



VOLUNTARY CARBON STANDARD 2007.1

VERIFICATION REPORT

WIND ENERGY PROJECT BY RAMCO GROUP IN INDIA

**Monitoring Period: 2006-03-28 to 2008-10-31
(incl. both days)**

Report No: 53610608 - 08/673

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Report Title:	Approved by:
Verification report of "Wind energy project by Ramco group in India"	Rainer Winter
Client:	Project Title:
Madras Cements Limited	Wind energy project by Ramco group in India
Summary:	
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 Coimbatore districts of Tamil Nadu, and Hassan and Chitradurga districts of Karnataka. Reporting period: From 28-03-2006 to 31-10-2008 In the course of the verification 7 Corrective Action Requests (CARs), 4 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, 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. As the result of the 1st 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: Emission reductions 590,912 t CO2 equivalents	
Work carried out by:	Number of pages:
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Abbreviations

AE	Assistant Engineer
BAU	Business as usual
BESCOM	Bangalore Electricity Supply Company
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CESC	Chamundeshwari Electricity Supply Corporation
CO₂	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
CP	Certification Program
CL	Clarification Request
DGM	Deputy General Manager
DNA	Designated National Authority
EB	CDM Executive Board
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
JMR	Joint Meter Reading
MP	Monitoring Plan
MR	Monitoring Report
QC/QA	Quality control/Quality assurance
SEB	State Electricity Board
TNEB	Tamil Nadu Electricity Board
TNERC	Tamil Nadu Electricity Regularity commission.
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCS - PD	VCS - Project Description
VCU	Voluntary Carbon Unit
VVM	Validation and Verification Manual
WTG	Wind Turbine Generator

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1 INTRODUCTION

The Madras Cement 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 2007.1^{/VCS/}. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered VCS project for the monitoring period 2006-03-28 to 2008-10-31,

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

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;
- 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 / VCUs) 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 verification of this project is based on the validated project design document^{/PD/}, the monitoring report^{/MR/}, emission reduction calculation spread sheet^{/ER/}, 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 TÜV NORD JI/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 VCS Project Description

1.3.1 Project Characteristics

Essential data of the project is presented in the following Table 1-1.

Table 1-1: Project Characteristics

Item	Data
Project title	Wind energy project by Ramco group in India
Project owner	MADRAS CEMENT LIMITED
Any specific project categories	☐ Mega project ($> 10^6$ t CO _{2eq} / a) ☐ Micro project (< 5000 t CO _{2eq} / a) ☐ AFOLU project ☐ Grouped project ☒ No specific project category
VCS PD dated	Draft: 2009-04-17 Final: 2009-10-01
Applied Methodology	ACM0002, version 10
Project starting date	2003-01-30
Crediting period	☐ Renewable Crediting Period (7 y) ☒ Fixed Crediting Period (10 y)
Start of crediting period	2006-03-28

1.3.2 Project Location

The details of the project location are given in table 1-2:

Table 1-2: Project Location

No.	Project Location
Host Country	India
Region:	Tamil Nadu & Karnataka
Project location address:	Mentioned in annex 1
Latitude:	Mentioned in annex 1
Longitude:	Mentioned in annex 1

1.3.3 Technical Project Description

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 Coimbatore 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 PDD) located in Tirunelveli, Dindigul and Coimbatore Districts 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 1-3a: 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
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 1-3b: Parameters confirmed during verification

Parameters mentioned in Annex1 are verified during verification.

1.3.4 Appointment of team members and technical reviewer

On the basis of a competence analysis and individual availabilities a verification team was appointed. Furthermore also the personnel for the technical review and the final approval was determined.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the table 1-4 below.

Table 1-4: Involved Personnel

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Sectoral competence ³⁾	Technical competence ⁴⁾	Host country Competence	Controlling competence
☒ Mr. ☐ Ms.	Ma Paa Puratchikkanal	TUV India Pvt, Ltd, Bangalore	TL/TE	SA	☒	T	☒	☒
☒ Mr. ☐ Ms.	R Murali	TUV India Pvt. Ltd, Bangalore	TM	A	☒	-	☒	☐
☐ Mr. ☒ Ms.	C Indumathi	TUV India Pvt. Ltd, Bangalore	TM	A	☒	T	☒	☐
☒ Mr. ☐ Ms.	Manjari Chandra	TUV India Pvt. Ltd, Bangalore	TM	A	☒		☒	☐
☒ Mr. ☐ Ms.	R Narendra Kumar	TUV India Pvt. Ltd., Bangalore	OT ³⁾	T	☐	-	☒	☐
☒ Mr. ☐ Ms.	Lendzian, Heiner	TN CERT GmbH	TR ³⁾	A	☒	T	☐	☐
☒ Mr. ☐ Ms.	Rainer Winter	TN CERT GmbH	FA/TR ³⁾	SA	☒	T	☐	☒

¹⁾ TL: Team Leader; TM: Team Member, TR: Technical review; OT: Observer-Team, OR: Observer-TR; FA: Final approval

²⁾ GHG Auditor Status: A: Assessor; E: Expert; SA: Senior Assessor; T: Trainee; TE: Technical Expert

³⁾ No team member

⁴⁾ As per S01-MU03 or S01-VA070 A2 (such as A, B, C.....)

1.4 Level of Assurance

The verification has been planned and organized to achieve a

☒ reasonable level of assurance

☐ limited level of assurance.

2 METHODOLOGY

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 2.1 below:

Table 2.1: Verification sequence

Topic	Time
Assignment of verification	2008-11-18
On-site visit	2009-07-28 to 2009-08-01
Draft reporting finalised	2010-08-27
Technical review on draft reporting finalised	2010-08-30
Final reporting finalised	2010-10-14
Technical review on final reporting finalised	2011-05-12
Final corrections	2011-05-12

The main verification steps are described below.

2.1 Review of Project Documentation

The VCS PD ^{/PD/} and supporting background documents related to the project design and baseline 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.

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

2.2 On-Site Assessment

2.2.1 Review of Performance Records

The verification team has 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 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.

The on-site audit was carried out between 2009-07-28 and 2009-08-01by verification team.

2.2.2 Follow-up 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 2-2.

Table 2-2: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Project proponent representatives Project consultant	- 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

A comprehensive list of all interviewed persons is part of section 5 'References'.#

2.2.3 Collection of Measurements

The verification team has carried out interviews and reviews of records to assess if the collection of measurements is in accordance with the monitoring plan of the validated PD and the relevant VCS criteria.

The parameter monitored in this project activity is net electricity exported to grid by the windmills.

The energy generated in the project activity was exported to the grid or wheeled to the industrial facility during the reported monitoring period.

Electricity produced is being measured by main meter installed in the wind mills. In some connections check meter is also installed to cross check the main meter readings. The Net electricity supplied to the grid is recorded monthly by taking a Joint Meter Reading from the main meter in the presence of officials from TNEB, BESCOM, CESC and representatives of wind mill owners. The Joint meter reading contains the value of energy imported and exported to the grid during the recording period. The JMR^{/JMR/} is issued to the wind mill owners (in Karnataka in a format

called B-Form) which includes electricity exported to grid, imported from grid, transmission loss and net electricity supplied to grid. This JMR is duly signed by TNEB/BESCOM/CESC representatives

During the on-site visit, the information about all the energy meters which was mentioned above was verified. In addition the joint meter readings ^{/JMR/} which were duly signed by the representatives TNEB/BESCOM/CESC and the PP were also verified. All the procedure followed in the site are found to be in line with the monitoring plan ^{/PD/} & the PPA^{/PPA/} signed for the project and deemed to be OK. No significant, lack of evidence and missing data were detected.

2.2.4 Observation of established practices and testing of the accuracy of monitoring equipment

During the on-site visit, the verification team has checked the test methods and practices established for the monitoring instruments whether they are in accordance to local and international requirements and as in the validated PD

2.3 Determination of the reductions in GHG emissions

The verification team has reviewed and checked the method for determination of GHG emissions and assessed if they are calculated in a conservative approach and in accordance to the methodology and relevant tools equations.

The GHG emission reduction achieved by the project activity is calculated as the difference between the baseline emission and the project emission as well as the leakage emission. There are no GHG emissions arising from the project being a green power project. Hence, the project emissions are zero. As the project activity does not involve power plant construction, fuel handling (extraction, processing, and transport), and land inundation, the leakage due to the project activity is not applicable as per the methodology.

Following the ACM0002 methodology, the combined margin (CM) methodology calculated ex-ante was chosen to calculate the baseline emission factor.

Baseline emission is equal to Net Electricity export by the project to the grid by the project activity (EG_y) multiplied by the grid emission factor (EF_y).

The operating margin (OM) and Build margin (BM) are as follows: $W_{OM} = 0.75$ and $W_{BM} = 0.25$ for operating margin emission factor ($EF_{grid, OM, y}$) and the build margin emission factor ($EF_{grid, BM, y}$). The calculation method of the OM and BM is derived from the guide of OM and BM calculation issued by CO₂ Baseline Database for the Indian Power Sector, User Guide (Version 4, Date: September, 2008) issued by CEA.

As per the CEA database the emission the operating margin and built margin for southern grid is

$$EF_{\text{grid, OM, y}} = 0.998157296$$

$$EF_{\text{grid, BM, y}} = 0.85573754$$

Therefore the combined margin is calculated as follows

$$EF_y = (0.75 \times EF_{\text{grid, OM}}) + (0.25 \times EF_{\text{grid, BM}}) = 0.92694 \text{ tCO}_2\text{equivalent / MWh}$$

Based on the net electricity supplied and the emission factor the net emission reductions are calculated for the reported monitoring period

2.4 Review of additional data from other sources if appropriate

Additional data^{/CEA/CR/PPA/EWA/} collected are reviewed and the sources are verified through interviews and review of any websites as stated in the monitoring report.

2.5 Review of monitoring results and verification of the correct application of monitoring methodologies

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.

2.6 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 3 of this report.

3 VERIFICATION FINDINGS

In this section the assessments and findings from the desk review of the VCS PD, 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
3.1	Remaining issues, including any material discrepancy			1
3.2	Project implementation	2		
3.3	Completeness of monitoring	3	4	
3.4	Accuracy of emission reduction calculations	2		
3.5	Quality of evidence to determine emission reductions			
3.6	Management and operational system			
-	SUM	7	4	1

3.1 Remaining issues, including any material discrepancy, from previous validation

Description

The verification team has reviewed the registered PD and found that there are no material discrepancies. The FAR raised during the validation^{VR/} had been checked that the project activity has not been registered with UNFCCC EB. This FAR has to be reviewed during the next monitoring period.

Related Findings

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

Finding:	3.1-1		
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 2 of this report needs to be verified in order to avoid double counting
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	
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 registration and approval will be checked again at the next verification period.
Conclusion <i>Tick the appropriate checkbox</i>	☒ To be checked during the next periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements

Final Assessment

The open issue in the validation report^{VR/} was reviewed and confirmed that the project activity has not been registered with UNFCCC for this monitoring period of 2006-03-28 to 2008-10-31 (both days included)

☒ FAR 3.1-1 will be checked again during next verification period

3.2 Project implementation

Description

The project activity is generation of renewable electricity from wind energy in Tirunelveli, Dindigul and Coimbatore 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.

During the monitoring period covering 2006-03-28 to 2008-10-31 the project replaces 637.49GWh of net electricity from the southern grid of India.

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.

It was verified in the course of this verification that the actual project activity was implemented in accordance with the Validated PD^{/PD/}.

Related Findings

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

Finding:	3.2-1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Page No 2 of MR says that 21 (11+10) wind mills of Madras cement limited are for captive consumption. This is not actual case. Please check.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Page no. 2 of MR mentions 10x800 kW and 11x1650 kW machines as captive. However, only 11x1650 kW Vestas machines are for captive consumption, while the 10x800 kW machines were exporting power to grid up to September 2009. Post September 2009, these 10x800 kW Enercon machines have been used for captive consumption purpose. This can be observed from the JMR for the particular HTSC no. which do not contain wheeling charges up to September 2009. Thus, for current monitoring period in consideration, only 11x1650 kW machines are for captive consumption purpose, and the same has been included in MR version 02. The deviation from validated PD has been explained under section 10 of the revised MR version 03.		

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>	Presently electricity generated from the 10x800 kW wind mills of Madras cements are used for captive purpose. But it is the real case only after September 2009. So during the monitoring period the wind mills are exporting power to grid. This is explained under section 10 as a deviation from validated PD which is verified with the power purchase agreement^{/PPA/} and the joint meter reading statement^{/JMR/}. CAR 3.2-1 is closed.
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	3.2-2
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	As per validated PD the owner of the mill having HTSC No 973 is Ramco Industries Limited (RIL). But in the calibration details of MR it states that it belongs to Sri Ramco Spinners (SRS). Please Justify
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	Wind mill corresponding to HTSC no. 973 is actually owned by Sri Ramco Spinners (SRS), and it can be verified from the calibration certificate by Tamil Nadu Electricity Board, which clearly states the owner as Sri Ramco Spinners. Hence, the same has been mentioned in the monitoring report under calibration details. It was erroneously reported in the VCS PD, that the HTSC no. 973 is owned by RIL. Please refer calibration details for HTSC. No. 973. Also, the commissioning certificate for HTSC No. 973 has been provided as Annexure 4, and it clearly mentions that the WTG is owned by Sri Ramco Spinners (SRS). The deviation from validated PD has been explained under section 10 of the revised MR version 03.
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 wind mill corresponding to the HTSC no 973 is actually owned by the Sri Ramco Spinners which was verified with the commissioning certificate of 973 and calibration certificates. This is explained in section 10 of revised MR as a deviation from validated PD. CAR 3.2-2 is closed

Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements
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Final Assessment

On the basis of this site visit and the reviewed project documentation it can be confirmed that w.r.t. the realized technology, the project equipments, as well as the monitoring and metering equipment, the project has been implemented and operated as described in the validated PD^{/PD/}. There are no major changes in the key equipment since the validation of the project. Also no change is envisaged. These facts have been verified during site visit.

☒ CAR3.2-1 & CAR 3.2-2 are closed

3.3 Completeness of monitoring

Description

The monitoring reporting /MR/ is in line with the requirements of the validated PD monitoring plan as well as with the applied methodology ACM0002 Version 10^{/ACM0002/} which is approved under VCS 2007.1.

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 per the Validated PD, Net electricity supplied by WTGs in the project activity is the only parameter which is to be monitored during the whole crediting period.

The monthly energy readings are noted down by TNEB/BESCOM/CESC persons along with the O&M representatives. The net electricity supplied to grid is calculated by considering export and import and the same has been written in Joint meter reading statement^{/JMR/} issued monthly to each individual service connection by the TNEB/BESCOM/CESC.

The calibration certificates of the meters were verified. Though the calibration was not done in the mentioned frequency the PP for the meter regarding to the HTSC no

510, U1469 the PP applied maximum error for the months when the calibration validity is not there. The net energy supplied is calculated for the months where calibration non-validity months is as follows

Net electricity exported = import * (1-0.5%) – (import * (1+0.5%)) – wheeling charge

This is as inline with the EB 52 annex 60 “Guidelines for Assessing Compliance with the Calibration Frequency Requirements”

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.
- 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.

The on-site audit was carried out by the verification team between 2009-07-28 and 2009-08-01. 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. It is assessed that the data and parameter monitored by the above said approach is accurate, conservative and transparent. It is found to be valid and acceptable.

No significant, lack of evidence and missing data were detected during on-site visit. Nevertheless, the following CARs and CLs have been raised and closed successfully based on the revised Monitoring report

Related Findings

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

Finding:	3.3-1
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The MR states that the meters are calibrated once in five year as per state electricity board norms. Please submit the state electricity board norms which specify calibration requirements.
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The latest TNERC tariff order titled "Comprehensive tariff order on wind energy" dated March 2009 mentions under paragraph 8.18 that the periodicity of calibration of meters will be governed by the Regulations issued by the Central Electricity Authority in this regard. Therefore, referring to the Central Electricity Authority (Installation and Operation of Meters) Regulations 2006 paragraph 18.1.b, it mentions that all meters shall be tested at least once in five years. Please refer to the TNERC tariff order dated May 2006 and March 2009 and Central Electricity Authority (Installation and Operation of Meters) Regulations 2006 provided as Annexure 1 , 2 & 3 respectively
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 TNERC "Comprehensive tariff order dated on wind energy" dated march 2008 is submitted which mentions the meters are tested as per regulations issued by the Central Electricity Authority (CEA). The Central Electricity Authority notification dated 17th March 2006 specifies the meters should be tested at least once in five years. CAR is closed.
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	3.3-2
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	For April 2006 and end of October 2008 (boundary months) the net energy exported is calculated from the daily meter readings log which is not fulfills the requirements because of the following reasons. • For captive wind mills the wheeling charge is not deducted from net energy exported. • For the wind mills located in Karnataka the transmission loss is not deducted from the net energy exported

Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	For April 2006 and end of October 2008 (boundary months), • Wheeling charges have been deducted from net energy exported for wind mills owned by textile mills which are for captive consumption. However, the wheeling charges had not been deducted earlier for the captive wind mills of Madras Cements Ltd. The same have been rectified and included in the revised CER sheet "MCL VCS CER sheet v2" • For the wind mills located in Karnataka (ELP-27 and H-31), the transmission loss had been deducted from the net energy exported in the CER calculations submitted earlier. Please refer the back-up calculation sheet "Karnataka WTGs net export" provided as an annexure to verify the same.
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 wheeling charges are deducted for the mills used for captive consumption. But for the wind mills located in Karnataka (ELP-27 and H-31), the transmission loss had not been deducted for the boundary months. Please check again. CAR is open
Corrective Action #2 	The transmission loss for the boundary months has been deducted in the revised ER computation sheet "MCL VCS CER sheet v3" in a conservative manner. Please refer to worksheet 'HTSC H31 & ELP-27' under excel sheet "computation for boundary period" for further clarity on deduction of transmission loss for the boundary periods.
DOE Assessment #2	The transmission loss of the whole boundary month has been taken from B-Form^{/JMR/} and deducted from energy supplied to grid. Since the transmission loss has been considered for whole month the calculation is conservative. CAR 3.3-2 is closed
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	3.3-3		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Meters of 271 & 510 (RIL) are not calibrated once in five year frequency. Please refer EB 52 Annex 60		

Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	For HTSC no. 271, the calibration was valid till 31.03.2009 and the monitoring period was ended on 31.10.2008. Therefore, the previous calibration was valid for the monitoring period in consideration. However, the applicable error as per accuracy class of the meters for HTSC no. 510 has been deducted from CER calculations as per EB 52 annex 60. The error has been deducted for the period of 15.03.2008 to 15.07.2008 which covers the period of non-availability of calibration certificates i.e. 26.03.2008 to 10.7.2008 and is conservative. Please refer to revised CER excel sheet "MCL VCS CER sheet v2"
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 error is applied directly for net energy supplied which is not correct. The error should be applied separately for electricity exported to grid and imported from grid. Please correct the same. CAR is open
Corrective Action #2	The error has been separately applied for electricity supplied to grid and imported from grid in the revised ER sheet "MCL VCS CER sheet v3". Please refer to the back-up calculation excel sheet "Error deduction for 510" for clarity on the error deduction.
DOE Assessment #2	The maximum error is correctly applied for both electricity export and import separately in the latest version of CER calculation. CAR 3.3-3 is closed
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	3.3-1		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Point no. 5 of MR says the project uses ACM 0002 version 05. The methodology version number is not matching with the validated PD. Please check.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The validated PD mentions usage of approved methodology ACM0002 version 10. The usage of methodology version 05 was erroneously mentioned under section 5 of MR version 01, and the same has been rectified in revised MR version 02, to reflect the correct version of methodology.		

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 MR now uses version 10 of ACM0002 methodology as mentioned in the validated PD. CAR 3.3-3 is closed
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	3.3-2		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Calibration details of ELP 27 (RIL) & 1532 (MCL-Udumalpet) are missing. Please include the same in MR and submit the calibration certificate of ELP 27.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The calibration details of HTSC ELP 27 (RIL) and 1532 have been included in the revised MR version 02. Calibration certificate for ELP-27 has been provided as Annexure 5 along with the response		
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 calibration details of ELP 27 & 1532 are included in the revised MR. The calibration certificate of ELP 27 is provided for verification. CAR is closed		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	3.3-3		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	a) HTSC no of 1460 (MCL Udumalpet) is mentioned wrongly in the calibration details of MR. Please correct it. b) Calibration date of 2361 (MCL-Thandyarkulam) is mentioned 18.12.2008 which is wrong. Please correct the date.		

Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	a) HTSC no. 1460 has been corrected under the calibration details in revised MR version 02 b) The calibration date of HTSC no. 2361 has been corrected as per calibration certificate in revised MR version 02
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>	a) The HTSC number is corrected in the revised MR b) The Calibration date of 2361 is corrected as per calibration certificate in revised MR CAR is closed
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	3.3-4		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Please mention the details of the meters that were changed during monitoring period. Please include the date of change, meter number of old & new meter and reason for changing the meter in the MR.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The details of energy meters changed during the monitoring period have been included in the revised MR under section 8, mentioning the date of change, meter number of old and new meters and reason for changing the meter.		
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 the energy meter which were changed during the monitoring period are included in the revised MR. Meters were immediately replaced by respective SEB because of meter failure. CAR 3.3-4 is closed.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Final Assessment

All relevant evidences^{/JMR/, /cal/} 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. 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.

- ☒ CAR 3.3-1, CAR 3.3-2, CAR 3.3-3, CL 3.3-1, CL 3.3-2, CL 3.3-3 & CL 3.3-4 are successfully closed

3.4 Accuracy of emission reduction calculations

Description

The verification team has verified and found out that GHG emission reduction achieved by the project activity is calculated as the difference between the baseline emission and the project emission as well as the leakage emission. There are no GHG emissions arising from the project being a green power project. Hence, the project emissions are zero. As the project activity does not involve power plant construction, fuel handling (extraction, processing, and transport), and land inundation, the leakage due to the project activity is not applicable as per ACM0002 version 10.

Following the ACM0002 methodology, the combined margin (CM) methodology calculated ex-ante was chosen to calculate the baseline emission factor.

Baseline emission is equal to Net Electricity export by the project to the grid by the project activity (EG_y) multiplied by the grid emission factor (EF_y).

The operating margin (OM) and Build margin (BM) are as follows: $W_{OM} = 0.75$ and $W_{BM} = 0.25$ for operating margin emission factor ($EF_{grid, OM, y}$) and the build margin emission factor ($EF_{grid, BM, y}$). The calculation method of the OM and BM is derived from the guide of OM and BM calculation issued by CO₂ Baseline Database for the Indian Power Sector, User Guide (Version 4, Date: September, 2008) issued by CEA.

As per the CEA database the emission the operating margin and built margin for southern grid is

$$EF_{grid, OM, y} = 0.998157296$$

$$EF_{grid, BM, y} = 0.85573754$$

Therefore the combined margin is calculated as follows

$$EF_y = (0.75 \times EF_{grid, OM}) + (0.25 \times EF_{grid, BM}) = 0.92694 \text{ tCO}_2\text{equivalent / MWh}$$

Both the values of Simple Operating Margin and Build Margin are selected under ex-ante approach. The grid boundary w.r.t the connected state grid is in Southern Regional Grid of India. The calculation of EF_y is current and publicly available and

published by the Central Electricity Authority on its web-site^{/CEA/} and fixed ex-ante during the entire crediting period.

The only parameter to monitor is net electricity exported to grid. The evacuation facility of the project activity to deliver the power to grid is maintained by the respective SEB (TNEB/BESCOM/CESC). In the project activity total electricity generated is being measured by energy meter, which is jointly monitored by the project participant and BESCOM.

To calculate net electricity supplied by the project activity, the PP has mentioned some procedure to calculate net electricity supplied to Southern grid. The electricity supplied to grid and electricity drawn from the grid are measured in the main meter reading. The net electricity exported to grid is calculated as follows

Net electricity exported to grid = electricity exported to grid – electricity imported from grid – transmission loss/wheeling charge (if applicable)

For the months where the calibration validity is not there the net electricity exported to grid is calculated as follows

Net electricity exported to grid = (1-0.5%)*electricity exported to grid – (1+0.5%)*electricity imported from grid – transmission loss/wheeling charge (if applicable)

The net electricity is noted from joint meter reading^{/JMR/} on monthly basis which is duly signed by the PP and TNEB/BESCOM/CESC. It is assessed that the data and parameter monitored by the above said approach is accurate, conservative and transparent. It is found to be valid and acceptable.

The validation team is convinced of the result of the emission coefficient calculation and emission reduction calculation^{/ER/}. Also the emission reduction calculation is calculated based on the net electricity exported to the grid after applying the apportioning adjustments. It is deemed to be adequate, transparent and conservative.

The total net electricity supplied by the WTGs during the monitoring period is 637,488 MWh. The baseline emission factor has been fixed ex-ante as 0.92694 tCO₂/MWh based on the CO₂ Baseline Database for the Indian Power Sector, User Guide (Version 4, Date: October, 2008) issued by CEA for NEWNE Grid^{/CEA/}. Based on the net electricity supplied and the emission factor the net emission reductions are 590,912 tCO_{2e}.

All the figures as per the monitoring plan were cross-checked by the verification team against basic monitored data and the calculations were found correct. The verification team has checked the input values as well as the computation in the emission reduction spreadsheet^{/ER/}. The estimation of the emission reduction was realized in a transparent and conservative manner.

Related Findings

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

Finding:	3.4-1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Net energy exported from HTSC No 1383 & 1384 is accounted in both RIL & SRS in the ER sheet (double counted). Please correct it		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The double counting of Net energy exported from HTSC no. 1383 and 1384 has been rectified in revised CER sheet "MCL VCS CER sheet v2" and the same reflected in the revised monitoring report "MCL VCS MR v2" Please refer to revised CER sheet.		
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 emission reduction is corrected in the revised ER sheet. CAR is closed.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	3.4-2		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Net energy exported readings of H-31 (RIL) are not matching with JMR. Please check		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The net energy exported readings for H-31 have been rectified in the revised CER excel sheet, and are now in line with the JMR.		
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 energy export readings of H-31(RIL) are corrected in the revised ER sheet. CAR is closed.		

Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements
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Final Assessment

All other relevant evidences were fully checked by the verification team during the on-site visit. All evidences are clearly identifiable and assessed to be correct. It could be evidenced that the monitoring system ensures for continuous operation. For the considered verification period, all indicators stated in the applicable monitoring methodology ACM0002 (Version 10) were correctly monitored and reported. Hence all the value applied for emission reduction calculation is found to be accurate and correct.

☒ CAR 3.4-1 & CAR 3.4-2 are closed

3.5 Quality of evidence to determine emission reductions

Description

During the on-site visit, the verification team has reviewed and verified the respective documents that were used to calculate and determine the emission reductions. The records were easily traceable and referred to a monitored or calculated data or parameter.

The only key monitoring parameter with influence on the calculation of the emission reductions is the Net electricity supplied to the Grid and the grid emission factor. The power is measured with high accuracy and duly calibrated class power meters.

The grid emission factor which a validated value and has been fixed ex-ante for the entire crediting period is taken from the registered PD^{/PD/}.

All necessary monitoring instruments are installed. The measuring devices use a proven and state of the art technology for measurement. The details of the meters are given in the monitoring report^{/MR/}. Calibration has been carried out as defined in the monitoring plan and the records for the same were reviewed. Based on the same it is concluded that the recorded reading from these meters are accurate enough.

The net electricity supplied to grid by the WTGs belonging to the project activity as reported in the monitoring report^{/MR/} and the emission reduction calculation sheet^{/ER/} were verified with the Joint meter reading^{/JMR/} given by TNEB/BESCOM/CESC. These certificates are issued by BESCOM a government body. Moreover, these JMRs are used for commercial billing by state electricity board. Hence these are

considered as highly authentic and reliable source of information. All evidences are clearly identifiable and assessed to be correct.

All the monitored data have been provisioned to be kept for at least 2 years after the end the issuance of VERs as per the requirement

Related Findings

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

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 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.

3.6 Management and operational system

Description

The management and operational system of the project is reviewed in the course of verification. The operational and management structure is established in accordance with the validated PD and the responsibilities for proper plant operation were clearly defined.

All internal data are subjected to QA/QC measures. All monitored data are archived partly in physical and partly in Electronic format.

The allocation of responsibilities is documented in a written form and is followed as described in the PD and 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^{/PD/}.

The monitoring personnel at site are well trained and follow reproducible routines as was evident during the site visit. Members of monitoring team were interviewed. Procedure for training and maintenance of critical equipments were discussed during site visit.

The operator reports to the Assistant Engineer (AE) - Wind Farm, who is responsible for collecting the required information from the operator. The AE – Wind Farm records the generation on a daily basis for each service connection point and reports the cumulative generation to the Manager - Electrical. The Manager – Electrical

reports to the DGM – Wind Farm on a daily basis. The DGM – Wind Farm is responsible for overall operation of the WTGs

The main meter readings are noted in presence of officials from both SEBs (TNEB/BESCOM/CESC) and the PP. The project activity has got dedicated metering system and thus the value reflected in the ER sheet is purely for the project activity.

All the energy meters are calibrated in the 5 year frequency as per state electricity regularity commission. In the case where the energy meter of the windmill was not calibrated in the reported monitoring period, the electricity data were adjusted as per EB 52 Annex 60. The monitoring report therefore satisfies the calibration procedure followed and the calibration frequency for the energy meters

Related Findings



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

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.

4 VERIFICATION STATEMENT

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 Coimbatore districts of Tamil Nadu, and Hassan and Chitradurga districts of Karnataka.

Reporting period: From 28-03-2006 to 31-10-2008

In the course of the verification 7 Corrective Action Requests (CARs), 4 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, 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 1st 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:

	2006	2007	2008	Total ER in the monitoring period
Baseline emission (tCO ₂ e)	106845	193037	291030	590912
Project emission (tCO ₂ e)	0	0	0	0
Emission reduction (tCO ₂ e)	106845	193037	291030	590912



Bangalore, 2011-05-12

A handwritten signature in blue ink, appearing to read 'Ma. Paa. Puratchikkanal', with a horizontal line drawn underneath.

TÜV NORD JI/CDM Certification
Program

Ma. Paa. Puratchikkanal

TÜV India Pvt. Ltd., Bangalore

Verification Team Leader

Essen, 2011-05-12

A handwritten signature in blue ink, appearing to read 'Gert', with a horizontal line drawn underneath.

TÜV NORD JI/CDM Certification
Program

Final Approval

5 REFERENCES

Table 5-1: Documents provided by the project participant

Reference	Document
/PD/	Validated VCS Project Description of the project "Wind energy project by Ramco group in India" Version 03 dtd 30-09-2009
/VR/	Validation report of VCS Project "Wind energy project by Ramco group in India" dtd 2009-11-16
/MR/	Monitoring report of VCS project "Wind energy project by Ramco group in India" version 01 dtd 10/05/2010 Monitoring report of VCS project "Wind energy project by Ramco group in India" version 02 dtd 16/09/2010 Monitoring report of VCS project "Wind energy project by Ramco group in India" version 03 dtd 11/10/2010 Monitoring report of VCS project "Wind energy project by Ramco group in India" version 04 dtd 09/05/2011
/ER/	Emission reduction calculation sheet of VCS project "Wind energy project by Ramco group in India" version 01 dtd 10/05/2010 Emission reduction calculation sheet of VCS project "Wind energy project by Ramco group in India" version 02 dtd 16/09/2010 Emission reduction calculation sheet of VCS project "Wind energy project by Ramco group in India" version 03 dtd 11/10/2010
/CR/	Commissioning certificates of 800 KW turbines supplied by Enercon and commissioned during 27-02-07 to 15-03-08 by Madras Cements Limited from Tamil Nadu Electricity Board. Commissioning certificates of 1650 KW turbines supplied by Vestas and commissioned during 31-12-05 to 23-05-08 by Madras Cements Limited from Tamil Nadu Electricity Board. Commissioning certificates of 1250 KW turbines supplied by Suzlon and commissioned during 29-09-03 to 21-10-04 by Tanjavur Spinning Mills Limited from Tamil Nadu Electricity Board. Commissioning certificates of 1250 KW turbines supplied by Suzlon and commissioned during 29-09-03 to 12-08-05 by Shri Vishnu Shankar Mill Ltd

Reference	Document
	from Tamil Nadu Electricity Board. Commissioning certificates of 1650 KW turbines supplied by NEG MICON and commissioned during 28-12-05 by Shri Vishnu Shankar Mill Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 1250 KW turbines supplied by Suzlon and commissioned during 21-09-03 to 29-09-05 by Rajapalayam Mills Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 1650 KW turbines supplied by NEG MICON and commissioned during 28-02-06 to 27-03-06 by Rajapalayam Mills Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 1250 KW turbines supplied by Suzlon and commissioned during 21-09-03 to 23-09-04 by Sandhya Spinning Mills Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 350 KW turbines supplied by Suzlon and commissioned during 31-12-05 by Sandhya Spinning Mills Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 1250 KW turbines supplied by Suzlon and commissioned during 30-09-04 to 15-09-05 by Ramco Industries Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 1650 KW turbines supplied by NEG MICON and commissioned during 28-12-05 by Ramco Industries Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 800 KW turbines supplied by Enercon and commissioned during 31-03-06 by Ramco Industries Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 500 KW turbines supplied by Vestas RRB and commissioned during 25-03-03 by Ramco Industries Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 750 KW turbines supplied by NEG MICON and commissioned during 21-03-04 by Ramco Industries Ltd from Tamil Nadu Electricity Board. Commissioning certificates of 1500 KW turbines supplied by Suzlon and commissioned during 10-10-07 by Ramco Industries Ltd from Tamil Nadu Electricity Board.

Reference	Document
/PPA/	Power Purchase Agreements between Madras Cements Limited and Tamil Nadu Electricity Board for 24 windmills of 1650 KW capacity Power Purchase Agreements between Madras Cements Limited and Tamil Nadu Electricity Board for 43 windmills of 800 KW capacity Power Purchase Agreements between Ramco Industries Limited and Tamil Nadu Electricity Board for 2 windmills of 800 KW capacity. Power Purchase Agreements between Ramco Industries Limited and Tamil Nadu Electricity Board for 1 windmill of 1500 KW capacity. Power Purchase Agreements between Ramco Industries Limited and Tamil Nadu Electricity Board for 1 windmill of 1650 KW capacity.
/EWA/	Energy Wheeling Agreement between Madras Cements Limited and Tamil Nadu Electricity Board for 11 wind mills of 1650 KW capacity. Energy Wheeling Agreement between Madras Cements Limited and Tamil Nadu Electricity Board for 10 wind mills of 800 KW capacity. Energy Wheeling Agreement between Tanjavur Spinning Mills Limited and Tamil Nadu Electricity Board for 4 wind mills of 1250 KW capacity. Energy Wheeling Agreement between Shri Vishnu Shankar Mills Limited and Tamil Nadu Electricity Board for 6 wind mills of 1250 KW capacity. Energy Wheeling Agreement between Shri Vishnu Shankar Mills Limited and Tamil Nadu Electricity Board for 1 wind mill of 1650 KW capacity. Energy Wheeling Agreement between Rajapalayam Mills Limited and Tamil Nadu Electricity Board for 13 wind mills of 1250 KW capacity. Energy Wheeling Agreement between Rajapalayam Mills Limited and Tamil Nadu Electricity Board for 2 wind mills of 1650 KW capacity. Energy Wheeling Agreement between Sandhya Spinning Mills Limited and Tamil Nadu Electricity Board for 4 wind mills of 1250 KW capacity. Energy Wheeling Agreement between Sudarsanam Spinning Mills Limited and Tamil Nadu Electricity Board for 3 wind mills of 1250 KW capacity. Energy Wheeling Agreement between Sudarsanam Spinning Mills Limited and Tamil Nadu Electricity Board for 1 wind mill of 1650 KW capacity Energy Wheeling Agreement between Sudarsanam Spinning Mills Limited

Reference	Document
	and Tamil Nadu Electricity Board for 1 wind mill of 1650 KW capacity Energy Wheeling Agreement between Ramco Industries Limited and Tamil Nadu Electricity Board for 6 wind mills of 1250 KW capacity Energy Wheeling Agreement between Ramco Industries Limited and Tamil Nadu Electricity Board for 1 wind mill of 500 KW capacity Energy Wheeling Agreement between Ramco Industries Limited and Tamil Nadu Electricity Board for 1 wind mill of 750 KW capacity
/JMR/	Joint meter reading of all the service connection meters from April 2006 to November 2008
/QA/QC/	Internal quality assurance and quality control records and procedures
/TD/	Technical details of the wind mills.
/cal/	Calibration certificates of the energy meters involved in the monitoring of the project activity

Table 5-2: 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
/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

Reference	Document
/ISO14065/	Greenhouse gases -- Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
/AT/	Tool for the demonstration and assessment of additionality (Version 05.2; EB 39).
VCS	Voluntary Carbon Standard 2007.1
/VDS-PD-T/	VCS PD Template
/VVM/	Validation and Verification Manual (Version 1.2 as per EB 55)

Table 5-3: 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 5-4: List of interviewed persons

Reference	Mol ¹		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms.	Mr. Sivakumar	DGM, Madras Cements Limited
/IM01/	V	☒ Mr. ☐ Ms.	S.V. Subba Raj	Dy. Manager, Wind Farm
/IM01/	V	☒ Mr. ☐ Ms.	G. Seenivasagan	Jr. Manager, Wind Farm
/IM01/	V	☒ Mr. ☐ Ms.	K.K. Thangngaraj	Incharge, Sashta Engineering
/IM01/	V	☒ Mr. ☐ Ms.	T. Kandasamy	Operator, Sashta Engineering
/IM01/	V	☒ Mr.	M. Senthil Kumar	Asst. Manager, Electrical

Reference	Moi ¹		Name	Organisation / Function
		☐ Ms.		
/IM01/	V	☒ Mr. ☐ Ms.	J. Madava Raj	Dy. Engineer, Wind Farm
/IM01/	V	☒ Mr. ☐ Ms.	M. Venkatesan	Engineer, Wind Farm
/IM01/	V	☒ Mr. ☐ Ms.	R. Ramachandran	Operator, Wind Farm
/IM01/	V	☒ Mr. ☐ Ms.	K Idhaya Kumar	Operator, Wind Farm
/IM01/	V	☒ Mr. ☐ Ms.	M. Kowna Garay	Operator, Wind Farm
/IM01/	V	☒ Mr. ☐ Ms.	S. Jagadeshwaran	Operator, Wind Farm
/IM01/	V	☒ Mr. ☐ Ms.	G. Ganesan	Jr. Manager, Wind Farm
/IM02/	V	☒ Mr. ☐ Ms.	Mr. Saurabh Kaura	Asst. Manager, BUNGE Emissions Group

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

Annex-I

Investor: Madras cements Limited							
HT Sc No.	NO.s and Capacity (KW) of turbine	Make of Turbine	SF No. of Turbine	Location	Latitude	Longitude	Commissioning Date
D131	1X800	ENERCON	484/1,2	Pushpathur	N10° 34` 4.981"	E77° 24` 59.852"	27.02.07
D69	7X800	ENERCON	125/1A;188/1,2 ;193/1B;185;177/1B,1C(P);177/1C(P);171	Pushpathur	N10° 36` 5.822" N10° 36` 1.228" N10° 35` 57.224" N10° 36` 8.74" N10° 36` 1.294" N10° 35` 51.574" N10° 35` 44.379"	E77° 24` 2.497" E77° 24` 20.415" E77° 24` 33.504" E77° 24` 33.496" E77° 24` 45.736" E77° 24` 48.981" E77° 24` 45.439"	29.03.07
D76	1X800	ENERCON	338	Pushpathur	N10° 35` 26.614"	E77° 24` 49.969"	16.04.07
D77	1X800	ENERCON	347/2B1&2B2	Pushpathur	N10° 35` 11.947"	E77° 24` 49.427"	16.04.07
D97	1X800	ENERCON	702/1A(P)	Pushpathur	N10° 36` 5.822"	E77° 24` 2.497"	23.07.07
D98	1X800	ENERCON	451/1(P)	Pushpathur	N10° 35` 25.7"	E77° 27` 25.556"	23.07.07
D99	1X800	ENERCON	461/1(P), 457/1(P)	Pushpathur	N10° 35` 17.777"	E77° 27` 40.388"	23.07.07
D100	1X800	ENERCON	305(P)	Pushpathur	N10° 33` 22.967"	E77° 25` 31.349"	23.07.07
D101	1X800	ENERCON	1/1(P)	Pushpathur	N10° 33` 32.172"	E77° 25` 10.455"	02.08.07
D102	1X800	ENERCON	9	Pushpathur	N10° 33` 21.471"	E77° 25` 5.923"	02.08.07

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

Rev.0 / 2009-08-21



D122	1X800	ENERCON	228/2A2	Pushpathur	N10° 33' 47.03"	E77° 26' 6.389"	27.09.07
D116	2X800	ENERCON	222, 210/1	Pushpathur	N10° 35' 55.43" N10° 35' 52.793"	E77° 24' 59.435" E77° 25' 12.37"	27.09.07
D115	1X800	ENERCON	166/3 & 165/2 (P)	Pushpathur	N10° 33' 48.419"	E77° 24' 31.989"	27.09.07
D121	2X800	ENERCON	471 (P) SOUTH, 472 (P), 471 (P) N ORTH	Pushpathur	N10° 33' 12.822" N10° 35' 18.626"	E77° 27' 16.773" E77° 27' 10.868"	27.09.07
D120	1X800	ENERCON	616/1A (P)	Pushpathur	N10° 35' 34.50"	E77° 27' 15.17"	27.09.07
D119	2X800	ENERCON	649/1C2 (P), 644 (P)	Pushpathur	N10° 35' 52.105" N10° 36' 6.094"	E77° 27' 14.39" E77° 27' 6.084"	27.09.07
D118	1X800	ENERCON	644 (P)	Pushpathur	N10° 39' 53.363"	E77° 27' 5.333"	27.09.07
D117	1X800	ENERCON	665/1A (P)	Pushpathur	N10° 36' 33.779"	E77° 27' 5.877"	27.09.07
D129	7X800	ENERCON	670/1B (P), 347 (P), 349 (P) SOUTH , 356/4A, 3G, 5C, 358/1 (P) NORTH, 416, 676 (P), 675/1 (P)	Pushpathur	N10° 36' 7.969" N10° 36' 14.638" N10° 36' 20.462" N10° 36' 26.49" N10° 36' 30.69" N10° 36' 33.35" N10° 36' 43.57"	E77° 28' 1.439" E77° 28' 5.537" E77° 27' 57.231" E77° 27' 51.525" E77° 27' 42.812" E77° 27' 26.820" E77° 27' 26.244"	28.09.07
D134	1X800	ENERCON	44/3A	Pushpathur	N10° 35' 26.614"	E77° 24' 49.969"	02.01.08
D133	1X800	ENERCON	103/1B	Pushpathur	N10° 37' 1.551"	E77° 26' 33.779"	02.01.08
D132	2X800	ENERCON	53/1 (P), 54/1 (P) & 2 (P)	Pushpathur	N10° 35' 11.947" N10° 36' 46.863"	E77° 24' 49.427" E77° 26' 44.245"	02.01.08
D140	2X800	ENERCON	69/1B (P), 70/1, 2 (P)	Pushpathur	N10° 36' 1.294" N10° 35' 44.379"	E77° 24' 45.736" E77° 24' 45.439"	15.03.08



D139	2X800	ENERCON	78/5,6(P), 100/1(P),2(P)	Pushpathur	N10° 35' 51.574" N10° 36' 41.402"	E77° 24' 48.981" E77° 24' 31.245"	15.03.08
D135	7X800	ENERCON	26/1(P),27/1(P) , 12/1B3(P), 148/1,2(P), 144/4(P), 110/1A(P), 115/1(P), 110/3(P))	Pushpathur	N10° 37' 17.098" N10° 37' 24.643" N10° 37' 30.434" N10° 37' 10.15" N10° 37' 13.54" N10° 37' 4.232" N10° 36' 57.384"	E77° 26' 55.041" E77° 26' 38.692" E77° 26' 51.136" E77° 26' 28.152" E77° 26' 10.488" E77° 26' 7.092" E77° 26' 13.319"	15.03.08
D138	2X800	ENERCON	225/2A2,2A3,2A 4,224/1(P), 125/1(P), 2(P)	Pushpathur	N10° 36' 51.945" N10° 37' 1.115"	E77° 25' 40.589" E77° 25' 45.298"	15.03.08
D137	1X800	ENERCON	204/2(P) & 126/1(P)	Pushpathur	N10° 37' 15.869"	E77° 25' 47.388"	15.03.08
D136	1X800	ENERCON	199(P)	Pushpathur	N10° 37' 28.380"	E77° 25' 49.131"	15.03.08
U1459	1X1650	VESTAS	186(P),188/1AA (P)	Udumalpet	N10° 35.857'	E77° 14.145'	27.07.07
U1460	1X1650	VESTAS	163/1	Udumalpet	N10° 34.498'	E 77° 11.435'	31.07.07
U1464	1X1650	VESTAS	59/3B(P),253/C 1(P)	Udumalpet	N10° 37.239'	E77° 12.081'	16.08.07
U1465	1X1650	VESTAS	252/B1 C(P),253/C1(P)	Udumalpet	N10° 34.844'	E77° 11.315'	16.08.07
U1468	1X1650	VESTAS	446/3,446/4	Udumalpet	N10° 37.760'	E77° 21.854'	22.08.07
U1469	1X1650	VESTAS	440/2A,2B	Udumalpet	N10° 37.985'	E77° 21.804'	22.08.07
U1522	1X1650	VESTAS	370/1C1 1C2(P)	Udumalpet	N10° 38.175'	E77° 21.520'	29.03.08



U1532	1X1650	VESTAS	525/2 (P)	Udumalpet	N10° 38.559'	E77° 20.304'	31.03.08
U1311	1X1650	VESTAS	161/1A3	Thungavi	N10° 37.476'	E77° 18.987'	29.09.06
U1310	1X1650	VESTAS	34/2C2 (P)	Thungavi	N10° 37.644'	E77° 19.306'	29.09.06
1528	1X1650	VESTAS	619	Uthumalai	N8° 58' 10.2"	E77° 32' 32.4"	31.12.05
1529	1X1650	VESTAS	649	Uthumalai	N8° 58' 01.9"	E77° 32' 52.0"	31.12.05
1530	1X1650	VESTAS	641	Uthumalai	N8° 57' 43.1"	E77° 32' 46.9"	31.12.05
1531	1X1650	VESTAS	664	Uthumalai	N8° 58' 08.3"	E77° 32' 13.1"	31.12.05
2037	1X1650	VESTAS	233	Anaikulam	N9° 00' 46.5"	E77° 28' 15.2"	29.09.06
2038	1X1650	VESTAS	284	Anaikulam	N9° 00' 22.2"	E77° 28' 18.7"	29.09.06
2039	1X1650	VESTAS	66	N. Krishna puram	N9° 00' 27.4"	E77° 29' 34.0"	29.09.06
2067	1X1650	VESTAS	99	Kurichampatti	N8° 59' 27.1"	E77° 29' 48.8"	30.09.06
2068	1X1650	VESTAS	83	Kurichampatti	N8° 59' 18.1"	E77° 29' 21.3"	30.09.06
2505	1X1650	VESTAS	179	Vadiyoor	N8° 58' 097"	E77° 27' .549'	31.12.07
2506	1X1650	VESTAS	58	Rajagopalaperi	N8° 57' .193'	E77° 27' .533'	22.01.08
2507	1X1650	VESTAS	324	Rajagopalaperi	N8° 57' .504'	E77° 27' .620'	24.01.08
2509	1X1650	VESTAS	87	Anaikulam	N9° 00' 06.2"	E77° 27' 24.3"	04.02.08
2510	1X1650	VESTAS	37	Vadiyoor	N8° 59' 02.7"	E77° 28' 06.4"	13.02.08
2522	1X1650	VESTAS	196	Rajagopalaperi	N8° 56' .944'	E77° 27' .823'	17.03.08
2616	1X1650	VESTAS	234	Rajagopalaperi	N8° 56' 40.7"	E77° 27' 48.0"	22.04.08
2629	1X1650	VESTAS	654	Uthumalai	N8° 58' 20.3"	E77° 32' 47.7"	23.05.08
2357	1X1650	VESTAS	525	Thandayarkulam	N8° 19' 45.8"	E77° 37' 30.2"	04.06.07



2358	1X1650	VESTAS	538	Thandayarkulam	N8° 19' 19.4"	E77° 37' 38.7"	04.06.07
2359	1X1650	VESTAS	529	Thandayarkulam	N8° 19' 39.6"	E77° 37' 12.8"	04.06.07
2360	1X1650	VESTAS	568	Thandayarkulam	N8° 19' 32.7"	E77° 37' 34.3"	04.06.07
2361	1X1650	VESTAS	931	Thandayarkulam	N8° 18' 45.0"	E77° 40' 06.8"	05.06.07
2362	1X1650	VESTAS	754	Thandayarkulam	N8° 18' 53.6"	E77° 40' 36.3"	05.06.07
2367	1X1650	VESTAS	150	Thandayarkulam	N8° 18' 40.9"	E77° 39' 30.4"	14.06.07
2368	1X1650	VESTAS	502	Thandayarkulam	N8 19' 55.1"	E77° 36' 59.8"	15.06.07

Investor: Thanjavur Spinning Mills Ltd

HT Sc No.	NO.s and Capacity of turbine	Make of Turbine	SF No. of Turbine	Location	Latitude	Longitude	Commissioning Date
625	1X1250	SUZLON	123/5 (P)	Dhanakarkulam	N8° 14' 55.9"	E77° 38' 12.8"	29.9.03
626	1X1250	SUZLON	338/4 (P)	Dhanakarkulam	N8° 14' 55.0"	E77° 38' 28.0"	29.9.03
1041	1X1250	SUZLON	887/1C (P)	Irukanthurai	N8° 12' 33.9"	E77° 39' 16.4"	21.10.04
1748	1X1250	SUZLON	884/2G (P), 2I (P)	Irukanthurai	N8° 12' 15.1"	E77° 39' 24.3"	30.3.06

Investor: Shri Vishnu Shankar Mill Ltd



587	1X1250	Suzlon	662/2D	Dhanakarkulam	N8° 13' 13.2"	E77° 39' 46.2"	21.09.03
588	1X1250	Suzlon	755/3A1 (P)	Dhanakarkulam	N8° 12' 44.5"	E77° 39' 45.2"	22.09.03
974	1X1250	Suzlon	782/1	Dhanakarkulam	N8° 12' 57.4"	E77° 39' 59.5"	30.09.04
976	1X1250	Suzlon	920/3B (P)	Dhanakarkulam	N8° 13' 11.9"	E77° 39' 00.2"	30.09.04
1333	1X1250	Suzlon	54/1C (P)	Irukanthurai	N8° 13' 28.4"	E77° 40' 45.5"	16.07.05
1354	1X1250	Suzlon	858/1B (P) & 857/2B (P)	Dhanakarkulam	N8° 13' 45.9"	E77° 40' 43.9"	12.08.05
1527	1X1650	NEG Micon	142/1 (P)	Kavalakuruchi	N8° 56' 48.8"	E77° 32' 16.3"	28.12.05

Investor: Rajapalayam Mills Ltd

576	1X1250	SUZLON	674/ (P)	Dhanakarkulam	N8° 13' 33.2"	E77° 39' 55.3"	21.09.03
577	1X1250	SUZLON	845/1 (P)	Dhanakarkulam	N8° 13' 34.5"	E77° 40' 10.2"	21.09.03
944	1X1250	SUZLON	311/2A1, 2A2	Irukanthurai	N8° 12' 48.4"	E77° 40' 17.3"	28.09.04
972	1X1250	SUZLON	363/2A (P)	Irukanthurai	N8° 12' 15.1"	E77° 39' 57.1"	30.09.04
979	1X1250	SUZLON	890/4	Dhanakarkulam	N8° 13' 55.1"	E77° 40' 16.8"	30.09.04
980	1X1250	SUZLON	891	Dhanakarkulam	N8° 14' 04.2"	E77° 40' 13.9"	30.09.04
1022	1X1250	SUZLON	837/2	Irukanthurai	N8° 12' 04.8"	E77° 38' 34.6"	30.09.04
1347	1X1250	SUZLON	129/9 (P)	Irukanthurai	N8° 12' 28.8"	E77° 41' 14.4"	04.08.05
1348	1X1250	SUZLON	36 (P)	Irukanthurai	N8° 12' 39.5"	E77° 41' 12.4"	04.08.05
1467	1X1250	SUZLON	137/3 (P)	Irukanthurai	N8° 12' 21.3"	E77° 40' 59.6"	29.09.05
1582	1X1650	NEG MICON	245/2 (P)	Uthumalai	N8° 58' 07.9"	E77° 31' 44.7"	28.02.06
1691	1X1650	NEG MICON	249/2 (P)	Uthumalai	N8° 58' 14.9"	E77° 31' 26.9"	27.03.06



Investor: Sandhya Spinning Mill Ltd

631	1X1250	SUZLON	393/3B(P)	Irrukanthurai	N8° 11' 35.0"	E77° 39' 24.9"	30.09.03
632	1X1250	SUZLON	329/4B(P)	Dhanakarkulam	N8° 14' 57.7"	E77° 38' 43.0"	30.09.03
1044	1X350	SUZLON	972/1B(P) & 2B(P)	Irrukanthurai	N8° 12' 17.7"	E77° 38' 39.4"	18.11.04
1422	1X1250	SUZLON	404/2B	Irrukanthurai	N8° 11' 20.0"	E77° 39' 15.1"	27.09.05
1468	1X1250	SUZLON	145/2(P)	Irrukanthurai	N8° 12' 07.7"	E77° 40' 48.2"	29.09.05

Investor: Sudarsanam Spinning Mills

578	1X1250	Suzlon	851/1B(P)	Dhanakarkulam	N8° 13' 25.5"	E77° 40' 30.6"	21.09.03
579	1X1250	Suzlon	854/1(P)	Dhanakarkulam	N8° 13' 35.3"	E77° 40' 25.1"	21.09.03
926	1X1250	Suzlon	828/2(P)	Dhanakarkulam	N8° 13' 14.7"	E77° 40' 19.8"	23.09.04
1540	1 x 1650	NEG Micon	336/5,6,7A, 7B,8,9,10A,1 0B,11A,10B	Uthumalai	N8° 57' 57.3"	E77° 32' 01.9"	31.12.05

Investor: Rajapalayam Textile

978	1X 1250	SUZLON	879/3C	Dhanakarkulam	N8° 14' 06.4"	E77° 40' 29.0"	30.09.04

Investor: Ramco Industries Ltd

1383	1 x 1250	Suzlon	483/1(P),2(P))	Irukanthurai	N8° 10' 34.3"	E77° 39' 05.0"	15.09.05
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1384	1 x 1250	Suzlon	94/1B(P)	Irukanthurai	N8° 12' 58.7"	E77° 40' 39.9"	15.09.05
468	1 x 1250KW	Suzlon	301/3C (part)	Irukanthurai	N8° 12' 25.7"	E77° 40' 09.5"	30.01.033
630	1 x 1250KW	Suzlon	386/3 (p)	Irukanthurai	N8° 12' 32.1"	E77° 30' 21.9"	30.09.03
973	1 x 1250KW	Suzlon	886/3A1	Irukanthurai	N8° 12' 42.8"	E77° 39' 28.6"	30.09.04
1525	1650 kW	NEG MICON	212/2, 212/3 & 213/2 (P)	Uthumalai	N8° 54' 47.6"	E76° 33' 16.3"	28.12.05
1526	1650 KW	NEG MICON	207/3	Uthumalai	N8° 55' 46.8"	E75° 33' 16.3"	28.12.05
271	1 x 1250KW	Suzlon	320/1 (p)	Kallupalayam	N10° 55' 43.0"	E77° 04' 11.1"	31.03.04
510	500	Vestas RRB	1227/6 (part)	Pazhavor			25.03.03
426	750	NEG MICON	178/2 (part)	Panagudi			21.03.04
ELP- 27	2 * 800	Enercon	321/P	Gulihosahalli			31.03.06
H - 31	1500	Suzlon	SN-12	Aidahalli Kaval			10.10.07

Investor: Rajapalayam Spintext

975	1X1250	Suzlon	705/3	Dhanakarkulam	N8° 13' 16.9"	E77° 38' 44.2"	30.09.04
977	1X1250	Suzlon	682/1 A, 1A (P)	Dhanakarkulam	N8° 13' 25.9"	E77° 39' 08.2"	30.09.04

Annex-II

Wind mills applied for CDM benefit

Wind Mill HTSC No.				
D97	D120	D135	U1522	2357
D98	D119	D138	U1532	2358



D99	D118	D137	2505	2359
D100	D117	D136	2506	2360
D101	D129	U1459	2507	2361
D102	D134	U1460	2509	2362
D122	D133	U1464	2510	2367
D116	D132	U1465	2522	2368
D115	D140	U1468	2616	
D121	D139	U1469	2629	