Voluntary Carbon Standard 2007.1 Validation Report

No. 53804508-08/668

Validation Report:

Name of Validation company:	Date of the issue:
TÜV NORD CERT GmbH	2009-11-13
Report Title:	Approved by:
16.45 MW bundled grid connected renewable energy project in Tamil Nadu, India	Mr. Krupp Eric
Client:	Project Title:
Arvind.A.Traders.	16.45 MW bundled grid connected renewable energy project in Tamil Nadu, India
Summary:	

M/s Arvind. A. traders has commissioned the TÜV NORD JI/CDM Certification Program to carry out the validation of the project - "16.45 MW bundled grid connected renewable energy project in Tamil Nadu, India ", with regard to the relevant requirements of VCS 2007.1 Standard as well as criteria for consistent project operations, monitoring and reporting.

The project activity generates electricity which will be supplied to the Southern Grid of India and then distributed to connected end users.

The review of the VCS PD and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

A risk based approach has been followed to perform this validation. In the course of the validation 12 Corrective Action Requests (CAR) and 6 Clarification Requests (CR) were raised and successfully closed out.

The validation is based on the VCS PD, proof of title, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validators by project proponent.

As a result of the validation, the validators confirm that:

The project fulfils criteria of VCS 2007.1 provided.

- The project additionality is sufficiently justified in the PD.
- The monitoring plan is transparent, adequate and inline with applied baseline and monitoring methodology of ACM0002, version-10.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 365,180CO_2e (total) is most likely to be achieved within the 10 years renewable crediting period.
- No restrictions or uncertainties were identified related to the validation.

Work carried out by:	Number of pages:
Ma. Paa. Puratchikkanal B.J.M. Amarnath K.V. Sudarshan S.Stalin N.Premjit Singh A.Kirthika.	33

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1 Introduction

1.1 Objective

The purpose of this validation is to have an independent third party assessment of the project design. In particular the project's baseline, the monitoring plan (MP), and the project's compliance with the requirements of:

- The requirements of VCS 2007.1 program guidelines
- Requirements of the Approved methodology, ACM0002 version 8,EB-44
- To assess the project's compliance with other relevant rules;
- Other relevant rules, of VCS sustainability criteria are validated in order to confirm that the project design as documented is sound and reasonable and meet the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders on the quality of the project and its intended generation of Verified Emission Reductions (VERs).

1.2 Scope and Criteria

The validation scope is given as an independent and objective review of the project design, the project's baseline study and monitoring plan (based on CDM approved methodology ACM0002. /Version 10:"Consolidated baseline methodology for grid-connected electricity generation from renewable sources" will be employed for the project), which are included in the VCS PD and other relevant supporting documents.

The items covered in the validation are described below:

- VCS 2007.1 & Host Country Criteria
  - To meet the requirements of VCS 2007.1 guidelines requirements, in particular,
  - Host country requirements / criteria
- VCS Project Description
  - Project design
  - Project boundaries and Predicted VCS project GHG emissions
- Project Baseline
  - Baseline methodology
  - Baseline GHG emissions

- Monitoring Plan
  - Monitoring methodology
  - Indicators/data to be monitored and reported
  - Responsibilities
- Project Additionality
- Background investigation and follow up interviews
- Draft validation reporting with CARs,CRs & FARs, if any
- Final validation reporting.

The information included in the PD/PDD/ and the supporting documents were reviewed against the requirements and criteria mentioned above. The TÜV NORD CERT GmbH JI/CDM CP has employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of VERs. The validation is based on the information made available to TÜV NORD JI/CDM CP and on the contract conditions.

The validation is not meant to provide any consulting to the project participant. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 **VCS project Description**

The project activity involves installation of 8 WEGs capacity of 1250kW, 3 WEGs capacity of 1650KW and 2 WEGs of 750kW. The details of ownership, location and number of WEGs are presented in the Table 1 below. The electricity generated from the WEGs is supplied to the TNEB Grid, which forms part of the Southern Grid. This power from GHG free source will displace power from state grid which is primarily fossil fuel based and hence will effect reduced emissions in power generation from southern grid connected power stations. The proposed project falls under Large-scale methodology ACM0002 version 10, of CDM methodologies. The estimated GHG emission reduction is 365,180 tCO_2e (total) or average 36,518 tCO_2e per year for ten years of crediting period.

Table 1: Project location including geographic and physical information allowing the unique identification

Taluka: Veerakeramputhur
District: Tirunelveli

S.No	Name	Survey No.	HT.Sc No	Capacity In MW	Latitude	Longitude
1	Arvind.A.Traders	484/2A	1957	1.25	9° 00' 07''	77° 32' 48''
		430/1,2,3B P	1943		8° 59' 39''	77° 32' 22''
		121/2P	2006		8° 59' 11''	77° 31' 07''
		715/1P	1940		8° 59' 15''	77° 33' 23''
		29/2P	2005		8° 59' 24''	77° 31' 06''
		431/3,4B,4C P	1994		9° 00' 12''	77° 32' 25''
2	R.K. Textiles	21 / 3 P	1938	1.25	8° 57' 07''	77° 34' 10''
		120/1A, 115/2B	1520	1.65	8° 58' 44''	77° 28' 07''
3	Sri Rama Vilas Weaving Factory	435 / 3 P	1981	1.25	9° 00' 26''	77° 32' 20''
4	Asian Handloom	63/2,3,4,5,6	1522	1.65	8° 59' 11''	77° 28' 33''
		91/1(P), 2(P)	1524		8° 59' 05''	77° 28' 57''
5	R. Aswatha	608 / 1,2 P	1697	0.75	8° 58' 46''	77° 26' 51''
6	Allied Textiles	304 / 1 / P	1810	0.75	8° 59' 37''	77° 26' 37''

1.4 Level of assurance

The validation report is based on VCS PD, site visit interviews and documents provided by the project proponent, as well as information got from on-site visit. The validation opinion is assured and provides the credibility of all above.

2 Methodology

The validation of the project was carried out between December 2008 to November 2009.

Preparations : 2008-12-01 to 2008-12-09
On-site validation : 2008-12-10,
(Draft) Reporting : 2009-01-17
(Final) Reporting : 2009-11-13

The validation consisted of the following three phases:

- a desk review of the project design and the

baseline and monitoring methodology
- follow-up interviews
- the resolution of outstanding issues and the issuance of the final Validation report and opinion

2.1 Review of Document

The draft PD[/PD]/ submitted by the project participants in December 2008 and supporting background documents related to the project design and baseline were reviewed. Furthermore, the validation team used additional documentation by third parties like technical reports referring to the project design or to the basic conditions and technical data.

The documents that were considered during the validation process are given in chapter 5 of this report. They are listed as follows:

- Documents provided by the project proponent (Table 5-1)
- Background investigation and assessment documents (Table 5-2)
- Websites used (Table 5-3).

2.2 Follow-up Interviews

On 2009-12-10, the TÜV NORD JI/CDM CP performed On-site validation visit with the project proponent.

During this visit, as well as earlier and after, interviews with the project proponent, the consultant, project stakeholders and with local authorities were carried out to confirm selected information and to resolve issues identified in the document review.

The key interview and main topics of the interview are summarised in Table 2-1.

Table 2-1 Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
1.Projects & Operations Personnel /IM01/ 2. Consultants /IM02/	- Technical details of the project activity - WEGs Performance data - Approval procedures and status - Monitoring and measurement

Interviewed Persons / Entities	Interview topics
3. O & M Contractor /IM03/	- Project activity starting date and commissioning date - Crediting period - VER allocation /ownership - Sustainable development issues - Environmental Impact Assessment - Local stake holder consultation process - Roles & responsibilities, competency and training of the staff members w.r.t project management, monitoring and reporting - Operational Data - technical specification, capacity, estimated life time of the project plant units - Editorial aspects of PD - Baseline study and additionality - Details of emissions reduction calculations - Estimation of net energy (Import / Export) - QA/QC and calibration procedures - Data quality, archiving and reporting procedures - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification

A detailed list including the functions or designations of the interviewed persons is given in chapter 5 (see. Table 5-4). This table also includes reference codes to be used in the validation protocol.

2.3 Resolution of any material discrepancy

A few Discrepancies were found during the validation and the validation report containing a set of CARs & CRs were submitted to the project proponent. The project design document was revised addressing the CARs & CRs issued by TÜV NORD JI/CDM CP.

After reviewing the revised and resubmitted project documentation/PDD/; resolving the CARs & CRs raised and

outstanding concerns, TÜV NORD JI/CDM CP issues this final validation report and opinion.

The results are shown in Table 2-2:

Table 2-2: Summary of CAR and CR issued

Validation topic 1)	No. of CAR	No. of CR
Project Design (3.1)	6	4
Baseline (3.2)	4	2
Monitoring plan (3.3)	2	0
Calculations of GHG emissions (3.4)	0	0
Environmental Impact (3.5)	0	0
Local Stakeholder Comments (3.6)	0	0
SUM	**12**	**6**

1) The letters in brackets refer to the validation protocol

For an in depth analysis/evaluation of all CARs and CRs can be referred to the below sections from 3.1 to 3.6.

3 Validation Findings

3.1 Project Design

The proposed project uses wind power for electricity generation. Total installed capacity is 16.45 MW (8 X 1.25 MW, 3 X 1.65 MW and 2 X 0.75 MW). The estimated electricity supplied to the grid is 39,396 MWh/ER/ per year after commissioning of the entire WEG's. On the basis of the site visit and the reviewed project documentation it can be confirmed that with respect to the realized technology, the project equipments, as well as the monitoring and metering equipment, the project has been implemented and operated as described in the PD/PD/and the same has been confirmed from the commissioning certificates/COM/of the individual WEG.

Key parameters of the technology used are as follows:

Table 3-1: Key parameters of the wind power project

Salient Features of WEG's

S.No	Particulars	Technical specification for 1250KW WTG	Technical specification for 750KW WTG	Technical specification for 1650KW WTG
1	Make	Suzlon	NEG MICON	NEG MICON
2	Cut In Wind Speed	3m/s	4m/s	3.5m/s
3	Cut out wind speed	22m/s	25m/s	20m/s
4	Hub Height	74m	55m	78 m
5	Gearbox Type	Integrated 3 stage 1 planetary 2 Helical	Planetary - Parallel Axle	Planetary/ Helical Stages
6	Gear Ratio	1: 74.917	1:67.5	1:70.2
7	Rated Power Output	1250KW	750KW	1650KW
8	Tower Type	Tubular Tower	Conical Steel Painted	Conical Tubular
9	Tower Height	74m	53.6m	75.2m
10	No of blades	3	3	3
11	Rotor Diameter	66m	48.2m	82m
12	Brake System	Aerodynamic	Hydraulic	Hydraulic

The project duration is: 20 years.

Project start date is: 2005/12/06(commissioning date of the R.K textiles 1.65 MW WEG, Which is the earliest commissioning date in the bundled project activity)

Crediting period is: Ten years starting from 2006/03/28.

Arvind. A. traders has ownership of the proposed project. Proof of title/COM//BUN/ was submitted. Arvind.A.traders is the bundling organization/BUN/for the project activity also entitled for the right to emission reductions for the entire crediting period. Refer to Table 5-1.

The emission reduction was not double counted.

The project was not registered under any other emission trading mechanism and hence there is no rejection history. The same has been declared/DEC/ by the project participants of the project activity has been found OK.

However, CAR 3.1.1 to CAR 3.1.6 and CR 3.1.1 to 3.1.4 were raised.

CAR/CR	***Reference***	***Summary of project owner response***	***Revised sections (as applicable)***	***Conclusion***
CAR 3.1.1 The reference of VCS 2007 mentioned in various sections of PD has to be modified to the current version VCS 2007.1	/PD/	The reference for VCS 2007 mentioned in various sections is modified as per latest version of VCS 2007. 1 in revised PD	/PD/	OK CAR 3.1.1 is closed
CAR 3.1.2 The date and version of the document should be included in the section 1.1 of VCS PD	/PD/ 1.1	The date and version of the document is included in the section of 1.1 in revised PD	/PD/ 1.1	OK CAR 3.1.2 is closed
CAR 3.1.3 The methodology used ACM0002 in the PD is to be revised as per latest version in all sections also include the correct reference (web link) of the methodology.	/PD/ 1.2 2.1 3.1	Latest version of the methodology and the reference web link is included in the revised PD	/PD/ 1.2 2.1 3.1	The same has been incorporated in all relevant sections of the revised PD. OK CAR 3.1.3 is closed

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
CAR 3.1.4 The unique identification should also contain the HTSC No of the WEGs in section 1.5 of VCS PD	/PD/ 1.5	HTSC no of all WEG is included in section 1.5 of VCS PD	/PD/ 1.5	The same has been verified with the commissioning certificate provided by the Project participants. CAR 3.1.4 is closed
CAR 3.1.5 The crediting period mentioned in the PD is not inline with VCS 2007.1 guidelines.	/PD/ 1.6	The crediting period start date of the project activity is revised as per VCS 2007.1	/PD/ 1.6	OK CAR 3.1.5 is closed.
CAR 3.1.6 The starting date of the project activity mentioned in section 1.6 of VCS PD need to be revised as per the definition for start date in VCS 2007.1.	/PD/ 1.6	Starting date of the project activity is changed as per VCS 2007.1 and also it is the earliest commissioning date of all WEG	/PD/ 1.6	The starting date of the project activity is now revised on 06/12/2005 which is the Earliest Commissioning Date of this bundled project activity CAR 3.1.6 is closed.
CR 3.1.1 In section 1.7 of VCS PD the hyperlink does not provide the exact reference for type of power plants and their net power generation in 2005-06.	/PD/ 1.7	Exact reference for type of power plants and their net power generation is included in revised PD.	/PD/ 1.7	The reference given in the revised PD has provided the exact details of the power plants and their net generation in 2005-06

CAR/CR	Reference	Summary of project owner response	Revised sections (as applicable)	Conclusion
				CR 3.1.1 is closed.
CR 3.1.2 The risks associated with the project activity which will affect the GHGs emission reductions is missing in the the section 1.11 of VCS PD.	/PD/ 1.11	The risk associated with the project activity which affects the GHG emissions is provided in the revised PD in section 1.11.	/PD/ 1.11	OK CR 3.1.2 is closed.
CR 3.1.3 The justification for demonstration to confirm that the project was not implemented to create GHG emissions for the purpose of its removal or destruction in the section 1.12 of VCS PD is not clear.	/PD/ 1.12	The justification for demonstration to confirm that the project was not implemented to create GHG emissions for the purpose of its removal or destruction in the section 1.12 of VCS PD is clearly explained in revised PD	/PD/ 1.12	CR 3.1.3 is closed. OK.
CR 3.1.4 The justification/proof (under taking by promoters) of demonstration that the project has not created another form of environmental credit by the project in section 1.13 of VCS PD is missing.	/PD/ 1.13	The proof has been provided to DOE.	/PD/ 1.13	This project activity has not created another form of environmental credit. The proof[/DEC/] for the same has been verified and found OK. CR 3.1.4 is closed.

3.2 Baseline

The project activity is grid connected renewable energy generation through wind electricity generators. The purpose of the project activity is to generate electricity through renewable resources (wind) and displace equivalent amount of electricity in the regional grid which is predominant by fossil fuels. The selected baseline methodology is approved baseline methodology for "consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM0002 Ver.10).

The baseline under the adopted methodology ACM 0002 is calculated by multiplying the grid emission factor ($kgCO_2/kWh$) and the net electricity exported (in kWh) by this project activity consisting 16.45 MW WEGs to the southern grid.

ACM0002 (Version 10) states that Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system". In this case the Combined Margin (weighted average of Simple Operating Margin and Build Margin) is estimated based on three years average (05-06, 06-07 and 07-08) of Simple Operating Margin and 20 % Build Margin of current year (07-08) is in line with steps of "Tool to calculate the emission factor for an electricity system". Both the value of Simple Operating Margin and Build Margin are selected under ex-ante approach. The grid boundary w.r.t the connected state grid is Southern Grid of India.

The project proponent has calculated the Simple Operating Margin (OM) based on the latest three year statistics data (year of 2005-06, 2006-07, 2007-08) as per Central Electricity Authority guidelines version 4.0 October 2008 and the Operating Margin Emission Factor is 0.998157296 tCO2/MWh, which is weighted average of the three years data. The value for Build Margin (BM) for 2007-2008 is directly used, i.e., 0.71331778 tCO2/ MWh. For wind and solar projects, "Tool to calculate the emission factor for an electricity system" allows the usage of the default weights are as follows: w_{OM} =0.75 and w_{BM} = 0.25. Using the above values the combined margin emission factor is valued at 0.92694742 tCO_2e/MWh.

The calculation of EF_y is current and publicly available and published by the Central Electricity Authority on its

web-site[/cea/]. The validation team is convinced of the result of the emission coefficient calculation.

Altogether the project activity reduces emissions of 365,180 tCO2e over the ten year fixed crediting period.

The project satisfies all criteria for ACM0002 Version 10. The application of baseline methodology is assessed as correct. There is no methodology deviation or revision. The selection of baseline scenario is assessed appropriately.

The additionality is assessed using project test-1.

Step as per VCS 2007.1	**Argument**	**Assessment**
Step 1: Regulatory Surplus	• Local or National Legislation does not require the production of the underlying service or product with the chosen technology. - There is no legal requirement on the choice of a particular technology for power generation. - The applicable Environmental Regulations do not restrict the use of wind energy for power generation. • The implementation of project activity is a voluntary initiative and it is not mandatory or a legal requirement. For power generation, the Electricity Act 2003 does not restrict or empower any authority to restrict the fuel choice, the applicable environmental regulations do not restrict the use of wind energy and there is no legal requirement on the choice of a particular technology. • Project Proponents have been issued with all required regulatory clearances before commissioning.	Validation team has checked all the National Regulations and Local legal requirements. It was found that there is no legal requisite in India and at the local level which restricts the implementation of wind power generating projects. Hence the argument is appropriate for this project activity. ☒ Step passed ☐ Step not passed ☐ Not applicable

Step as per VCS 2007.1	Argument	Assessment
Step 2: Implementation Barriers: Investment Barrier	The project faces capital or investment return constraints that can be overcome by the additional revenues associated with the generation of VCU. So the PP has chosen Benchmark Analysis to demonstrate the additionality of the projects in the bundle. Weighted average costs of capital (WACC) has been considered as the benchmark for the project activity. To arrive at this benchmark risk free rate from Indian Government bond rates published by the RBI for various years till the date of placement of first purchase order of all the projects have been analyzed. Sensex details for various years till the project start date was also evaluated to understand the market returns. The difference in this annual market return and the interest rate on Central Government Securities available from RBI has been used to arrive at the market risk premium for the project. Beta calculation for seven power generating industries has been carried out to arrive at the average beta applicable to this project activity. Along with this, RBI PLR on the debt cost of equity and applicable rate of tax has been considered together for arriving the benchmark. Since the investment decision taken by the project participants is in different period, the specific benchmark has been	Investment Barrier: Various elements have been checked during the additionality assessment. Validation team has checked the identified financial indicator (Project IRR), which is most suitable for the project type and decision context. In order to verify the relevant benchmark value of WACC, validation team has referred all necessary supportive data which is publically available and found OK. Project proponents have demonstrated through the investment analysis that the financial returns of the project activity are below the requisite benchmark. TUV-Nord considers the benchmark chosen is conservative and appropriate for the project. Using the investment analysis, the project proponents have demonstrated that the Project IRR for all the investors are lower than their benchmark. Thus, the established investment barrier has been assessed to be appropriate and sufficient. The arguments with supporting spreadsheets[/XLS/] provide proof for the non-viability of the project. The input data and assumptions for calculation of IRR like (profit after tax,

[1] http://www.indianwindpower.com/potential.html#topv(as on: 31.06.2006)

<table>
<tr><th>Step as per VCS 2007.1</th><th>Argument</th><th>Assessment</th></tr>
<tr><td><u>Institutional barriers</u></td><td>chosen for each project participant.

Since the Project IRR is chosen as the financial indicator to demonstrate the additionality; WACC is one of the appropriate benchmarks as per the Guidance on Investment Analysis EB 41, Annex 45, and version 2.

An investment analysis of the project activity was conducted with the project Internal Rate of Return (IRR) as the financial indicator comparing with the benchmark considered for the project activity. The IRR for the project activity without VCUs revenue was computed for a period of 20 years, corresponding to the lifetime of the all the WEGs.
Project proponents have demonstrated through the investment analysis that the financial returns of the project activity are below their requisite benchmark.
The IRR calculations of project activity exhibit that the IRR of the project without VCUs revenue for all the phases of is below the bench mark.

<table><tr><th>Project participants</th><th>WACC</th><th>IRR % without VER</th></tr><tr><td>Allied Textiles</td><td>15.98</td><td>11.63</td></tr><tr><td>Arvind Traders</td><td>14.05</td><td>10.98</td></tr><tr><td>Asian Handloom</td><td>13.87</td><td>10.85</td></tr><tr><td>R. Aswatha</td><td>15.81</td><td>10.80</td></tr><tr><td>Sri Rama Vilas Weaving Factory</td><td>13.84</td><td>10.88</td></tr><tr><td>R. K. Textiles NEG Micon (1.65 MW)</td><td>13.99</td><td>10.32</td></tr><tr><td>R. K. Textiles – NEG Micon (1.25 MW)</td><td>14.82</td><td>10.92</td></tr></table></td><td>project cost, net cash flow, additional depreciation, interest on term loan) are verified with references/PO,,PPA,COM / provided by PP. Based on the assessment the chosen benchmarks for the all the project participants are appropriate and deemed acceptable. The project developer has demonstrated that the expected return from the project activity is lower than the benchmark.

The project revenue is sensitive to the electricity generation and tariff. Hence the sensitivity analysis has been carried out by the PP for the above variable. The calculation has been reviewed and it is concluded that the project activity has an IRR less than the benchmark value, clearly indicating that the project is financially not feasible without CDM benefits.</td></tr>
</table>

Step as per VCS 2007.1	Argument	Assessment
	The sensitivity analysis is also carried out. The purpose of the sensitivity analysis is to demonstrate the sensitivity of the return on project due to uncertainty in Generation and tariff. From the analysis it is apparent that there is significant risk associated with the project activity that impacts the viability of the project as highlighted through the sensitivity analysis. It is evident that the project activity having lower returns while comparing benchmark without VCS revenue. The wind power policy[1] in the state is not in favor for the investors. Moreover the state government does not allow the third party sale of power within the state, it allows only for captive consumption (through wheeling and banking) and sale to the grid. Also the purchase price of power is lower compared to other states also lower than the recommended tariff by MNRE, whereas the banking and wheeling charges are higher than other states. Such power policies of the state government impediments implementation of clean power projects.	The sensitivity analysis have also been provided for individual developers with increase in the generation and tariff to a tune of +/- 10% and it has been verified that the Project IRR does not cross the bench mark. The same has been verified and it is evident that the policies followed by the tamilnadu government is not favour to the investors to implement the clean power project in that region also the power purchase price is lower compared to other states. The approval and registration of the proposed project activity as a VCS project would lead to additional revenue thereby improving the returns from the project activity alleviating investment and regulatory policy risk to a certain extent. The successful registration also provides an incentive for other entrepreneurs to invest in wind power projects. Thus the VCS revenue acts as a risk mitigation tool in overcoming barriers and imparting viability to the project. The argument is justified but not a decisive barrier.OK ☒ Step passed ☐ Step not passed ☐ Not applicable
Step 3:	From the Annual report 2005-	By the analysis done on

Step as per VCS 2007.1	Argument	Assessment
Common Practice	2006 of Central electricity authority (CEA)[2], which shows that the Wind energy has only 6.48% of the installed capacity as compared to 33.63 % of hydro and 55.31% of thermal in Southern Regional electricity Grid. The above shows that power generation using wind energy in southern region face the common practice barrier due to preference for thermal generation because of higher capacity utilization and availability of fossil fuel sources in the state.	the Common Practice it is found that the scope of existing and upcoming wind energy projects of similar or higher scale is low. As a result of existence of the analysis of the barriers, the project activity has been concluded as not a common practice scenario in the region. OK. ☒ Step passed ☐ Step not passed ☐ Not applicable

However, CAR 3.2.1 to CAR 3.2.2 and CR 3.2.1 to 3.2.2 were raised.

[2] http://cea.nic.in/power_sec_reports/Executive_Summary/2005_03/22-28.pdf

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
CAR 3.2.1 The basis/reference of Combined margin calculation basis as per ACM 0002 is missing in the section 2.4 of VCS PD. Moreover exact reference for the type and net generation for the year 2007-08 is missing.	/PD/ 2.4	The basis / reference of the combined margin calculation is added in the section of 2.4 of revised VCS PD The exact reference for the net generation is included.	/PD/ 2.4	The revised PD addresses the basis for combined margin calculation and provides the exact reference for the net generation for the year 2007-08. CAR 3.2.1 is closed.
CAR 3.2.2 • In section 2.5 of VCS PD alternatives considered in the capital investment analysis can not be compared with the project activity .In the analysis the project activity should compare with the same capacity/service of alternative power projects. • Source mentioned in the institutional barrier as on: 31.06.2006 does not provide the	/PD/ 2.5	The section 2.5 of the VCS PD was modified in the revised PD The exact reference for the institutional barrier is	/PD/ 2.5	The same has been removed in the revised PDD. Project developer has demonstrated through the investment analysis that the financial returns of the project activity are insufficient to justify the required investment. The reference given in the revised PD has provided the comparison of the Tamil Nadu wind power

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
exact reference.		included in the revised VCS PD.		policy with other state government policies as on 31.06.2006 CAR 3.2.2 is closed.

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
CAR 3.2.3 Clarification requested why the values for annual generation used in the financial calculation were conservative. In the calculation you used the highest value measured for the years 2006/2007 and 2007/2008. Perhaps this years were years with bad conditions for "Wind projects" and the generation in the next years will be much higher? Pl. explain	/PD/ 2.5 4.2	The estimated generation for the project activity has taken from the purchase orders of the WEG which was the available data during the investment decision.	/PD/ 2.5 4.2	The estimated generation of the has been arrived based on the guaranteed generation given by the suppliers of the WEG .The same has been verified with the documents/PO/ The applied value is valid and appropriate for the project activity. The same has been used for the investment analysis and estimating the emission reductions calculations which is found to be OK. CAR 3.2.3 is closed.
CAR 3.2.4 Why is this appropriate benchmark? According to EB 39, annex 35 "The Risk premiums applied in the determination of required returns on equity shall reflect the risk profile of the project activity being assessed." Pl. explain how this country risk premium reflects the	/PD/ 2.5	The same has been removed in all the relavent sections of the revised PD.The Weighted average costs of capital (WACC) has been considered as the benchmark for the project activity and the benchmark is calculated for individual project activity based	/PD/ 2.5	PP has taken the WACC as the benchmark for the project activity which is also inline with as per the Guidance on Investment Analysis EB 41, Annex 45, and version 2.Project proponents have demonstrated through the investment analysis that the financial returns of the project activity are below the requisite benchmarks is not worthwhile by taking all the risks associated with the

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
risk profile of the project activity. Also clarification requested for selecting single benchmark for the project activity since the investment decision of the project participants is in different period.		on the every individual investment decision date.		project activity. Since the project activity has been implemented in various years and various project participants the cost associated with its implementation are different in nature also returns expected from the project activity also vary according to the market scenarios. Project promoters considering different benchmarks according to their investment decision taken period is appropriate and deemed to be acceptable. CAR 3.2.4 is closed.
CR 3.2.1 The justification of the choice of the applied methodology given section 2.2 of VCS PD is incomplete.	/PD/ 2.2 3.2	The justification of the choice of the applied methodology is completed in the revised PD	/PD/ 2.2 3.2	The revised PD addresses all the applicability conditions. CR 3.2.1 is closed.
CR 3.2.2 Data and notations used in section 4.1 to 4.4 of the VCS PD should be consistent	/PD/ 4.1 4.4	Data and notations are revised as per VCS 2007.1	/PD/ 4.1 4.4	OK CR 3.2.2 is closed.

3.3 Monitoring Plan

The proposed project used CDM approved methodology ACM 0002/Version 10: "Consolidated Baseline Methodology for grid connected electricity generation from renewable sources", which is approved under VCS 2007.1.

The project satisfies all criteria for ACM0002. The application of monitoring methodology is assessed as correct.

The revised monitoring plan[/PD/] provides detailed information related to the collection and archiving of all relevant data needed to:

- Estimate or measure emissions occurring from GHG sources, sinks and reservoirs
- Determine the baseline emissions
- Estimate changes in emissions from the site

This methodology stipulates that monitoring shall consist of metering the net electricity exported (to the grid) by the renewable technology. Tamil Nadu State Electricity Board is certifying agency for meter reading. The net electricity supplied to the Southern grid is monitored with the help of electricity imported and exported to the grid which is directly obtained from meter readings which is unique for the WEG connected through the Tamilnadu State Electricity Board (TNEB) grid which is in part of the Southern grid. The connected meter is the two-way meter which can measures both import and export located at grid interconnection point owned by the state electricity board. Joint meter reading is certificate for electricity generated by WEGs for the month being taken by State electricity board in presence of project proponent representative. The net quantity of electricity supplied to the grid would be calculated ex-post from the recorded readings from the meter that is the difference between export and import.

During the on-site visit the monitoring personnel were interviewed[/IM01//IM03/] to cross check their roles & responsibilities, competency and training of the staff members[/TRG/] w.r.t project management, monitoring and reporting, operation and maintenance scheduled[/O&M/], monitoring plan[/PD/], net electricity generation records [/GR/] , calibration procedures/frequency for the meters[/CAL/] and were found to be satisfactory Data are monitored continuously. Measurements are recorded every month. Electricity sale invoices will be kept for cross-checked. The meters are calibrated by the TNEB officials within 3 years as per the requirements of UNFCCC (EB 41, Annex 20). Calibration, periodical testing, Responsibilities related

to monitoring and maintenance procedures of monitoring equipment are clearly defined in the section 3 of the PDD and found to be ok.

However, CAR 3.3.1 and CR 3.3.2 have been raised.

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
CAR 3.3.1 Clarify whether the import of electricity to the project activity has been considered. More over measurement methods and procedures, including a specification which accepted industry standards or national or international standards will be applied, which measurement equipment is used, how the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person / entity that should undertake the measurements and what is the measurement interval not addressed adequately in	/PD/	Import of electricity by this project activity is mentioned in the VER calculation sheet. The electricity generated by this project activity is exported to TNEB grid and the net electricity exported to grid is measured by TNEB energy meter. This energy meter is calibrated once in three year. This energy meter follows the standards/procedures stipulated in the central electricity authority (Installation and operation of meters) regulation 2006.	/PD/	All the points with respect to the guidelines are addressed. CAR 3.3.1 is closed.

CAR/CR	Reference	*Summary of project owner response*	*Revised sections (as applicable)*	Conclusion
section 3.3 of PD. Moreover data capture should be elaborated in QA/QC procedures.				
CAR 3.3.2 The monitoring plan should contain all the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects generated by the project activity and also indicate the responsibilities for and institutional arrangements for data collection and archiving.		Operational and management structure is included in the section 3.4 of the revised PD.		The revised PD includes operational and management structure of the project activity and indicate the responsibilities for persons involving data collection and archiving. CAR 3.3.2 is closed.

3.4 Calculation of GHG Emissions

The calculation of emission reductions is based on subtracting project emissions and leakage from the baseline emissions. As the plant runs exclusively with wind energy without any usage of fossil fuel, the project emissions is considered as zero. Leakage is considered to be zero as per applied methodology since there is no equipment is transferred from another activity or if the existing equipment is transferred to another activity.

Following the ACM 0002 methodology, the combined margin (CM) methodology calculated ex-ante was chosen to calculate the baseline emission factor.

Baseline emission is equal to Electricity supplied to the grid by the project activity (EG_y) multiplied by the grid emission factor (EF_y).The net electricity export to the grid is cross checked with the sale records to the grid and other records maintained by the monitoring personnel.

The baseline emission factor is equal to the CM, which is applying the default weights are as follows: w_{OM} = 0.75 and w_{BM} = 0.25 for operating margin emission factor (EF_{OM}) and the build margin emission factor (EF_{BM}).

The calculation method of the OM and BM is derived from the guide of OM and BM calculation issued by CO_2 Baseline Database for the Indian Power Sector, User Guide (Version 4, Date: November, 2008)issued by CEA.

No CAR/ CR was raised.

The calculation is assessed as transparent and conservative.

3.5 Environmental Impact

As per the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated 27th. January 1994 and further modified on 14th September 2006, 38 Categories of project activities are required to undertake environmental impact assessment studies. The details of these activities are available at: http://envfor.nic.in/legis/eia/so1533.pdf

The proposed project doesn't fall under the list of activities requiring EIA as it will not involve any negative environmental impacts, as the WEGs installed for generation of power use wind (cleanest possible source of renewable energy).

No CAR/ CR was raised.

3.6 Comments by stakeholders

The promoters organized formal & informal stakeholder consultation with the objective to inform the local interested stakeholders which include villagers, technology suppliers, representative from state electricity board and social workers in the local region on the environmental and social impacts of the project activity and discuss their concerns related to the development and operation of the activity. A stakeholder consultation meeting of the project were conducted and the schedule of same is provided under section 6 of VCD PD. All the Comments were positive and it has been verified that all comments sufficiently have been

addressed. The same has been confirmed with the documents[/LSC/] provided by the project proponent.

No CAR/ CR were raised.

4 Validation conclusion

M/s Arvind. A. traders has commissioned the TÜV NORD JI/CDM Certification Program to carry out the validation of the project - "16.45 MW bundled grid connected renewable energy project in Tamil Nadu, India", with regard to the relevant requirements of VCS 2007.1 Standard as well as criteria for consistent project operations, monitoring and reporting.

The project activity generates electricity which will be supplied to the southern regional grid of India and then distributed to connected end users.

The review of the VCS PD and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

A risk based approach has been followed to perform this validation. In the course of the validation 12 Corrective Action Requests (CAR) and 6 Clarification Requests (CR) were raised and successfully closed out.

The validation is based on the VCS PD, proof of title, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validators by project proponent.

As a result of the validation, the validators confirm that:

The project fulfils criteria of VCS 2007.1 provided.

- The project additionality is sufficiently justified in the PD.
- The monitoring plan is transparent, adequate and inline with applied baseline and monitoring methodology of ACM 0002 Version 10.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 365,180 t CO_2e (total) is most likely to be achieved within the 10 years renewable crediting period which will be renewed once.

No restrictions or uncertainties were identified related to the validation.

Mr. Ma. Paa. Puratchikkanal
Verification Team Leader
Bangalore, 2009-11-13

Eric Krupp
Final approval
Essen, 2009-11-13

TÜV NORD JI/CDM Certification Program

5 References

Table 5-1: Documents provided by the project proponent

Reference	Document
/CC/	Commissioning Certificates of all the WTGs
/DEC/	Declaration letter that the "the project has not created another form of environmental credit"
/ER/	• Emission reduction worksheet for monitoring (draft) • Emission reduction worksheet for monitoring (final)
/IRR/	IRR calculation sheets consisting of Investment Analysis, Returns from Project activity and profitability projections of the Project
/LSC/	Local stakeholder interviews
/ORG/	Organization chart.
/PD/	• PD draft version • PD final version
/CR/	Calibration Report of all energy meters in the bundle.
/PO/	Purchase orders of WTG's
/PPA/	Power purchase agreements
/SC/	Permission for setting up of wind farm at respective project site (in form of technical clearances)
COM	Commissioning certificates of all WEG
BUN	Bundling agreement between Arvind.A.Traders and other project participants
/SD/	Proof of starting date of project activity. (based on Commissioning Certificates)

Table 5-2: Background investigation and assessment documents

Reference	Document
/ACM0002/	Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version 07: 19 May 2006)
/CEA/	CO_2 Baseline Database for Indian Power Sector -User Guide, Ver 4 dated September 2008 published by CEA.
/CPM/	TÜV Nord JI / CDM CP Manual (incl. CP procedures and forms)
/GCP/	1. Voluntary Carbon Standard Project Description Template 2. UNFCCC: Guidelines for Completing the Project Design Document (CDM- -PDD)
/GHG/	The Greenhouse Gas Protocol, The GHG Protocol for Project Accounting
/IPPC-RM/	1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/KP/	Kyoto Protocol (1997)
/MA/	Decision 17/CP.7 (Marrakesh - Accords)
/TOOL/	"Tool to calculate the emission factor for an electricity system" version 1.1
/VVM/	Validation and Verification Manual

Table 5-3: Websites used

Reference	Link	Organisation
/cea/	www.cea.nic.in	Central Electricity Authority
/moef/	http://envfor.nic.in/	Ministry of Environment and Forests.
/tnerc/	http://www.tnerc.nic.in/	Tamilnadu electricity regulatory commission.
/unfccc/	www.unfccc.int	Unfccc website

Reference	Link	Organisation
/unfccc/	http://cdm.unfccc.int	UNFCCC CDM website
/vcs/	www.v-c-s.org	VCS website

Table 5-4: Interviewed Persons

Reference		Name	Organisation / Function
/IM01/	☒ Mr. ☐ Ms.	I.Muthukumar	Site Incharge-Arvind. A. traders
/IM02/	☒ Mr. ☐ Ms.	K.Vijayarajan	Director,Abi Energy consultancy Pvt Ltd
/IM03/	☒ Mr. ☐ Ms.	S.Prabhu	Junior Engineer, Suzlon Infrastructure Services

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