

WIND ENERGY PROJECT BY RAMCO GROUP IN INDIA (2ND VERIFICATION)

Document Prepared By



TÜV NORD CERT GmbH
JI/CDM Certification Program
Langemarckstraße, 20
45141 Essen, Germany
Phone: +49-201-825-3335
Fax: +49-201-825-3290
www.tuev-nord.de
www.global-warming.de

Project Title	Wind energy Project by Ramco group in India
Version	Version 3
Report ID	669

Report Title	Wind energy project by Ramco group in India Report Number : 53601411 - 11/348
Client	Madras Cements Limited
Pages	29
Date of Issue	2012-09-06
Prepared By	TÜV NORD CERT GmbH
Contact	JI/CDM Certification Program Langemarckstraße, 20 45141 Essen, Germany

Approved By	Phone: +49-201-825-3335 Fax: +49-201-825-3290 www.tuev-nord.de www.global-warming.de
	Stefan Winter
Work Carried Out By	Manjari Chandra (TL)* Ma. Paa Puratchikkanal (TL)** R. Murali (TL)*** C. Indumathi (TL)**** R. Narendra Kumar (TM) Vijay Machcha (T) Jimmy Sah (OR) Kunal Rami (TR) * TL from 2012-06-23 ** TL till 2012-01-24 *** TL from 2012-01-25 to 2012-04-30 **** TL from 2012-05-01 to 2012-06-22

Summary:

M/s. Madras Cements Limited has commissioned the TÜV NORD JI / CDM Certification Program to carry out the verification of the Project "Wind energy project by Ramco group in India" in Tamil Nadu and Karnataka, India with regard to the requirements of VCS Version 3.2 Standard.

The project activity involves installation and operation of 159.75 MW capacity wind power project consisting of 136 Wind Turbine Generators (WTGs) in Tirunelveli, Dindigul and Tirupur districts of Tamil Nadu, and Hassan and Chitradurga districts of Karnataka.

Reporting period: From 2008-11-01 to 2011-03-31 (both days included)

In the course of the verification 7 Corrective Action Requests (CARs), 0 Clarification Requests (CLs) were successfully closed and 1 Forward Action Request (FAR) will be verified during the subsequent periodic verification.

The verification is based on the draft monitoring report^{/MR/}, revised monitoring report^{/MR/}, the monitoring plan as set out in the validated PD^{/PD/}, the validation report^{/val/}, emission reduction calculation spreadsheet^{/xls/} and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

As the result of the 2nd periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

GHG Emission Reductions	2008	2009	2010	2011	Total ER in the monitoring period	
Emission reduction (tCO ₂ e)	18,551	356,335	320,210	45,009	740,105	

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1 INTRODUCTION

Madras Cements Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the verification of the project:

“Wind energy project by Ramco group in India”

with regard to the relevant requirements of the Voluntary Carbon Standard version 3.2^{/VCS/}. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered VCS project for the monitoring period 2008-11-01 to 2011-03-31,

The applied monitoring methodology is ACM0002 -“Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, Version 10.

1.1 Objective

The purpose of this verification, by independent checking of objective evidence, is as follows:

- to verify that the project is implemented as described in the project design document;
- to assess the implementation of the monitoring plan (MP) content in the VCS-PD^{/PD/};
- to assess the project's compliance with other relevant rules, including the host country (India) legislation;
- to confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions (VERs / VCU) without any double counting; and
- to establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The 2nd periodic verification of this project is based on the VCS project description^{/PD/}, the monitoring report^{/MR/}, emission reduction calculation spreadsheet^{/XLS/}, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The verification is carried out on the basis of the following requirements, applicable for this project activity:

- Article 12 of the Kyoto Protocol^{/KP/},
- VCS Version 03.2 requirements
- guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 3/CMP.1^{/MA/}, and subsequent decisions made by the Executive Board and COP/MOP,
- other relevant rules, including the host country legislation,
- CDM Validation and Verification Manual^{/VVM/}

- monitoring plan as given in the VCS registered PD ^{/PD/},

-Approved CDM Methodology ACM0002 Ver.10 (Consolidated baseline methodology for grid connected electricity generation from renewable sources,)

The TÜV NORD II/CDM CP has employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

1.3 Level of assurance

The verification has been planned and organized to achieve a

☒ reasonable level of assurance

☐ limited level of assurance.

1.4 Summary Description of the Project

The project activity involves the implementation of 159.75 MW capacity wind power project consisting of 136 Wind Turbine Generators (WTGs) in Tirunelveli, Dindigul and Tirupur districts of Tamil Nadu, and Hassan and Chitradurga districts of Karnataka. The project activity would generate about 324 GWh of electricity annually which would replace equivalent quantum of power at the Tamil Nadu Electricity board (TNEB), Bangalore Electricity Supply Company Ltd (BESCOM) and Chamundeshwari Electricity Supply Corporation Ltd (CESC). The latitude and longitude details of the 136 windmills (given in annex 1 of PD) located in Tirunelveli, Dinugal and Tirupur Districts of Tamil Nadu and were Hassan and Chitradurga districts of Karnataka were verified and found to be OK.

Owner	Number and Capacity (KW)	Utilization
Madras Cements Limited	24 X 1650	Export to Grid
	11 X 1650	Captive Consumption
	10 X 800	Export to Grid
	43 X 800	Export to Grid
Thanjavur Spinning Mills Limited	4 X 1250	Captive Consumption
Shri Vishnu Shankar Mill Limited	6 X 1250	Captive Consumption
	1 X 1650	Captive Consumption
Rajapalayam Mills Ltd	10 X 1250	Captive Consumption
	2 X 1650	Captive Consumption

Sandhya Spinning Mill Limited	4 X 1250	Captive Consumption
	1 X 350	Captive Consumption
Sudarsanam Spinning Mills	3 X 1250	Captive Consumption
	1 X 1650	Captive Consumption
Rajapalayam Textile (a division of Rajapalayam Mills Ltd)	1 X 1250	Captive Consumption
Ramco Industries Limited	6 X 1250	Captive Consumption
	2 X 800	Export to grid
	1 X 1500	Export to grid
	2 X 1650	Export to grid
	1 X 500	Captive Consumption
	1 X 750	Captive Consumption
Rajapalayam Spintext (a division of Rajapalayam Mills Ltd)	2 X 1250	Captive Consumption

The key parameters of the project are given in table 1-3:

Table 1-4a: Technical data of the project

Parameter	Unit	V 82	E - 53	E - 48	E – 33	S - 64
Make		Vestas	Enercon	Enercon	Enercon	Suzlon
Capacity of generator	kW	1650	800	800	330	1250
Cut in wind speed	m/s	3.5	3	3	3	3
Cut out wind speed	m/s	20	28-34	28-34	28	25
Maximum rotational speed	rpm	14.4	31.5	31.5	45	20.8
Rotor Diameter	m	82	53	48	33.4	64
Number of blades		3	3	3	3	3
Hub height	m	78	75	75	50	65
Gearing		With gear	gearless	gearless	With gear	gearless

Parameter	Unit	S - 33	NM 750 -200/48	S 82	V 39
Make		Suzlon	NEG Micon	Suzlon	Vestas
Capacity of generator	kW	350	750/200	1500	500
Cut in wind speed	m/s	3.5	3.5	4	4
Cut out wind speed	m/s	25	25	20	25

Parameter	Unit	S - 33	NM 750 -200/48	S 82	V 39
Maximum rotational speed	rpm	32	22/15	18.4	26.4
Rotor Diameter	m	33.4	48.2	82	47
Number of blades		3	3	3	3
Hub height	m	50/60/70	55	78.5	50
Gearing		With gear	With gear	With gear	With gear

Table 1-4b: Parameters confirmed during verification
Parameters mentioned in Annex1 are verified during verification.

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

- Method and Criteria:
- Document Review:
- Interviews:
- Site Inspections:
- Resolution of Any Material Discrepancy:

The project is already registered under VCS with the project ID: 669, further for above points, please refer to VCS Final Validation report of “Wind energy project by Ramco group in India” dated 2009-11-16 by TÜV NORD CERT GmbH and submitted to VCSA..

2.2 Validation Findings

2.2.1 Gap Validation

. The project is already registered under VCS with the project ID: 669, however some of the WTGs (41.6 MW) in this project activity had applied for CDM benefits. But now the CDM validation contact has been terminated which can be checked from the UNFCCC website¹. Hence it has been concluded that the project has not created another form of environmental credit and does not require Gap validation to be carried out.

2.2.2 Methodology Deviations

No methodology deviation is required for this project activity.

¹ <http://cdm.unfccc.int/Projects/Validation/DB/AOLO0C51SE7IUL19FP3B27HORLRSK0/view.html>

2.2.3 New Project Activity Instances

There is no new project activity instances is identified or proposed by the project proponent during the current monitoring period.

2.3 Validation Conclusion

The project has already been validated under VCS with project ID: 669 refer section 4 of the VCS Final Validation report of “Wind energy project by Ramco group in India” dated 2009-11-16 by TÜV NORD CERT GmbH and submitted to VCSA.

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the monitoring report
- Desk review of the Monitoring Report^{/MR/} submitted by the client and additional supporting documents.
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

The sequence of the verification is given in the table 3.3-1 below:

Table 3.1-1: Verification sequence

Topic	Time
Assignment of verification	2011-06-01
On-site visit	2011-10-23, 2011-10-24 & 2011-10-25
Draft reporting finalised	2011-10-28
Technical review on draft reporting finalised	2011-10-28
Final reporting finalised	2012-02-20
Technical review on final reporting finalised	2012-08-23
Final corrections	2012-08-23

The main verification steps are described below.

3.2 Document Review

The submitted MR (version 1) and supporting background documents related to the project design and

monitoring were reviewed.

Furthermore, the verification team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data.

During the verification process a comparison of Emission reductions was carried out, the actual emission reductions for the project activity during this monitoring period (29 months) is 740,105 tCO₂ whereas the estimated Emission Reductions as per the registered VCS PD for 29 months is 785223 (estimated based on annual emission reductions of 324290 tCO₂)

Hence the emission reduction in the monitoring period is 6% less than it was estimated. The reason being low wind availability leading to low plant load factor in past two years and the same is accepted.

The references used in the course of this verification are summarized in section 5.

3.3 Interviews

The verification team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS.

During verification, the verification team has performed interviews to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarized in Table 3.3-1.

Table 3.3-1: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Project proponent representatives ^{//IM01/}	- General aspects of the project - Technical equipment and operation - Changes since validation - Monitoring and measurement equipment - Remaining issues from validation / previous verifications - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification - Maintenance - Environmental aspects - Editorial issues of the Monitoring Report
Project consultant representatives ^{//IM02/}	

3.4 Site Inspections

The verification team has carried out an inspection on site on 2011-10-23, 2011-10-24 & 2011-10-25 in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore the

on-site assessment was conducted and monitoring data were checked with respect to accuracy to ensure the calculation of emission reductions. The main tasks covered during the site visit include,

- The on-site assessment included an investigation of whether all relevant equipment is installed and works as anticipated.
- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed.
- The duly calibration of all metering equipment was checked.
- The monitoring processes, routines and documentations were audited to check their proper application.
- The monitoring data were checked completely.
- The data aggregation trails were checked via spot sample down to the level of the meter recordings.

Responsibilities related to monitoring are executed as defined in the monitoring plan^{/PD/ & /MR/} and were assessed and found to be OK.

3.5 Resolution of Any Material Discrepancy

Material discrepancies identified in the course of the verification are addressed either as CARs, CLs or FARs.

A **Corrective Action Request (CAR)** is established where:

- mistakes have been made in assumptions, application of the methodology or the project documentation which will have a direct influence the project results,
- the requirements deemed relevant for verification of the project with certain characteristics have not been met or
- there is a risk that the project would not be registered or that emission reductions would not be able to be verified and certified.

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the first verification.

A detailed list of the CARs CLs and FAR raised and discussed in the course of this verification is included in the next section 4 of this report.

4 VERIFICATION FINDINGS

In this section the assessments and findings from the desk review of the VCS PD, Validation report site visit, interviews and supporting documents as well as the final assessments are summarised. Table 3-1 includes an overview of all raised CARs, CLs and FARs.

Table 3-1: Overview of CARs, CLs and FARs issued

No.	Topic / Chapter	CAR	CL	FAR
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4.1	Project implementation status	2	-	1
4.2	Accuracy of GHG Emission Reduction or Removal Calculations	4	-	
4.3	Quality of Evidence to Determine GHG Emission Reductions or Removals	-	-	-
4.4	Management and Operational System	1	-	-
-	SUM	7	-	1

4.1 Project Implementation Status

Description

The project activity is generation of renewable electricity from wind energy in Tirunelveli, Dindigul and Tirupur districts of Tamil Nadu, and Hassan and Chitradurga districts of Karnataka by Ramco Group Companies.

The installed capacity of the project is 159.75 MW which consist of 136 wind turbine generators (WTGs) and the electricity is sold to southern grid of India and used for captive consumption in Ramco group industries which also replaces the grid electricity from southern grid of India. There are no changes in the Key equipment since the validation of the project during the monitoring period.

The net electricity supplied to the grid or supplied for captive use is calculated by exported electricity minus imported electricity and wheeling charge (if applicable). An energy meter is installed at the output to account the electricity supplied to grid. This meter reading is noted every month which is used for ER calculation.. The QA/QC procedure followed onsite for data management and data archiving is as per the ISO standards. Thus the assessment team confirmed that the monitoring procedure implemented and followed is as per the registered monitoring plan.

During the validation of the project activity a FAR regarding the applicability of project under CDM mechanism was raised which need to be address in every subsequent verification and the same has been assessed under CAR 4.1-1.

During the desk review, assessment team raised CAR 4.1.1 and CAR 4.1.2 which were closed successfully during the verification process.

The methodology followed for present verification is approved registered consolidated methodology ACM0002 version 10. No deviation is sought in the applied methodology after the registration of the project activity.

During the monitoring period (01-11-2008 to 31-03-2011), the net electricity exported to the grid by the project activity is 798439650 KWh and thus the total baseline emission for this monitoring period is computed to 740105 tCO_{2e}.

It was verified during the site visit and the subsequent review of the, Commissioning Certificates and in the course of this verification that the actual project activity was implemented in accordance with the VCS PD.

Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context
- ☒ The following finding(s) have been addressed:

Finding:	4.1-1
Classification	☐ CAR ☐ CL ☒ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The project has also applied for CDM benefits. The process is still under validation. In future it has to be ensured that there will be no double counting regarding emission reductions between CDM and VCS. The wind mills corresponding to the HTSC Nos listed in annex 1 of the validation report needs to be verified in order to avoid double counting With reference to the FAR raised in during validation, please clarify the status of the CDM validation.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The contract of the CDM validation project of 41.6 MW has been terminated which can be verified from the given link as follows: http://cdm.unfccc.int/Projects/Validation/DB/AOLO0C51SE7IUL19FP3B27HORLRSK0/view.html The rest of the WTGs have not applied for CDM credits. Thus there no double counting regarding emission reductions between CDM and VCS will occur.
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The CDM status of the project of capacity 41.6 MW was checked through the link http://cdm.unfccc.int/Projects/Validation/DB/AOLO0C51SE7IUL19FP3B27HORLRSK0/view.html <u>and found that the validation contact has been terminated and also confirmed this project (41.6 MW) has not been re-assigned to any other validation agency. Moreover by checking UNFCCC website, the verification team could also confirm that the rest of WTGs have also not applied for CDM credits.</u> <u>Thus the entire WTGs of this VCS project activity of capacity 159.75 MW have not sought any credits from CDM. Hence there is no scope of double counting regarding emission reductions between CDM and VCS.</u> It has been verified that is no double counting during this VCS monitoring period from 2008-11-01 to 2011-03-31.

	Though the project activity will be availing credits only through VCS, but the issue of double counting can be checked again during the next periodic verification to ensure that the WTGs of this project have not applied for any credits other than VCS. Thus FAR 4.1-1 is closed for this verification and should be checked again during next verification.
Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☐ The finding is closed

Finding:	4.1-2		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Section 5 of monitoring report mentions the deviation from the validated PD. During site visit it is observed that there are few more WTGs (Eg. D31, D69, D76 & D77) which have been changed to either from sale to board to captive or vice-versa. The list for both the cases with the dates along with supporting documents is not provided. In page 3 of the MR, the information provided in the table w.r.t above WTGs is not correct.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The utilization for the respective WTGs given on page 3 of MR is as per the registered VCS-PD. During this monitoring period there have been changes in the utility for a few WTGs. The detailed description is given under section 2.3 of the MR on page 7 and listed in table in Annex 4 on page 28.		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The current status of the utilization has been checked and confirmed that there are no changes from the validated PD regarding the mode of electricity delivery. However during this monitoring period (01-11-2008 to 31-03-2011), the mode of electricity delivery of some WTGs were changed (either from sale to board to captive or vice-versa) for a period of time. With this utility change there is no major impact in monitoring plan as the monitoring procedures for the WTGs utilization of both export and captive have been already established separately (through deviation of monitoring plan) and also the net electricity generation values are directly sourced from JMR. But for the WTGs which have been changed from export to captive utility in this monitoring period, there will be reduction in the net energy generation when compared to the previous years, meanwhile for those changed from captive to export, there will be increase in the net electricity generation. On the whole, these changes does not have major impact in the overall emission reductions of the project activity, as the verification team could assess the total emission reduction during this monitoring period is well below the estimated reductions in VCS PD / PD/. Thus these changes do not have major impact in the emission reductions.		

	Moreover, the above utility changes were temporary (occurred only during this monitoring period for limited months) and it was confirmed that the current status of utilization of WTGs are in line with the registered VCS PD ^{/PD/}. For those WTGs which have been changed from export to captive utility during this monitoring period, there is reduction of net electricity generation (after considering wheeling charges) and subsequently the IRR of the project activity comes down whereas due to increase in tariff (applying the rate of INR 3.5/kWh), the IRR increases. But all these factors are already covered under sensitivity analysis during validation ^{/PD/}. As a credibility check, the additionality of the project activity was assessed again. The utility changes have happened to the WTGs belonging to the MCL and RIL and hence the investment analysis/^{IRR/} of both the PPs were checked. With respect to MCL, the base equity IRR is 10.24% and benchmark ROE is 16.48%. Even with 20% increase in generation or tariff, the IRR does not cross the benchmark. With respect to RIL, the base equity IRR is 12.48% and the benchmark ROE is 16.48%. Even with 20% increase in generation or tariff, the IRR does not cross the benchmark. Thus it has been assessed and confirmed that the additionality of the project activity is not affected by these utility changes. Hence CAR 4.1-2 is closed.
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding:	4.1-3		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	As per the validated VCS-PD there are some WTGs located in the Coimbatore district. During interview with the PP it is noticed that the WTGs location no more comes under the Coimbatore district as the Coimbatore district is now separated into two districts namely Coimbatore and Tirupur. But there is no information in the MR regarding the above change.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The WTGs which are located in Udumalpet taluka now come under Tiruppur district of Tamil Nadu that came into existence as on 22/02/2009 (http://tiruppur.tn.nic.in/distformation.html). Therefore, this is a deviation from the VCS-PD registered on 28/03/2006. The same has been corrected in the MR.		

DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The location has been corrected as per present condition. CAR 4.1-2 is closed
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Final Assessment

During the verification an on-site visit was carried out. By means of the on-site visit and interview with the PP^{/IM01/} it is checked that the realized technology, the project equipments, the project has been implemented and operated as described in the validated PD^{/PD/}. During monitoring period some of the energy meters were changed due to failure of meters as well as utility change (for example when the utility is changes from export to captive, the meter will be changed due to up gradation from 3 slot TOD to 5 slot TOD) which are detailed in the monitoring report^{/MR/} and accepted . It is also confirmed that the new meter installed are having the accuracy class of 0.5S. There is no change is envisaged in the project activity. These facts have been verified during site visit.

FAR raised in during validation is closed for this monitoring period. However the same needs to be checked in the next verification. Also there are no remaining issues/ discrepancies in previous verification of the project. The PD^{/PD/} and validation report^{/val/} are found to be OK.

☒ FAR 4.1-1, CAR 4.1-1 and CAR 4.1-2 are closed

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

Description

The proposed project uses CDM approved methodology ACM0002 -“Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, Version 10, which is approved under VCS version 3

The project satisfies all criteria of ACM0002, Version 10. The application of monitoring methodology is assessed as correct. The main parameters monitored in the project activity are

No.	Parameter	Monitoring method *	Value source
1	Net electricity supplied to the grid. (EG _y)	In Tamil Nadu, 1. For WTG's used to export electricity to the grid: Net electricity supplied to the grid = (Net electricity exported to the grid – Net electricity imported)	Joint meter reading ^{/JMR/}

		2. For WTG's used for <u>captive consumption</u>: Net electricity supplied to the grid = (Net electricity exported to the grid) – wheeling charges (in kWh). Wheeling charges are calculated by multiplying 5 % with the total electricity exported to the grid. <i>In Karnataka,</i> Since both the WTGs export electricity to grid Net electricity supplied to grid = Net export – Net import – Transmission losses	
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* The applied deviation of MP for captive consumption (Tamil Nadu), where the net electricity export is calculated as ((Export*(1-5%)) - Import) was checked. The fixed 5% wheeling charges has been incorporated to the export value as the electricity is wheeled for the captive consumption. The approach is thus conservative and is followed for the complete monitoring period. The same is checked from the JMR report which is the basis for calculation of emission reduction. The JMR sheet is an authentic document as it is signed by both the State utility and the PP for every billing period.

The applied deviation of MP with respect to Karnataka region was checked. In order to determine the electricity supplied to the grid by the project activity at high voltage (66 kV) side of substation, the state utility (KPTCL) applies the transmission loss between 33 kV metering point and 66 kV metering point to the meter reading recorded at the 33 kV metering point. The transmission loss calculated by the state utility is endorsed / confirmed jointly by the representatives of PP and the state utility. The transmission loss applied to the project activity by the state utility is reflected in the JMR recorded at 33kV metering point.

The JMR readings for the complete monitoring period have been checked by the assessment team and found that the same readings are applied to the emission reduction calculations. Thus the monitoring procedures are in line with the on-site conditions and hence accepted.

The 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

As most essential part of the verification exercise it is indispensable to carry out an inspection on site in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore the on-site assessment is necessary to check the monitoring data with respect to accuracy to ensure the calculation of emission reductions. The main tasks covered during the site visit include, but are not limited to:

- The on-site assessment included an investigation of whether all relevant equipment is installed and works as anticipated.

- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed.
- The duly calibration of all metering equipment was checked. Annex 1 of the MR was checked in respect to the meter calibration details and cross verified with the calibration certificates ^{/cal.}
- The monitoring processes, routines and documentations were audited to check their proper application.
- The monitoring data were checked completely.
- The data aggregation trails were checked via spot sample down to the level of the meter recordings.

Before and during the on-site visit the verification team performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context
- ☒ The following finding(s) have been addressed:

Finding:	4.2-1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	As per the version 3 monitoring report template, the monitoring equipment type, accuracy class, serial number of equipment needs to be included in the monitoring report.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	As per the requirement of version 3 monitoring report template, the monitoring equipment type, accuracy class, serial number of equipment have been provided in the MR in section 3.2 and Annex 2.		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The details of energy meters like make, serial number have been provided in annex 2 of MR which were cross checked during site visit and found to have been correctly mentioned. Moreover, all the meters were of accuracy class 0.5 s as indicated in section 3.2 of MR which was again confirmed during site visit. Hence OK. CAR 4.2-1 is closed		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

Finding:	4.2-2		
Classification	☒ CAR	☐ CL	☐ FAR

Description of finding Describe the finding in unambiguous style; address the context (e.g. section)	Please submit the following documents 1. All the monthly Joint meter reading statement covering the monitoring period 2. Supporting document for change in utility 3. Supporting documents for change in investor name (if any)
Corrective Action #1 This section shall be filled by the PP. It shall address the corrective action taken in details.	All the required documents have been submitted to the DOE.
DOE Assessment #1 The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.	1. The Joint meter reading statements covering the monitoring period are submitted. The net electricity exported reading used for ER calculation are crosschecked with the respective joint meter reading statement and found to be correct. 2. Supporting documents for the change in utility has been submitted and the details are checked to be in line with the details given in the annex-4 of MR. Moreover, the above utility changes were temporary (occurred only during this monitoring period) and it was confirmed that the current status of utilization of WTGs which are in line with the registered VCS PD. For those WTGs which have been changed from export to captive utility during this monitoring period, there is reduction of net electricity generation (after considering wheeling charges) and subsequently the IRR of the project activity comes down whereas due to increase in tariff (applying the rate of INR 3.5/kWh), the IRR increases. But all these factors are already covered under sensitivity analysis during validation ^{IPD/}. As a credibility check, the additionality of the project activity was assessed again. The utility changes have happened to the WTGs belonging to the MCL and RIL and hence the investment analysis/^{IRR/} of both the PPs were checked. With respect to MCL, the base equity IRR is 10.24% and benchmark ROE is 16.48%. Even with 20% increase in generation or tariff, the IRR does not cross the benchmark. With respect to RIL, the base equity IRR is 12.48% and the benchmark ROE is 16.48%. Even with 20% increase in generation or tariff, the IRR does not cross the benchmark. Thus it has been assessed and confirmed that the additionality of the project activity is not affected by these utility changes. 3. There is no change in investor name which is verified with the interview with PP and through the monthly joint meter reading statements. CAR 4.2-2 is closed

Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed
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Finding:	4.2-3
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	As per the discussion during site visit, the Net electricity supplied to the grid value for the month January and December of every year will not match with the JMR value of the respective month as this has been calculated based on the JMR value and daily reading value. Please explain the method of calculation in the MR with supporting documents and also mention the reason for not taking JMR value directly for those months.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The billing cycle varies for all WTGs. The general practice is from Xth of one month to the Xth of next month. Most of the JMR dates for WTGs under this project start from 8th of the month. Since the buyers prefer year wise vintage, the emission reductions are calculated on yearly basis and apportioning is done for 1st November 2008 and the months of December and January by obtaining the daily reading values from records maintained by MCL staff. Daily reading value (export and import) is sourced from the daily TNEB meter readings taken by MCL staff and archived in log books. Therefore, net electricity supplied to the grid value for the month January and December of every year is being calculated from daily reading value as follows: For WTG's that export electricity to the grid – Net electricity supplied to the grid = (Net electricity exported to the grid) where the net electricity supplied is calculated by deducting the electricity imported from the electricity exported For WTG's that are used for captive consumption – Net electricity supplied to the grid = (Net electricity exported to the grid) – wheeling charges (in kWh)

DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	As observed from the monthly joint meter reading statement, the billing cycle all the WTGs are not same. But the VCS registry demands the calendar year wise emission reduction calculation. Hence PP has calculated net electricity export based on the joint meter reading and the daily reading of 31st December of every year which is deemed to be acceptable. Moreover the total net electricity export of December of a specific year and January of subsequent year used for ER calculation is cross checked with the total net electricity export mentioned in the joint meter reading statement for the month of December of that specific year and January of subsequent. It is found that both the totals are same. Hence it is accepted. The net electricity export values provided in the ER sheet^{/ER/} have been cross checked from the detailed calculation sheets based on JMR readings of each PP^{/Detail JMR readings/}, where the export, import and calculation of net electricity export values are traceable. Thus the applied values in ER sheet are verified to be correct. CAR 4.2-3 is closed
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding:	4.2-4		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Though some of the WTGs are exported electricity to grid during monitoring period, net export is calculation includes 5% wheeling charge which includes the transmission loss. This is not correct.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The wheeling charges are removed wherever applicable.		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The net electricity export is corrected. The monthly joint meter reading statement are now matching with the values that taken for ER calculation. The net electricity export values provided in the ER sheet^{/ER/} have been cross checked from the detailed calculation sheets based on JMR readings of each PP^{/Detail JMR readings/}, where the export, import and calculation of net electricity export values are traceable. Thus the applied values in ER sheet are verified to be correct. CAR 4.3-4 is closed		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

Final Assessment

All relevant evidences^{/JMR/, /cal//ER/,/Detail ER/} regarding the monitoring were fully checked by the verification team. All evidences are clearly identifiable and assessed to be correct. It could be evidenced that the monitoring system ensures for continuous operation. As most of WTGs are in Tamil Nadu, where there is no mandatory installation of check meter, the details of main meter given in the MR are accepted. For the considered monitoring period, all indicators stated in the applicable monitoring methodology ACM0002 (Version 10) and the registered PD^{/PD/} were correctly monitored and reported. Hence all the value applied for emission reduction calculation is found to be accurate and correct.

☒ CAR 4.2-1, CAR 4.2-2, CAR 4.2-3 & CAR 4.2-4 are closed

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

Description

Proper data management inclusive of data acquisition and aggregation, data management system is being followed for the project activity.

All the parameters need to be measured/ monitored by calibrated meters. As per the validated VCS-PD, the energy meters need to be calibrated as per SEB norms once in 5 years.

The monitoring personnel at site are well trained and follow reproducible routines. The training records^{/TR/} of the plant personals have been cross checked and found OK. Thus, monitoring personals are competent to carry out the relevant tasks with sufficient accuracy. All necessary monitored and measured raw data were checked during on-site verification.

Related Findings

☒ No CARs, CLs or FARs have been identified in this context

☐ The following finding(s) have been addressed:

Final Assessment

The verification team had reviewed the data collected and archived for the determination of the baseline emissions and any project emissions during the crediting period claiming the emission reductions.

The Joint meter readings statements are not only used for the VCS monitoring purpose but for the purpose of billing to TNEB which the government agency. Hence the JMR statement is authentic document signed by TNEB personnel's. The quality of the documents developed by the project proponent to monitor and determine the emission reductions were easily traceable and reference. Documents archiving and storage are in secured locations

4.4 Management and Operational System

Description

All internal data are subjected to QA/QC measures. All monitored data are archived in Electronic form. The allocation of responsibilities is documented in a written form and is followed as described in the Validated VCS PD^{/PD/} and VCS MR^{/MR/}. This has been verified. Routines for the archiving of data are defined and documented. Calculations are laid down in the monitoring report are in line with VCS PD^{/VCS-PD/}.

Members of monitoring team were interviewed^{/IM01/} during the site visit. Procedure for training and maintenance of monitoring equipments were discussed during site visit. The shift-in-charge is responsible for logging hourly readings. Managers and heads are responsible for the compilation and data correlation. All the staffs involved in the monitoring are well trained and have adequate knowledge. Training records^{/TR/} for the monitoring personnel were reviewed during site visit.

.All monitored data are archived in hard (JMR) and Electronic form. Details on monitoring constraint was verified during the site visit and found that proper procedures were adopted for data handling. The data will be stored for 2 years after the end of crediting period or till the issuance of VERs for this project activity whichever occurs later.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	4.4-1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Details related to training of monitoring personnel are not included in the monitoring report. Please include the same.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Details related to training of monitoring personnel's have been included in the monitoring report in the section 3.3 and training reports of respective WTG manufacturer is provided separately.		
DOE Assessment #1 <i>The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Details related to training of monitoring personals are included in the section 3.3 of monitoring report. The training records of O&M operators with respect to different sites in the project activity have been checked and found to be in order. CAR 4.4-1 is closed		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

Final Assessment

The monitoring procedures and responsibilities are documented in a written form and is followed as described in the Validated PD/PD/. Routines for the archiving of data are defined and documented. Calculations are laid down in the monitoring report is in line with validated PD^{/PD/}. The monitoring personnel are well trained and follow reproducible routines. Thus, they have the necessary competence to carry out the relevant tasks with sufficient accuracy

☒ CAR 4.4-1 is closed

5 VERIFICATION CONCLUSION

Madras Cements Limited has commissioned the TÜV NORD JI / CDM Certification Program to carry out the verification of the Project "Wind energy project by Ramco group in India" in Tamil Nadu & Karnataka, India with regard to the requirements of VCS 2007.1 Standard.

The project activity involves installation of 159.75 MW capacity wind power project consisting of 136 Wind Turbine Generators (WTGs) in Tirunelveli, Dindigul and Tirupur districts of Tamil Nadu, and Hassan and Chitradurga districts of Karnataka.

Reporting period: From 01-11-2008 to 31-03-2011

In the course of the verification 8 Corrective Action Requests (CARs), 0 Clarification Requests (CLs) were successfully closed and 1 Forward Action Request (FAR) will be verified during the subsequent periodic verification.

The verification is based on the draft monitoring report, revised monitoring report, and the monitoring plan as set out in the validated PD, the validation report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

In detail the conclusions can be summarised as follows:

- All operations of the project are implemented and installed as planned and described in the validated project description.
- the monitoring plan is in accordance with the applied approved methodology ,ie, ACM0002 version 10
- the installed equipment essential for measuring parameters required for calculating emission reductions is calibrated appropriately.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 2nd periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

GHG Emission Reductions or Removals	2008	2009	2010	2011	Total ER in the monitoring period
Baseline emission (tCO ₂ e)	18,551	356,335	320,210	45,009	740,105

Project emission (tCO ₂ e)	0	0	0	0	0
Emission reduction (tCO ₂ e)	18,551	356,335	320,210	45,009	740,105

Bangalore, 2012-09-06



Manjari Chandra
TÜV India Pvt. Ltd., Bangalore
Verification Team Leader

Essen, 2012-09-06



Stefan Winter
TN JI/CDM Certification Program
Final Approval

6 REFERENCES

Table 6-1: Documents provided by the project participant

Reference	Document
/cal/	Calibration certificates of the energy meters involved in the monitoring of the project activity
/JMR/	Joint meter reading of all the service connection meters from November 2008 to March 2011
/MR 1/	Monitoring report of the project "Wind energy project by Ramco group in India", Version 1 dated 2011-09-02
/MR 2/	Monitoring report of the project "Wind energy project by Ramco group in India", Version 2 dated 2012-02-03
/MR 3/	Monitoring report of the project "Wind energy project by Ramco group in India", Version 3 dated 2012-05-30

Reference	Document
/IMR 4/	Monitoring report of the project “Wind energy project by Ramco group in India”, Version 4 dated 2012-06-14
/IPD/	Validated VCS Project Description of the project “Wind energy project by Ramco group in India” Version 03 dated 2009-09-30
/TR/	Training records of O & M operators (Enercon, Vestas, Suzlon and NEG Micon)
/val/	Validation report of VCS Project “Wind energy project by Ramco group in India” dated 2009-11-16
/ER/	Emission reduction calculation sheet of VCS project “Wind energy project by Ramco group in India” version 01 dated 2011-09-02 Emission reduction calculation sheet of VCS project “Wind energy project by Ramco group in India” version 02 dated 2012-02-03 Emission reduction calculation sheet of VCS project “Wind energy project by Ramco group in India” version 03 dated 2012-05-30. Emission reduction calculation sheet of VCS project “Wind energy project by Ramco group in India” version 04 dated 2012-06-14.
/Detail JMR readings /	Detailed JMR readings with export, import and net electricity export
/IRR/	Validated investment analysis calculation sheets of VCS Project “Wind energy project by Ramco group in India” dated 2009-11-16

Table 6-2: Background investigation and assessment documents

Reference	Document
/ACM0002/	Approved CDM Methodology ACM0002, version 10: “Consolidated methodology for grid-connected electricity generation from renewable sources”
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/IPPC/	1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book

Reference	Document
/ISO 14064/	Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals Greenhouse gases -- Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements Greenhouse gases -- Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
/ISO14065/	Greenhouse gases -- Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
VCS	Voluntary Carbon Standard version 3
/VVM/	Validation and Verification Manual (Version as per EB 55 annex 1)

Table 6-3: Websites used

Reference	Link	Organisation
/cd4cdm/	www.cd4cdm.org	UNEP Riso Centre
/ipcc/	www.ipcc-nggip.iges.or.jp	IPCC publications
/vcs/	www.v-c-s.org	VCSA
/unfccc/	http://cdm.unfccc.int	UNFCCC

Table 6-4: List of interviewed persons

Reference	Mol ¹		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms.	G. Ganesan	Jr.Manager-Wind Farm, Madras Cements Limited
	V	☒ Mr. ☐ Ms.	G. Seeni Vasagan	Jr.Manager –Wind Farm, Madras Cements Limited
	V	☒ Mr. ☐ Ms.	M. Senthil Kumar	Asst. Manager- Electrical, Madras Cements Limited
	V	☒ Mr. ☐ Ms.	R. Ramamoorthi	Dy. Engineer- Wind Farm, Madras Cements Limited

Reference	Mol ¹		Name	Organisation / Function
	V	☒ Mr. ☐ Ms.	K. Madhavarajan	Dy. Engineer- Electrical, Madras Cements Limited
	V	☒ Mr. ☐ Ms.	G. Ramesh Kumar	Dy. Engineer- Electrical, Madras Cements Limited
	V	☒ Mr. ☐ Ms.	R.Jaya Kumar	Asst. Manager- Electrical, Madras Cements Limited
	V	☒ Mr. ☐ Ms.	A. Shanmugam	Engineer, Madras Cements Limited
	V	☒ Mr. ☐ Ms.	Girija Sankar Subudhi	Assistant Engineer
	V	☒ Mr. ☐ Ms.	I.Madavadhas.	Engineer – Electrical, Madras Cements Ltd
	V	☒ Mr. ☐ Ms.	Sushil Kshnayan	AM
	V	☒ Mr. ☐ Ms.	Hanamant	Technician
	V	☒ Mr. ☐ Ms.	B.Parthasarathi	TECH-Vestas
	V	☒ Mr. ☐ Ms.	M.Senthil	J.E-Vestas
	V	☒ Mr. ☐ Ms.	Jabastin	Engineer-Vestas
	V	☒ Mr. ☐ Ms.	Suresh	Engineer-Vestas
	V	☒ Mr. ☐ Ms.	Justin	Junior Engineer -Vestas
	V	☒ Mr. ☐ Ms.	K. Gopal	Senior Engineer
	V	☒ Mr. ☐ Ms.	Thanu.N	Jr Engineer, Suzlon
	V	☒ Mr. ☐ Ms.	K. Sivaramakrishnan	Sr. Engineer, Suzlon

Reference	Mol ¹		Name	Organisation / Function
	V	☒ Mr. ☐ Ms.	M. Venkatesan	Engineer, Wind Farm
/IM02/	T,E,V	☒ Mr. ☐ Ms.	Tanvi Bongale	Executive, BUNGE Emissions Group

¹⁾ Means of Interview: (Telephone, E-Mail, Visit)