



## Monitoring report form (Version 05.1)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

### MONITORING REPORT

<b>Title of the project activity</b>	MCL wind power project in Tamilnadu, India	
<b>UNFCCC reference number of the project activity</b>	9740	
<b>Version number of the monitoring report</b>	2.1	
<b>Completion date of the monitoring report</b>	17/06/2016	
<b>Monitoring period number and duration of this monitoring period</b>	Monitoring Period: 01 Monitoring Period duration: 30/09/2013 to 15/12/2015 (first & last days are included)	
<b>Project participant(s)</b>	The Ramco Cements Limited (formerly Madras Cements Limited)	
<b>Host Party</b>	India	
<b>Sectoral scope(s)</b>	Sectoral scope: 01 Energy Industries (renewable -/ non-renewable sources)	
<b>Selected methodology(ies)</b>	Consolidated baseline methodology for grid-connected electricity generation from renewable sources.  Reference : ACM0002, Version : 13.0.0	
<b>Selected standardized baseline(s)</b>	Not Applicable	
<b>Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD</b>	81,730 <sup>1</sup> tCO <sub>2</sub> e	
<b>Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period</b>	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	Nil (the project got registered with UNFCCC only on 30/09/2013)	61,491 tCO <sub>2</sub> e (reported from 30/09/2013)

<sup>1</sup> According to the registered PDD, the estimated annual emission reductions are 36,966 tCO<sub>2</sub>e, (for 365days). The current monitoring period is from 30/09/2013 to 15/12/2015 (807 days). Therefore, emission reductions for this duration is (36,966\*807/365) i.e. 81,730 tCO<sub>2</sub>e.

## SECTION A. Description of project activity

### A.1. Purpose and general description of project activity

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The purpose of the project activity is to generate power through the renewable source (wind) of energy and export the net electricity to the grid.

The project activity involves the implementation and operation of 19.8 MW wind power project, in Tirpur district of Tamilnadu, India. The project activity leads to reduced Green House Gases (GHG) emissions because it displaces equivalent electricity generated in the grid connected fossil fuel based power plants.

The project activity includes the electricity generation using horizontal axis wind turbine generator. The kinetic energy of the blowing wind is harnessed using the blades on the wind turbine generator and converted to mechanical energy. The blades are connected to the low speed shaft which in turn is connected to the high speed shaft. The gears connect the low speed shaft to the high-speed shaft and increase the rotational speed. The high-speed shaft attached to the generator produces electricity i.e, converts the mechanical energy into the electrical energy. This form of electricity generators do not emit any GHGs commonly associated with the electricity generation in general.

The project activity involves installation of 12 Wind Turbine Generator (WTG) of Vestas make 1650 kW capacity each having aggregated capacity of 19.8 MW in the state of Tamilnadu, India. The Location and capacity of WTGs of the project activity are described below:

**Table 1- Details of WTG Installations**

S.No.	Location	Number of WTG	Capacity. of each WTG (kW)	Installed capacity (kW)
I	Periyapatti, Udumalpet region, Tirpur District, Tamilnadu state, India	12	1650	19800

Detailed technical description of the WTGs has been provided in Appendix - 3.

#### Relevant dates for the Project activity:

The project has been registered with UNFCCC on 30/09/2013 and the project UNFCCC registration number is 9740. The duration of the monitoring period considered under this monitoring report is 30/09/2013 to 15/12/2015 (both the dates included). The length of the crediting period for the project activity is 10 years. The important dates related to the project activity are listed in table below.

**Table 2- Relevant dates of the project activity**

Project activity	Dates
Start date of the project activity (i.e. date of the Letter of Intent (LoI) for purchase of 12*1650 kW Turbines to Vestas)	22/07/2008
Commissioning date of first WTG under the project activity.	25/09/2008
Commissioning date of last WTG under the project activity (Commissioning Date of all WTGs under the project activity has been explicitly mentioned under Appendix-2)	29/09/2008
CDM Registration date of the project activity	30/09/2013
Crediting Period	30/09/2013 to 29/09/2023 (Fixed)
1 <sup>st</sup> Periodic Monitoring period	30/09/2013 to 15/12/2015

Project activity is in continuous operation since the respective dates of commissioning.

**Emission reductions achieved in the current monitoring period:**

The duration of the current monitoring period considered under this monitoring report is 30/09/2013 to 15/12/2015 (inclusive of both the dates). The emission reduction achieved under this monitoring period is 61,491 tCO<sub>2</sub>e.

**A.2. Location of project activity**

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- a. Host Party – India
- b. State – Tamilnadu
- c. District – Tirpur district



Figure 1: Location of the project activity

**A.3. Parties and project participant(s)**

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
India (host party)	The Ramco Cements Limited (formerly Madras Cements Limited) - (Private Entity)	No

**A.4. Reference of applied methodology and standardized baseline**

&gt;&gt;

The details of the applied methodology and tools used in this project activity are listed below:

**Methodology:**

ACM0002 (Version 13.0.0) - Consolidated baseline methodology for grid-connected electricity generation from renewable sources.<sup>2</sup>

**Tools Reference:**

1. Tool to calculate the emission factor for an electricity system, (version 03.0.0<sup>3</sup>)
2. Tool for the demonstration and assessment of additionality (version 7<sup>4</sup>)

<sup>2</sup> <http://cdm.unfccc.int/methodologies/DB/MPY3HVJIMTKE5P0UNTYE827D6Q7EHB>

<sup>3</sup> <http://cdm.unfccc.int/Reference/tools/index.html>

<sup>4</sup> <http://cdm.unfccc.int/Reference/tools/index.html>

**Standardized baseline:**

Not applicable.

**A.5. Crediting period of project activity**

&gt;&gt;

Crediting Period : Fixed crediting period (10 years) has been considered for this project activity

Start date of the Crediting Period : 30/09/2013

Duration of the Crediting Period : 10 years (30/09/2013 – 29/09/2023)

Duration for the current Monitoring Period : 30/09/2013 – 15/12/2015 (both dates included)

**A.6. Contact information of responsible persons/entities**

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The Ramco Cements Limited (*formerly Madras Cements Limited*).

The entity is a Project Participant and contact details are provided in the Appendix 1.

**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity**

&gt;&gt;

In accordance with the para 244 of project standard (version 9) the description of the implemented registered CDM project activity is provided below:

First WTG under this project activity started its commercial operation on 25/09/2008 and the project activity was registered with UNFCCC as CDM project on 30/09/2013. Commissioning dates for all the WTGs under this project activity are mentioned in Appendix-2. All the WTGs were commissioned prior to registration of project activity with UNFCCC. Hence the monitoring period is considered from the date of registration of the project activity. The project has been in operation since commissioning.

The project activity includes the electricity generation using horizontal axis wind turbine generator<sup>5</sup>. The kinetic energy of the blowing wind is harnessed using the blades on the wind turbine generator and converted to mechanical energy. The blades are connected to the low speed shaft which in turn is connected to the high speed shaft. The gears connect the low speed shaft to the high-speed shaft and increase the rotational speed. The high-speed shaft attached to the generator produces electricity i.e. converts the mechanical energy into the electrical energy. This form of electricity generators do not emit any GHGs commonly associated with the electricity generation in general. Installation and operation of the wind power project does not pose any environmental hazards. Therefore the technology is considered to be environmentally safe and sound.

The main parts of a typical WTG are Blades, Rotor, Tower, Gearbox, Generator, Control system, Yaw system, Brakes, Nacelle, Pitch and Hub. Figure shows a typical WTG with arrangement of different parts.

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<sup>5</sup> Detailed technical description of the WTGs has been provided in Appendix- 3.

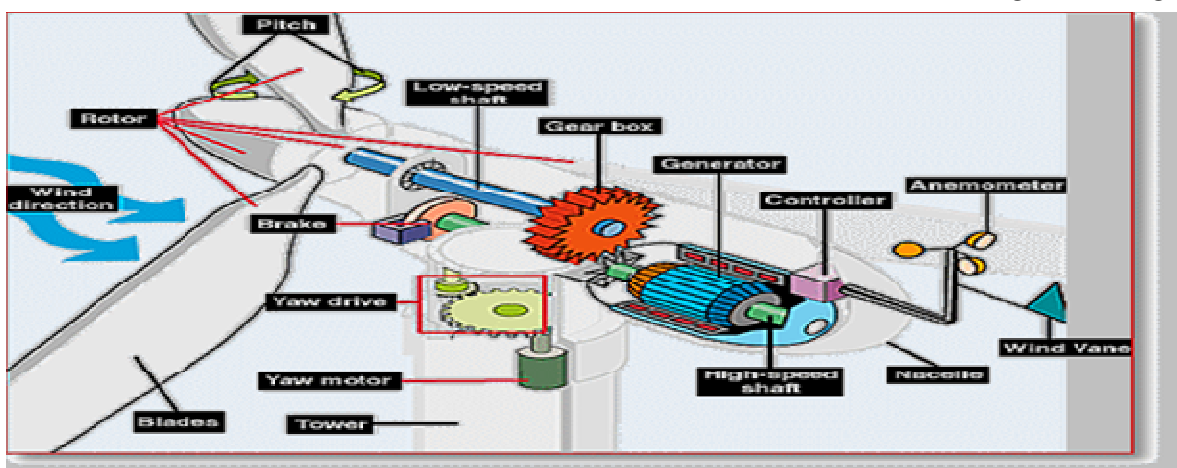


Figure 2: Parts of a WTG

No adverse situation has arisen during the monitoring period of the project which may eventually impact the applicability of the methodology and affect the additionality of the project activity.

## **B.2. Post-registration changes**

### **B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

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Not applicable.

### **B.2.2. Corrections**

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Not applicable.

### **B.2.3. Changes to start date of crediting period**

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Not applicable.

### **B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration**

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Not applicable.

### **B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline**

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Not applicable.

### **B.2.6. Changes to project design of registered project activity**

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Not applicable.

### **B.2.7. Types of changes specific to afforestation or reforestation project activity**

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Not applicable.

## SECTION C. Description of monitoring system

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According to the registered PDD, following parameter is being monitored in the project activity:

- Net Electricity Quantity supplied to the grid ( $EG_{PJ,y}$ )
- Electricity exported to grid ( $EG_{Export}$ )
- Electricity imported from grid ( $EG_{Import}$ )

The parameter (Net Electricity Quantity supplied to the grid) is calculated as difference of gross electricity exported and electricity imported from grid. However, the monthly Joint Meter Readings (JMRs) reflects the direct reading of electricity exported from the site and electricity imported from the grid.

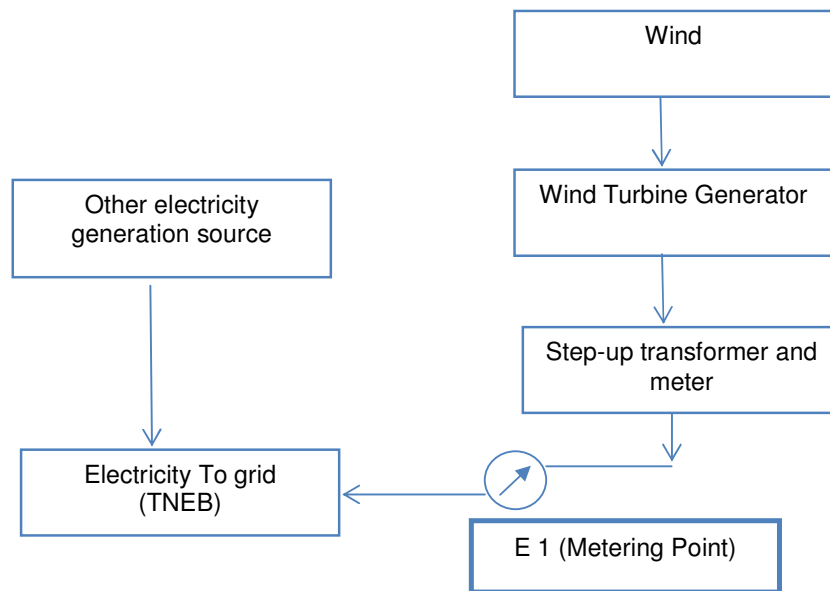


Figure 3: Project line diagram

All the energy meters are under the purview of TNEB for calibration. The frequency of the meter calibration will be at regular intervals as mentioned in Power Purchase Agreement (or once in 2 years). The Joint Meter Reading (JMR) is the primary source of data in all cases and the basis of emission reductions. Daily TNEB meter readings were also recorded and monitored by project operational & management team in the log books; these readings serve as the source of data when the individual verification period dates and the dates of JMRs of the various WTGs in the project activity do not coincide.

### Operational and Management structure for the project activity:

The day to day operation of the WTGs at the ground level is looked after by the operator. 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 organization structure is given below.

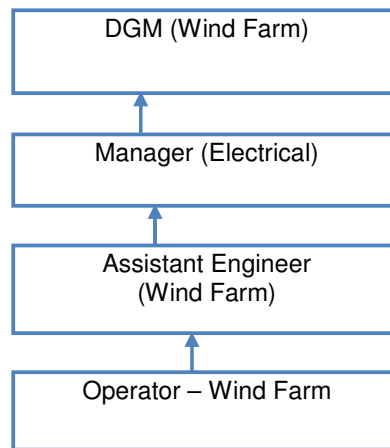


Figure 4: Organization structure for CDM project activity

The same project management team (as detailed in the above figure) is responsible for carrying out the CDM related internal audit programme.

#### **Procedures for maintenance of monitoring equipment**

In the context of the identified project activity, main energy meter and check meter are the only equipment's which is required to track the monitoring parameters. As per the Power Purchase Agreement (PPA) with TNEB, all the energy meters and the meter boxes are kept sealed by TNEB. Hence TNEB is responsible for maintenance of the energy meters.

#### **Procedures for handling data uncertainties**

##### *In the event of failure of energy meter:*

In case of failure of energy meter, during the period when the faulty meter is replaced by new calibrated meter, the WTG would not be in operation therefore the readings from the concerned WTG would not be available and hence no electricity generation and no emission reductions would be accounted for. In this context it is to be noted that there would be separate joint meter readings (JMRs) for the faulty meter and new meter (for the faulty meter up to the time of replacement and for the new meter from the time of replacing the old faulty meter). As the emission reductions would be estimated based on JMRs, the readings during the period of replacement of old faulty meter by new meter would not be accounted for in the calculations.

##### *In the event when verification period dates and billing cycle of WTGs in the project activity, do not coincide:*

In the event when the individual verification period dates and billing cycle dates (or dates of JMRs) of the various WTGs in the project activity do not coincide, the following procedure is adopted to estimate the net electricity supplied to the grid during the specific period/ or days where there is a mis-match.

*"The primary source of data for this period is the daily TNEB meter readings taken by Project participant site staff from the TNEB meter. This daily recorded value is added or subtracted from the JMR value to coincide the verification period dates and billing cycle dates."*

**SECTION D. Data and parameters****D.1. Data and parameters fixed ex ante or at renewal of crediting period**

<b>Data/parameter:</b>	$EF_{grid,CM,y}$
Unit	tCO <sub>2</sub> / MWh
Description	Combined Margin for Southern Grid
Source of data	Estimated figure based on the weighted average of OM and BM values calculated using data obtained from CEA database on CO <sub>2</sub> baseline emission factor for Indian Power Sector. Default weights of 0.75 and 0.25 have been ascribed to OM and BM respectively because of the intermittent and non dispatch able nature of wind energy. ( <a href="https://cdm.unfccc.int/filestorage/u/0/806KPL03NHJRCWMDTS9GQAI52YEXZ4.pdf/32%20CEA%20India%20GEF.pdf?t=QUJ8bzQwbGx5fDBfJF20zzxwfYQ6PY8mgbrn">https://cdm.unfccc.int/filestorage/u/0/806KPL03NHJRCWMDTS9GQAI52YEXZ4.pdf/32%20CEA%20India%20GEF.pdf?t=QUJ8bzQwbGx5fDBfJF20zzxwfYQ6PY8mgbrn</a> )
Value(s) applied)	0.8970
Choice of data or measurement methods and procedures	The database is Government of India's official publication based on the "Tool to calculate the emission factor for an electricity system" version 03.0.0
Purpose of data	Calculation of baseline emissions
Additional comments	Combined Margin emission Factor for Southern Grid has been fixed ex-ante for the crediting period

**D.2. Data and parameters monitored**

<b>Data/parameter:</b>	Net Electricity Quantity supplied to the grid ( $EG_{PJ,y}$ )
Unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid.
Measured/calculated/default	Calculated
Source of data	Joint Meter Reading (JMR) Report
Value(s) of monitored parameter	68551.872
Monitoring equipment	<p>Net electricity exported to grid is calculated as the difference of electricity exported and electricity imported from grid.  <math>EG_{PJ,y} = EG_{Export} - EG_{Import}</math></p> <p>The metering equipment is located at each WTG's location and the energy is metered by the TNEB at the high voltage side of the step up transformers installed at each HTSC connection. Monthly meter reading is recorded by the authorized representatives of TNEB in presence of the representative of project participant.</p>
Measuring/reading/recording frequency:	Continuous measurement and recorded once in a month.
Calculation method (if applicable):	<p>Let the gross electricity exported to the grid by the project activity be 'X' MWh</p> <p>Let the electricity imported from the grid by the project activity be: 'Y' MWh</p> <p>The electricity supplied to the grid is,  <math>EG_{PJ,y} = (X - Y)</math> MWh</p>



QA/QC procedures:	<p>Regular calibration of all the meters will be undertaken at required intervals as mentioned in PPA (or once in two years) and faulty meters will be duly replaced immediately with information to concerned Authority.</p> <p>At site, the operator is responsible for data collection from TNEB which is reviewed by the Assistant Engineer (AE) and Manager (Electrical) before the same is communicated to the top management for further review and necessary action.</p> <p>The measured value of the meter will be cross checked with the records of sold electricity and conservative value from the same will be used in CER calculation.</p> <p>Accuracy class of energy meters: 0.5 / 0.2</p>
Purpose of data:	Calculation of baseline emissions
Additional comments:	Joint Meter Report is the primary source of data in all cases. Daily TNEB Meter readings recorded by the project participant staff in the log book serves as the source of data when the individual verification period dates and the dates of JMRs of the various WTGs in the project activity do not coincide.

<b>Data/parameter:</b>	Electricity exported (EG <sub>Export</sub> )
Unit	MWh
Description	Total Electricity Export to the Grid by the Project Activity
Measured/calculated/default	Measured
Source of data	Joint Meter Reading (JMR) Report.
Value(s) of monitored parameter	69419.400
Monitoring equipment	Electricity exported to grid is directly monitored by TNEB energy meters. Type: Energy Meter Accuracy class of energy meter: 0.5 / 0.2
Measuring/reading/recording frequency:	Continuous measurement and recorded once in a month.
Calculation method (if applicable):	This data is monitored directly.
QA/QC procedures:	<p>Regular calibration of all the meters will be undertaken at required intervals as mentioned in PPA (or once in two years) and faulty meters will be duly replaced immediately with information to concerned Authority.</p> <p>The energy meters are maintained and owned by TNEB and TNEB holds the responsibility of carrying out calibration of all the metering instruments. At site, the operator is responsible for data collection from TNEB which is reviewed by the Assistant Engineer (AE) and Manager (Electrical) before the same is communicated to the top management for further review and necessary action.</p>
Purpose of data:	This data used for baseline emission calculation
Additional comments:	Joint Meter Report is the primary source of data in all cases. Daily TNEB Meter readings recorded by the project participant staff in the log book serves as the source of data when the individual verification period dates and the dates of JMRs of the various WTGs in the project activity do not coincide.

<b>Data/parameter:</b>	Electricity imported (EG <sub>Import</sub> )
Unit	MWh
Description	Total Electricity Import from the Grid by the Project Activity
Measured/calculated/default	Measured
Source of data	Joint Meter Reading (JMR) Report.
Value(s) of monitored parameter	867.528
Monitoring equipment	Electricity imported from grid is directly monitored by TNEB energy meters. Type: Energy Meter Accuracy class of energy meter: 0.5 / 0.2
Measuring/reading/recording frequency:	Continuous measurement and recorded once in a month.
Calculation method (if applicable):	This data is monitored directly.
QA/QC procedures:	Regular calibration of all the meters will be undertaken at required intervals as mentioned in PPA (or once in two years) and faulty meters will be duly replaced immediately with information to concerned Authority.  The energy meters are maintained and owned by TNEB and TNEB holds the responsibility of carrying out calibration of all the metering instruments. At site, the operator is responsible for data collection from TNEB which is reviewed by the Assistant Engineer (AE) and Manager (Electrical) before the same is communicated to the top management for further review and necessary action.
Purpose of data:	This data used for baseline emission calculation
Additional comments:	Joint Meter Report is the primary source of data in all cases. Daily TNEB Meter readings recorded by the project participant staff in the log book serves as the source of data when the individual verification period dates and the dates of JMRs of the various WTGs in the project activity do not coincide.

### D.3. Implementation of sampling plan

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Not applicable.

## SECTION E. Calculation of emission reductions or GHG removals by sinks

### E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

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According to the approved methodology ACM0002 (Version 13.0.0) emission reductions are calculated as

$$ER_y = BE_y - PE_y$$

Where:

ER<sub>y</sub> : Emission Reductions in year y (tCO<sub>2</sub>e)

BE<sub>y</sub> : Baseline Emissions in year y (tCO<sub>2</sub>e)

PE<sub>y</sub> : Project Emissions in year y (t CO<sub>2</sub>e)

According to the baseline methodology ACM0002 (Version 13.0.0), the GHG emission of the proposed project within the project boundary is zero, i.e.

$$PE_y = 0$$

Therefore the above equation is simplified to

$$ER_y = BE_y$$

**Estimation of Baseline Emissions**

As per ACM0002 (Version 13.0.0), the baseline emissions are to be calculated as follows:

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

Where:

$BE_y$  : Baseline emissions in year y (tCO<sub>2</sub>e)

$EG_{PJ,y}$  : Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh)

$EF_{grid,CM,y}$  : Combined margin CO<sub>2</sub> emission factor for grid (tCO<sub>2</sub>/MWh)

The Baseline emission factor ( $EF_{grid,CM,y}$ ) is 0.8970 tCO<sub>2</sub>/MWh has been estimated and validated for the project activity. This is fixed ex-ante for the entire crediting period as per the registered PDD.

**Emission Reduction Calculation:**

For the entire project activity, for the period 30/09/2013 to 15/12/2015

The gross electricity exported to the grid by the project activity  
= 69,419,400 kWh

The electricity imported from the grid by the project activity  
= 867,528 kWh

Net Electricity Export to grid = (69,419,400 – 867,528) = 68,551,872 kWh

**Baseline Emissions**

= (68,551,872/1000 MWh) x (0.897 tCO<sub>2</sub>e/MWh)

= 61,491.03 tCO<sub>2</sub>e

= **61,491.00 tCO<sub>2</sub>e** (round down)

Data Apportioning:

During this current monitoring period from 30/09/2013 to 15/12/2015, the billing cycle dates (or dates of JMRs) of all the WTGs in the project activity does not coincide with the monitoring period. Hence data apportioning has been applied at the beginning and in the end of the monitoring period. The primary source of data for this period is the daily TNEB meter readings recorded by Project participant site staff from the TNEB meter.

Example: for HTSC 1550:

The monitoring period starts on 30/09/2013, whereas the JMR is for the period 07/09/2013 to 07/10/2013. Hence the daily meter reading recorded by site staff from 30/09/2013 to 07/10/2013 has been considered to match the current monitoring period of this particular month. The same value has been used for the emission reduction calculation.

Similarly, the monitoring period ends on 15/12/2015, whereas the JMR is for the period 09/12/2015 to 09/01/2016. Hence the daily meter reading recorded by site staff from 09/12/2015 to 15/12/2015 has been considered to match the current monitoring period of this particular month. The same value has been used for the emission reduction calculation.

Similar procedure has been followed for other HTSC Nos. and the details of the same have been provided in emission reduction sheet separately.

**Month-wise gross electricity export, electricity import, and Net electricity export details are listed below:**

**Table 3: Month-wise Electricity Export, Electricity Import, Net Electricity Export Details for Project Activity**

<b>Month</b>	<b>Gross Electricity Supplied to Grid (kWh)</b>	<b>Electricity Imported from the Grid (kWh)</b>	<b>Net Electricity Exported (kWh)</b>	<b>Baseline Emissions, tCO<sub>2</sub></b>
September 2013 & October 2013	1208736	936	1207800	1083.40
November 2013	2385672	25944	2359728	2116.68
December 2013	184200	66696	117504	105.40
January 2014	607680	47160	560520	502.79
February 2014	752808	33048	719760	645.62
March 2014	542520	50856	491664	441.02
April 2014	1563360	36552	1526808	1369.55
May 2014	1794312	37752	1756560	1575.63
June 2014	5297976	7176	5290800	4745.85
July 2014	8320272	2520	8317752	7461.02
August 2014	9119016	2424	9116592	8177.58
September 2014	5223576	8832	5214744	4677.63
October 2014	3823392	25416	3797976	3406.78
November 2014	1014864	52800	962064	862.97
December 2014	465264	51264	414000	371.36
January 2015	331992	55776	276216	247.77
February 2015	441408	33768	407640	365.65
March 2015	426384	45696	380688	341.48
April 2015	712488	58056	654432	587.03
May 2015	656040	39240	616800	553.27
June 2015	2746680	25224	2721456	2441.15
July 2015	5964552	5016	5959536	5345.70
August 2015	6796464	3360	6793104	6093.41
September 2015	5161824	13920	5147904	4617.67
October 2015	3208176	18384	3189792	2861.24
November 2015	437640	57816	379824	340.70
December 2015	232104	61896	170208	152.68
	<b>69419400</b>	<b>867528</b>	<b>68551872</b>	<b>61491.03</b>

**Table 4: Summary for Electricity Export, Electricity Import, Net Electricity Export Details for total project Activity**

Summary of Emission Reduction by the project activity (30/09/2013 - 15/12/2015)			
Gross Electricity Export (kWh)	Electricity Import (kWh)	Net Electricity Export (kWh)	Baseline Emissions (BE <sub>y</sub> ) (tCO <sub>2</sub> e)
69,419,400	867,528	68,551,872	61,491 <sup>6</sup>

**E.2. Calculation of project emissions or actual net GHG removals by sinks**

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According to the baseline methodology ACM0002 (Version 13.0.0), the GHG emission of the proposed project within the project boundary is zero, i.e. Project Emission (PE<sub>y</sub>) = 0

**E.3. Calculation of leakage**

&gt;&gt;

No anthropogenic Green House Gases by sources outside the project boundary that are significant, measurable and attributable to the project activity are identified. Hence, no leakage is considered from the project activity. In addition, project proponents confirm that the renewable energy technology is not transferred from another activity.

Hence, no leakage calculation is required.

LE<sub>y</sub> = 0

**E.4. Summary of calculation of emission reductions or net GHG removals by sinks**

Item	Baseline emissions or baseline net GHG removals by sinks (t CO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	GHG emission reductions or net GHG removals by sinks (t CO <sub>2</sub> e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	61,491	0	0	0 <i>(the project got registered with UNFCCC only on 30/09/2013)</i>	61,491 <i>(reported from 30/09/2013)</i>	61,491

**E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD**

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO <sub>2</sub> e)	81,730 <sup>7</sup>	61,491

<sup>6</sup> The value has been rounded down.

<sup>7</sup> The emission reductions have been extrapolated for 807 days as this monitoring period consists of 807 days.

**E.6. Remarks on difference from estimated value in registered PDD**

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Actual CERs generated during this first monitoring period (30/09/2013 – 15/12/2015) is lower than the estimated CERs with respect to comparable period in the registered PDD. This is due to lower PLF achieved during the current monitoring period.

## Appendix 1. Contact information of project participants and responsible persons/entities

<b>Project participant and/or responsible person/ entity</b>	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
<b>Organization name</b>	The Ramco Cements Limited (formerly Madras Cements Limited)
<b>Street/P.O. Box</b>	98 A , Dr. Radhakrishna Road, Mylapore
<b>Building</b>	5 <sup>th</sup> floor , Corporate Office , “Auras Corporate Centre”
<b>City</b>	Chennai
<b>State/region</b>	Tamil Nadu
<b>Postcode</b>	600 004
<b>Country</b>	India.
<b>Telephone</b>	+9144 28478666
<b>Fax</b>	+9144 28478676
<b>E-mail</b>	ksn@ramcocements.co.in
<b>Website</b>	
<b>Contact person</b>	
<b>Title</b>	Company Secretary
<b>Salutation</b>	Mr.
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## Appendix 2. Detailed location and commissioning dates of Wind Turbine Generators (WTGs)

WTG HTSC No	S.F. No	Wind Farm location	Village and District	Latitude & Longitude	Date of Commissioning
U1550	340 / C (p)	Periyapatti	Illuppainagaram Village, Tirpur District	N10 43.603 E77 11.729	25/09/2008
U1551	357	Periyapatti	Illuppainagaram Village, Tirpur District	N10 43.697 E77 11.395	25/09/2008
U1552	316 / 1 (p)	Periyapatti	Illuppainagaram Village, Tirpur District	N10 43.624 E77 10.847	25/09/2008
U1553	315 (p)	Periyapatti	Illuppainagaram Village, Tirpur District	N10 43.103 E77 11.059	28/09/2008
U1554	244/ B,C 224 / A (p) 225 / D,E	Periyapatti	Anikkadavu village, Tirpur District	N10 43.209 E77 10.711	25/09/2008
U1555	218 (p)	Periyapatti	Anikkadavu village, Tirpur District	N10 43.457 E77 11.357	25/09/2008
U1565	118 (p)	Periyapatti	Thottampatti Village, Tirpur District	N10 43.233 E77 11.343	28/09/2008
U1566	427 / 2A (p)	Periyapatti	Virugalpatti, Tirpur District	N10 44.323 E77 1.553	28/09/2008
U1567	379 / 1 (p)	Periyapatti	Illuppainagaram Village, Tirpur District	N10 44.544 E77 10.850	25/09/2008
U1568	284 / 3A (p), 3B (p) 280 / 2 (p)	Periyapatti	Anikkadavu village, Tirpur District	N10 42.684 E77 11.108	28/09/2008
U1569	204 (p)	Periyapatti	Anikkadavu village, Tirpur District	N10 39.719 E77 11.786	28/09/2008
U1574	105 / 2	Periyapatti	Thottampatti Village, Tirpur District	N10 39.191 E77 11.745	29/09/2008



### Appendix 3. Technical specification of WTGs

#### VESTAS V 82 (1650 kW) WTG

##### OPERATING DATA VALUE

Nominal Power	: 1650 kW
Cut-in wind speed	: 3.5 m/s
Cut-out wind speed	: 20 m/s
Maximum rotational speed	: 14.4 rpm
Rotor Position	: Upwind

##### ROTOR & BLADE

Rotor Diameter	: 82 m
No of Rotor Blade	: 3
Blade material	: Carbon Fibre / Epoxy / Wood
Blade Length	: 40 m
Blade Profile	: FFA – W3, NACA 63.4
Air Brake	: Full Blade
Rotational speed (Synchronous)	: 14.4 rpm
Operating Range Rotational Speed	: 12 - 29 rpm
Rotor Tilt angle	: 5°
Swept area	: 5281 m <sup>2</sup>
Hub height	: 78 m

##### GENERATOR

Rated Power	: 1650 kW
Rated Speed (Synchronous)	: 1012 rpm at rated power
Insulation Class	: F/B
Protection Class (IEC529)	: F/B

##### GEAR BOX

Gear Ratio	: 1 : 70.2
Mechanical Power	: 1800 kW

##### MECHANICAL BRAKE SYSTEM

Type	: Fail Safe – Hydraulic release
Position	: Mounted on high speed shaft
No. of callipers	: 1 pc

##### CONTROL SYSTEM

Manufacture	: Vestas control systems
Type	: Microprocessor based

**YAW SYSTEM**

Yaw bearing, type	: ball bearing, internal gearing
Yaw motor	: 6 nos
Yaw gear	: 6 pcs
Gearing ratio	: 1 / 1666
Yaw brake	: Hydraulic disc brake, 6 pcs

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**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to the Host Party;</li> <li>• Remove reference to programme of activities;</li> <li>• Overall editorial improvement.</li> </ul>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;</li> <li>• Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>;</li> <li>• Editorial improvement.</li> </ul>
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
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