

Project Title	Bundled wind power project by KMSPL, Bangalore
Version	02
Report ID	SQAS-VCS-ES12880115

Report Title	Bundled wind power project by KMSPL, Bangalore
Client	Kanaka Management Services Pvt. Ltd.
Pages	18
Date of Issue	3 October 2013
Prepared By	SIRIM QAS International Sdn Bhd
Contact	No.1, Persiaran Dato' Menteri, Section 2, 40700 Shah Alam, Selangor Darul Ehsan, Malaysia Tel.: 603-55446479 Fax: 603-55446787 www.sirim-sqas.com.my
Approved By	Mr. Parama Iswara Subramaniam
Work Carried Out By	Mr. R. Vijayaraghavan , Lead Auditor (from July 2013) Dr. G. Vishnu, Lead Auditor (up to October 2012) Dr. D. Siddaramu, Auditor (up to April 2013) Mr. A. Prabu Das (Technical Reviewer)

Summary:

Kanaka Management Services Pvt. Ltd. has appointed SIRIM QAS International Sdn Bhd to perform a periodic verification and certification of the emission reductions of '**Bundled wind power project by KMSPL, Bangalore** (VCS Project ID - 324) for the period from 1/04/2006 to 31/12/2009. The verification was based on VCS Standard Version 3.3 criteria^{/1/}, the validated project description (PD)^{/2/} version 02.2 dated 11th November 2009, corresponding validation report^{/3/}, monitoring report^{/5/}, spreadsheets^{/8/} and other supporting documents were made available to the verification team by client.

The project activity involved the commissioning and operation of a new, Greenfield large scale bundled wind project activity of 38.275 MW capacity. The project comprises of 49 numbers of WTG's in Tamilnadu and Karnataka, aggregating to a total installed capacity of 38.275 MW. The project activity comprises of 29 individual investors. The earliest commissioned WTG, indicating project start date is on 22nd March 2005. The project activity uses wind energy as power generation source and displaces the most common fuel in the Southern Grid i.e., coal, for power generation. The generated electricity is sold / used for captive purpose to the state electricity utilities in Tamilnadu and Karnataka via Power Purchase Agreements. The project activity results in the reduction of GHG emission by displacing the grid electricity from the Southern Grid, a fossil fuel dominated grid.

As a result of the verification, SIRIM QAS Intl. verification team confirms that the project has achieved emission reductions for the monitoring period as below:

Monitoring period	1/04/2006 to 31/12/2009
Baseline emissions	236,633.00 tCO ₂ e
Project emissions	0.0 tCO ₂ e
Leakage emissions	0.0 tCO ₂ e
Emissions reduction	236,633.00 tCO₂e

Table of Contents

1.0	INTRODUCTION	4
1.1	Objective	4
1.2	Scope and Criteria	4
1.3	Level of Assurance	4
1.4	Summary Description of the Project	4
2.	VALIDATION PROCESS, FINDINGS AND CONCLUSION	8
2.0	Validation Process	8
2.1	Validation Findings	8
2.2	Validation Conclusion	8
3.0	VERIFICATION PROCESS	8
3.1	Method and Criteria	8
3.2	Document Review	9
3.3	Interviews	9
3.4	Site Inspections	10
3.5	Resolution of Any Material Discrepancy	11
4.0	VERIFICATION FINDINGS	11
4.1	Project Implementation Status	11
4.2	Remaining Issues from Previous Validation	11
4.3	Compliance of the monitoring plan with the monitoring methodology	11
4.4	Accuracy of GHG Emission Reduction or Removal Calculations	12
4.5	Implementation Status of the Monitoring Plan and Completeness of Monitoring	13
4.6	Baseline Emissions	14
4.7	Quality of Evidence to Determine GHG Emission Reductions or Removals	16
4.8	Management and Operational System	16
5.0	VERIFICATION CONCLUSION	17
6.0	REFERENCES	18

APPENDIX A: VERIFICATION PROTOCOL

1 INTRODUCTION

1.1 Objective

- To verify that the project was being implemented as described in the registered PD;
- To confirm that the monitoring system was being implemented and fully functional to generate verified carbon units (VCUs) without any double counting, and
- To establish that the data reported were accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation; and
- to verify and certify GHG emission reduction reported for 'Bundled wind power project by KMSPL, Bangalore' project for the period from 1/04/ 2006 to 31/12/2009.

1.2 Scope and Criteria

The scope of the verification is the independent and objective review and *ex-post* determination of the monitored reductions in GHG emissions from 'Bundled wind power project by KMSPL, Bangalore' project. The verification of this VCS project was based on registered VCS Project Document (PD), registered validation report (VCS 2007.1), monitoring report and supporting documents including the monitored data made available to the verification team. These documents were reviewed against the requirements of VCS Standard Version 3.3 criteria^{1/} and latest policy announcements, from VSC Board, presently applicable to the verification of project activity. The verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Level of assurance

In line with VCS Standard Version 3.3 and as per ISO 14064-3:2006 para A.2.3.2, a reasonable level of assurance has been followed for the verification of the project. Based on the desired level of accuracy, SIRIM QAS Intl. has established an internal quality control process and assures that the information given in the monitoring report is materially correct and is a fair representation of GHG data and information which has been prepared in accordance with the VCS Standard 3.3 criteria and latest policy announcements, from VSC Board, presently applicable to the verification of project activity for the current verification period. The verification report is prepared as per this requirement and details are presented in the verification statement in section 2 below:

1.4 Summary Description of the Project

The VCS project activity consists of 49 wind turbine generators totalling to 38.275 MW capacity located in the states of Tamilnadu and Karnataka, India. The generated electricity is injected / wheeled through the respective state electricity grids for sale / consumption, displacing energy generation of grid (predominated by fossil fuels) and hence leading to greenhouse gases emission reduction

The details of the project are as below:

S.no	Client name	WTG size	Grid/Captive	HTSC no	State / District / Place	Geographical coordinates
1.	Madras Hydraulic Hose (P)Ltd	0.75	Captive	1162	Tirunelveli, Tamilnadu	N 08 58 00.01, E 77 23 59.99
2.	Shanthi Gears Ltd.	1.25	Grid	1624/TIN	Tirunelveli, Tamilnadu	N 08 59 28.00, E 77 32 41.80
		1.50	Captive	2417		N 08 59 35.60, E 77 31 56.10
		1.25	Grid	1963		N 09 01 11.30, E 77 33 30.50
		1.25	Grid	2020		N 08 14 14.00, E 77 45 41.00
3.	Raj Ranga Textile Pvt. Ltd.	1.25	Captive	294	Coimbatore, Tamilnadu	N 10 48 09.50, E 77 08 42.90
4.	Suueera Alloys Global Pvt. Ltd	1.25	Captive	989	Coimbatore, Tamilnadu	N 10 48 23.20, E 77 08 50.80
5.	Cotton Blossom India Pvt. Ltd.	0.75	Grid	1416	Tirunelveli, Tamilnadu	N 08 5743.60, E 77 08 30.01
		0.75	Grid	2048	Tirunelveli, Tamilnadu	N 08 55 23.00, E 77 38 14.00
6.	Ambica Agarbathis and Aroma Industries Ltd.	0.75	Captive	1198	Tirunelveli, Tamilnadu	N 08 58 21.70, E 77 26 53.20
7.	Tirupur Export Knitwear Industrial Complex	1.00	Grid	1269	Tirunelveli, Tamilnadu	N 08 18 09.10, E 77 41 28.50
		1.50	Grid	1270		N 08 18 00.90, E 77 41 28.60
		1.50	Grid	1271		N 08 18 12.60, E 77 41 38.60
8.	Ansan Textile	0.225	Captive	609	Coimbatore, Tamilnadu	N 10 55 47.30, E 77 17 43.90
9.	Sree Santhosh Garments	0.225	Captive	473	Coimbatore, Tamilnadu	N 10 55 21.40, E 77 17 39.10
10.	Mod Forge Pvt. Ltd.	0.75	Captive	1952	Tirunelveli, Tamilnadu	N 09 00 12.30, E 77 32 02.05
11.	Sri Kumaran Wind Energy (P) Ltd	1.25	Captive	1739	Tirunelveli, Tamilnadu	N 08 59 02.24, E 77 32 56.62
		1.25		1725		N 08 58 55.11, E 77 32 38.14
		1.25		1726		N 08 59 06.73, E 77 33 40.68
12.	Eskay Design	1.25	Grid	1982	Tirunelveli, Tamilnadu	N 08 59 50.90, E 77 32 54.40
13.	Nutech Associates	1.25	Grid	1198	Erode, Tamilnadu	N 10 39 42.90, E 77 24 47.30
		0.75	Grid	1412	Tirunelveli, Tamilnadu	N 08 15 51.60, E 77 37 59.40

		1.50	Grid	H-20	Hassan, Karnataka	N 13 10 38.50, E 76 11 43.94
14.	Oriental Extractions Pvt. Ltd.	0.350	Captive	1201	Coimbatore, Tamilnadu	N 10 35 43.90, E 77 18 07.00
		0.350		1206		N 10 36 12.30, E 77 19 20.40
15.	Nagammal Mills Pvt. Ltd.	0.75	Grid	1626	Tirunelveli, Tamilnadu	N 08 58 54.25, E 77 27 31.63
		0.75	Grid	2126		N 09 00 54.37, E 77 24 29.37
16.	Best Engineers Pumps Pvt. Ltd.	1.25	Grid	1939	Tirunelveli, Tamilnadu	N 08 59 19.40, E 77 33 40.20
17.	Premier Carbonic Pvt. Ltd.	0.35	Grid	1145	Coimbatore, Tamilnadu	N 10 36 22.70, E 77 18 28.00
18.	Pure Carbo Gases	0.25	Grid	580	Coimbatore, Tamilnadu	N 10 41 04.00 E 77 31 16.50
19.	Popular Carbonic Pvt. Ltd	0.35	Grid	1144	Coimbatore, Tamilnadu	N 10 35 51.70, E 77 18 02.00
20.	Royal Classic Mills Pvt. Ltd	0.75	Captive	1937	Tirunelveli, Tamilnadu	N 08 58 05.80, E 77 29 54.70
21.	Saranya Garments Pvt. Ltd	0.75	Grid	2124	Tirunelveli, Tamilnadu	N 08 56 40.00, E 77 38 40.30
22.	Cethar Vessels Ltd	1.25	Captive	1648	Tirunelveli, Tamilnadu	N 08 55 36.70, E 77 36 20.60
23.	VT Switch gears & Transformers	0.60	Grid	PS 52	Davangere, Karnataka	N 14 13 59.80, E 75 47 03.10
24.	Shri Santhosh Meenakshi Textiles Pvt. Ltd.	0.50	Captive	624	Coimbatore, Tamilnadu	N 10 54 17.45, E 77 10 25.22
		0.50		542		N 10 54 20.67, E 77 10 16.51
		0.50		543		N 10 54 12.88, E 77 10 34.55
		0.50		628		N 10 55 10.01, E 77 08 46.95
		0.225		420		N 10 55 27.26, E 77 09 02.48
		0.225		421		N 10 55 26.59, E 77 08 45.00
25.	Lakshmi Exports	0.35	Grid	637	Coimbatore, Tamilnadu	N 10 56 28.90, E 77 20 42.20
		0.225	Grid	474	Coimbatore, Tamilnadu	N 10 56 27.72, E 77 20 42.27
26.	Adtech Systems Ltd	0.60	Grid	D 126	Dindigul, Tamilnadu	N 10 33 32.96 E 77 25 10.73
27.	Nutech Prasiddhi Consortium	1.50	Grid	H - 20	Hassan, Karnataka	N 13 10 32.17, E 76 11 48.66
28.	Sri Ramaiah Spinners Ltd.	0.35	Captive	2390	Tirunelveli, Tamilnadu	N 08 18 05.29, E 77 37 53.54
29.	Jayashree Cables & Conductors Pvt Ltd.	0.60	Grid	D.127	Dindigul, Tamilnadu	N 10 32 43.46, E 77 25 10.73

The project is a registered large scale VCS project that applies CDM methodology ACM 0002 version 10 under the sectoral scope 1 (Energy industries- renewable/non-renewable sources). The project has been reducing GHG emission since 22nd March 2005.

The verification report is based on the VCS version 3.3^{/1/}, VCS PD^{/2/}, the monitoring reports^{/4/,5/} and supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment.

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.0 Validation Process

Not applicable as the project activity had been validated as per the VCS 2007.1 Standard. Please refer to the VCS Validation Report dated 17th November 2009 submitted to VCS Registry.

2.1 Validation Findings

2.1.1 Gap Validation

Not Applicable

2.1.2 Methodology Deviations

Not applicable as no methodology deviations have been sought during the validation of this project activity. The project activity has applied Methodology ACM0002, Version 10^{/7/}.

2.1.3 Project Description Deviations

Not applicable

2.1.4 New Project Activity Instances

Not applicable as no new project activity instances are included in the project activity during the current monitoring period. The assessment team confirms that the project has been implemented and equipment installed as described in the validated VCS PD.

2.2 Validation Conclusion

As per the registered Validation Report of the project activity (VCS Project ID - 324) issued on 17th November 2009, the project activity has correctly applied the baseline and monitoring methodology ACM0002, Version 10 and meets the relevant VCS 2007.1 requirements.

3 VERIFICATION PROCESS

3.1 Method and Criteria

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

- i) a document review of the VCS registered PD, the Monitoring Report, VCS additional information and the emission reductions calculation spreadsheets submitted by the client; verification audit planning;
- ii) on-site visit to the project activity which included interviews with the project owner and the client, review of various monitoring records and records of calibration of the monitoring equipment, and verification of measurement procedures;
- iii) preparation of draft verification report (issuance of verification audit findings);
- iv) Resolution of outstanding issues and the issuance of final verification report and opinion.

3.2 Document Review

The following documentation were reviewed and verified:

- i) the validated version of the PD^{/2/} (dated 11th November 2009);
- ii) the approved baseline and monitoring methodology for the project ACM 0002.Version 10^{/7/}
- iii) The final validation report^{/3/} (dated 17th November 2009)
- iv) Version 0 of the monitoring report^{/4/} of the project (dated 16th June 2010)
- v) Version 1 of the monitoring report^{/4/} of the project (dated 11th January 2011)
- vi) Version 2 of the monitoring report^{/4/} of the project (dated 12th July 2013)
- vii) Calibration certificates provided for the individual WTGs^{/10/}
- viii) Emission reductions calculations spreadsheet^{/8/}
- ix) CEA Version 4.0^{/12/}

The complete list of all documents reviewed is as listed in part 5 (References) of this report.

3.3 Interviews

The personnel interviewed and the coverage of interviews during 05th-06th August 2010 is summarized below:

Persons interviewed	Coverage
1. Mr. R.K.S. Pillai (Assistant Manager, Suzlon) 2. Mr. R.Raghuram (site engineer) 3. Mr. S. Senthil (site engineer, Suzlon) 4. Mr. Ananda Narayanan (site engineer, Suzlon) 5. Mr. Arun (site engineer, Vestas RRB)	▪ Assessment of project boundary ▪ Review of physical components ▪ Qualification and training ▪ Calibration of equipment
Mr. P. Nandagopal (CDM Consultant)	▪ GHG data monitoring and recording ▪ Roles and responsibilities ▪ GHG raw data compilation

3.4 Site Inspections

An on-site verification to the project site was carried out from 05th-06th August 2010. The on-site audit consisted of visit to the site, metering room present in the switch yard and Central Monitoring system (CMS), to verify project implementation, the location of the monitoring equipment, and the review of documents and data in the office. Interviews with relevant personnel were also carried out to confirm the method of recording the GHG data.

The project assessment was based on the methodology and VCS Standard 3.3. In order to ensure transparency, a verification protocol was customized for the project, according to VCS Standard 3.3. The protocol shows, in a transparent manner, requirements, means of verification and the results. The verification protocol serves the following purpose;

- it organizes, provides details and clarifies the requirements of verification of a VCS project is expected to meet;
- it ensures a transparent verification process where the verifier will document how a particular requirement has been proved, and the results of the verification.

The completed protocol is enclosed in Annex I to this report.

The onsite verification team consisted of the following members:

Mr. R. Vijayaraghavan*, Lead Auditor (from July 2013)

Dr. G. Vishnu, Lead Auditor (up to October 2012)

Dr. D. Siddaramu, Auditor (up to April 2013)

**participated as Technical expert during onsite*

Dr. G. Vishnu holds a Ph.D in Environmental Science. He has around 8 years of experience in the field of research and consultancy related to water, wastewater, solid waste management systems, implementation of new, Cleaner Production technologies and biomass assessment studies. He has undergone extensive training on CDM validation and verification and has been qualified in accordance with SIRIM QAS Intl.'s qualification criteria as CDM lead auditor.

Mr. R. Vijayaraghavan holds BE in Mechanical Engineering, M. Tech in Energy Conservation and Management and MBA in Technology Management. He is certified as Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has 7 years of working experience in energy sector. He has been trained in the CDM validation and verification processes, and has been qualified as trainee CDM lead auditor in accordance with SIRIM QAS intl.'s qualification criteria.

Dr. D. Siddaramu holds a Ph.D in Environmental Science and P.G. Diploma in Industrial Safety. He has more than 7 years of experience in research & development, and EIA projects viz., hydro power projects, stone quarrying & mining and biomass assessment studies. He has experience in monitoring air and noise quality, conducting socio-economic surveys and data analysis. He has been trained in the CDM validation and verification processes, and has been qualified as a CDM lead auditor as per SIRIM QAS intl.'s qualification criteria.

3.5 Resolution of Any Material Discrepancy

The objective of this phase of the verification is to resolve the request for corrective actions and clarification and any other outstanding issues which needed to be clarified prior to SIRIM QAS Intl.'s conclusion on the monitoring report based on the site inspection and review of documents, such that the project activity meets the VCS version 3.3 criteria and latest policy announcements. Six (6) Corrective Action Requests (CAR) and five (5) Clarification Requests (CL) raised by the verification team were resolved during communication between the client and the verification team. In order to ensure the transparency of the verification process, completed protocol is enclosed in Appendix A to this report.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The project has been implemented and all WTGs were commissioned and are in operation as described in the registered VCS PD. The same has been verified during the site visit. As described in the registered PD, 49 WTGs have been commissioned as on 01st April 2006 constituting a total capacity of 38.275 MW. The commissioning of all the WTGs has been checked against their commissioning certificates^{/9/}.

The verification team was able to confirm that the physical features of the project site such as the technology and project equipment of the project activity are in place and the project is being implemented and operated as per the registered PD.

4.2 Remaining Issues from Previous Validation or Verification

This is the first verification for the project activity for the crediting period from the date of commissioning of the 01st WTGs. The validation report has been checked to confirm that there are no pending issues. However, a FAR had been raised on the issue of double counting which was resolved based on the replies as described in Annex 1.

4.3 Compliance of the monitoring plan with the monitoring methodology

The project has been registered with the “Consolidated methodology for grid-connected electricity generation from renewable resources” ACM0002^{/7/} Version 10.0. In compliance with the paragraph 13 of EB 61 Annex 25, the project is being verified against Version 10.0 of the same methodology. The assessment team verified the monitoring plan in the registered VCS PD^{/2/} against the applied methodology and confirms that the registered monitoring plan is in accordance with the approved methodology applied by the project activity.

4.4 Accuracy of GHG Emission Reduction or Removal Calculations

During the verification of the project activity, accuracy and calibration^{/10/} of all the metering have been checked and found appropriate. The details of monitoring equipments involved in the project activity and their calibration details are mentioned in Annex 1 of the Monitoring Report^{/5/}.

The Gazette of India (Registered NO. DL (N) – 04/0007/2003 – 15) dated 26/07/2010 which is a gazette for metering regulations in India clearly mentions that for voltage of 650 V up to 33 kV, energy meters with accuracy 0.5s and better is recommended. Hence, the accuracy classes of 0.5s and 0.2s of energy meters installed at sites are found to be appropriate and it is accepted.

CEA Notification No. 502/70/CEA/DP&D dated 17/03/2006 which is considered as national standard mentions that “All interface meters shall be tested at least once in five years.” However, the calibration frequency of once per year has been checked from the PPAs^{/6/} signed specifically for this project.

The installation and working conditions of the meters were checked during the on-site inspection and it was found to be satisfactory. It is also evident from the table in Annex 1 of the MR that calibrations for all monitoring equipment involved in the project activity are valid for current monitoring period and there is no delay in calibration. In cases where there was delay in calibration, the PP has conservatively applied the maximum permissible error of 5% for the delay period which is in line with the EB 52 Annex 60 calibration frequency guidelines.

According to the approved methodology ACM0002 (Version 10) Emission Reductions are calculated as:

$$ER_y = BE_y - PE_y - L_y$$

Where:

BE_y: Baseline Emissions in year y (t CO₂e/yr)

PE_y: Project Emissions in year y (t CO₂e/yr)

L_y: Leakage Emissions in year y (t CO₂e/yr)

Baseline emissions (BE_y in tCO₂) due to displacement of grid electricity is calculated as the product of the Baseline Emissions Factor (EF_y in tCO₂/MWh) calculated as described below, times the electricity supplied by the project to the grid (EG_y - EG_{baseline} in MWh), over the crediting period.

$$BE_y = EG_{PJ,y} \times EF_{Grid,CM,y}$$

Where:

BE_y: Baseline emissions in year y (tCO₂/yr.)

EG_{PJ,y} Electricity supplied by the project to the grid (MWh)

For calculation of the ex-ante combined margin emission factor, data of Operating and Build Margin for the three financial years from 2005-06 to 2007-08 has been obtained from the CO₂ Baseline Database for the Indian Power Sector Ministry of Power: Central Electricity Authority (CEA) Version 04 Dated: October 2008^{/12/} in line with the requirements of the registered PD. The verification team has verified the source which is appropriate and correct. Net electricity supplied to grid by the project activity EG_{PJ,y} during the monitoring period under verification has been monitored ex-post based on the total of the readings from the meters installed by State Electricity Boards at individual WTGs under this project activity. The calculations have been verified based on the Emission reduction spread sheet^{/8/} submitted.

The formulae applied for the emission reductions are found to be correct as per the requirements of the methodology which result in accurate and credible emission reductions.

4.5 Implementation Status of the Monitoring Plan and Completeness of Monitoring

The monitoring of the project activity is found to be in conformance with the monitoring methodology described in ACM0002^{/7/} Version 10.0; monitoring plan indicated in the registered VCS PD^{/2/} & the MR^{/5/} for the current monitoring period. The monitoring mechanism is effective and reliable.

The parameter to be monitored is the Net electricity supplied to grid by the project activity EG_{PJ,y} has been monitored ex-post based on the total of the readings from the meters installed by State Electricity Boards at individual WTGs under this project activity. For WTGs installed in Tamilnadu, the Net electricity supplied is based on the readings in the main meter taken as Joint Meter Readings. Metering system consists of one main (tri-vector) meter of accuracy class 0.5. Net electricity supplied to grid is measured through meter readings of this two-way export/import meter installed by TNEB.

For WTGs installed in Karnataka, Total electricity generated (TEGy) by the project activity is monitored based on the Joint meter readings to which a transmission loss is applied as per KERC regulations to calculate the value of Net electricity supplied to Grid (EGy) which is used for the purpose of estimating emission reductions. Metering system consists of one main (tri-vector) meter of accuracy class 0.2. Net electricity supplied to grid is measured through meter readings of this two-way export/import meter installed by KSEB.

During the site visit, personnel involved at various levels of operation of the project activity have been interviewed to confirm that the plant personnel are conscious of the importance of the monitoring activities. The on-site verification of the plant records also substantiate consistency in recording and reporting of monitored data.

The required monitoring systems have been installed and are operational. The meters comply with appropriate quality standards applicable for the used technology. The accuracy class of the meters installed^{/10/} for the project activity is found to be in accordance with the PPA signed specifically for the project activity.

The supporting records of monthly JMR bills^{/11/}; approved by respective state utilities were found to be sufficient to enable verification of emission reductions.

The following were the details of electricity generation for WTGs in Tamilnadu that were verified:

Monitoring Period	Installed Capacity (MW)	Electricity Generation (MWh)
2006*	34.675	42973.51
2007	34.675	53880.55
2008	34.675	62281.02
2009	34.675	71527.86
Total electricity generation (MWh)		230,662.95

**from April 1st onwards*

The actual achieved PLF ranged from 19.41 % to 24.35 % with an average of 21.16 % which was lesser than the estimated PLF of 25.29 and 27.46 % in the registered PD. Hence the electricity generated was found to be fair and conservative and reflective of actual site conditions.

The following were the details of electricity generation for WTGs in Karnataka that were verified:

Monitoring Period	Installed Capacity (MW)	Electricity Generation (MWh)
2006*	3.600	1039.74
2007	3.600	6031.36
2008	3.600	9367.25
2009	3.600	8180.50
Total electricity generation (MWh)		24,618.87

**from April 1st onwards*

The actual achieved PLF ranged from 22.67 % to 28.21 % with an average of 25.55% which was lesser than the estimated PLF of 26.50 % in the registered PD. Hence the electricity generated was found to be fair and conservative and reflective of actual site conditions. The total electricity generated $EG_{PJ,y}$ calculated as 255281.83 MWh was found to be correct and consistent with the data sheets provided and found acceptable by the verification team.

4.6 Baseline Emissions

For calculation of the ex-ante combined margin emission factor, data of Operating and Build Margin for the three financial years from 2005-06 to 2007-08 has been obtained from the CO2 Baseline Database for the Indian Power Sector Ministry of Power: Central Electricity Authority (CEA) Version 4 Dated: October 2008^{/12/} in line with the requirements of the registered PD. The verification team has verified the source which is appropriate and correct.

Net electricity supplied to grid by the project activity $EG_{PJ,y}$ has been monitored ex-post based on the total of the readings from the meters installed by State Electricity Boards at individual WTGs under this project activity. For WTGs installed in Tamilnadu, the Net electricity supplied is based on the readings in the main meter taken as Joint Meter Readings. Metering system consists of one main (tri-vector) meter of accuracy class 0.5. Net electricity supplied to grid is measured through meter readings of this two-way export/import meter installed by TNEB.

For WTGs installed in Karnataka, Total electricity generated (TEGy) by the project activity is monitored based on the Joint meter readings to which a transmission loss is applied as per KERC regulations to calculate the value of Net electricity supplied to Grid (EGy) which is used for the purpose of estimating emission reductions. Metering system consists of one main (tri-vector) meter of accuracy class 0.2. Net electricity supplied to grid is measured through meter readings of this two-way export/import meter installed by KSEB.

The total electricity supplied by the project activity to the grid is thus calculated by including the electricity supplied by WTGs in Karnataka and Tamilnadu.

Parameter	Description	Value	Unit
$EG_{PJ,y}$ (Ex- post)	Electricity supplied by the project to the grid	255281.83	MWh
$EF_{grid,CM,y}$ (Ex- ante)	Combined margin CO2 emission factor for grid connected power generation	0.9269	tCO2e/MWh

According to the approved methodology ACM0002 (Version 10) Emission Reductions are calculated as:

$$ER_y = BE_y - PE_y - L_y$$

Where:

BE_y : Baseline Emissions in year y (t CO2e/yr)

PE_y : Project Emissions in year y (t CO2e/yr)

L_y : Leakage Emissions in year y (t CO2e/yr)

Baseline emissions (BE_y in tCO2) due to displacement of grid electricity is calculated as the product of the Baseline Emissions Factor (EF_y in tCO2/MWh) calculated as described below, times the electricity supplied by the project to the grid ($EG_y - EG_{baseline}$ in MWh), over the crediting period.

$$BE_y = EG_{PJ,y} \times EF_{Grid,CM,y}$$

Where:

BE_y : Baseline emissions in year y (tCO2/yr.)

$EG_{PJ,y}$: Electricity supplied by the project to the grid (MWh)

The calculations of the emission reductions are found to be correct. The net quantity of electricity exported to the grid by the project activity is used for the emission reduction calculations. The project participant has provided a complete set of data for the current monitoring period.

The baseline emissions for WTGs in Tamilnadu are as verified as follows:

Monitoring Period	Baseline Emissions BE _y (tCO ₂ e)	Project Emissions PE _y (tCO ₂ e)	Leakage L _y (tCO ₂ e)	Emission reductions ER _y (tCO ₂ e)
2006*	39834	0	0	39834
2007	49944	0	0	49944
2008	57731	0	0	57731
2009	66303	0	0	66303
Total Emission reductions ER_y(tCO₂e)				213,812

*From April 1 onwards

The baseline emissions for WTGs in Karnataka are as verified as follows:

Monitoring Period	Baseline Emissions BE _y (tCO ₂ e)	Project Emissions PE _y (tCO ₂ e)	Leakage L _y (tCO ₂ e)	Emission reductions ER _y (tCO ₂ e)
2006*	964	0	0	964
2007	5591	0	0	5591
2008	8683	0	0	8683
2009	7583	0	0	7583
Total Emission reductions ER_y(tCO₂e)				22,820

*From April 1 onwards

The total calculated emission reductions of 236,633 (tCO₂e) based on the total project capacity of 38.275 MW was verified to be correct. The values of the monitored parameters reported are in the ER spreadsheet by the PP. The formula and method used to calculate the baseline emissions are appropriate. Since the project is a wind power generation project, project emissions and leakage emissions are not involved in the project activity. This is found to be in line with the approved methodology ACM0002^[7] Version 10.0 and as defined in the registered VCS PD^[2].

4.7 Quality of Evidence to Determine GHG Emission Reductions or Removals

The equipment used to monitor and measure the parameters in the monitoring plan had been calibrated accordingly. The project owner has established an annual calibration plan to ensure that the measuring equipment was calibrated in accordance with the recommendation made by the equipment supplier.

The installation and working conditions of the meters were checked during the on-site inspection and it was found to be satisfactory. It is also evident from the table in Annex 1 of the MR that calibrations for all monitoring equipment involved in the project activity are valid for current monitoring period and there is no delay in calibration. In cases where there was delay in calibration, the PP has conservatively applied the maximum permissible error of 5% for the delay period which is in line with the EB 52 Annex 60 calibration frequency guidelines.

The calibration records^{/10/} were verified and the verification team found that the calibration results were acceptable and that the equipment were functioning properly throughout the reporting period. All values used in determining emission reductions were substantiated with evidence that were free from any material errors.

4.8 Management and Operational System

The roles and responsibilities for monitoring of emission reduction data have been clearly defined and implemented as described in the registered PD. The monitoring of the GHG parameters (EGy) is part of the normal operations of the wind turbine generators. The project Head is the key person managing GHG data records. Hence it can be confirmed that the management system of the VCS project is in place; with the responsibilities properly identified.

5 VERIFICATION CONCLUSION

The scope of this verification covers the determination of voluntary greenhouse gas emission reductions generated by the “Bundled wind power project by KMSPL, Bangalore” for the period from 1/04/ 2006 to 31/12/2009. The verification is based on the VCS additional information^{/1/}, VCS registered PD^{/2/}, Monitoring Reports^{/5/}, emission reductions calculation spreadsheets^{/8/} and other supporting documents which were made available to SIRIM QAS International verification team by the client.

The management of KMSPL was responsible for the preparation and reporting of GHG emissions data, and the reported GHG emissions reduction on the basis set out within the project monitoring plan. It is the responsibility of SIRIM QAS Intl. verification team to express an independent GHG verification opinion on the GHG emissions from the project for the period from 1/04/2006 to 31/12/2009 and on the calculation of GHG emission reductions from the project based on the verified emissions for the same period.

The verification was carried out in accordance with the requirements of the VCS Version 3.3. As a result of the verification, the verification team confirms that for the reporting period:

- the project activity was in accordance with the applicable criteria of the VCS version 3.3;
- all operations of the project were implemented as described in the project description document.
- the monitoring system was in place and functional, with the installed equipment essential for generating emission reductions operating appropriately.
- Calibration of all the equipment had been carried out accordingly;
- the GHG emission reductions were calculated correctly on the basis of approved monitoring methodology ACM 0002, version 10.

The verification team has verified the information included in the final monitoring report (version 3.0, dated 12th July 2013) was correct and that the emission reductions achieved had been determined correctly. In our opinion, the GHG emission reductions for the period from 01st April 2006 to 31st December 2009 stated in the final monitoring report (version 3.0, dated 12th July 2013) for the project were fairly stated.

The verifier confirms that the GHG emission reductions were calculated without material misstatements for the whole monitoring period. Our opinion is based on the project’s GHG emissions and resulting GHG emission reductions reported, and, to the valid and registered project baseline and monitoring documents. Based on the information we have seen and evaluated, we confirm the following:

Monitoring period	01 st April 2006- 31 st December 2006	01 st January 2007 – 31 st December 2007	01 st January 2008 – 31 st December 2008	01 st January 2009 – 31 st December 2009
Baseline Emissions tCO ₂ e	40798	55535	66414	73885
Project Emissions tCO ₂ e	0	0	0	0
Leakage tCO ₂ e	0	0	0	0
Net GHG emission reductions or removals tCO₂e	40798	55535	66414	73885
Total Net GHG emission reductions or removals tCO₂e for the monitoring period	236,633			

As such, SIRIM QAS Intl. recommends the issuance of the VCS project activity.

Prepared by :

Approved by:

R. Vijayaraghavan

Parama Iswara Subramaniam

(R Vijayaraghavan)
Validation Team Leader

(Parama Iswara Subramaniam)
VVB Authorised Representative

6 REFERENCES

Ref No.	Document / type of information
/1/	VCS Standard Version 3.3 criteria
/2/	Validated project description dated 11 th November 2009
/3/	Validation report dated 17 th November 2009
/4/	Monitoring report version 01 dated January 11 th 2011
/5/	Final monitoring report version 03 dated 12 th July 2013
/6/	Power Purchase Agreement for all 49 WTGs
/7/	CDM methodology ACM0002 version 10
/8/	Emission reduction spreadsheet
/9/	Commissioning certificates for all 49 WTGs
/10/	Calibration certificates for energy meters for entire monitoring period
/11/	Monthly billing invoice (JMR) for all WTGs for entire monitoring period
/12/	CEA version 04

APPENDIX A : VERIFICATION PROTOCOL

Project name : Bundled wind power project by KMSPL, Bangalor

TABLE 1: VERIFICATION REQUIREMENTS BASED ON VCS VALIDATION AND VERIFICATION STANDARD VERSION 3.0

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
1. Compliance of the project implementation with the registered project design document					
1.1 Was an on-site visit conducted for this verification? If no, please justify the rationale of the decision.	VVS	227	Yes onsite visit was conducted for the project activity during 5 th – 6 th August 2010	OK	OK
1.2 Are all physical features of the VCS project activity proposed in the registered PD in place?	VVS	227	Yes all physical features of the VCS project activity proposed in the registered PD are in place. The onsite visit has verified the WTGs in Tamilnadu and Karnataka and the associated features such as meter yard, transmission systems.	OK	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
1.3 Have the project participants operated the proposed VCS project activity as per the registered PD or any approved revised PD?	VVS	227 & 230	The WTGs in the project activity involves sale to grid as well as for captive usage which is in line with the registered PD. However the following clarifications were raised - It is not evident from the monitoring report that, how many PP are sale to grid and captive use, from starting date of crediting period - The billing period details for HTSC No. 1162 and HTSC No. 1626 have not been mentioned in the ER calculation sheets - MR has not provided the comparison of the actual annual emission reductions with estimates in the registered PD for the monitoring period considered. - Since the project is also undergoing validation for CDM, it has to be ensured that double counting of the emission reductions does not take place throughout the VCS crediting period. Pls. provide evidence for the same based on the FAR raised in previous validation.	~~CL-1~~ ~~CL-2~~ ~~CAR-1~~ ~~CAR-2~~	OK OK OK OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
1.4 For this monitoring period, what is the status of the implementation of the project? For project activities that consist of more than one site, the DOE shall describe the status of implementation and starting date of operation for each site.	VVS	228 (a)	The project is bundled by Kanaka Management Services Pvt. Ltd. (KMSPL) Bangalore. It is established to harness the available wind power potential with 49 numbers of WTGS in Tamilnadu & Karnataka, aggregating to a total installed capacity of 38.275 MW. The project activity is located in the districts of Tirunelveli, Coimbatore and Erode in the State of Tamil Nadu and in the districts of Hassan and Davangere in the State of Karnataka, India.	OK	OK
For project activities with phased implementation, what is the progress of the proposed project activity achieved in each phase under verification. If the phased implementation is delayed, describe the reasons and present the expected implementation dates;	VVS	228 (a)	The project has been commissioned and is operating at the full expected capacity of 38.275 MW.	OK	OK
1.5 Describe the actual operation of the project activity.	VVS	228 (b)	The project is bundled by Kanaka Management Services Pvt. Ltd. (KMSPL) Bangalore with 49 numbers of WTGS in Tamilnadu & Karnataka, aggregating to a total installed capacity of 38.275 MW. The project supplies electricity to the fossil fuel dominated southern grid. A CAR was raised in this section as follows: The major breakdown and maintenance records for the entire monitoring period (01/04/2006 to 31/12/2009) have not been submitted.	~~CAR-3~~	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
1.6 Any information (data and variables) provided in the monitoring report that is different from that stated in the registered PD or any approved revised PD? (that has caused an increase in estimates of the emission reductions in the current monitoring period or is highly likely to increase the estimates of emission reductions in the future monitoring)	VVS	228 (c)	Data and variables that have a bearing on emission reductions, mentioned in the monitoring report are verified to identical with the registered PD. However the following CAR was asked: PP is requested to provide details of the actual PLF obtained in the project activity for the entire monitoring period and provide justifications if any for increase observed during the monitoring period compared the PLF used in the ex-ante estimation of emission reductions.	CAR-4	OK
2. Compliance of the monitoring plan with the monitoring methodology including applicable tool(s) The monitoring plan of the proposed VCS project activity shall comply with the applied methodology.					
2.1 For monitoring aspects that are not specified in the methodology, particularly in the case of small-scale methodologies (e.g. additional monitoring parameters, monitoring frequency and calibration frequency), these should be brought to the attention of the Board issues which may enhance the level of accuracy and completeness of the monitoring plan.	VVS	231	Monitored parameters in the project activity are as per the applied monitoring methodology ACM0002 version 10 and the applicable guidelines for small scale project activities.	OK	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
2.1 Is the monitoring plan of the VCS project activity complying with the methodology applied by the registered VCS project activity or an approved revised PD?	VVS	232	The monitoring plan is in consistency with the applied approved VCS methodology ACM0002 as indicated in the registered PD.	OK	OK
3. Compliance of monitoring activities with the registered monitoring plan. Determine whether the monitoring of parameters related to the GHG emissions reductions in the project activity has been implemented in accordance with the monitoring plan contained in the registered PD or any accepted revised monitoring plan.					
3.1 Has the monitoring plan been properly implemented and followed by the project participants?	VVS	234 (a)	The monitoring plan implemented is in line with the requirements of the registered PD and also ACM 0002 version 10 which was also verified from the site visit	OK	OK
3.2 Have all parameters stated in the monitoring plan, and relevant CDM Executive Board decisions been sufficiently monitored and updated as applicable, including:	VVS	234 (b)	Yes, all parameters stated in the monitoring plan, applied methodology and relevant VCS board decisions have been sufficiently monitored and updated as applicable	OK	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
i) project emission parameters			As the project is wind-based power generation and no primary or auxiliary fuel consumption is envisaged in the project, there are no project emissions. P _{Ey} = 0		
ii) baseline emission parameters	PD	4.1	The baseline emission parameters for establishing the baseline emissions, namely E_{Gpjy} (monitored parameter) and E_{Fy}(ex-ante parameter) are sufficiently monitored and reported in the monitoring report, the verification teams deems it is reasonable and in line with the applied monitoring methodology in the registered PD. For calculating the Combined margin, data of Operating margin from 2005-06 to 2007-08 and Build Margin from 2007-08 has been obtained from – The CO2 Baseline Database for the Indian Power Sector Ministry of Power: Central Electricity Authority (CEA) Version 4 Dated: October 2008 as verified from the source which is in line with the requirements in the registered PD.		
iii) leakage parameters	PD	4.1	As the project activity is generation of power from wind by installation of WTGs no leakage parameters are applicable as per requirements of the applied methodology.	OK	OK
iv) Management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan?	PD	3.3	Yes, the responsibilities and authorities for monitoring and reporting are in line with the details stated in the registered PD as verified from onsite interviews.	OK	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
3.3 Has the equipment used for monitoring is in accordance with section 4 below and is controlled and calibrated in accordance with the monitoring plan, the applied methodology, the Board guidance, local/national standards, or as per the manufacturer's specification?	VVS	234 (c)	Yes, the equipment used (energy meters) is in line with the requirements of the monitoring plan. However, the onsite visit indicated that the accuracy class of the energy generation recording meters is of 0.2S class in Karnataka while the MR does not indicate this detail. Clarify	~~CL-3~~	OK
3.4 Are monitoring results consistently recorded as per approved frequency?	VVS	234 (d)	Yes, the results (energy generated) have been consistently recorded (daily) as per the requirements of the monitoring plan and the monthly readings are monitored.	OK	OK
3.5 Have quality assurance and quality control procedures been applied in accordance with the monitoring plan or revised monitoring plan?	VVS	234 (e)	Yes, the QA and QC procedures have been applied. The readings in these meters is taken by State Electricity Board (SEB) officials in the presence of PP's representative and used for billing purposes.	OK	OK
4. Compliance with the calibration frequency requirements for measuring instruments. Determine whether the calibration of those measuring equipments that have an impact on the claimed emission reductions is conducted by the project participants at a frequency specified in the applied monitoring methodology and/or the monitoring plan.					

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
4.1 Identify if there is any monitoring equipment not calibrated in accordance with the monitoring plan, the applied methodology, the Board guidance, local/national standards, or as per the manufacturer's specification?	VVS	238	The details of meter calibration and period for which correction is applicable as per EB 52, Annex 60 in conformance to requirements of the methodology and the registered PD are not provided.	CAR-5	OK
4.2 If there is delayed and the calibration has been implemented after the monitoring period in consideration (i.e. the results of delayed calibration are available), has the following conservative approach adopted in the calculation of emission reductions: (a) Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error; or (b) Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment.	VVS	238	Monitoring equipment i.e energy meter is calibrated at a frequency and as per procedures defined in the monitoring plan in the registered PD. However, for few WTGs, calibration frequency is observed to be not as per registered monitoring plan, and "Guidelines for assessing compliance with the calibration frequency requirements" are referred for those WTGs. In this context the following clarification was raised (a) For HTSC No. 1982 (Eskay design), the initial calibration date is on 29th September 2007 whereas the WTG is commissioned on 29 August 2006. Pls. clarify the discrepancy with relevant sources. (b) For HTSC No. 474 (Lakshmi exports), the earliest calibration certificate is dated 24th September 2007 whereas the WTG is commissioned on 24 September 2005. Considering the TNERC / PPA calibration guidelines of once per year, Pls. clarify the discrepancy with relevant sources. (c) For HTSC No. 1162 (Madras hydraulic hose) the earliest calibration certificate is dated 23rd March 2007 whereas the WTG is commissioned on 22 March 2005. Considering the TNERC / PPA calibration guidelines of once per year, Pls. clarify the discrepancy with relevant sources. (d) Clarify the date of commissioning for HTSC No. 1952 (Mod forge Pvt Ltd.) as the VER sheet list the date as 19th July 2011 while calibration certificate is dated earlier (18th July 2007).	CL-4	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
4.3 Confirm that the error has been applied: (a) In a conservative manner, such that the adjusted measured values of the delayed calibration shall result in fewer claimed emission reductions; (b) For all measured values taken during the period between the scheduled date of calibration and the actual date of calibration.	VVS	239	The error has been applied for EG_{pij} as per “Guidelines for assessing compliance with the calibration frequency requirements” To refer to earlier CL 4 for closure	Depends on closure of CL 4	OK
4.4 In cases where the results of the delayed calibration are not available, or the calibration has not been conducted at the time of verification, the verification team, prior to finalizing verification, shall request the project participants to conduct the required calibration and shall determine whether the project participants have calculated the emission reductions conservatively using the approach mentioned in paragraph 4.3 above.	VVS	240	The error has been applied for EG_{pij} as per “Guidelines for assessing compliance with the calibration frequency requirements”	OK	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
4.5 In cases where the verification team determines that it is not possible for the project participants to conduct the calibration at a frequency specified by either the applied methodology, guidance provided by the Board, and/or the registered monitoring plan due to reasons beyond the control of project participants (For example, due to the contractual terms between the project participant and purchasing/selling entities), the verification team, shall follow the requirements for post registration changes in section of E of the VVS.	VVS	241	the project participants have conducted the calibration at a frequency specified by the applied methodology ACM 0002 and in case this is not followed the guidance provided by the Board “Guidelines for assessing compliance with the calibration frequency requirements” has been applied	OK	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
4.6 In cases where neither the monitoring methodology nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, the verification team shall determine whether the equipments are calibrated either in accordance with the specifications of the local/national standards, or as per the manufacturer's specification. If neither local/national standards nor the manufacturer's specification are available, international standards may be used. Refer to appendix 1 of the VVS for an illustrative example to apply the above requirements.	VVS	242	Not applicable as both the monitoring methodology and the monitoring plan specify requirements for calibration frequency	OK	OK
5.0 Assessment of data and calculation of emission reductions Assess the data and calculations of GHG emission reductions achieved by/resulting from the project activity by the application of the selected approved methodology.					

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
5.1 Is a complete set of data for the specified monitoring period is available?	VVS	245 (a)	The complete sets of data (calibration / monitoring records) for the some periods are not available. However the PP has conservatively considered not accounting the emission reductions for the same.	OK	OK
e5.2 If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, the verification team shall raise a CAR for the project participants to comply with the requirements of Appendix 1 of the Project Standard or submit a request for deviation prior to submitting the request for issuance, if appropriate;	VVS	245 (a)	The complete sets of data for the following periods are not available. However the PP has conservatively considered not accounting the emission reductions for the same.	OK	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
5.3 Has information provided in the monitoring report been crosschecked with other sources such as plant log books, inventories, purchase records, laboratory analysis?	VVS	245 (b)	The data provided has been cross-checked with the monthly bill / invoices which are issued by third party. However the following CAR was raised: Below mentioned PPs with HTSC No. the EB bills for verification has not been provided. • Popular Carbonic HTSC No.1144 Jan 2009 to March 2009, HTSC No.1145 April 2006 to May 2006 & April 2008 to March 2009 • AD-Tech D-126 Oct 2008 to Jan 2010 • Ambika Agarbathis HTSC No. 1198 Jan 2007 to Feb 2007, Aug 2007 to Sept 2007 & April 2009 to Jan 2010 • Rajranga HTSC No. 986 April 2006 to Jan 2010 • Madras Hydraulics HTSC No. 1162 April 2006 to Jan 2010 • Mod Forge HTSC No. 1952	~~CAR-6~~	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
5.4 Have calculations of baseline emissions, proposed VCS project activity emissions and leakage, as appropriate, been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document?	VVS	245 (c)	Yes, the calculations of baseline emissions, have been carried out in accordance with the formulae and methods described in the registered monitoring plan and the applied methodology. Verification team confirms that the VCS project activity does not involve any project activity emissions and leakage. Calculations of baseline emissions, proposed VCS project activity emissions and leakage, as appropriate, been carried out according to the approved methodology ACM0002 (Version 10) as follows: $ER_y = BE_y - PE_y - Ly$ Where: BE_y: Baseline Emissions in year y (t CO₂e/yr) PE_y: Project Emissions in year y (t CO₂e/yr) Ly: Leakage Emissions in year y (t CO₂e/yr)	~~CL-5~~	OK

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.
			However the following CL was raised: Clarify, For Madras Hydraulic Hose (P)Ltd HTSC No 1162, • PP has not considered the wheeling charges from April 2006 to Jan 2010. • In net generation calculations PP does not applied formulae consistently. For Shanti gears HTSC no 1624 & 2020 • As per registered PD above mentioned WTGs are sale to grid but in excel sheet PP applied wheeling charges for the same. • For HTSC No 1624 net generation of figure in J10 column does not indicate the formula used for computation. • For Nutech Prasiddhi Consortium HTSC No. H-20 • The source for - transmission losses in column H to be clarified • Is it calculated or taken from the Energy meter reading. clarify • Same parameter in column H12 and H13, H14 and H36 shows nil. clarify		

APPENDIX A : VERIFICATION PROTOCOL

Checklist Questions	Ref	§	Comments by verifier	Draft Concl.	Final Concl.										
5.5 Any assumptions used in emission calculations? If yes, they been justified?	VVS	245 (d)	The assumptions used in the emission calculations relate to the PLF that is mentioned in the validated PD. The assumption has been verified and justified as follows: Actual PLF for the monitoring period has been verified to be <table><tr><th>Period</th><th>PLF (%)</th></tr><tr><td>2006 - 07</td><td>20.506</td></tr><tr><td>2007 - 08</td><td>21.747</td></tr><tr><td>2008 - 09</td><td>22.614</td></tr><tr><td>2009 - 10</td><td>25.132</td></tr></table> as per the registered VCS-PD estimated reduction for the period of 1/ 04/ 2006 to 31/12/2009 is 312329 tCO2e whereas, the actual emission reduction achieved during the period 1/ 04/ 2006 to 31/12/2009, which is 2,36,633 tCO2e and this is lower than expected. This is because the actual PLF achieved by the WTGs during this monitoring period is lower than expected PLF mentioned in the registered VCS-PD.	Period	PLF (%)	2006 - 07	20.506	2007 - 08	21.747	2008 - 09	22.614	2009 - 10	25.132	OK	OK
Period	PLF (%)														
2006 - 07	20.506														
2007 - 08	21.747														
2008 - 09	22.614														
2009 - 10	25.132														
5.6 Have appropriate emission factors, IPCC default values and other reference values been correctly applied?	VVS	245 (e)	Project activity follows ex-ante grid emission factor and it is correctly applied across monitoring report and VCU excel sheets.	OK	OK										

APPENDIX A : VERIFICATION PROTOCOL

TABLE 2: RESOLUTION OF CORRECTIVE ACTION AND CLARIFICATION REQUESTS

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Verification team conclusion
<u>CAR 1</u> MR has not provided the comparison of the actual annual emission reductions with estimates in the registered PD for the monitoring period considered.	1.3	The discrepancy in the M.R is updated as per the requirement and the same is submitted to DOE.	The comparison of actual emission annual reductions is now provided. As the actual ER is much lesser than the estimated ER in the PD, the emissions verified are conservative and acceptable. <u>Conclusion: CAR 1 Resolved</u>
<u>CAR 2</u> Since the project is also undergoing validation for CDM, it has to be ensured that double counting of the emission reductions does not take place throughout the VCS crediting period. Pls. provide evidence for the same based on the FAR raised in previous validation.	1.3	Undertaking letter is submitted to the DOE from PP ensuring that the double counting of the emission reductions does not take place. Since, the project is being validated under VCS, PP will claim the VERs up to CDM registration only.	The letter of undertaking has been provided for ensuring that PP will claim VERs up to CDM registration only. <u>Conclusion: CAR 2 Resolved</u>
<u>CAR 3</u> The major breakdown and maintenance records for the entire monitoring period (01/04/2006 to 31/12/2009) have not been submitted.	1.5	Since the unit generation data is not available during the time of grid failure and major breakdown period. Those periods generation is considered as zero.	As PP has not considered ER for the period in which generation data is not available, this is considered appropriate. <u>Conclusion: CAR 3 Resolved</u>

APPENDIX A : VERIFICATION PROTOCOL

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Verification team conclusion
<u>CAR 4</u> PP is requested to provide details of the actual PLF obtained in the project activity for the entire monitoring period and Provide justifications if any for increase observed during the monitoring period compared the PLF used in the ex-ante estimation of emission reductions.	1.6	Actual PLF obtained for each WTG is updated in the latest M.R. Since, there was no increase in the PLF in contrast with the assumed PLF during validation; there was no increase in the emission reductions compared to the estimated ex-ante calculations.	Actual PLF has been calculated based on the generation records. For WTGs in Tamil Nadu, The actual achieved PLF ranged from 19.48 % to 24.44 % with an average of 21.32 % which was lesser then the estimated PLF of 25.29 and 27.46 % in the registered PD. For WTGs in Karnataka the actual achieved PLF ranged from 22.67 % to 28.21 % with an average of 25.55% which was lesser then the estimated PLF of 26.50 % in the registered PD. Hence the electricity generated was found to be fair and conservative and reflective of actual site conditions. <u>Conclusion: CAR 4 Resolved</u>
<u>CAR 5</u> The details of meter calibration and period for which correction is applicable as per EB 52, Annex 60 in conformance to requirements of the methodology and the registered PD are not provided.	4.1	The latest calibration records are submitted to DOE and correction factors applied accordingly.	The calibration records for all WTGs have been submitted for verification. In case of delays the maximum permissible error has been applied as per calibration frequency guidelines. <u>Conclusion: CAR 5 Resolved</u>

APPENDIX A : VERIFICATION PROTOCOL

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Verification team conclusion
<u>CAR 6</u> Below mentioned PPs with HTSC No. the EB bills for verification has not been provided. • Popular Carbonic HTSC No.1144 Jan 2009 to March 2009, HTSC No.1145 April 2006 to May 2006 & April 2008 to March 2009 • AD-Tech D-126 Oct 2008 to Jan 2010 • Ambika Agarbathis HTSC No. 1198 Jan 2007 to Feb 2007, Aug 2007 to Sept 2007 & April 2009 to Jan 2010 • Rajranga HTSC No. 986 April 2006 to Jan 2010 • Madras Hydraulics HTSC No. 1162 April 2006 to Jan 2010 • Mod Forge HTSC No. 1952	5.3	• Popular Carbonic – The pending bills has been submitted to the DOE. • AD-Tech – The pending bills has been submitted to the DOE. • Ambika Agarbathis – Since the data is not available from Jan 2007 to Feb 2007 and Aug 2007 to Sep 2007, the generation is considered as zero in the submitted spread sheets. EB Invoices has been submitted to the DOE from the period April 2009 to Jan 2010. • Rajranga - EB Invoices has been submitted to the DOE from the period April 2006 to Jan 2010. • Madras Hydraulics - EB Invoices has been submitted to the DOE from the period April 2006 to Jan 2010. • Mod Forge - EB Invoices has been submitted to the DOE from the period April 2006 to Jan 2010.	The EB bills for the following have been provided and have been verified. • Popular Carbonic • AD-Tech • Ambika Agarbathis • Rajranga • Madras Hydraulics • Mod Forge <u>Conclusion: CAR 6 Resolved</u>
<u>CL 1</u> It is not evident from the monitoring report that, how many PP are sale to grid and captive use, from starting date of crediting period	1.3	Latest M.R submitted outlines the sale to grid and captive usage details of each WTGs.	The MR has been updated with the relevant details reflecting the WTGs under sale to grid and captive use category <u>Conclusion: CL 1 Resolved</u>

APPENDIX A : VERIFICATION PROTOCOL

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Verification team conclusion
<u>CL 2</u> The billing period details for HTSC No. 1162 and HTSC No. 1626 have not been mentioned in the ER calculation sheets	1.3	The revised ER sheets with the corrections is now submitted.	The billing period details mentioned have been verified from the monthly invoices as correct. <u>Conclusion: CL 2 Resolved</u>
<u>CL 3</u> The onsite visit indicated that the accuracy class of the energy generation recording meters is of 0.2 class while the MR does not indicate this detail. Clarify	3.3	The accuracy class of the energy generation recording meters details has been updated in the latest M.R	The MR has been revised to reflect the actual onsite implementation with regard to the accuracy class of the energy metres. <u>Conclusion: CL 3 Resolved</u>
<u>CL 4</u> (a) For HTSC No. 1982 (Eskay design), the initial calibration date is on 29th September 2007 whereas the WTG is commissioned on 29 August 2006. Pls. clarify the discrepancy with relevant sources. (b) For HTSC No. 474 (Lakshmi exports), the earliest calibration certificate is dated 24th September 2007 whereas the WTG is commissioned on 24 September 2005. Considering the TNERC / PPA calibration guidelines of once per year, Pls. clarify the discrepancy with relevant sources. (c) For HTSC No. 1162 (Madras hydraulic hose) the earliest calibration certificate is dated 23rd March 2007 whereas the	4.2	(a) The maximum permissible error is applied for the delay period in calibration (b) The calibration certificate for 2006 has been submitted for HTSC No. 474 (c) The calibration certificate for 2006 has been submitted for HTSC No. 1162 (d) The correct commissioning date of HTSC no. 1952 (july 2006) is now provided	(a) For HTSC 1982, the maximum error of 5% has been applied for the delay period which is appropriate. (b) The calibration frequency for HTSC No. 474 is now in line with PPA. (c) The calibration frequency for HTSC No. 1162 is now in line with PPA. (d) For HTSC no. 1952, the commissioning date has been verified to be correct. <u>Conclusion: CL 4 Resolved</u>

APPENDIX A : VERIFICATION PROTOCOL

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Verification team conclusion
WTG is commissioned on 22 March 2005. Considering the TNERC / PPA calibration guidelines of once per year, Pls. clarify the discrepancy with relevant sources. (d) Clarify the date of commissioning for HTSC No. 1952 (Mod forge Pvt Ltd.) as the VER sheet list the date as 19th July 2011 while calibration certificate is dated earlier (18th July 2007).			
CL 5 For Madras Hydraulic Hose (P)Ltd HTSC No 1162, • PP has not considered the wheeling charges from April 2006 to Jan 2010. • In net generation calculations PP does not applied formulae consistently. For Shanti gears HTSC no 1624 & 2020 • As per registered PD above mentioned WTGs are sale to grid but in excel sheet PP applied wheeling charges for the same. • For HTSC No 1624 net generation of figure in J10 column does not indicate the	5.4	Madras Hydraulic Hose (P) Ltd – corrected excel sheet applying wheeling charges has been submitted to the DOE and the formulae is made consistent in the excel sheet for net generation calculations. Shanti Gears – As per the latest PPA both the WTGs HTSC No. 1624 and 2020 are captive, based on that the calculations were made. Latest PPA was also submitted to the DOE for examination. The typological error in the excel sheet is corrected. Nutech Prasiddhi Consortium - Transmission losses were calculated based on the energy meter reading.	For Madras Hydraulic Hose (P) Ltd The PP has now applied the wheeling charges for net generation calculations which is correct For Shanti Gears the discrepancy in the spreadsheet is now corrected For Nutech Prasiddhi Consortium Transmission losses are taken from the energy meter reading in the substations located near the WTG. This is based on the billed monthly invoices.

APPENDIX A : VERIFICATION PROTOCOL

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Verification team conclusion
formula used for computation. For Nutech Prasiddhi Consortium HTSC No. H-20 • The source for - transmission losses in column H to be clarified • Is it calculated or taken from the Energy meter reading. clarify • Same parameter in column H12 and H13, H14 and H36 shows nil. clarify		The transmission loss data for the remaining period is updated in the excel sheet.	<u>Conclusion: CL 5 Resolved</u>