



Voluntary Carbon Standard 2007.1

VALIDATION REPORT

Bundled Grid connected 2.9 MW Wind Power Project in India by Kamal Engineering Corporation [Unit of KEC Industries Ltd]

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Version No.: 01.1

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Report Title:	Approved by:
VCS Validation report for “ <i>Bundled Grid connected 2.9 MW Wind Power Project in India by Kamal Engineering Corporation [Unit of KEC Industries Ltd]</i> ”.	S. V Jamble
Client:	Project Title:
Kamal Engineering Corporation.	Bundled Grid connected 2.9 MW Wind Power Project in India by Kamal Engineering Corporation [Unit of KEC Industries Ltd]
Summary:	
Kamal Engineering Corporation has commissioned Perry Johnson Registrars Clean Development Mechanism Inc. (PJRCMD) to perform validation of the project – “Bundled Grid connected 2.9 MW Wind Power Project in India by Kamal Engineering Corporation [Unit of KEC Industries Ltd]” 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 two wind turbine generators (WTGs) of 1.65 MW and 1.25MW capacity at Maharashtra and Tamil Nadu respectively. The power generated from the project activity in Maharashtra is sold to the Northern Eastern Western North Eastern (NEWNE) grid, while the WTG in Tamil Nadu export power to the Southern 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. PJRCMD conducted a physical verification of the WTGs, interviewed representatives of the project proponent and carried out a review of relevant documents. A number of Clarification Requests (CLs) and Corrective Action Requests (CARs) were issued which were subsequently resolved by the project proponent. Total GHG emission reduction achievable by the project activity has been estimated at be 5,016 tonnes of CO₂ equivalent per annum. The difference between the current version 01.1 and version 01 (dated 2009-11-19) of the validation report is related to inclusion of additional information provided regarding the geographical co-ordinates for each WTG in the project activity. Thus no major changes apply to validation report. Based on the documentation verified, it is PJRCMD’s opinion that the emission reductions from the project activity would be real, measurable, additional and permanent.	

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Project No. / Version No.	Number of pages
V-3-I-01-S-0061 /01.1	27
Work carried out by:	Work reviewed by
N Siddhartha	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

Kamal Engineering Corporation, has contracted Perry Johnson Registrars Clean Development Mechanism Inc. (PJRCDM) to perform validation of the project “*Bundled Grid connected 2.9 MW Wind Power Project in India by Kamal Engineering Corporation [Unit of KEC Industries Ltd]*” (hereinafter referred to as the project/project activity) under the Voluntary Carbon Standard (VCS) 2007.1 standard. This report describes the validation work undertaken.

1.1 Objective

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

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

1.2 Scope and Criteria

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

To verify that the project activity meets the requirements of VCS 2007.1 standard including additionality, proof of title and compliance with local laws

To assess whether the baseline and monitoring plan are in conformance with the methodology applied from the VCS approved GHG program.

To certify that the information presented are complete, consistent, transparent and free of omission or material error.

The information in the PD is reviewed against the criteria of VCS 2007.1 standard, the VCS program guidelines, and the applied simplified baseline and monitoring CDM methodology AMS ID version 13. PJRCDM has performed the validation based on a risk based approach focusing mainly on the significant risks to meet the qualification criteria and the ability to generate Voluntary Carbon Units (VCUs).

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

1.3 VCS project Description

The project activity involves installation and operation of wind turbine generators (WTGs or machines) totalling 2.9 MW capacity in the state of Maharashtra and Tamil Nadu in India. The power generated from the WTG (1 x 1.65MW) in Maharashtra is exported to the Maharashtra State Electricity Distribution Company Limited, state electricity grid operator, while the power from the WTG (1 x 1.25MW) Tamil Nadu is exported to the Southern grid in India. Since, August 2006 the grid is operating in synchronised mode with the integrated Northern Eastern Western and North Eastern (NEWNE) grid of India. The WTGs are expected to generate power with a plant load

factor (PLF) of 20%. The unique identification details of the machines including the geographical coordinates are included below:

State	Village	District	Date of commissioning	WTG ID Number	Capacity MW	Geographical Co-ordinates
Tamilnadu	Devarkulam	Tirunelveli	29.03.2005	K-118	1.25	8° 57' 18.3" N 77° 35' 14.9" E
Maharashtra	Brahmanvel	Dhule	08.02.2006	L-12	1.65	21° 09' 57.2" N 74° 12' 28.7" E

The WTG installed in Maharashtra has been supplied by M/s Vestas India Pvt Ltd., while that in Tamil Nadu has been supplied by M/s Suzlon Energy Pvt. Ltd., (of the makes *NM/V-82* in Maharashtra of 1.65 MW and *S-66* in Tamil Nadu of 1.25 MW). The proposed project activity has a total installed capacity of 2.9 MW [11] [14]. The net energy generation for the projects in Maharashtra and Tamil Nadu were confirmed by PJRCMD (Pls see section 3.1 of the report below)

The lifetime of the machines stated is 20 years.

The geographical coordinates are as provided by the technology provider [26].

1.4 Level of assurance

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

This implies that, based on the process and procedures conducted, PJRCMD 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 which PJRCMD has been accredited to carry out both validation and verification activities. For validation, PJRCMD's approach involves broadly three steps:

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

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

Name	Role	Areas covered
Siddhartha N	GHG auditor	Desk review, Draft report and final report preparation.
L V Kuttiappan	GHG auditor	Site visit
G Subramanyam	GHG auditor	Site visit
Santosh Kumar P	Financial expert	Review of financial analysis
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 section 5 of this report.

2.2 Follow-up Interviews

A site visit was conducted by PJRCMD team between August and September 2009 for the WTGs in Tamil Nadu to resolve the issues identified during the desktop review of the documents submitted by the project developer. Similarly a site visit was carried out by Subramanyam, on 12th and 13th August 2009.

Following table provides the list of the personnel interviewed and issues discussed during the site visit:

<i>Name / Designation / Company</i>	<i>Interviewed on</i>
Mr. R.K.S Pillai, Assistant manager, CDM, Suzlon Energy Ltd.	• Project technical details, • Monitoring system, • Calibration practice,

Mr. Ananthanarayanan Sr. project Engineer Suzlon Energy Ltd.	Joint meter readings
Mr. Bharat Naik, Customer Relations Manager Suzlon Energy Ltd	

During the site visit, PJRCDM verified the actual operation of the project as described in the PD. The system of controller energy meters and joint energy meters used for monitoring the sale of electricity sale to grid were examined. The monthly records for joint meter readings were reviewed.

2.3 Resolution of any material discrepancy

Based on the site inspection and review of documents and records 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, discussed and to be resolved by the project proponent. A Corrective Action Request (CAR) is raised if one of the following occurs:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- The VCS 2007.1 standard requirements, including the specific requirements of the methodology applied, have not been met;
- 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.

3 VALIDATION FINDINGS

3.1 Project Design

- a) Project design/Technology used: The project activity includes installation of two WTGs by installed by Kamal Engineering Corporation. The installed capacities of the WTGs are 1.65 MW and 1.25MW in Maharashtra and Tamil Nadu, thus totalling to an installed capacity of 2.90 MW. The energy generated is supplied to Maharashtra State Electricity Board (MSEB) and Tamil Nadu Electricity Board (TNEB) respectively. The net energy generation for the projects is estimated to be 5,460 MWh. The energy generation is estimated based on the PLF of 20% and transmission losses of 4% as suggested by the MERC tariff order [16].

The net energy generation for all the WTGs installed in the state of Tamil Nadu has been arrived at, based on the PLF as suggested by the TNERC order at 25.90% [18].

- b) Project duration, crediting time and project start date:

The project proponent has considered 23rd March 2005, as the project start date, which is the earliest amongst the commissioning dates of the two WTGs considered under the project activity. The selected project start date is in line with the VCS policy guidance (VCS 2007.1) which says “the project start date is identified as the date when the project activity began reducing or removing GHG emission”. PJRCMD verified the commissioning dates of each of the WTG under the project activity from the commissioning certificates issued by the Maharashtra State Electricity Distribution Company Ltd and the Tamil Nadu Electricity Board [14].

The project proponent has opted for a crediting period of 10 years starting from 28 March 2006, which can be renewed twice. The selected crediting period is reasonable keeping in view VCS 2007.1 guidance for such projects.

Operational lifetime of the proposed project has been defined as 20 years.

- c) Ownership:

▪ Proof of title:

The proposed project includes 2 WTGs installed by Kamal Engineering Corporation [Unit of KEC Industries Ltd]. The project developer has been defined as the project participant and hence, owns the emission reductions resulting from the project under consideration. PJRCMD was able to confirm the ownership of the emission reductions against the copies of the purchase order for the wind turbines for Kamal Engineering Corporation. The same has been accepted by PJRCMD.

- d) Double counting and whether the project participated in another emission trading programme:

The proposed bundled project has applied under CDM program, however, is still under validation and the crediting period for the CDM project will start only from the date of registration of the project by UNFCCC Executive Board.

In the event any of these projects are registered under the CDM scheme, it has been clarified that the project proponent (PP) shall claim for the emission reductions only prior to that date of registration under the VCS programme.

Furthermore, the renewable energy credits (RECs) are still in the implementation phase and have not been availed by the project activity in question. In the event that such RECs are made available to the project activity, it has been confirmed by the PP that they would only claim either for the VCU or the RECs. This would further be checked again during the verification period.

e) **Project applicability to the VCS for projects rejected under other GHG programme (if applicable):** The proposed project is under CDM validation, however, is not rejected under the same scheme.

f) **Whether the project is eligible under the VCS:**

- The proposed project is a renewable electricity project. The project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions from electricity generation by fossil fuel power plants connected to the grid. The project is also demonstrated to be additional compared with the business as usual scenario, hence, the project is anticipated to fulfil VCS conditions and qualify for carbon finance.

In addition to above, the project meets the specific criteria set in 5.2.1 of VCS Standard and has contracted a validating entity on 17th November 2008.

3.2 Baseline and demonstration of additionality

Baseline: The project proponents have applied approved baseline methodology AMS-I.D., version 13, which has been approved under the CDM programme. The total installed capacity of the bundle is 2.9 MW which is less than the qualifying limit of 15 MW for type I small scale project activities. The application of baseline methodology is justified:

- The proposed 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 purchase order placed with Suzlon Energy Ltd and Vestas India Pvt. Ltd.
- The grid boundary selected for the project activity is the NEWNE Regional grid of India for the projects in Maharashtra and Southern regional grid for the WTGs in Tamil Nadu, to which the project exports generated power. The selection is appropriate for a large country like India and is in line with CDM guidelines. The project proponents have committed not to increase the capacity or to replace the technology during the crediting period.

Baseline scenario for the proposed project has been identified in line with the baseline methodology. In the absence of project activity, same amount of electricity would have been generated by the regional grid (NEWNE and Southern grid respectively) as per the current grid mix and expected future capacity expansions.

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. 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: Equity IRR has been selected as the financial indicator.

Benchmark: The benchmark for the project activity has been defined as the cost of equity. The PP has used the cost of equity calculated using the Capital Asset Pricing model (CAPM) to arrive at the benchmark for the project activity. The benchmark selected is justified as the same is compared with the equity IRR and hence in the line EB 41 guidelines. The benchmark has been arrived at based on the following assumptions:

The formula applied for Cost of Equity is given by:

$$R_e = R_f + \beta * (\text{Market Return} - R_f)$$

Where,

R_e = Rate of return on equity capital

R_f = Risk- free rate of return

R_m = Market risk premium [estimated as Market return (R_m) – risk free return(R_f)]

β = Beta

Risk Free Return (R_f) and the Market risk premium (R_m):

The risk free rate has been taken from Indian government bond rates available at the project start date. This has been considered at 6.11% in 2004-05 and 7.34% in 2005-06 for the Tamil Nadu project as prevalent at the start date of the project activity. The data on government bond rates is published by Reserve Bank of India. (Web-link: <http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/72295.pdf>) and confirmed by PJRCMD for the project activity.

The market risk premium (R_m) at the start date of the project activity has been estimated based on the BSE 500 index and data between 1978-79 to up to project start and the same has been worked out to be 13.02% for 2004-05 and 10.98% for 2005-06.

Beta (β):

The value of beta (β) is determined by referring beta values of publicly listed companies that are engaged in similar types of business. However, owing to the fact

that there was only one wind energy company (BF Utilities Ltd) listed on BSE-Bombay Stock Exchange in India (at the start date of the project activity), the project proponent has considered the next best option for assessing the risk of these projects, i.e.: is to consider the data available on all power companies listed in the BSE.

Therefore, the PP has considered β of all electricity generating companies in India. The group of companies considered includes renewable as well as conventional power generating companies. The use of this Beta value is therefore considered conservative, as it does not add for the higher risk of non conventional energy. The companies considered were Gujarat Industries, Tata Power Co Ltd., NTPC Ltd, Neyveli Lignite Corp, Reliance Energy, JaiPrakash Hydro, Ahmedabad Electrical Company Limited, etc.

The beta values thus arrived at has been found to be at 0.69 for the year 2004-05 and 0.804 for FY 2005-06 (relevant at the start date of the project activity).

Based on the above parameters, the cost of equity for the proposed project has been calculated as 8.22% and 9.58%. PJRCMD has verified all the input values used in the working of the benchmark and is of the opinion that the benchmark selected is reasonable.

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.

Tariff: The tariff and the yearly escalation of INR 3.50 and INR 0.15 respectively is in line with the MERC tariff order, for the WTG installed in Maharashtra. PJRCMD has further confirmed against the power purchase agreement signed between the PP and the MSEDCL. 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 PJRCMD's opinion, the project proponent's selection is conservative.

In case of WTG installed in Tamil Nadu, the PP has considered the tariff of INR 2.70 for the entire operational lifetime which is in line with the PPA signed for the respective projects with the TNEB. PJRCMD was able to confirm the same against the tariff rates as indicated in the power purchase agreement signed between the PP and the TNEB

The operation and maintenance cost (O&M) and yearly escalation, line losses have been sourced from the purchase order. PJRCMD was able to confirm the total equipment cost against the orders placed with M/s Suzlon Energy Ltd., and M/s Vestas India Pvt. Ltd., for the supply and erection of the WTGs and other equipment.

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 and Tamil Nadu, PLF has been sourced from the tariff orders issued by the electricity

regulatory commissions (ERCs) of respective states i.e.: Maharashtra State Electricity Regulatory Commission (MERC) tariff Order dated 24 November 2003 and Tamil Nadu Electricity Commission tariff order dated 18 May 2006 [18]. The project promoter's selection is deemed reasonable in PJRCDM's opinion in view of the fact that the PLF declared by MERC/TNERC 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 and Tamil Nadu.

The calculations were provided in the spreadsheet and verified to be correct. The table below presents the results of the financial analysis for the project activity without revenues from carbon credits.

Based on the above information/ data equity IRR is estimated, which comes out to be only 8.96% for Tamil Nadu WTG and 9.58% for Maharashtra. It can be seen that the equity IRR for the project activity is less than the benchmark.

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:

PLF: It is seen that even with 10% variations in PLF considered, the IRR for the project activity doesn't cross the benchmark. Hence the PLF considered for the financial analysis is deemed reasonable.

Tariff: It needs to be brought out that the tariff for the project has been fixed on the basis of the agreement entered into by the project proponent with the State Electricity Board (SEBs) and furthermore, the same is governed by the Electricity regulatory commission's (ERC) tariff order.

Operation and Maintenance cost: The same does not contribute to more than 20% of the revenue or the cost and hence has not been considered for the sensitivity analysis.

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.

Furthermore, it is argued that the wind power generation involves uncertainty related to the wind availability have pose a risk to the project developer. The PP considered the risks associated with low plant load factor since this directly affects the revenue for the project activity. Furthermore, it unlike conventional power sources where PLF is dependent on availability of fuel, in case of wind power generation, the PP has now control over the operation of the WTG. This has further been justified with the actual generation data which shows that the average PLF for Maharashtra and Tamil Nadu for the years 2005-2009 to be 14% and 21% respectively as opposed to the 20% and 25.9% considered for the IRR calculation.

PJRCDM is of the opinion that the PLF for the project poses a risk to the project, however, can only be considered a supporting barrier, while the main barrier to the project activity remains the low returns as compared to the benchmark for the project activity.

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 used for monitoring are electronic trivector 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.

In case of Maharashtra, 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 electricity authorities of the respective states (MSEDCL and TNEB). The meters are of 0.2 accuracy class in Maharashtra while it is 0.5 accuracy class in Tamil Nadu.

In case of meter failures, and back up meter reading being unavailable, it has been confirmed that the PP shall not claim for VCUs during that respective period.

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 CO₂ and no other sinks and reservoirs for either the baseline or project activity have been identified. This is justified as per the applicable methodology.

The baseline emissions for the project activity is estimated as the kWh produced by the renewable generating unit multiplied by an emission coefficient (kg CO₂/kWh) calculated as a combination of operating margin and build margin according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

Emission reductions for the proposed project have been calculated as:

Emission reductions (ER) = Baseline emissions (BE) – Project emissions (PE) – Leakage (L).

Since the proposed project is a renewable energy based project, no project emissions or leakage have been considered in accordance with the baseline methodology AMS ID, version 13.

Hence, the final emission reductions resulting from the proposed bundled project is equivalent to the baseline emissions.

Baseline emissions (BE) = Net amount of electricity generated by the project in a year (EG) * emission factor of the southern regional grid (EF).

While the net annual generation of the project is a metered value, the grid emission factor has been calculated using the data available on the official website of Central Electricity Authority (CEA) under the Ministry of Power, Govt of India. An ex-ante fixed combined margin emission factor has been calculated to be 0.906 tCO₂e/MWh for the NEWNE grid and 0.93tCO₂e/MWh for the Southern grid of India. This has been sourced from Central Electricity Authority CO₂ Baseline Database. Central electricity Authority (CEA) (which is an official source of Ministry of Power, Government of India) have worked out baseline emission factor for various grids in India and made them publicly available (“Baseline CO₂ Emission Database version 4.0) [19]. This database i.e. the CO₂ baseline database provides information about the OM and BM factors of the regional electricity grids in India. PJRCDM confirms that the database is an official publication of the Government of India for the purpose of CDM baselines and the OM in the CEA database is calculated *ex-ante* using the simple OM approach based on the generation weighted average emissions per electricity unit of all fossil-fuelled generating sources serving the system over a three year period of 2005-06, 2006-07 and 2007-08. BM is calculated ex-ante based on the 20% most recent capacity additions in the grid based on net generation for the year 2007-08 as described in tool to calculate the emission factor for an electricity system.

The estimated emission reductions from the project activity have been estimated at an average of 5,016 tCO₂e per annum.

3.5 Environmental Impact

The project activity is a renewable energy project with a cumulative capacity of 2.9MW, with the WTGs being implemented in the Dhule districts in Maharashtra, and some WTGs being installed at Tirunelveli districts in Tamil Nadu. 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, PJRCDM 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. A stakeholders’ meeting was organized by the project proponent at the Suzlon office in Tirunelveli City in Tamil Nadu on 23rd April 2005 and Vestas site in Dehivel-Taluka Sakri, Maharashtra on 21st January 2006. The identified stakeholders included the local

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villagers, employees and the O&M contractor. The relevant stakeholders were invited for the meeting through public notices. PJRCMD was able to verify the invitation letters and the notices inviting the relevant stakeholders for inviting their comments. Furthermore, the minutes of the meeting were also submitted to PJRCMD.

No negative comments have been received for the project activity.

4 VALIDATION CONCLUSION

PJRCDM Inc. has performed the validation of the project “Bundled Grid connected 2.9 MW Wind Power Project in India by Kamal Engineering Corporation [Unit of KEC Industries Ltd”. 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, and site interview, including other explanations where necessary to enable PJRCDM to provide reasonable assurance that the information reported in the PD is complete and materially correct. Our scope and conclusion is thus limited to the above evaluation.

The project involves sale of electricity from wind turbine generators with total capacity of 2.9 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 5,016 tCO₂e per annum. 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 03 of the VCS PD Bundled Grid connected 2.9 MW Wind Power Project in India by Kamal Engineering Corporation [Unit of KEC Industries Ltd 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: “Grid-connected wind electricity generation project identified as Project E5 in Maharashtra and Tamil Nadu, India”, version 01 to 05, dated 11 th November 2009
[02]	Financial and benchmark evaluation worksheets
[03]	AMS-I.D., Version 14, “Grid connected renewable energy generation”, EB 48.
[04]	Voluntary Carbon Standard, Voluntary Carbon Standard 2007.1, 18 th November 2008
[05]	Voluntary Carbon Standard, Voluntary Carbon Standard Program Guidelines, 18 th 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, 30 th September 2005
[10]	Approval/clearance from • Tamilnadu Electricity Board issued to Kamal Engineering Corporation dated 21st March 2005 for installation of the project activity. • Government of Tamilnadu issued to Kamal Engineering Corporation dated 28th March 2005 for Provisional. • Government of Maharashtra issued to Kamal Engineering Corporation on 28th December 2005 for electrical installation of the project activity • Maharashtra Energy Development Agency issued to Kamal Engineering Corporation dated 28th March 2005 for infrastructure clearance.
[11]	Chartered Accountant certified project costs
[12]	Power Purchase Agreement between • Kamal Engineering Corporation and MSEDCL on 24th March 2006 for 1.65MW • Kamal Engineering Corporation and TNEB on 29th March 2005 for 1.25
[13]	Commissioning Certificates of the WTGs for ▪ Kamal Engineering Corporation, Location number from the TNEB ▪ Kamal Engineering Corporation, Location number from the MSEDCL
[14]	Contract with Validator, PJRCMD signed by • Kamal Engineering Corporation, dated 17th November 2008

[15]	Minutes of Stakeholders meeting of Kamal Engineering Corporation held on 11th July 2009 at Suzlon Office, Devarkulam, Tamilnadu.
[16]	MERC Order dated 24 th November 2003
[17]	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)
[18]	Reserve Bank of India Annual Report http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/72286.pdf
[19]	Letter from the equipment provider – Suzlon Energy Ltd, on the operational lifetime of the project activity dated 01 st October 2009.
[20]	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
[21]	Letter from the equipment provider, Suzlon Energy Ltd, on the controller readings and data reliability.
[22]	Operation & Maintenance Agreement between Kamal Engineering Corporation and Suzlon Infrastructure Services Ltd. on 24th May 2008
[23]	Public notice of Kamal Engineering Corporation dated on 29th June 2009.
[24]	HCA presentation
[25]	Central Electricity Authority notification, dated 17 th March 2006
[26]	Letters from Technology Providers indicating the geographical coordinates of the WTGs

APPENDIX II

Resolution of Corrective Action and Clarification Requests: *Bundled Grid connected 2.9 MW Wind Power Project in India by Kamal Engineering Corporation [Unit of KEC Industries Ltd]*

Draft report clarification requests and corrective action requests by validation team	Ref. To the section of the PD	Summary of project owner response	Validation team conclusion
CAR #1 The project size to be defined as per guidelines. The choice of VCS program being applied for to be clarified.	1.3	Section 1.3 is revised as per the VCS program guidelines.	The PD has been revised to include the project size. This is closed.
CL #1 The source of grid emission factors used in the PD (0.906 and 0.31 tCO ₂ e/MWh) is not clear.	1.4	To calculate the grid emission factor, data published by Central Electricity Authority (CEA) of India is used. Reference is included in revised PD. Detail calculation is provided in section 2.4 of PD.	The PP has now included reference of the emission factor. This CL is closed.
CAR #2 The crediting period start date to be defined as per guidelines.	1.6	The credit period start is revised as per VCS guidelines.	The date has now been revised in line with the VCS guidelines. This CAR is closed.
CL #2 The list of permissions obtained by the project activity in the two states to be clearly mentioned in the PD. Further the argument to be analyzed in	1.10	The revised PD includes the list of permissions obtained by the project activity in two states and the further discussion to clarify applicability of the Electricity Act 2003.	All the permissions obtained for the project have been reviewed and verified This CL is closed.

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Draft report clarification requests and corrective action requests by validation team	Ref. To the section of the PD	Summary of project owner response	Validation team conclusion
the context that Electricity Act 2003 mandates the use of renewable energy			
CAR #3 The description provided in 1.12 does not meet the requirements.	1.12	Section 1.12 is revised as per the guidelines.	This has been revised. This CL is closed.
CAR #4 The project activity has applied under CDM and hence relevant changes to be made to the PD to include the information and the mechanism to be put in place to avoid double counting of emission reductions accrued. The effect of possible CDM registration on the crediting period of the project activity under VCS is not clear.	1.13	Section 1.13 is revised as per the guidelines.	The undertakings for the project activity regarding generation of RECs have been confirmed. In the event such a program is made available, the same will be checked and confirmed at the verification stage to avoid double counting of benefits. This CL is closed.
CAR #5 Relevant roles and responsibilities of project proponents and other participants to be identified.	1.15	Section 1.15 is revised to include the details responsibilities and other participations.	The roles and responsibilities have now been defined. This CAR is closed.
CL #3 Clarification is requested if other WTGs connected to the substation are also part	2.3	The other WTGs connected to the substation is not part of proposed project activity and not in the project boundary and the same is applicable to both states.	OK. It has been clarified that there are other WTGs connected to the sub-station, which do not form a part of the project activity.

VCS VALIDATION REPORT

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
of the project boundary and if the same is applicable to both the states.		The Project boundary diagram is revised for more clarity.	This CL is closed.
CAR #6 The description provided in section 2.4 does not meet the requirements.	2.4	As per the guidelines, section 2.4 should include the most reasonable baseline scenario for the project. In absence of the project activity, the power would have been generated by the existing fossil fuel power plants. Therefore the selected baseline is the most likely to be occurred in absence of the project activity. A detail explanation of identified scenario has been included in revised PD.	The PD has now defined the baseline for the project activity in line with the methodology. This CAR is closed.
CAR #7 The applicable tool for assessment and demonstration of additionality to be used. ¹	2.5	Section 2.5 is revised as per the applicable tool for demonstration of additionality to be used.	The tool for the additionality has been revised in lien with the methodology used for the project activity. This CL is closed.
CL #4 The source of data for assumed PLF to be	2.5	References of PLF are included in revised PD.	The excel worksheet clearly states that the PLF for project has been sourced from the respective Electricity regulatory

¹ <http://www.v-c-s.org/faq.html#question22>

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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
provided and included in the PD.			Commission's order. This CL is closed.
CL #5 Justify the technological barrier of low CUF as it is based on post implementation data. Justify institutional barrier of lack of experience compared to other similar projects implemented in the region which too have been implemented by proponents without experience in power generation.	2.5	PP has provided the references, which reflects the uncertainty of PLF. PP has considered the risk of low PLF at the time decision making considering the significant variation in the reported PLF. The project has already been implemented therefore PP has provided the project specific performance data to substantiate the risk involved in the project activity. PP would like to remove the institutional barrier as does not seem convincing.	The institutional barrier has now been deleted. The This CL is now closed.
CAR #8 The monitoring plan to be defined as per site practice as there are different practices followed in different states.	3.2	Monitoring plan is revised as per site specific practices.	The PD now includes details regarding the monitoring system as applicable at the two sites. This CAR is now closed.
CL #6 The method to arrive at the net electricity generated by the project activity is not clearly defined in the PD.	3.3	Net electricity calculation is provided in section 4.2.	The monitoring plan now details the source of the Net electricity generation. This CL is now closed.

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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 #9 Procedures to identify errors, error limits, emergency measures and methods to deal with inaccuracies and uncertainties related to monitoring and measurement of electricity generation are not evident in the PD.	3.4	The monitoring plan in PD is revised to incorporate the suggestions.	The PD has now been revised to include these details This CL is closed.
CAR #10 The emission factor for Southern regional grid to be corrected.	4.2	Emission factor for southern regional grid is corrected.	OK. This CL is closed.
CL #7 Complete information about the stakeholder meetings carried out to be included in the PD. The stakeholder's meeting comments included in the PD denote a date of 01 st March 2005 as the date of meeting while supportive documents denote a date of 11 th July 2009.	6	Section 6 of PD is revised to include stakeholder details. Minutes of meetings are provided to DoE to confirm the date of stakeholder meeting i.e., 01 st March 2005 for Tamilnadu WTG and 21 st Jan 06 for Maharashtra.	The PD now includes all the information on the stakeholder consultation process. This CL is closed.
CL #8 PLF: The basis for PLF considered. Debt: Provide the loan documents Tax Benefit: Tax Benefit to be	IRR Spreadsheets	1. State Electricity Board Order. References are included in PD 2. Loan documents are provided by PP	1. PLF is considered as per State tariff orders. CL Closed. 2. Provide the loan documents. CL

VCS VALIDATION REPORT



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
calculated on income tax loss, but not on the accelerated Depreciation. ▪ Carry forward of losses: Tax benefit arising on income tax loss is considered in IRR calculations, how the PP considers the same loss to carry forward and set off with next year profits. ▪ Dates: Clarification is required on considering of total generation in the first year of financial projections. The commissioning dates of windmills (1.25 MW – 29.03.2005 and 1.65 MW – 08.02.2006). The dates of operations are different.		3. IRR sheet revised 4. As per IT act 5. IRR sheet is based on 20 years return. Therefore returns are calculated without considering the dates of commissioning 17/11/09 Loan documents are provided to DoE Revised IRR cal for both machine separately.	OPEN. 3. Tax benefit is considered. CL Closed. 4. Tax benefit arise due to initial year losses are considered, how one can claim carry forward and set off the the same losses. Reply: Carry forward and setoff losses are not considered. CAR Closed. 5. The windmill commissioning dates are in different financial years and income tax depreciation and operational revenue all should be allocated. Reply: IRR 's are calculated separately for each windmill and evaluated individually.CAR Closed.
CL #9:Benchmark ▪ The commissioning dates are and 29.03.2005 (1.25 MW)	IRR Spreadsheets	1. Benchmark is revised as per the date of decision.	Clarification is required on not considering of BFUL.

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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
08.02.2006 (1.65 MW). How the benchmark calculated is relevant to the following dates. ▪ Dividend Growth Model: • Clarification is required on consideration of CNX -100 for Dividend Yield. • Clarification is required on consideration of average risk-free return for one year. Generally it is considered before four months. • Clarification on consideration of dividend yield up to November '2004. ▪ CAPM Model: Check the figures of • CESC Stock price of July, August and Sep'2001. • Debt- Equity Ratio of CESC. • Income Tax of Gujarat Industries. ▪ The market return (R_m) is considered up to 31st March'2005.		2. PP would like to remove benchmark 1 was earlier used to justify the conservative approach. CAPM 1. Benchmark is revised as per the available data of 2004-05. For 2004-05 BFUL, performance data could not be accessed, hence excluded.. BFUL data is included and benchmark for Maharashtra machine is also included in the IRR sheet.	Reply: BF Utilities is also considered in Beta calculations. CAR Closed.
CAR #11 ▪ Equity IRR: In the calculation of equity	IRR Spreadsheets	1. IRR sheet is revised as per EB guidelines.	Equity IRR calculations are revised and the land cost is not considered for

VCS VALIDATION REPORT

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
IRR only the portion of investment costs which is financed by equity should be considered as the net cash outflow, the portion of the investment costs which is financed by debt should not be considered a cash outflow. (Refer point number 10 of Annex 45 of EB 41 of UNFCCC). ▪ Depreciation: The land cost should not be considered for depreciation calculation. (Both book depreciation and income tax depreciation purposes). ▪ Check the Equity IRR mentioned in PD and excel sheet.		2. Land cost is removed from depreciation. IRR is revised as per IRR xls sheet.	depreciation. CAR Closed.