from Vestas is in line with the guidelines to investment analysis (EB 51 annex 58).

Draft report clarifications and corrective action requests by validation team	Ref. to Section of the PD	Summary of project owner response	Validation team conclusion
not any subsequent date. **4. INCOME TAX:** It is observed that Education Cess @ 2% has been applied. This was not in vogue at the time of investment decision. **5. URLs / OTHER AUTHENTIC EVIDENCES:** Pl. furnish the relevant authentic URLs / evidences for the following assumed data: a. Service Tax– 12.36% **6. TAX SHIELD:** The Tax shield available to the company out of the accelerated depreciation available has not been reckoned. **7. EVIDENCE FOR DATE OF THE INVESTMENT DECISION:** Please furnish the relevant evidence		4. Income tax considered is 33.99%. Please find below the web link for the same : http://ezinearticles.com/?Direct-Tax-Rates-in-India-for-AY-2008--2009&id=906600 5. Please find below the relevant URL: http://www.btassociate.com/pdf/Budget%202007%20-%20Executive%20Summary.pdf 6. The relevant changes have been made in the section 2.5 of the revised PD version 01. 7. The relevant document will be submitted to the validator. Supply agreement is the evidence document which has been submitted	4. As per the web link provided by the PP, income tax considered is 33.99% for the project activity is acceptable. 5. The relevant URL / evidence for the assumed Service Tax of 12.36% is acceptable. 6. The changes have now been made in the relevant section of the revised PD version 01. 7. The Supply agreement dated 07/01/2008 has been submitted for validation and forms the

Draft report clarifications and corrective action requests by validation team	Ref. to Section of the PD	Summary of project owner response	Validation team conclusion
to vouch the exact date of investment decision.			basis for evidence for the date of the investment decision.
8. The PP has not performed a detailed sensitivity analysis. As per CDM Investment guidance the additionality conclusion has to be drawn from the results of the sensitivity analysis. PP is also required to demonstrate/explain how the sensitivity analysis provided meets the requirement of paragraph 16 of the EB's latest investment guidance.		8. Sensitivity Analysis have been carried out for three parameters i.e. variation in the project cost, variation in tariff rate and variation in PLF. Hence the same meets the requirement of the validator as per the CDM EB's latest investment guidelines.	8. Sensitivity Analysis have been carried out for three parameters i.e. variation in the project cost, variation in tariff rate and variation in PLF in the revised PD version 01 which are affecting the project revenue / expenses more than 20% which is in line with the CDM EB's latest investment guidelines.
9. How the source of all input values used in the financial analysis meet the requirement of paragraph 6 of EB's latest guidance on investment analysis.		9. Source of all input values for financial analysis have been considered on the basis of Proposal from Vestas and other publically available document which was available before the investment decision, hence the same meet the requirement of the EB's latest guidance on investment analysis.	9. The source of all the input values used in the revised financial analysis are based on the Proposal (offer letter) from Vestas which was available to the PP prior to the date of investment which is in line with the paragraph 6 of the EB 51 guidance on investment analysis.

Draft report clarifications and corrective action requests by validation team	Ref. to Section of the PD	Summary of project owner response	Validation team conclusion
			Conclusion CL closed
CL 3 The accuracy class of both the main and check meters installed is mentioned as 0.2 class in the PD. It was observed from the site visit that the meters used at the site are of 0.5 accuracy class. Clarify	**Section 3.2**	Relevant changes have been incorporated in the section 3.2 of the revised PD version 01.	The accuracy class of the meters described in the PD are now in line with the actual technical specifications of the meters installed on-site in the revised PD version 01. Conclusion CL CLOSED
CL 4 The annual emission reduction figures indicated in PD (7402tCO_2) and in Excel sheet IRR calculations (7372tCO_2) are not consistent. Clarify.	**Section 1.6**	The annual emission reduction figures indicated in PD (7402 tCO_2e) have been calculated ex-ante and accordingly modified in the CER calculation sheet.	The relevant section of the revised PD version 01 has been modified accordingly and revised CER calculation sheet has been provided now. Conclusion CL CLOSED

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