Voluntary Carbon Standard 2007.1

VALIDATION REPORT

BUNDLED WIND POWER PROJECT

M/s Salora International Limited

6.25 MW Wind Power Generation project of Salora International Limited

Project No/ Rev. No.: V-3-I-01-S-0026/ 01

VCS VALIDATION REPORT

Name of Validation company:	Date of issue:
Perry Johnson Registrars CDM Inc.	2009-11-15
Report Title:	**Approved by:**
VCS Validation Report for "6.25 MW Wind Power Generation project of Salora International Limited".	S. V. Jamble
Client(s):	**Project Title:**
Salora International Limited	PD - 6.25 MW Wind Power Generation project of Salora International Limited, *India* Version : 02 Date : 2009-08-31

Summary:

Salora International Limited has commissioned Perry Johnson Registrars Clean Development Mechanism Inc. (PJRCDM) to perform validation of their bundled project – 6.25 MW Wind Power Generation project of Salora International Limited, *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 5 No's of wind turbine generators (WTGs) of 6.25 MW capacity in Dhule district of Maharashtra state, India. The machines were commissioned during the year 2006 and the power generated is exported to the Northern Eastern Western North Eastern (NEWNE) grid regional grid of India.

The project activity has correctly applied the AMS I D methodology version 13 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 proponents 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 9440 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-S-0026/ 01	26
Work carried out by:	**Work reviewed by**
G.Subramanyam	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
NEWNE	Northern Eastern Western North Eastern (NEWNE) Grid of India
PD	Project Description (VCS)
PJRCDM	Perry Johnson Registrars Clean Development Mechanism Inc.
PLF	Plant Load Factor
PP	Project Proponent
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

The Salora International Limited (hereinafter referred to as the 'client' or 'project proponent') has contracted Perry Johnson Registrars Clean Development Mechanism Inc. (PJRCDM) to perform validation of the bundled project 6.25 MW Wind Power Generation project of Salora International Limited, *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) [01]. 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 [04], the VCS program guidelines[05], and the applied CDM methodology - AMS I D, version 13 [03]. 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 5 No's wind turbine generators (WTGs or machines) totalling 6.25 MW capacity at Maharashtra state of India.[11][14] The power generated from the WTGs is exported to the Maharshtra State Electricity grid, which is inter-connected with the Northern Eastern Western North Eastern (NEWNE) grid network of India. The WTGs are expected to generate 9.882 GWh power with a plant load factor (PLF) of 20% and on accounting for the grid availability and line losses. The commissioning dates, unique identification details of the machines and geographical coordinates of location of the WTGs are as follows[10]. The lifetime of the machines stated is 20 years.

Sl. No.	*WTG No*	*Location*	*Latitude*	*Longitude*	*Date of commissioning*
1	*J104*	*R.S.No.59 & R.S.No.01 Village: Petle , Panhalipada, Isharde;Taluka Sakri; Dist Dhule; Maharashtra*	N21 12 15.0	E74 19 22.9	31/07/2006
2	*J106*		N21 13 25.7	E74 19 06.5	03/08/2006
3	*J107*	*R.S.No.138 , R.S.No.01 & R.S.No.16 ,Village: Petle ;Taluka Sakri; Dist Dhule; Maharashtra*	N21 13 45.1	E74 19 06.8	01/08/2006
4	*J108*		N21 13 16.3	E74 18 59.8	01/08/2006
5	*J109*		N21 14 39.0	E74 18 55.7	01/08/2006

All the WTGs installed under the project activity have been supplied by M/s Suzlon (5 WTGs of the make S70 in Maharashtra of 1.25MW). The proposed project activity is a bundled wind power project with a total installed capacity of 6.25 MW [11] [14]. The net energy generation for the projects in Maharashtra and Tamil Nadu were confirmed by PJR (*Pls see section 3.1 of the report below)*

The lifetime of the machines stated is 20 years. PJR CDM was able to confirm the same against the certificate provided by the manufacturer, Suzlon Energy Ltd **[21]**

1.4 Level of assurance

In line with VCS 2007.1 requirements and as per ISO 14064-3:2006 para A.2.3.2[06], 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 13 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
G Subramanyam	GHG Auditor	Completeness check, desk top review, site visit, issuance and closure of findings, report preparation
Umashankar S.	Validator	Desk top review, 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 31th August 2009.

2.2 Follow-up Interviews

After reviewing the project documents, site visits were conducted on 23rd September 2009 where 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. B.S.Naik, Asst. Manager (CRM) Suzlon Energy Ltd	Project technical details, monitoring system, calibration practice and frequency

During the site visit, PJRCDM verified the actual operation of the project as described in the PD. The system of metering used for monitoring the export to grid and the calibration practice adopted were examined. The monthly records system of energy meter readings was also reviewed.

2.3 Resolution of any material discrepancy

Based on the site inspection and review of documents including the monitoring plan, issues that need to be further elaborated upon, researched or added in order that the project activity meets the VCS 2007.1 requirements and can achieve credible emission reductions is identified, clarified and to be resolved by the project proponent. A Corrective Action Request (CAR) is raised if one of the following occurs:

a. The project 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.

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 6.25 MW at Dhule district of Maharashtra state, India. Details of unique identification and commissioning dates are as provided in section 1.3 of this report. An estimated 9.882 GWh/ year is expected to be sold to the country's Northern Eastern Western North Eastern (NEWNE) grid. Plant Load Factor

stated was 20% and this was found as per the prevailing Maharashtra state renewable energy policy tariff order and hence subsequently resolved.

Version 1 of the PD stated crediting period start date as the commissioning date the machines in the bundle. CL#3 was raised to correct this as per VCS 2007.1 standard. The start date of the project has been stated as the commissioning date of the first WTG, i.e. 31st July 2006.[14] The VCS crediting period for the project is 10 years fixed from 1st August 2006 to 31st July 2016. Operational lifetime of the machines under the project has been defined as 20 years.

In line with the VCS requirements, proof of title of the proponents of the bundle was sought (CAR#4). These were evidenced through ownership documents like purchase orders, commissioning certificates and power purchase agreements (see Appendix-I for document references) and hence resolved.

Version 1 of the PD stated that the project has not applied for another GHG program. To ensure that the environmental credits generated by the project are not double counted under VCS, CL#8 was raised to transparently declare the status. The PP confirmed that they have not applied for any other GHG program, but in future any other Renewable energy credits are enforced in India, they will withdraw from the VCS program, so that there is no double accounting. A declaration letter has also been separately furnished by the project proponent for the avoidance of double counting during the VCS crediting period.

3.2 Baseline and demonstration of additionality

Baseline: The project proponent had applied approved baseline methodology AMS I.D., version 13 which has been approved by the CDM Executive Board. CAR#5 raised to apply latest methodology AMS I.D, version 13 and PD is corrected. The total installed capacity of the bundle is 6.25 MW which is less than the 15 MW limit for type I small scale project activities. The application of baseline methodology is justified as follows:

- The project generates electricity using the renewable source i.e. wind energy.
- The total installed capacity of the project is less than 15 MW. The installed capacity has been verified from the commissioning certificates and power purchase agreements of the proponents.[11]
- The grid boundary selected for the project activity is the NEWNE regional grid of India to which the project exports generated power. The selection is appropriate for a large country like India and is in line with CDM guidelines and the Tool to calculate the emission factor for an electricity system (Version 1.1) [08].The project proponents have 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 13 [09], 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 of the NEWNE grid as 0.906 tCO_2/ MWh in line with the 'Tool to calculate the emission factor for an electricity system' (Version 1.1).[08]

Additionality: Since the project activity applies the SSC methodology, AMS I.D, the project proponent used the "*Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities*" for the assessment and demonstration of additionality [09]. The project proponent has carried out financial analysis in order to demonstrate that the additionality for the project activity

Approach selected:

Since the project activity generates revenue without sale of carbon credits and the alternative to the project does not involve investments, a benchmark analysis was selected to demonstrate the financial unattractiveness of the project compared to the benchmark.

Financial indicator: Post tax project IRR has been selected as the financial indicator.

Benchmark: The project activity has used the prime lending rate (PLR) of 10.25% as the benchmark for the project activity as applicable at the start ate of the project activity. This benchmark has been deemed conservative given that most of the banks in India lend at interest rates equal to or higher than the PLR.

Input values used for the financial analysis:

Assessment period: The assessment period for the financial calculation of IRR has been considered at 20 years (lifetime of project activity) and is reasonable.

Salvage value: A salvage value of 10% of initial equipment cost in addition to the total land cost has been also considered for financial analysis at the end of the lifetime of project activity. This is deemed conservative.

Tariff: The tariff and the yearly escalation of INR 3.50 and INR 0.15 respectively is in line with the MERC tariff order [18], for the 7 WTGs installed in Maharashtra. PJR CDM has further confirmed against the power purchase agreement signed between the PP and the MSEDCL [13]. However, respective PPAs also states that this tariff and annual escalation for the first 13 years of operation of the WTG and beyond that, the tariff will be based on the commission rulings. Hence, there is uncertainty in the tariff after 13th year of operation. To be conservative, the individual project promoters considered escalated tariff i.e. equivalent to the tariff in 13th year of operation, for the remaining lifetime of the equipment. In PJRCDM's opinion, the project proponent's selection is conservative.

The operation and maintenance cost (O&M) and yearly escalation, Plant load factor, line losses have been sourced from the purchase order. PJR CDM was able to confirm the total equipment cost against the orders placed with M/s Suzlon Energy Ltd., and M/s Suzlon Infrastructure Ltd. for the supply and erection of the WTGs and other equipment [11, 12].

Other parameters like depreciation, income tax, Minimum alternate Tax (MAT) have been considered taking into account the laws prevalent at the time of investment decision like the Income tax rules in India.

Plant load factor (PLF): For the WTGs installed in the state of Maharashtra, PLF has been sourced from purchase orders for the period of guaranteed generations, and from the tariff orders issued by Maharashtra State Electricity Regulatory Commission

(MERC) tariff Order dated 24 November 2003 [18]. The project promoter's selection is deemed reasonable in PJRCDM's opinion. The guaranteed figure by technology supplier is a very idealistic figure and is on 100% grid availability (which is never the case in practical). Hence, considering the same PLF for the entire lifetime of the project would not present the practical financial statistics. The PLF declared by MERC in its tariff order is more realistic as it is based on the study conducted by Maharashtra State Electricity Board (MSEB) and other relevant stakeholders for different type of actually operating WTGs at different locations in the state of Maharashtra.

The calculations were provided in the spreadsheet and verified to be correct. The table below presents the assumptions taken for arriving at project IRR.

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

Input Parameter	Value Applied	Source of information verified from
Accelerated Depreciation under IT Act	80%	Written Down Value (WDV) basis - Under Income Tax Act 1961
Plant Load Factor	20%	Based on Maharashtra Electricity Regulatory Commission –Wind Tariff Order dated 24/11/2003[18]
Regular Income Tax (with surcharge)	33.66%	Under Income Tax Act 1961
Sale of power	Rs. 3.50 per kWh with escalation of Rs. 0.15/ KWh every year	MSERC's tariff policy /Power Purchase Agreement[13]
Capital Cost for WTGs	As per actuals	Cross-checked with purchase orders (see Appendix-1 for details) Cost/ MW works out at INR 49.44 Million/ MW, and is based on actuals.[11]

The prime lending rate data of 10.25% for 2006-07 was checked with the Reserve Bank of India circulars for the years and found acceptable. These have been used as benchmark at the time of investment.

The results of the project IRR computation and applicable benchmark was found to be 7.44%, against the benchmark 10.25% RBI PLR.

The tariff is fixed based on state regulatory commission orders and the capital cost is based on actual purchase orders, therefore the only major variable influencing IRR is identified as the plant load factor.

Sensitivity analysis: To further demonstrate the robustness of the financial analysis, the project developer has also carried out the sensitivity analysis. Project developer has justified the following key indicators for carrying out the sensitivity analysis:

Sensitivity analysis for 10% higher PLF shows that the IRR touches 14.28% and cross the benchmark. But the actual PLF achieved is only 12.37% for the project activity. This was verified against the historical monthly generation records for the machines

and found reasonable. With the assumed 20% PLF itself the IRR is only 7.44%, and there is no question of PLF going 10% higher than the assumed PLF. With the actual PLF the IRR will be only 0.95%. The supplementary check was carried out as per the provision in para 17 of the CDM 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". It is thus concluded that the additionality of the project is adequately demonstrated and project is not the baseline scenario.

Furthermore, PJR CDM was able to confirm the same against the PLF for the project activity using the actual generation data between August 2006 to March 2009 presented by the project proponent. The same has been presented in the table below.

Generation in J-104 (kWh)	4310764
Generation in J-106 (kWh)	2709088
Generation in J-107 (kWh)	3018110
Generation in J-108 (kWh)	3091569
Generation in J-109 (kWh)	4930990
Total generation (kWh)	**18060521**
Generation as per capacity of J-104 (kWh)	29190000
Generation as per capacity of J-106 (kWh)	29190000
Generation as per capacity of J-107 (kWh)	29190000
Generation as per capacity of J-108 (kWh)	29190000
Generation as per capacity of J-109 (kWh)	29190000
Total generation as per capacity (kWh)	**145950000**
PLF	**12.37%**

From the analysis presented above, it is clear that the actual PLF is attained is less than the assumptions of 20% used for the IRR calculation. In view of the evidences and justification presented by the PP, PJR CDM is of the opinion that it is highly unlikely that the PLF for each of these WTGs would be the increase to touch the benchmark through the operational lifetime of the project activity, making the same financially attractive.

Tariff: It needs to be brought out that an increment in the tariff rate for electricity sale to the respective State Electricity Board (SEBs) is not a plausible option in view of the fact that the same is governed by the Maharashtra Electricity Regulatory Commission's (MERC) Wind Tariff Order dated 24th November, 2003 [18]. The PP has however, carried out a sensitivity analysis on the tariff and the results of the same are presented below:

Description	***Project IRR Without VER Revenue (Post Tax)***
Base Case	**7.44%**
Increase in Tariff by 10%	7.64%

In Maharashtra tariff considered is INR 3.50/kWh with an annual escalation of INR 0.15/kWh would be considered for the first 13 years of WTG operation and then revised as per the 'cost plus' approach resulting in values that would be lesser than the above mentioned value, as per the said Order. Furthermore, the PPA signed by the project proponent with the MSEDCL is also in the same lines. Hence, it is reasonable to assume that it is highly unlikely for the project proponent to realise tariffs upto INR 3.61 and INR 3.53 through the project lifetime so as to touch the benchmark of 10.5%.

Operation and Maintenance cost: Sensitivity analysis is carried out for O & M cost also, but it does not contribute to more than 20% of the revenue or the cost. Even with 10% decrease in O & M cost, the IRR will not cross the benchmark.

Investment cost: Since the investment cost used for the IRR analysis has been sourced from the purchase orders placed by the project proponents with the equipment supplier, it is highly unlikely that the same can be subject to change.

The above analysis clearly demonstrates that the project activity does not represent a financially attractive venture to the promoters. In conclusion, the assessment of the arguments presented above is deemed to sufficiently demonstrate that the project is not a likely alternative, and that emission reductions resulting from the project are additional

3.3 Monitoring Plan

The project proponents have applied simplified approved methodology AMS-I.D., version 13 – Grid connected renewable electricity generation, which has been approved under the CDM programme. The applicability of the same has been justified as already discussed under section 3.2 of the validation report.

The monitoring plan consists of monitoring the energy generated by the project activity as measured by the installed energy meters at the sub-station. These energy meters (main meter and check meter) used for monitoring are electronic tri-vector meters, which measure both the amount of electricity imported from and exported to the grid continuously. This data is measured monthly in the presence of third party, State Electricity Board officials as a Joint Meter Reading (JMR) exercise.

Since the WTGs under the project are connected to the same feeder as other non-VCS projects, the energy generation of each WTG is arrived at based on the agreed procedures followed by MSEDCL. The procedure takes into account apportioning of the total energy generated by each WTG connected to the feeder and the equivalent line losses of each WTG. Based on this calculation, the final invoices are raised by the MSEDCL. Hence for the emission reduction calculation purposes the net energy generation is sourced from the invoices. However, the total energy generated and imports of each WTG, as well are monitored as a part of the monitoring plan. The data is consolidated annually and emission reductions calculated based on these net generating figures.

The responsibility of measuring parameters rests with the operations and maintenance (O&M) contractor, who is also the technology provider. The data is archived electronically and the retention time for keeping of records is defined in the PD as two years in addition to the crediting period.

The calibration of the energy meters at the sub-station shall be carried out annually by the MSEDCL. The meters are of 0.2 accuracy class. The controller meters installed on the individual WTGs are micro-processor based controllers and are reliable. It uses a Woodward Multi function Relay that have three current inputs from CT and three direct voltage inputs (690 Volts). The analog values of current / voltage are converted into digital signal internally using A/D Converters at very high sampling rate. Furthermore, PJR CDM was also able to verify against the letter provider by the equipment supplier that the data provided is accurate and reliable [23]. Given that the final emission reductions are based on the 3rd party data, sourced from the break up sheets and given that it is based on this data that the grid company makes payment to the individual proponents, PJR CDM is of the opinion, it is reasonable to assume that the same will be conservative. Further the Operations & Maintenance contractor responsible for measurement of parameters carries out internal audits which were verified.

The grid emission factor has been determined and fixed ex-ante.

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.[19] PJRCDM confirms that grid emission factor 0.907 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 13.

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 9.882 GWh/ year. The GHG emission reduction accruable from the project activity has therefore been estimated as 9440 tCO_2 equivalent per year.

3.5 Environmental Impact

The project activity is a renewable energy project with a cumulative capacity of 6.25 MW, with the WTGs being implemented in the Dulhe district in Maharashtra. Projects of such category and scale do not warrant any environmental impact assessment to be carried out as per the current law of India. However, PJR CDM was able to verify the projects compliance with the local laws and regulations.

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#2 was raised for providing complete details with evidences of the stakeholder meeting. Stakeholders' meetings were organized by the project proponents at Suzlon site offices in Dhule, India on 10 June 2009 at Dhule, along with other wind bundles. The identified stakeholders were the local villagers, representatives of the project proponents and the employees of O&M contractors. The relevant stakeholders were invited for the meeting through public notices and advertisements in the local newspapers. PJR CDM was able to verify the invitation letters and the notices inviting the relevant stakeholders for inviting their comments [17]. Furthermore, the minutes of the meeting were also submitted to PJR. The details of the stakeholder meeting have been included in version 2 PD. The information provided was cross checked with the evidences (see Appendix-I for details) and found in order.[17]

No negative comments have been received for the project activity.

4 VALIDATION CONCLUSION

PJRCDM Inc. has performed the validation of 6.25 MW Wind Power Generation project of Salora International Limited, 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 6.25 MW to the grid, thereby displacing grid power. The VCS approved CDM baseline and monitoring methodology AMS I D, version 13 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 9440 tonnes of CO_2 equivalent per year over the 10 year crediting period starting from 1st August 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 02 of the VCS PD 6.25 MW Bundled Wind Power Project in Maharashtra, India dated 31st August 2009 meets the VCS 2007.1 requirements and correctly applies the baseline and monitoring methodology AMS-I.D, version 13.

Project Manager
PJRCDM

Site Program Manager
PJRCDM

APPENDIX I: DOCUMENTS REVIEWED

Sl. No.	***Document reference***
[01]	*VCS PD: "6.25 MW Wind Power Generation project of Salora International Limited", version01, 02 dated 31st August 2009*
[02]	Financial and benchmark evaluation worksheets
[03]	AMS-I.D., Version 13, "Grid connected renewable energy generation", EB 48.
[04]	Voluntary Carbon Standard, Voluntary Carbon Standard 2007.1, 18th November 2008
[05]	Voluntary Carbon Standard, Voluntary Carbon Standard Program Guidelines, 18th November 2008
[06]	ISO 14064 part I, II and III : 2006
[07]	Indicative Simplified Baseline and Monitoring Methodologies for selected Small-Scale CDM Project Activity Categories, Annex 20 to EB 41
[08]	Version 01.1 of "Tool to calculate the emission factor for an electricity system"
[09]	Attachment A to Appendix B, tool for demonstration of additionality for small scale projects, Version 06, 30th September 2005
[10]	Approval/clearance from Maharashtra Energy Development Agency on 4th August 2006 for 5 WTGs commissioning of the project activity.
[11]	Purchase Order placed by Salora International Ltd, with Suzlon Energy Ltd. on 25th March 2006 for 5 WTGs
[12]	Work Order for Civil & electrical work, and the Erection, Installation & Commissioning between M/s Suzlon Energy Ltd. on 25th March 2006 for 5WTGs
[13]	Power Purchase Agreement between Kandhari Beverages Pvt. Ltd., and MSEDCL on the 21st August 2008 for 5 nos of WTGs
[14]	Commissioning Certificates of the WTGs ▪ Location No. J104, J105, J106, J107, J108, J109 on 4th August 2006
[15]	Contract with Validator, PJR CDM signed by M/s Salora International Ltd.., dated 15th November 2008
[16]	Land sale deed between M/s Sarjan Realities Ltd.., and M/s Salora Internation Ltd., dated on 16th December 2005.
[17]	Minutes of Stakeholders meeting held on 10th June 2009 at Suzlon Site Office, Dhule district of Maharastra with appended minutes of meeting.
[18]	MERC Order dated 24th November 2003

[19]	Version 04 of the CO_2 database by the official website of Central Electricity Authority (CEA), Ministry of Power, Government of India. (www.cea.com)
[20]	Reserve Bank of India Annual Report http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/72286.pdf
[21]	MEDA website for actual generation data for region wise data for individual developers in the state of Maharashtra. http://www.mahaurja.com/Download/WindGenerationInfo.xls

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
CL 1 The project size, micro/major to be included	1.3	Description of the choice of the project category have been added **in 1.3**	OK. PD corrected and ***This CL is closed***
CL 2 The PDD states in section 1.4 and 1.5 that the project activity produces electrical power using two Wind Turbine Generators (WTGs), each with a rated capacity of 6.25 MW. Pls clarify and revise the PDD accordingly.	1.4,1.5	Corrected in PDD.	OK. This has been corrected in the PD. ***This CL is closed.***
CL 3 The PP is required to state clearly in the PD in section 1.6 the exact start date of the project activity and the start date of the crediting period	1.6	Corrected in PDD.	OK. The start date of the project activity is now defined to be the earliest date of commissioning of the WTGs. **This CL is closed**.
CL 4 The PD states that the project has not created any form of environmental credits. PJR CDM	1.13	The renewable energy credits which are contemplated will only address the energy component and not the GHG emission	The VCS standard does not allow for availing environmental credits and the ER under VCS scheme as well. Hence,

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requests PP to justify this statement keeping in view the MERC RPS order dated 16 August 2006. Please confirm in the PD how this would be addressed in the event of RECs trading mechanism is enforced in the country during the crediting period		reductions due to the project activity; hence there will be no double accounting of emission reduction credits. Revised	the same remains to be addressed. *Pls respond to the CL clearly in the PD.* *PD corrected and* ***This CL is closed***
CL 5 Proof of O& M of the all WTG's by M/s SEL to be provided	1.15	Copy of the O&M agreement with M/s SEL , attached.	The O&M agreements have been submitted and verified by PJR. ***This CL is closed.***
CL 6 The PP is required to include in section 1.16 of the PD, relevant information in line with the PD template including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information	1.16	In the 1.4 section description added. Added in the section 1.16 also	Pls review the same again. The same is to be filled in section 1.16. *The 1.16 is revised and* ***This CL is closed***
CL 7 Proof for Power Purchase Agreement (PPA) for thirteen years and copies of purchase orders of individual WTG's. Further relevant permissions from government agencies such as MEDA and	3.4,1.10, 8.1	Copy of PPA, PO of WTG and MEDA clearance attached. MEDA clearance certificate attached.	All the approvals and Pos have been verified. The MEDA clearance however needs to be provided ***MEDA clearance is OK and This CL***

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
land registration details also to be provided.			***is closed***
CL 8 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	There will be no claim for emission reductions credits , as the project is not registered with any other GHG program in the future till date .The project has not applied for the registration under any GHG program other than VCS 2007.1	The PP needs to confirm, if these WTGs form a part of any CDM project, which might be under validation… Not clear. *PD is revised and confirmed not applied to any other carbon credits.* ***This CL is closed.***
CAR 1 1. Since the project activity applies a CDM approved small scale methodology AMS ID, the PP is required to only apply the additionality tools as recommended in the "Attachment A to appendix B of the simplified Modalities & Procedures for small scale CDM project activity". Pls correct the same. 2. Pg 11 of the PD, states that the project	2.5	1.added Revied 1. Correted. 3. Attached.	1. The PP has now corrected the tools for proving the additionality of the project. However, pg 12 of the PD, still says, the project applies the project test as per VCS and has also applied the regulatory surplus part of the project test. Pls revise the same. 2. OK. This has been corrected.

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
activity applies the comparison analysis, while a benchmark analysis has been applied. Pls correct the same in the PD 3. Proof for all assumptions considered for IRR calculation needs to be furnished. 4. The CUF/PLF mentioned in the table VIII is 24.66%. The actual PLF calculated is 12.37% as per table XII- c. Evidence for basis of Plant Load Factor (PLF) considered to be provided.		4.Offer from the M/s SEL (equipment supplier Quotation)	3. The CLs as identified in CAR 1 contd below, are required to be clarified 4. The PLF for the estimation of IRR has been sourced from the supplier data, considering the effects of 95% grid availability and 5% line losses. This is thus deemed conservative. ***This CAR is closed*** 1. Section 2.2.2 of Maharashtra Electricity Regulatory Commission –Wind Tariff Order dated 24/11/2003. http://www.mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf
CAR 1 contd: a. Document number 2, shows that the			a)Revised as per O & M agreement B)

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
O&M is free for 2 years and for 3rd year it is 5lac per WTG and 10 lakh per WTG from 4th year on. Pls clarify why different values are considered for the IRR calculation			C) http://www.mahaurja.com/PDF/InformationBookletforWind.pdf
b. The source for the refundable security deposit to be confirmed. (also, if the same is refundable, it should be included as the whole amount at the end of the operational lifetime as inflow)			d) Revised e) revised as per purchase order f) revised in excel sheet
c. Annual maintenance fee of 15000 per/MW to be substantiated.			
d. IDC will not form a part of the total investment cost at the start date of the project activity. It should be included as outflow in the year it was incurred.			

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
e. For the project cost, pls provide the exact amounts and the source of the data. Currently the same is not matching with the amounts and the entire documented evidences provided. f. Financing charges of 3.56 Million INR considered for the cash outflows to be justified.			
CL 9 Suggested to provide proof for 'Operation and Maintenance' by supplier for ten years to operate the WTGs.	3.4	O & M contract agreement copy attached.	Ok. The O&M agreement has been submitted and reviewed by PJR. ***This CL is closed***
CL 10 In line with the monitoring requirements of the VCS2007.1 standard as per ISO 14064-2:2006, more specific information is sought on the roles and responsibilities, the calibration procedure, uncertainty management and the method of archiving the data.	3.2, 3.4	Provided 3.2	Uncertainty and apportioning not addressed. ***This CL is 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 2 a) The details of stakeholder comments, the minutes of meeting and attendance sheet to be provided. Annexure 3 is missing.	6.0	All the supporting documents are attached. New annex is attached.	The documents submitted currently involve stakeholder consultation documentation for a huge bundle of projects, including Salora. Pls provide ONLY the project specific documents. The stake holders meeting was conducted along with other PP's and the stakeholders are common for all bundles, so accetped ***This CL is closed***
CAR 3: The PP is requested to clarify and include the following: 1. As per the guidelines for carrying out the investment analysis, a sensitivity analysis needs to be carried out for all parameters that constitute more than 20% to the total revenue or costs of the project. Hence, justification for exclusion of the key indicators like the		Tariff sensitivity analysis added in excel sheet as well as PD IRR revised.	1. The PP has now considered a sensitivity analysis using investment cost. Justification for exclusion of tariff from the sensitivity analysis has not been justified. Pls address the same. 2. It needs to be confirmed as to what parameters and assumptions have been changed in the new IRR sheet

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
investment cost and tariff from sensitivity analysis needs to be provided. 2. On reducing the O&M cost by a meagre 2%, it is seen that the iRR crosses the benchmark. Justification on why this is not a possibility is to be provided in the PD 3. The PD shows that even on increasing the O&M cost, the IRR seems to be crossing the benchmark of 10.25%. Pls clarify and correct the same accordingly.			presented. 3. The PD has now been revised to address the corrections regarding the sensitivity analysis with the O&M costs. The IRR checked with actual PLF confirmed that the IRR is much less than the benchmark IRR . ***The CL is is closed***
CL 11 a) It needs to be confirmed if the invoices raised by the MSEDCL, is directly taken from the meter reading of the WEG of the project activity or if it is WEG from the		Added	a) It has now been clarified that the invoices rasied by MSEDCL are based on the main meter reading at the sub-station and apportioning method is followed to arrived at the

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 activity and other non-project WEGs are connected to the same feeder and eventually to a sub-station. b) In case, the project WEG is connected to the same feeder as other non-project WEGs, the details of the method used apportioning of electricity generated from each of the WEGs including in the project activity, needs to be included in section 3.4 of the PD. c) More clarity is requested on whether the calibration mentioned in the PD refers to the main meter of the sub-station or of the controller/meter at WTG generator outlet.		Added As per OEM (original equipment manufacturer M/s suzlon) the controller/meter at WTG generator outlet does not required calibration. The calibration mentioned in the PD refers to the main meter at the respective sub-station	same. b) However, the method of apportioning is not discussed in the Annex I to the PD. The same needs to be included. Pls elaborate the same. c) Since the final reading are calculated based on the readings from the WTG generator outlet. Documented evidence for the statement that no calibration is required for these controllers are to be submitted. *It is convinced that the calibratrion of both main meter & check meter are sufficient for ensuring reliability of monitored parameters.* ***This CL is 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 4 **The proof of title/ownership, i.e commissioning report ,** purchase and work orders to be provided	8.1	Copy of Commissioning certificates attached.	The commissioning certificates along with the PPA were reviewed. This is OK. ***This CL is closed.***