"BIOMASS BASED RENEWABLE ENERGY GENERATION AT KARNAL"

Document Prepared By

Enen Green Services Pvt. Ltd.

Project Title	Biomass based Renewable Energy Generation at Karnal
Version	05
Report ID	
Date of Issue	21-September-2015
Project ID	-1303
Monitoring Period	03-October-2012 to 30-April-2014 (Inclusive of Both the Days)
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1   PROJECT DETAILS

1.1   Summary Description of the Implementation Status of the Project

The purpose of the project activity is to utilize biomass (rice husk) available in the region for steam generation for captive consumption. The project activity undertaken includes three steam generation boilers of capacity 12 TPH, 12 TPH and 3 TPH respectively, located in the premises of Modern Dairies Limited at Karnal district in the state of Haryana, India. The project activity involves three boilers viz. Boiler 1 and Boiler 2 with a capacity of 12 TPH at 17.5 Kg/cm^2 pressure and Boiler 3 with a capacity of 3 TPH at 10.5 Kg/cm^2 pressure. The said boilers have been retrofitted in order to fire rice husk as fuel for steam generation.

As the project activity utilizes a carbon neutral fuel, it thereby reduces the anthropogenic Green House Gas (GHG) emission that would have been generated as a result of continued operation of pet coke based boilers.

The project activity was commissioned on 03rd October, 2012 (The earliest commissioning amongst the three retrofitted boilers at the project sitei.e. of the 12 TPH, 17.5 kg/cm^2 retrofittedboiler at MDL). The project activity has been operational since then.

The total GHG emission reductions or net anthropogenic GHG removals achieved in this monitoring period (03/10/2012 – 30/04/2014): 60,857 tCO_2e

1.2   Sectoral Scope and Project Type

The project activity belongs to the sectoral scope 1: Energy industries (renewable/non-renewable) in accordance with the sectoral scopes defined by the VCS.

This is not a grouped project as it does not involve combination of GHG projects or other project categories. It is a single project and there are no other project participants involved.

Furthermore, the activity type is categorized under "Project" with less than 3,00,000 tCO_2e per annum.

1.3   Project Proponent

Organization name	Modern Dairies Limited (MDL)
Contact person	V. K. Nayyar
Title	Mr.
Address	Post Box No. 3, 136 KM, GT Road, Karnal, Haryana
Telephone	+91-9896113733
Email	works@moderndairies.com

Modern Dairies Limited is responsible for overall administration and implementation of the project activity.

1.4   Other Entities Involved in the Project

There is no other entity involved in the project activity.

1.5   Project Start Date

Project Start Date: 03rd October, 2012 (The earliest commissioning amongst the three retrofitted boilers at the project sitei.e. of the 12 TPH, 17.5 kg/cm^2 retrofittedboiler at MDL)

1.6   Project Crediting Period

Project Crediting Period: Ten years (renewable twice)

Crediting Period Start Date: 03rdOctober, 2012[1]

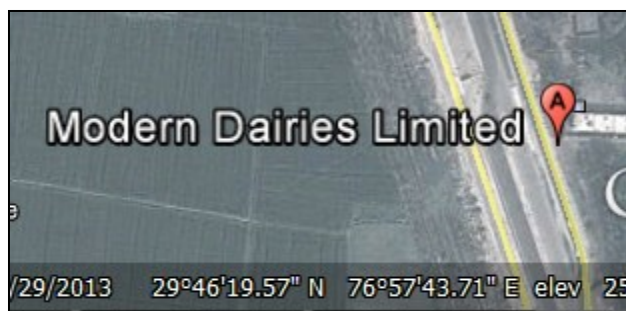**1st Crediting Period**: 03rd October, 2012 – 02ndOctober, 2022

1st Monitoring Period:03rd October, 2012– 30th April, 2014

1.7   Project Location

The project activity is located at Post Box No. 3, 136 KM, GT Road, Karnal district, in the state of Haryana, India. The location of the same has been illustrated in the map given below:

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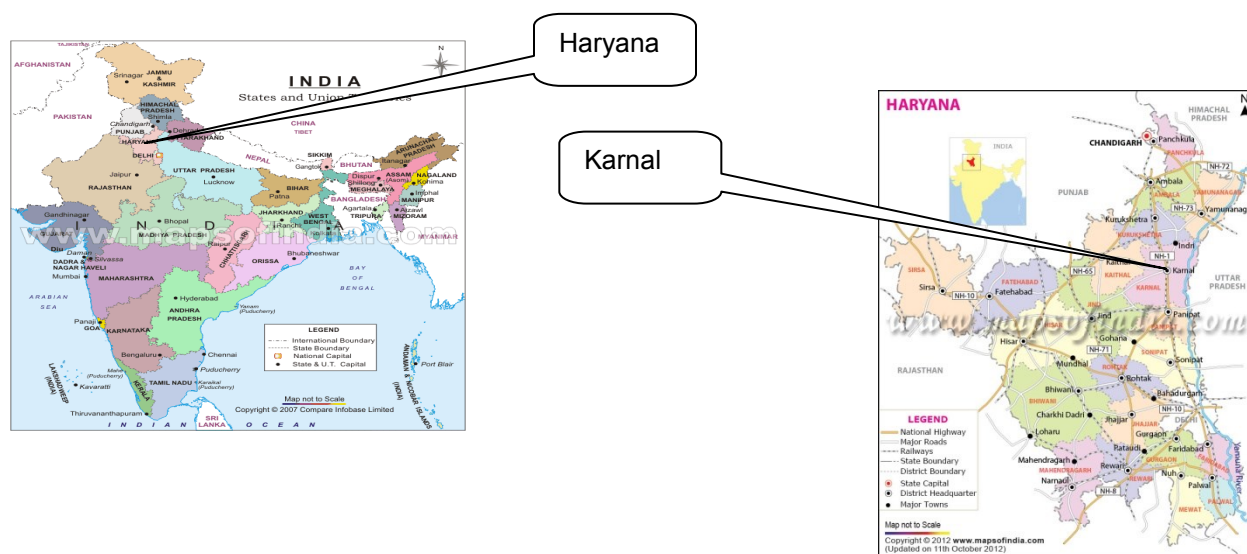
[1]Commissioning Certificate

The Geographical co-ordinates of the project activity are:

Latitude   :   29°46'19.57" N
Longitude   :   76°57'43.71" E

1.8   Title and Reference of Methodology

Title: Thermal energy production with or without electricity
Type: I – Renewable energy project
Category I.C: Thermal Energy production with or without electricity; I.C/Version 19
Sectoral Scope: 01

The reference has been taken from the list of the small-scale CDM project activity categories contained in Appendix B of the simplified M&P for small-scale CDM project activities.

1.9   Other Programs

The net GHG emission reductions generated by the project activity will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions.

The project activity by MDL has not been registered and is not seeking registration under any other GHG emission program to avail carbon benefits during the crediting period of the project activity.[2]Furthermore, the project proponent also corroborates that the project activity has not created or sought or received any other form of environmental credit.[3]

2   IMPLEMENTATION STATUS

2.1   Implementation Status of the Project Activity

The project activity has been commissioned and is operational since commissioning. The project activity was commissioned on 03rd October, 2012(The earliest commissioning amongst the three retrofitted boilers at the project site i.e. of the 12 TPH, 17.5 kg/cm^2 retrofittedboiler at MDL). The project activity is undergoing verification for its first monitoring period.

Outage Details:

Boiler 1 has been non-operational for a period of 7 days in the year 2013 i.e. from 25th May, 2013 to 31st May, 2013. Furthermore, Boiler 2 has also non-operational for a period of 7 days in the year 2013 i.e. from 24[th]June, 2013 to 30th June, 2013.These are planned shutdowns for the purpose of boiler maintenance.

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[2]An undertaking by MDL
[3]An undertaking by MDL

Boiler 3 has been non-operational for a period of 2 Months in the year 2013 i.e. from 1st May, 2013 to 30th June, 2013. The same is due to less availability of Milk. It can also be noted that Boiler 1 and Boiler 2 also operate at 70% capacity during the said months due to less availability of Milk.

Apart from the above stated outages, there has been no exchange of equipment or any major breakdown during the current monitoring period. Also, no such events have occurred during the current monitoring period that may have an impact on the applicability of the applied methodology.

2.2 Deviations

2.2.1 Methodology Deviations

As per section 4.2 of approved PD, $NCV_{biomass}$ would be monitored by measuring quarterly, taking at least three samples for each measurement. The average value is used for the rest of the crediting period. However the same has not been monitored in accordance with approved PD. Only one certificate of date 18 June 2013 is available by independent accredited laboratory. Keeping the fact that NCV is intrinsic property of biomass, it is almost fixed within a range as this cannot be affected by project's operation; a deviation has been sought in this regard. Moreover in the next verification, quarterly $NCV_{biomass}$ reports (taking at least three samples for each measurement) from independent accredited laboratory will be produced in accordance with section 4.2.

2.2.2 Project Description Deviations

Pl. refer to next section 2.2.1.

2.3 Grouped Project

Not Applicable; as the project activity is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{EF,CO2}$
Data unit	tCO_2/ TJ
Description	The CO_2 emission factor per unit of energy of petcoke that would have been used in the baseline plant in absence of the project activity
Source of data	As per 2006 IPCC Guidelines for National Greenhouse Gas Inventories , Vol. 2, Chapter 2 (Table 2.2), pg 1.23 (IPCC default emission factors has been used as Local and National data on the emission factor of petcoke is not available)
Value applied:	97.5

Justification of choice of data or description of measurement methods and procedures applied	Default values, as per §22 of AMS I C version 19, as reliable local/ national data is not available.
Purpose of Data	For calculation of baseline emissions
Comments	Nil

Data / Parameter	$\eta_{BL, thermal}$
Data unit	%
Description	The efficiency of the pet coke based boiler that would have been used in the absence of the project activity.
Source of data	Project Document
Value applied:	100
Justification of choice of data or description of measurement methods and procedures applied	This value is as per para 30 (c) of applied methodology. This is the most conservative value for the efficiency.
Purpose of Data	For calculation of baseline emissions
Comments	Nil

Data / Parameter	$TDL_{j,y}$
Data unit	-
Description	Average technical transmission and distribution losses for providing electricity to the source j in year y
Source of data	Section III, Page 12, of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", Version 1
Value applied:	0.2
Justification of choice of data or description of measurement methods and procedures applied	The value applied is a default value provided by the associated tool i.e. "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", Version 1
Purpose of Data	For calculation of project emissions
Comments	Nil

Data / Parameter	$EF_{grid,CM,y}$

Data unit	tCO_2/MWh
Description	Combined margin emission factor for the grid in the year y
Source of data	CEA, CO_2 Baseline Emission Factor for Indian Power Sector, Version 09 (http://www.cea.nic.in)
Value applied:	0.98
Justification of choice of data or description of measurement methods and procedures applied	The value applied is a default value provided by the CO_2 Baseline Emission Factor for Indian Power Sector, Version 09 issued by the Central Electricity Authority (CEA).
Purpose of Data	For calculation of project emissions
Comments	Nil

3.2 Data and Parameters Monitored

Data / Parameter	$NCV_{biomass}$
Data unit	Kcal/Kg
Description	Net calorific Value of biomass residues
Source of data	Third party (lab test of biomass)
Description of measurement methods and procedures to be applied	Monitoring: Independent third party has tested the parameter. Pl. refer to the deviation described in section 2.2.1 for detail. Data type: Measured. Archiving policy: Paper. Recording Frequency: Once in a year. Responsibility: Manager is responsible for regular testing of the NCV as per the recording frequency.
Frequency of monitoring/recording	Annual
Value applied:	2752
Monitoring equipment	-
QA/QC procedures to be applied	Samples of biomass(rice husk) utilized have been analyzed for NCV from an NABL accreditated laboratory, Haryana Test House.
Purpose of data	-
Calculation method	Not Applicable
Comments	-

Data / Parameter	Q_{steam}
Data unit	Tonnes
Description	Quantity of steam generated from project activity biomass fired

	boiler annually
Source of data	On site measurement taken from steam flow meter
Description of measurement methods and procedures to be applied	Reading will be directly taken from steam flow meter by boiler attendant supervisor on hourly basis. Monitoring: steam flow meter. Data type: Measured. Archiving policy: Paper. Recording Frequency: hourly Responsibility: Manager is responsible for regular calibration of the meter. Calibration Frequency: Once in three years.
Frequency of monitoring/recording	Continuous monitoring, integrated hourly and recorded at least Monthly
Value applied:	Boiler 1: 133,254.71Tonnes Boiler 2 : 112,279.04 Tonnes Boiler 3: 16,759.11.34 Tonnes
Monitoring equipment	Steam flow meter 1 S. No. 990230 Accuracy class: 0.5 Calibration date: 25 September 2012 and 24 September 2014 Steam flow meter 2 S. No. 7011 Accuracy class: 0.5 Calibration date: 25 September 2012 and 24 September 2014 Steam flow meter 3 S. No. 8505B702000 Accuracy class: 0.5 Calibration date: 25 September 2012 and 24 September 2014
QA/QC procedures to be applied	Steam flow meters have been calibrated by external competent agency.
Purpose of data	For calculation of baseline emissions.
Calculation method	Not Applicable
Comments	Data will be kept for crediting period + 2 years. In case of failure of the meter, either most conservative value will be used or corresponding emission reductions will not be claimed.

Data / Parameter	T$_{steam}$
Data unit	°C
Description	Temperature of steam generated
Source of data	On site measurement taken by temperature gauge
Description of measurement methods and procedures to be applied	Reading will be directly taken from temperature gauge by boiler attendant supervisor on hourly basis. Monitoring: temperature gauge Data type: Measured. Archiving policy: Paper. Recording Frequency: hourly Responsibility: Manager is responsible for regular calibration of the meter. Calibration Frequency: Once in three years.
Frequency of monitoring/recording	Continuous monitoring, integrated and recorded hourly
Value applied:	Boiler 1: 202 Boiler 2 : 201 Boiler 3: 168
Monitoring equipment	Boiler 1: Temperature gauge (Identification No.: STI-1) S. No: 1209J09-164 Make/Model no: SELEC/PIC-101 Accuracy: + 0.1% Calibration details: Last calibration date : 12/09/12 and 12/03/13 and 12/09/13 and 12/03/14 Calibration due date : 12/03/17 Calibration agency : In house calibration using Reference temperature Tester Results: under the specified limits Boiler 2: Temperature gauge (Identification No.: STI-2) S. No: 1209J15-181 Make/Model no: SELEC/PIC-101 Accuracy: + 0.1% Calibration details: Last calibration date : 01/01/13 and 01/07/13 and 01/01/14 Calibration due date : 01/01/17 Calibration agency : In house calibration using Reference temperature Tester Results: under the specified limits

<table>
<tr><td rowspan="1"></td><td>Boiler 3:
Temperature gauge (Identification No.: STI-3)
S. No: 1201J12-051
Make/Model no: SELEC/PIC-101

Accuracy: ± 0.1%

Calibration details:
calibration date : 14/04/13 and 14/10/13 and 14/04/14 and 14/10/2014
Calibration due date : 14/10/17
Calibration agency : In house calibration using Reference temperature Tester
Results: under the specified limits

Calibration of reference temperature tester:
S. No: 9753018
Accuracy: ± 0.1%

Calibration date : 23/08/2012 (calibration done by third party)

due calibration date (as per three year calibration frequency):23/08/2015</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>-</td></tr>
<tr><td>Purpose of data</td><td>For calculation of baseline emissions.</td></tr>
<tr><td>Calculation method</td><td>Not Applicable</td></tr>
<tr><td>Comments</td><td>Please refer Section 2.2.1</td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>P_{steam}</td></tr>
<tr><td>Data unit</td><td>Kg/cm^2</td></tr>
<tr><td>Description</td><td>Pressure of steam generated</td></tr>
<tr><td>Source of data</td><td>On site measurement by the pressure gauge</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Reading will be directly taken from pressure gauge by boiler attendant supervisor on hourly basis.
Monitoring: pressure gauge
Data type: Measured.
Archiving policy: Paper.
Recording Frequency: hourly
Responsibility: Manager is responsible for regular calibration of the meter.
Calibration Frequency: Once in three years.</td></tr>
</table>

Frequency of monitoring/recording	Continuous monitoring, integrated and recorded hourly
Value applied:	Boiler 1: 16.64 Boiler 2 : 16.69 Boiler 3: 9.28
Monitoring equipment	Boiler 1: Pressure gauge (Serial No.: 5505-P7-17) Make /model no: WAREE/DIAL TYPE Accuracy: $\pm$ 0.1 Kg/cm^2 Calibration Frequency: Annual. Calibration details: Last calibration date : 1/10/13 Calibration due date : 1/10/14 Calibration agency : In house calibration used Dead Weight Tester Results: under the specified limits Last calibration date : 12/09/12 Calibration due date : 12/09/13 Calibration agency : In house calibration used Dead Weight Tester Results: under the specified limits Boiler 2: Pressure gauge (Serial No.: 5505-P7-15) Make /model no: WAREE/DIAL TYPE Accuracy: $\pm$ 0.1 Kg/cm^2 Calibration Frequency: Annual. Calibration details: Last calibration date : 1/10/13 Calibration due date : 1/10/14 Calibration agency : In house calibration used Dead Weight Tester Results: under the specified limits Last calibration date : 12/09/12 Calibration due date : 12/09/13 Calibration agency : In house calibration used Dead Weight Tester Results: under the specified limits Boiler 3: Pressure gauge (Serial No.: 1178PG/00031) Make /model no: WAREE/DIAL TYPE Accuracy: $\pm$ 0.1 Kg/cm^2 Calibration Frequency: Annual. Calibration details Last calibration date : 1/10/13 Calibration due date : 1/10/14 Calibration agency : In house calibration used Dead Weight Tester Results: under the specified limits Last calibration date : 12/09/12 Calibration due date : 12/09/13 Calibration agency : In house calibration used Dead Weight Tester

	Results: under the specified limits
QA/QC procedures to be applied	The Pressure Gauges have been calibrated in-house using a Dead Weight Tester. The same has been appropriately calibrated by an external calibration laboratory.
Purpose of data	For calculation of baseline emissions.
Calculation method	Not Applicable
Comments	The Pressure Gauges have been calibrated in-house using a Dead Weight Tester. The same has been appropriately calibrated by an external calibration laboratory. Details of the calibration areas follows: Dead Weight Tester (Sr. No.: T7D202) Last calibration date : 01/10/2013 Calibration due date : 01/10/2014 Calibration agency : Electronics Test & Development Centre, Mohali Results: under the specified limits Last calibration date : 12/09/2012 Calibration due date : 12/09/2013 Calibration agency : Electronics Test & Development Centre, Mohali Results: under the specified limits Data will be kept for crediting period + 2 years. In case of failure of meter, either most conservative value will be used or corresponding emission reductions will not be claimed.

Data Unit / Parameter:	T_{FW}
Data unit:	°C
Description:	Temperature of the feed water in the boiler.
Source of data:	On-site measurement by temperature gauge installed at feed water inlet.
Description of measurement methods and procedures to be applied:	Monitoring: temperature gauge Data type: Measured Recording Frequency: hourly Responsibility: Manager is responsible for regular calibration of the meter. Calibration Frequency: once in three years.
Frequency of	Continuous monitoring, integrated and recorded hourly

monitoring/recording:	
Value applied:	Boiler 1: 85 Boiler 2 : 85 Boiler 3: 81
Monitoring equipment:	Boiler 1: Temperature gauge (Identification No.: FWTI-1) S. No: 130214/0746 Make/Model no: AUTONIX/PP35 Accuracy: $\pm$ 0.1% Calibration details: Last calibration date : 12/09/12 and 12/03/13 and 12/09/13 and 12/03/14 Calibration due date : 12/03/17 Calibration agency : In house calibration using Reference temperature Tester Results: under the specified limits Boiler 2: Temperature gauge (Identification No.: FWTI-2) S. No: 130218/0748 Make/Model no: AUTONIX/PP35 Accuracy: $\pm$ 0.1% Calibration details: Last calibration date : 01/01/13 and 01/07/13 and 01/01/14 Calibration due date : 01/01/17 Calibration agency : In house calibration using Reference temperature Tester Results: under the specified limits Boiler 3: Temperature gauge (Identification No.: FWTI-3) S. No: 1112N11-066 Make/Model no: SELEC/PIC152 Accuracy: $\pm$ 0.1% Calibration details: calibration date : 14/04/13 and 14/10/13 and 14/04/14 and 14/10/2014 Calibration due date : 14/10/17 Calibration agency : In house calibration using Reference temperature Tester Results: under the specified limits Calibration of reference temperature tester: S. No: 9753018 Accuracy: $\pm$ 0.1%

	Calibration date : 23/08/2012 (calibration done by third party) due calibration date (as per three year calibration frequency):23/08/2015
QA/QC procedures to be applied:	Reference Temperature tester has been calibrated by external accredited agencies.
Purpose of data	Calculation of Baseline emissions
Calculation method:	-
Any comment:	Data will be kept for crediting period + 2 years. In case of failure of meter, either most conservative value will be used or corresponding emission reductions will not be claimed.

Data Unit / Parameter:	$EG_{thermal,y}$
Data unit:	TJ/annum
Description:	Net quantity of thermal energy supplied by the project activity during the year Y
Source of data:	Calculated from monitored data quantity, temperature and pressure of steam
Description of measurement methods and procedures to be applied:	Thermal energy is calculated as a product of Quantity of steam produced and Enthalpy (as a function of steam pressure). The values thus obtained are converted into TJ.A cumulative for the entire monitoring period is then calculated as a sum of the thermal energy of the three boilers involved in the project activity. Please refer the excel spread sheet for detailed calculations.
Frequency of monitoring/recording:	The required data are monitored continuously and the data is aggregated on an annual basis.
Value applied:	647.59 TJ
Monitoring equipment:	Calculated
QA/QC procedures to be applied:	The enthalpy of steam used in the calculations for thermal energy has been derived from the steam table. The enthalpy of feed water has been deducted from the enthalpy of steam to arrive at the thermal energy generated. The same can be referred from http://www.steamtablesonline.com/steam97web.aspx
Purpose of data	Calculation of Baseline Emission
Calculation method:	Thermal energy is calculated as a product of Quantity of steam produced and Enthalpy (as a function of steam pressure).Furthermore, the enthalpy of steam used in the calculations has been derived from the steam table.

Any comment:	-

Data Unit / Parameter:	$Q_{biomass,i,y}$
Data unit:	Tonnes
Description:	Quantity of rice husk consumed annually
Source of data:	Log book entry after on-site measurement
Description of measurement methods and procedures to be applied:	Monitoring: Weigh Bridges Data type: measured Archiving policy: Paper. Recording Frequency: Daily Responsibility: Manager would be responsible for regular calibration of the weigh bridges. Calibration Frequency: once in three years.
Frequency of monitoring/recording:	Daily
Value applied:	87,058
Monitoring equipment:	Weigh Bridge (Serial No.: 13ES00/93) Type: Electronic Calibration Frequency: Once in 3 years. Accuracy class; 1.0 Calibration details: calibration date : 06/01/2012 and 11/01/2013 and 22/01/2014 Calibration due date : 21/01/2017 (as per three year calibration frequency mentioned in validated PD) Results: under the specified limits
QA/QC procedures to be applied:	The weigh bridge has been duly calibrated by Haryana govt agency which is designated to do the calibration of weigh bridge. . Furthermore, the data has also been cross checked against the biomass (rice husk) Invoices.
Purpose of data	-
Calculation method:	-
Any comment:	Quantity of rice husk consumed is mentioned on dry basis i.e. quantity is mentioned after adjustment of any moisture, dust or any other impurity.

	Data will be kept for crediting period + 2 years.

Data Unit / Parameter:	$EC_{PJ, i, y}$
Data unit:	MWh
Description:	Quantity of Electricity consumed by the project activity in the year y.
Source of data:	Measured
Description of measurement methods and procedures to be applied:	Monitoring: Energy meters Data type: measured Archiving policy: Paper. Recording Frequency: Daily Responsibility: Manager would be responsible for regular calibration of the meter. Calibration Frequency: once in three years.
Frequency of monitoring/recording:	Daily
Value monitored:	1940.61.75 MWh (Cumulative value) 2012 — 180.40 2013 — 1333.75 2014 — 426.46
Monitoring equipment:	Energy Meters S. No. SI635/1206/P2899 Accuracy class: 0.5 Calibration date: 26/09/2012 and 24/09/2013 and Due calibration date: 24/09/2014 as per three year calibration frequency approved in PD
QA/QC procedures to be applied:	-
Purpose of data	Calculation of Project Emissions
Calculation method:	-
Any comment:	Data will be kept for crediting period + 2 years. In case of failure of meter, the most conservative value will be used.

3.3 Monitoring Plan

Data Collection and Recording:

The readings for the parameters involved are being appropriately recorded/ noted down in logbooks by the supervisor in-charge. Furthermore, the purchase invoices of biomass as well as fossil fuel have also been appropriately kept. These records are being archived and will be stored in the premises till +2 years of the end of the crediting period or from last issuance.

Reliability:

The project proponent has practiced the monitoring as per the designed measurement & verification plan and ensures the proper, regular measurement and recording of the data pertaining to the GHG emission reduction. The project activity has installed all the relevant equipment viz. Pressure Gauges, Energy Meters, Temperature Gauges, Steam flow Meters and Weigh Bridges after appropriate procedural checks. Furthermore, the same have been duly calibrated by accredited NABL laboratories for the current monitoring period in accordance for the frequency defined in the VCS PD. The calibration reports for the same have been checked and found to be appropriate. Moreover, all the equipments are inspected on a daily basis by the concerned operator while taking the readings. In case of an anomaly, the shift in-charge is notified for further check and calibration.

Internal audits have also been conducted by the top management at regular intervals i.e. once a year to ensure proper functioning of the plant. No ambiguities/NCs have been detected in the internal audit reports. Furthermore, monthly consolidated reports have also been submitted to the top management for their review.

Operational & Management Structure:

An organogram regarding the hierarchy of monitoring and QA/QC is as given below:
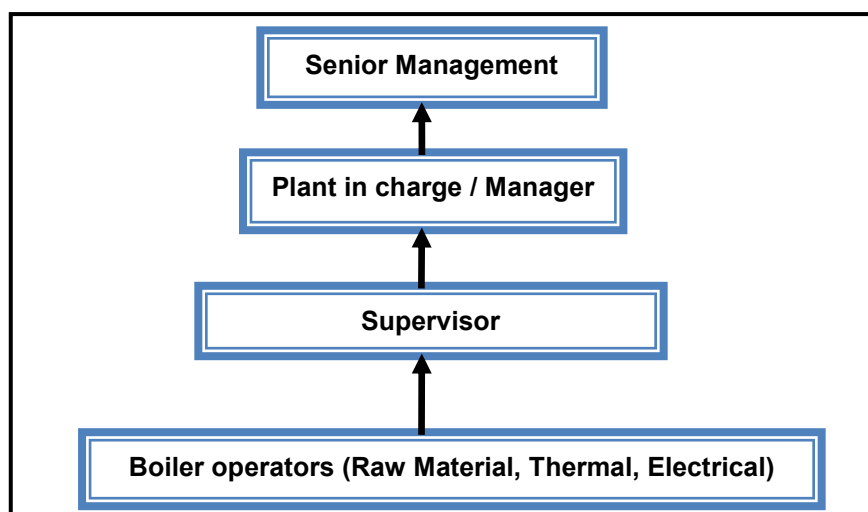
A VCS team has been constituted with participation from relevant departments. People are trained on VCS concepts and monitoring plan. This team is responsible for data collection and archiving. In case of any irregularity observed by any of the team members, it is informed to the concerned person for necessary actions. On a monthly basis, the data monitoring report is forwarded to the Senior Management. The responsibilities assigned are as follows:

Boiler Operator: Responsible for day to day operations of the boiler and data recording.

Supervisor: Responsibility of data monitoring and review of daily generation data.

Plant In-charge: Responsibility for completeness of data, reliability of data (calibration of meters), review of daily plant records and monthly report generation.

Senior Management: Review of monthly consolidated reports and internal review reports. Overall responsibility of compliance with the monitoring plan.

Training of team personnel:

Training of the VCS team and plant personnel have been carried out on operation, maintenance and monitoring of GHG reduction parameters through a planned schedule and a record of the same has been maintained.

4   QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1   Baseline Emissions

Baseline emissions for steam/ heat produced using fossil fuels is calculated in accordance with §22 of AMS-I.C., Version 19

The same is calculated as:

The baseline emissions $BE_{thermal, CO2,y}$ = $(EG_{thermal,y} /\eta_{BL,thermal})*EF_{EF,CO2}$

Where:

$BE_{thermal, CO2,y}$	The baseline emission from steam/heat displaced by the steam activity during the year y in tCO_2e.
$EG_{thermal,y}$	The net quantity of heat supplied by the project activity during the year y in TJ.
$EF_{EF,CO2}$	The CO_2 emission factor of the fuel that would had been use in the baseline plant obtained from reliable local or national data if available, alternatively, IPCC Default emission factor can be used(tCO_2/ TJ).
$\eta_{BL, thermal}$	The efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

Hence,

$BE_{thermal, CO2,y}$=(727.48 /1.0) X 97.5

= 63,140**tCO_2e**

Therefore, Baseline Emission Reduction (BEy) = 63,140**tCO_2e**

The detailed calculation has been provided in the corresponding Excel Spreadsheet.

4.2   Project Emissions

Project emissions (PEy) are calculated in accordance with § 45 of the AMS-I.C., version 19. In line with the same, the CO_2 emissions from electricity consumption by the project activity have been determined using the latest version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", Version 1.

The same is calculated as:

$$PEy = PE_{EC, y} = \Sigma EC_{PJ,i,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$$

Where:

$PE_{EC,y}$	Project emissions from electricity consumption in year y (tCO$_2$/yr)
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EL,j,y}$	Emission factor for electricity generation for source j in year y (tCO$_2$/MWh)
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y

Hence,

$$PEy = PE_{EC, y} =$$

2282tCO$_2$/yr

=

Therefore, Project Emission Reduction (PEy) = 2705.68tCO$_2$/yr

The detailed calculation has been provided in the corresponding Excel Spreadsheet.

4.3   Leakage

The biomass (rice husk) utilized by the project activity has been procured within a radius of 50Km from the project sites. Furthermore, there is no technology transfer involved in the project activity. Therefore, in accordance with the applied approved methodology AMS I.C., version 19, the emissions due to transportation of biomass (leakage emissions) are considered to be negligible.

Ly = 0

4.4   NetGHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO$_2$e)	Project emissions or removals (tCO$_2$e)	Leakage emissions (tCO$_2$e)	Net GHG emission reductions or removals (tCO$_2$e) (rounded down)
Year 2012	5280	212	0	5068

Year 2013	42427	1568	0	40858
Year 2014	15433	502	0	14931
Total	63140	2282	0	60857