Monitoring report form
(Version 03.1)

Monitoring report

Title of the project activity	3.66 MW poultry litter based power generation project by Raus Power in India
Reference number of the project activity	2348
Version number of the monitoring report	04
Completion date of the monitoring report	27/09/2013
Registration date of the project activity	27/03/2009
Monitoring period number and duration of this monitoring period	Monitoring Period No 2 25/01/2010 – 31/12/2012 (first and last days included)
Project participant(s)	Raus Power Ltd. South Pole Carbon Asset Management Ltd. – Climate Cent Foundation
Host Party(ies)	India, Switzerland
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope 1 – AMS-I.D. ver. 13 Sectoral Scope 13 – AMS-III.E. ver. 15.1
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	145,308 tCO_2e Calculation is based on 341 days for 2010 and complete years 2011 & 2012.
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	124,088 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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This Monitoring Report has been developed for the purpose of the verification exercise for greenhouse gas emission reductions achieved by the project activity titled "3.66 MW poultry litter based power generation project by Raus Power in India" and subsequent certification as per requirements of the UNFCCC Methodologies AMS I.D, Version 13 and AMS III.E, version 15.1 for the period 25/01/2010 – 31/12/2012(both days inclusive). It is the second monitoring period of this project activity. The project has already issued 25,906 CERs for the first monitoring period of 27/03/2009 – 24/01/2010.

1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions:

The purpose of the project activity under consideration is generation of power for a grid system using biogenic waste generated in local poultry farms. The biogenic waste i.e., poultry litter used by the project activity would have otherwise been dumped near poultry farms to natural decay in the absence of the project activity causing atmospheric release of methane which is a potent greenhouse gas. Thus the project activity is also avoiding production of methane from natural decay of poultry litter. The project design comprises the installation of a power generation facility in Andhra Pradesh state of India by a private entity Raus Power Ltd. (hereafter referred to as the Project Developer/ Project Proponent). The net power generated by the project activity is being exported to Andhra Pradesh Eastern Power Distribution Company Ltd. (APEPDCL), a public power utility company, a part of the Southern Regional Electricity Grid of India. In the absence of the project activity, the grid dominated thermal power plants would generate an equivalent quantity of power, resulting in GHG emissions as per the carbon intensity of the fuel mix constituting the grid. Hence the project activity results in a two-fold contribution towards GHG emissions reductions:

a) GHG emission reductions by renewable energy based power generation substituting fossil-fuel fired thermal power generation in the grid
b) GHG emission reductions by avoidance of methane emissions from animal waste.

2. Brief description of the installed technology and equipment

The steam cycle based electricity generation equipment installed by the project activity to harness the renewable energy for power generation. Technology of the project activity is direct combustion of poultry litter in a boiler to generate high pressure and high temperature steam from water. The steam will then be used to generate electricity by a turbine driven alternator.

3. Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)

Construction start date: 26/07/2007
Project commissioning date: 27/02/2009
Operation period: The plant has been in continuous operation since commissioning to 24/10/2012 and there were no major breakdowns. However, the plant stopped normal operations on 24/10/2012 and remained in shut down mode till the end of this monitoring period.

4. Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period

Total emission reduction achieved during this monitoring period are 124,088 tCO2e.

A.2. Location of project activity

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Region/State/Province: Andhra Pradesh
City/Town/Community:
Village: Duppalapudi
District: East Godavari
State: Andhra Pradesh
Country: India
GPS Coordinates: Latitude: 16° 56' 47.40"N and Longitude: 81° 56' 22.92"E
Geo-coordinates in decimal degrees: Latitude: 16.9465 & Longitude: 81.9397

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 if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Raus Power Ltd.(Private entity)	No
Switzerland	South Pole Carbon Asset Management Ltd. (Private entity)	No
Switzerland	Climate Cent Foundation (Private entity)	No

A.4. Reference of applied methodology

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The methodologies applied for the project activity under consideration are:

1. AMS-I.D:
Project type: Type I – Renewable energy projects
Category: I.D. – Grid connected renewable electricity generation
Version : 13
Tool(s) referred: "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", version 01

2. AMS-III.E:
Project type: Type III – Other project activities
Category: III.E. – Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment
Version : 15.1

Tool(s) referred: "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site", version 02

The methodologies and tools mentioned above can be found on the UNFCCC's website at:
http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

A.5. Crediting period of project activity

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Type: Renewable crediting period

Start date of first crediting period: 27/03/2009

Crediting period: 27/03/2009-26/03/2016

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The project activity has been implemented and operated as per registered PDD (Version 05, dated 11/12/2008).

Technical Description:

The equipment installed by the project activity to harness the renewable energy for power generation are listed below:

Sl. No.	Equipment	Specifications	Supplier
1	Steam Generation: **Boiler**	Capacity: 20 tonnes per hour, working pressure: 45kg/cm^2	Cogent Engineers Pvt. Ltd., India
2	Power Generation: **Turbine**	Capacity: 4000kW[1], Inlet Steam: 435°C temperature and 44Ata pressure	Triveni Engineering & Industries Ltd, India

There have been no replacements of the major equipment or their components among those listed above during the present monitoring period. However, it may be noted that the procedure followed at the site with respect to the calibration of the energy meters is: after the operation of an energy meter for the predetermined time period after which it is due for calibration, it is replaced by an already calibrated energy meter. The newly installed meter then operates for the same predetermined period of time, after which another already calibrated energy meter again replaces it. However, there was delay in replacement of calibrated meter (refer Table D.2). Adjustment for calibration delay of energy import/export bidirectional meter at grid sub-station (maximum possible error as specified by meter manufacturer) has been subtracted from export data and added to import data till meter replacement to ensure a conservative approach. The plant stopped normal operations on 24/10/2012 and remained in shut down mode till the end of this monitoring period. During this monitoring period (25/01/2010-31/12/2012), the project activity exported a total of 47,073.56 MWh of electricity to the grid. Further, plant operation levels were well below the capacity mentioned in the registered PDD i.e. 3.66 MW at a plant load factor (PLF) of 80% for the present monitoring period. Further, during the monitoring period only Poultry litter and rice husk have been used in the project. No other biomass fuels have been used. Also, the boiler is not designed for using any kind of fossil fuels (Section D.2).

The details of metering systems including serial number accuracy, calibration frequency, calibration dates are provided in Section D.2.

Operational Description:

The details of the major plant shut downs are listed in Table 1 below;

Table 1: Major shut down details

Shut down details				
Sl. No.	**Stopping date**	**Starting date**	**Duration**	**Reason for Stoppage**
1	01/09/2010	12/09/2010	11 days	Due to Heavy rains
2	23/09/2010	11/10/2010	18 days	Plant stopped due to Change of Management as the old Management sold the plant and for verification of Inventory and other things the plant stopped
3	18/10/2010	29/10/2010	10 days	Plant Stopped for maintenance
4	17/11/2010	17/12/2010	31 days	Site levelling and other maintenance works have been taken up as the fuel yard and approach roads to the plant are damaged due to rains in the monsoon season
5	20/12/2010	16/01/2011	27 days	Plant operated only three days trail run and stopped to complete the site levelling and laying of approach roads to the site and other maintenance works

[1] The project activity was designed with the parameter of 20TPH (tonnes per hour) boiler as the design criteria and the same has been implemented. However, the turbine design parameter of 3.66MW is a design value and not a standard specification available. Hence the next higher capacity of 4MW had to be installed as per the availability.

6	12/09/2011	11/10/2011	30 days	Plant stopped for Annual maintenance
7	30/10/2011	18/12/2011	49 days	Plant stopped due to Alternator problem
8	04/01/2012	18/01/2012	14 days	Stopped due to Boiler economiser problem and for Festival holidays
9	25/07/2012	18/09/2012	52 days	Due to inconsistent cash flow available to run the plant
10	24/10/2012	ongoing	ongoing	The plant closed due to liquidity cash flow crunch and management, as it was difficult to meet the operating expenses of the plant.

Due to these shut downs the plant operations were hampered and electricity generation reduced significantly particularly from August 2010 to January 2011.

Table 2: Summary of implementation milestones

Event	Date
Construction start date	26/07/2007
Commissioning date	27/02/2009
Registration date of CDM project activity	27/03/2009
First Monitoring period	27/03/2009 – 24/01/2010
Second Monitoring period	25/01/2010 – 31/12/2012

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

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No deviation from registered monitoring plan or applied methodology.

B.2.2. Corrections

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No correction to project information or parameters fixed during validation. Hence this is not applicable.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

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There are no permanent changes from the registered monitoring plan or applied methodology.

B.2.4. Changes to project design of registered project activity

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There is no change the project design of registered project activity.

B.2.5. Changes to start date of crediting period

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There is no change in start date of crediting period.

B.2.6. Types of changes specific to afforestation or reforestation project activity

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The project activity is not an afforestation or reforestation project.

SECTION C. Description of monitoring system

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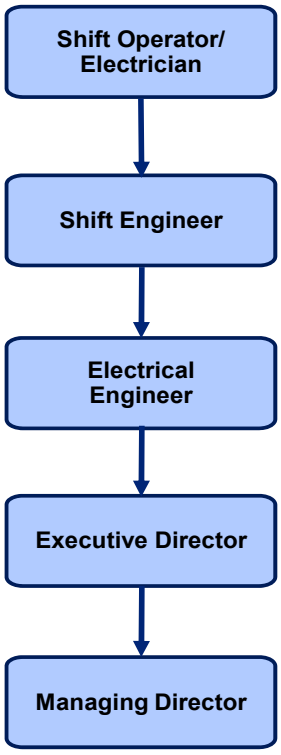
Section B.7.1 and Section B.7.2 of the CDM PDD provides details on the monitoring procedures of various parameters (also discussed in section D of this document) and the calculation of GHG emission reductions with the monitored data (also discussed in section E of this document). Both the emission reduction calculations and the monitoring plan are based on the UNFCCC CDM methodologies stated in this document.

Before the commencement of project operation and also in the initial stages, the project proponent established a CDM team for the purpose of collecting data, supervising and verifying the procedure of measurement and recording. Relevant employees have also been trained in order to fulfill their monitoring obligations and ensuring a sound Quality Assurance and Quality Control (QA/QC) procedures. Raus Power Ltd. also has a well-defined GHG performance internal audit procedure to ensure the accuracy and completeness check. The organisational structure for data monitoring (CDM Team) and the contribution of each team-member towards the QA/QC procedures has been provided below:

Organisational Structure of the Raus Power CDM Team



Roles & Responsibilities

- Measurement and recording of the meter readings in the plant log-book every shift
- Monitoring and reporting the GHG performance related parameters following the guidance provided in the PDD

- Reviewing the GHG performance related parameters as recorded by the shift operator/ electrician every shift
- Implementation of appropriate corrective measures in case any discrepancies are identified in the reported parameters
- Ensuring calibration of the monitoring equipments as per the defined calibration schedule

- Reviewing the recorded data on a daily basis
- Monitoring and evaluating the GHG performance of the project activity

- Overall Supervision
- Coordination with top management as a single point of contact

- Obtaining regular updates from the Executive Director
- Monitoring project performance in a holistic manner

Training and Maintenance:

The project staffs have been fully trained for performance maintenance and operation of plant. During the monitoring period, there are three Internal trainings have been conducted. The trainings cover boiler water treatment, safety device of turbine, and safety precautions in boiler.

Specific data monitoring systems:

The measuring systems comprise main meter, gross meter, auxiliary meter and weighbridge. The main meter is bidirectional meter installed at sub-station, which records the export of electricity to grid and import from grid. The gross meter and auxiliary meter have been installed at control panel inside the plant. The gross meter and auxiliary meter are installed for cross check purposes only. The weighbridge is installed at entry point of plant premises to measure the quantity of fuels entering the plant and the quantity of ash leaving the plant.

The gross energy generation and Auxiliary consumption data's are only for cross check and information purposes. For calculation of emission reductions due to the project activity, only the net energy exported to the grid system has been considered, after deducting imports from grid system if any.

The details of monitoring systems and monitored data are provided in Section D.2 of monitoring report.

The locations of meters are provided below in figure 1.

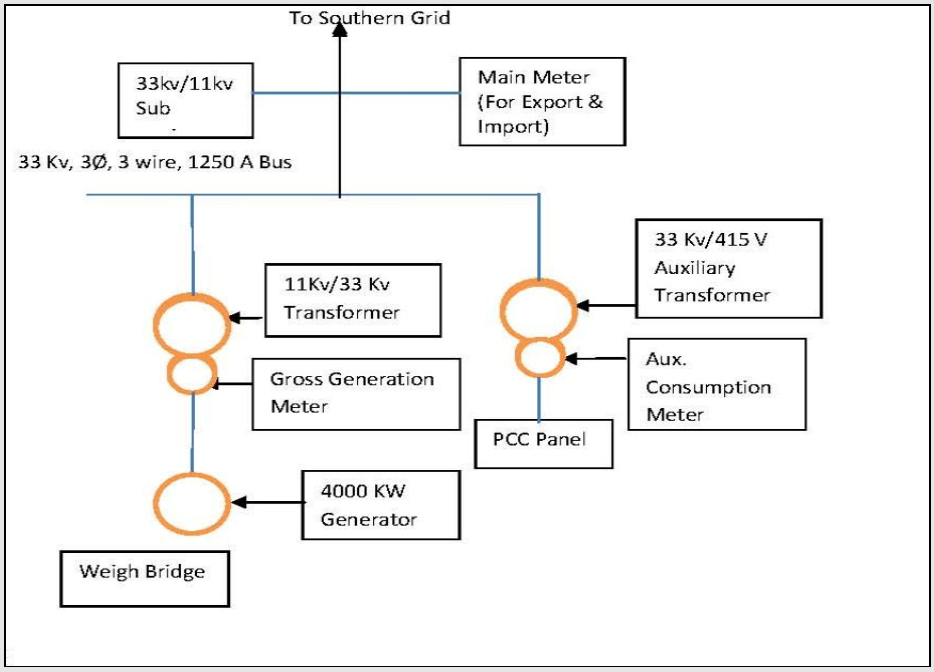


Figure 1: Location of metering points

Calibration of monitoring systems: The calibration details including frequency of calibration, accuracy, serial numbers of meters, and calibration dates are provided in Section D.2 of monitoring report.

SECTION D. Data and parameters

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

The values of each of the following parameters are determined ex-ante for the first crediting period of 7 years and are subjected to revalidation at the start of subsequent crediting periods.

Data/Parameter	**CEF_{Elec}**
Unit	tCO_2/MWh
Description	Emission factor of the southern region grid system
Source of data	Official data published by Central Electricity Authority, Government of India, available at their official website: www.cea.nic.in
Value(s) applied	0.854
Purpose of data	Calculation of baseline emissions
Additional comment	The emission factor is calculated by Central Electricity Authority for Indian CDM project activities following the guidance provided in approved consolidated methodology ACM0002 version 06. The data used in determination of grid emission factor is of high accuracy since the generation data is being directly monitored for all power generating sources in grid system by CEA.

Data/Parameter	**Φ**
Unit	-
Description	Model correction factor to account for model uncertainties

Source of data	Methodological tool of UNFCCC CDM: Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site/ Version 04
Value(s) applied	0.9
Purpose of data	Calculation of baseline emissions
Additional comment	Oonk et el. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase models was assessed to be 18%. Given the uncertainties associated with the model and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.

Data/Parameter	**OX**
Unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	Methodological tool of UNFCCC CDM: Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site/ Version 04
Value(s) applied	0
Purpose of data	Calculation of baseline emissions
Additional comment	No oxidation factor is applicable since no cover material is used for the waste at solid waste disposal site.

Data/Parameter	**F**
Unit	-
Description	Fraction of methane in the SWDS gas (volume of fraction)
Source of data	IPCC 2006 guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Purpose of data	Calculation of baseline emissions
Additional comment	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.

Data/Parameter	**DOCf**
Unit	-
Description	Fraction of degradable organic carbon (DOC) that can decompose
Source of data	IPCC 2006 guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Purpose of data	Calculation of baseline emissions
Additional comment	Based on the methodological tool to determine methane emissions avoided from dumping waste at a solid waste disposal site

Data/Parameter	**MCF**
Unit	-

Description	Methane correction factor
Source of data	IPCC 2006 guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.4
Purpose of data	Calculation of baseline emissions
Additional comment	To determine the MCF, the methodological tool "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" has been applied. As per MCF definitions in the afore mentioned tool, the disposal practice in the baseline scenario fits into two potential disposal site types: (i) unmanaged solid waste disposal sites with high water table where an MCF factor of 0.8 would apply or (ii) unmanaged shallow solid waste disposal sites with less than 5 m depth where a MCF factor of 0.4 would apply. As a conservative approach a factor, project proponents decided to apply a MCF factor of 0.4 instead of 0.8.

Data/Parameter	**DOCj**
Unit	%
Description	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data	IPCC 2006 guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)
Value(s) applied	38
Purpose of data	Calculation of baseline emissions
Additional comment	The biomass wastes used in the project activity are poultry litter All these wastes are attributed to the Food, Food waste, beverages and Tobacco (other than sludge) category as justified in section B.6.1 of registered PDD . The wastes are available in dry form hence, % dry waste is considered. According to the methodological tool the factor DOCj is 38% for the above category.

Data/Parameter	**kj**
Unit	-
Description	Decay rate for the waste type j
Source of data	IPCC 2006 guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 3.3)
Value(s) applied	0.4
Purpose of data	Calculation of baseline emissions
Additional comment	The project region is tropical with a mean annual temperature of more than 20ºC and has mean annual precipitation more than 1000 mm. Hence, the value of 0.40 given by the methodological tool has been considered for food, food waste and tobacco category (other than sludge). Based on the above ambient conditions, the project site cannot be considered to be in boreal and temperate climate zone as per the methodological tool.

D.2. Data and parameters monitored

The parameters provided below are monitored ex-post and used for GHG emission reduction calculations.

Data / Parameter:	**$EG_{export,y}$**

<table>
<tr><td>Unit:</td><td>MWh</td></tr>
<tr><td>Description:</td><td>Net electricity exported to the grid system during the year y</td></tr>
<tr><td>Measured/
Calculated /
Default:</td><td>Measured.</td></tr>
<tr><td>Source of data:</td><td>Plant operational history: Joint meter reading statements and power sale invoices.
The total net energy exported by the project to the grid system is measured using bidirectional energy meter (main meter). The data is measured continuously and aggregated monthly (in kWh and converted to MWh) at sub-station in the form of Joint Meter Reading (JMR). On the basis of JMR power sale invoices are raised by the project proponent to the APEPDCL for obtaining payment.</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Values in MWh
<table>
<tr><td>2010</td><td>2011</td><td>2012</td></tr>
<tr><td>13,304.51</td><td>17,809.90</td><td>16,398.89</td></tr>
</table>
</td></tr>
</table>

Monitoring equipment:

The electricity export to the grid was measured continuously and recorded monthly by the main meter located on the substation on jointly basis on 24th of each month. The main meter was replaced for calibration with a pre-calibrated meter during the monitoring period. The calibration frequency of main meter is annually and accuracy is 0.2s. The calibration details are given below;

Make	Sr. No.	Last calibration date	Period when equipment used.	Calibration validity date
Elster	10403171	08/05/2012	05/07/2012 to 31/12/2012	07/05/2013
Elster	10403172 *	31/03/2011	28/04/2011 to 05/07/2012	30/03/2012
Elster	10403171 **	29/01/2010	28/04/2010 to 28/04/2011	28/01/2011
L & T	07360987 ***	22/10/2008 29/04/2010	27/03/2009 to 28/04/2010	21/10/2009

*Meter was replaced on 05/07/2012 with new meter Sr. No. 10403171.The next calibration was done on 25/03/2013. The calibration report shows that the maximum error is 0.10% which is within maximum permissible error of 0.2%. Since there was delay in calibration, maximum possible error 0.2% as specified by meter manufacturer subtracted from export data and added to import data from for the period 25/03/2012 to till date replacement of meter for the compliance of the para 238 (a) of VVS version 04.0 (Refer CER calculation sheet) to ensure conservative approach.

**Meter was replaced on 28/04/2011 with new meter Sr. No. 10403172. The next calibration of this meter was done 08/05/2012. The calibration report shows that the maximum error is in the range of +0.02% to -0.12% which is well within the maximum permissible error of ± 0.2%. Since there was delay in calibration, maximum possible error 0.2% as specified by meter manufacturer subtracted from export data and added to import data from for the period 25/01/2011 till date replacement of meter for the compliance of the para 238(a) of VVS, version 04.0(Refer CER calculation sheet) to ensure conservative approach.

***Meter (Sr. No. 07360987) was replaced on 28/04/2010 with new meter (Sr. No 10403171) after that this meter was not used. The next calibration of this meter was done on 29/04/2010.The calibration report shows maximum error of 0.12% which is within maximum permissible limit of 0.2%. Since there was delay in calibration, maximum possible error 0.2% as specified by meter manufacturer subtracted from export data and added to import data from for the period 25/01/2010 to till date replacement of meter for compliance of the para 238 (a) of VVS version 04.0 (Refer CER calculation sheet) to ensure conservative approach.

Measuring/ Reading/ Recording frequency:	Measured continuously and aggregated monthly.
Calculation method (if applicable):	Not Applicable

QA/QC procedures:	The calibration of meter has been carried out per industry norms by Electronic Test & Development Centre, Govt of India and Electronic Research & Development Association, Govt of India as per their internal calibration schedule which is outside the preview of the project participants. .
Purpose of data:	Calculation of baseline emissions
Additional comment:	Energy meters are bidirectional meters that measure both exports and imports

Data / Parameter:	**$EG_{import,y}$**
Unit:	MWh
Description:	Electricity imported by the project activity during the year *y*
Measured/ Calculated / Default:	Measured
Source of data:	Plant operational history: Joint meter reading statements The total net energy imported by the project from the grid system is measured using bidirectional energy meter installed at grid sub-station, which is also used for export of electricity. The data is measured continuously and aggregated monthly (in kWh and converted to MWh) in the form of joint meter reading statements.
Value(s) of monitored parameter:	Values in MWh

2010	2011	2012
221.25	130.50	87.99

Monitoring equipment:	The electricity import from grid was measured continuously and recorded monthly by the main meter located on the sub-station on jointly basis on 24th of each month. The main meter was replaced for calibration with a pre-calibrated meter during the monitoring period. The calibration frequency of main meter is annually and accuracy is 0.2s. The calibration details are given below;

Make	Sr. No.	Last calibration	Period when equipment used.	Calibration validity date
Elster	10403171	08/05/2012	05/07/2012 to 31/12/2012	07/05/2013
Elster	10403172 *	31/03/2011	28/04/2011 to 05/07/2012	30/03/2012
Elster	10403171 **	29/01/2010	28/04/2010 to 28/04/2011	28/01/2011
L & T	07360987 ***	22/10/2008	27/03/2009 to 28/04/2010	21/10/2009

*Meter was replaced on 05/07/2012 with new meter Sr. No. 10403171. The next calibration was done on 25/03/2013. The calibration report shows that the maximum error is 0.10% which is within maximum permissible error of 0.2%. Since, there was delay in calibration, maximum possible error 0.2% as specified by meter manufacturer subtracted from export data and added to import data from for the period 25/03/2012 to till date replacement of meter for the compliance of para 238 (a) of VVS, Version 04.0 (Refer CER calculation sheet) to ensure conservative approach.

**Meter was replaced on 28/04/2011 with new meter Sr. No. 10403172. The next calibration of this meter was done 08/05/2012. The calibration report shows that the maximum error is in the range of +0.02% to -0.12% which is well within the maximum permissible error of ± 0.2%. Since, there was a delay in calibration, maximum possible error 0.2% as specified by meter manufacturer subtracted from export data and added to import data from for the period 25/01/2011 till date replacement of meter for the compliance of para 238(a) of VVS, Version 0.4.0(Refer CER calculation sheet) to ensure conservative approach.

***Meter (Sr. No. 07360987) was replaced on 28/04/2010 with new meter (S/No. 10403171) after that this meter was not used. The next calibration of this meter was done on 29/04/2010.The calibration report shows maximum error of 0.12% which is within maximum permissible limit of ±0.2%. Since there was delay in calibration, maximum possible error 0.2% as specified by meter manufacturer was subtracted from export data and added to import data from for the period 25/01/2010 to till date replacement of meter for the compliance of para 238(a) of VVS, version 04.0 (Refer CER calculation sheet) to ensure conservative approach.

Measuring/ Reading/ Recording frequency:	Measured continuously and aggregated monthly.

Calculation method (if applicable):	Not Applicable
QA/QC procedures:	The calibration of meter has been carried out by APEPDCL as per industry norms by Electronic Test & Development Centre, Govt of India and Electronic Research & Development Association, Govt of India as per their internal calibration schedule which is outside the purview of the project participants.
Purpose of data:	Calculation of baseline emissions
Additional comment:	Energy meters are bidirectional meters that measure both exports and imports.

Data / Parameter:	$EGy_{,gross}$
Unit:	MWh
Description:	Gross energy generated by the project activity in the year y
Measured/ Calculated / Default:	Measured.
Source of data:	Plant operational history: Log books
Value(s) of monitored parameter:	Values are in MWh 2010: 15451.10 2011: 20579.60 2012: 18779.50
Monitoring equipment:	The gross energy generated by the project activity is measured by using energy meter installed in power plant. The data is measured hourly and aggregated monthly. The calibration details are provided below; **Make**: Secure; **Sr. No.**: KVA03648; **Period when equipment is used.**: 27/03/2009 to 31/12/2012; **Last calibration** / **Calibration validity date**: 01/09/2012 – 31/08/2013; 18/09/2011 – 17/09/2012; 25/09/2010 – 24/09/2011; 20/11/2009 – 19/11/2010 The accuracy of the meter is 0.5s and calibration frequency is annually. In the registered PDD the accuracy is 0.2 class meter for measuring gross generation was mentioned in the PDD. However, at the time of actual project implementation, meter of class 0.5 was employed. This parameter is included in the monitoring plan only for information and cross-checking purposes and do not participate in the GHG emission reduction calculations. Hence there is no impact due to this change on the CER quantum which is calculated on the basis of the net electricity export measured by the energy meter at the grid sub-station.
Measuring/ Reading/ Recording frequency:	Continuously measured and aggregated monthly.

Calculation method (if applicable):	Not Applicable
QA/QC procedures:	Energy meters are calibrated once a year.
Purpose of data:	This parameter is monitored ex-post for cross-checking purposes and not used for GHG emission reduction calculations.
Additional comment:	The gross energy generated data's are for information purpose. For calculation of emission reductions only net energy exported to the grid have been considered after deduction of imports from grid.

Data / Parameter:	**$EG_{y,aux}$**
Unit:	MWh
Description:	Auxiliary consumption by the project activity during the year *y*
Measured/ Calculated / Default:	Measured continuously and aggregated monthly.
Source of data:	Plant operational history: Log books
Value(s) of monitored parameter:	Values are in MWh 2010: 2169.45 2011: 2670.00 2012: 2263.60
Monitoring equipment:	The electricity consumed by plant auxiliary equipment is measured by using auxiliary energy meter installed in power plant. The data is measured hourly and aggregated monthly. The calibration details are given below; Make: L & T; Sr. No.: 08039874; Period when equipment is used.: 25/01/2010 to 31/12/2012; Last calibration: 01/09/2012, 18/09/2011, 25/09/2010, 13/10/2009; Calibration validity date: 31/08/2013, 17/09/2012, 24/09/2011, 12/10/2010 The accuracy of meter is 0.2s and calibration frequency is annually.
Measuring/ Reading/ Recording frequency:	Measured continuously and aggregated monthly.
Calculation method (if applicable):	Not Applicable
QA/QC procedures:	Energy meters are calibrated annually.
Purpose of data:	This parameter is monitored ex-post for cross checking purposes and not used for GHG emission reduction calculations.
Additional comment:	The auxiliary consumption data are for information purposes. For calculation of emission reductions only net energy exported to the grid have been considered after deduction of imports from grid.

Data / Parameter:	**$Q_{y,w}$ or $W_{j,x}$**
Unit:	Tonnes

<table>
<tr><td>Description:</td><td>Quantity of waste type w or j transported to the project site during the year y</td></tr>
<tr><td>Measured/ Calculated / Default:</td><td>Measured.</td></tr>
<tr><td>Source of data:</td><td>Plant operational records: Material log books</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>
<table>
<tr><th>Year</th><th>Poultry litter (tonnes)</th><th>Rice Husk (tonnes)</th></tr>
<tr><td>2010</td><td>36,569</td><td>8,606</td></tr>
<tr><td>2011</td><td>49,925</td><td>10,911</td></tr>
<tr><td>2012</td><td>44,952</td><td>7,010</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment:</td><td>Each truck carrying the waste is weighed twice using electronic weigh bridge installed at the entrance of the plant premises, in loaded condition at the entry and in empty condition at the time of leaving. The waste weight is the difference in two weights. The calibration frequency of lorry weigh bridge is yearly and minimum sensible weight is 5 kg. The accuracy level is ±1%.
The details of monitoring equipment is given below;
<table>
<tr><td>Make</td><td>Sr. No.</td><td>Period when equipment is used.</td><td>Last calibration</td><td>Calibration validity date</td></tr>
<tr><td rowspan="4">Weitex</td><td rowspan="4">M/c number H 28111</td><td rowspan="4">Since commissioning of plant</td><td>29/06/2012</td><td>28/06/2013</td></tr>
<tr><td>22/06/2011</td><td>21/06/2011</td></tr>
<tr><td>15/06/2010</td><td>14/06/2011</td></tr>
<tr><td>19/06/2009</td><td>18/06/2010</td></tr>
</table>

There was a delay of 8 days in the calibration of the Weigh Bridge in the month of June 2011(15/06/2011 – 21/06/2011). The reports of the calibration exercise performed subsequently do not show any measurement error developed in the weighbridge. However, considering the calibration delay, the maximum permissible error (1%) as specified by the manufacturer has been used for adjustment in measured the quantity of materials transported (poultry litter and rice-husk on the measured quantities recorded in the logbooks as per requirement of para 238 (a) of VVS, version 04.0 to ensure a conservative approach.

Furthermore, there was another delay of 8 days in calibration of the weighbridge again in the month of June 2012 (22/06/2012-28/06/2012. Hence, the maximum permissible error (1%) as specified by the manufacturer has been used for adjustment in the measured quantities of materials transported in logbooks where material received as per requirement of the para 238(a) of VVS, version 04.0 to ensure a conservative approach.</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Recorded continuously and aggregated monthly</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Not applicable</td></tr>
<tr><td>QA/QC procedures:</td><td>Weighing scale is regularly calibrated to industry standards, once in a year. Accuracy level of the weighbridge is ±1%.</td></tr>
</table>

Purpose of data:	Calculation of baseline and project emissions
Additional comment:	The data is obtained by aggregating all the measured values for the full period. Each type of biomass waste combusted in the project is monitored separately.

Data / Parameter:	**$Q_{y,fuel}$**
Unit:	Tonnes
Description:	Quantity of auxiliary fossil fuel used in the year *y*
Measured/ Calculated / Default:	Measured
Source of data:	Plant operational records: Material log books
Value(s) of monitored parameter:	0
Monitoring equipment:	The details of monitoring equipment is given below:

Make	Sr. No.	Period when equipment is used.	Last calibration	Calibration validity date
Weitex	M/c number H 28111	Since commissioning of plant	29/06/2012	28/06/2013
			22/06/2011	21/06/2011
			15/06/2010	14/06/2011
			19/06/2009	18/06/2010

Measuring/ Reading/ Recording frequency:	Since fuel is not used hence not applicable.
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Weighing scale is regularly calibrated to industry standards, once in a year. Accuracy level of the weighbridge is ±1%.
Purpose of data:	Calculation of project emissions
Additional comment:	The data is obtained by aggregating all the measured values for the full period.

Data / Parameter:	**$Q_{y,ash}$**
Unit:	Tonnes
Description:	Quantity of combustion residue transported to the end user during the year *y*
Measured/ Calculated / Default:	Measured
Source of data:	Plant operational records: Material log books

<table>
<tr><td>Value(s) of monitored parameter:</td><td>
<table>
<tr><th>Year</th><th>Quantity of combusted residue (tonnes)</th></tr>
<tr><td>2010</td><td>10,414</td></tr>
<tr><td>2011</td><td>11,778</td></tr>
<tr><td>2012</td><td>10,932</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment:</td><td>Each truck carrying the residue is weighed using electronic weigh scale installed at the entrance of the plant premises, in empty condition at the entry and in loaded condition at the time of exit. The residue weight is the difference in two weights. The calibration frequency of lorry weigh bridge is yearly and minimum sensible weight is 5 kg. The accuracy level is ±1%.

The details of monitoring equipment is given below;
<table>
<tr><td>Make</td><td>Sr. No.</td><td>Period when equipment is used.</td><td>Last calibration</td><td>Calibration validitydate</td></tr>
<tr><td rowspan="4">Weitex</td><td rowspan="4">M/c number H 28111</td><td rowspan="4">Since commissioning of plant</td><td>29/06/2012</td><td>28/06/2013</td></tr>
<tr><td>22/06/2011</td><td>21/06/2011</td></tr>
<tr><td>15/06/2010</td><td>14/06/2011</td></tr>
<tr><td>19/06/2009</td><td>18/06/2010</td></tr>
</table>
There was a delay of 8 days in the calibration of the Weigh Bridge in the month of June 2011. The reports of the calibration exercise performed subsequently do not show any measurement error developed in the weighbridge. However, considering the calibration delay, the maximum permissible error (1%) as specified by the manufacturer has been used for adjustment in the combustion residue transported to end users recorded in the logbooks as per requirement of the para 238 (a) VVS, version 04.0 to ensure a conservative approach..

Furthermore, there was another delay of 8 days in calibration of the weighbridge again in the month of June 2012 (22/06/2012-28/06/2012). Hence, the maximum permissible error (1%) as specified by the manufacturer has been used for adjustment in the quantities of combusted materials to end users recorded in logbooks where material received as per requirement of the para 238(a) of VVS, version 04.0 to ensure a conservative approach.</td></tr>
<tr><td>Measuring/ Reading/Recording frequency:</td><td>Recorded continuously and aggregated monthly</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Not Applicable</td></tr>
<tr><td>QA/QC procedures:</td><td>Weighing scale is regularly calibrated to industry standards, once in a year. Accuracy level of the weighbridge is ±1%.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of project emissions</td></tr>
<tr><td>Additional comment:</td><td>The data is obtained by aggregating all the measured values for the full period.</td></tr>
</table>

Data / Parameter:	**$CT_{y,w}$**
Unit:	Tonnes

<table>
<tr><td>Description:</td><td>Average capacity of trucks used for carrying the materials</td></tr>
<tr><td>Measured/ Calculated / Default:</td><td>Calculated.</td></tr>
<tr><td>Source of data:</td><td>Plant operational records: Material log books</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>
<table>
<tr><th>Year</th><th>Average capacity of trucks used for carrying the materials</th></tr>
<tr><td>2010</td><td>8.92</td></tr>
<tr><td>2011</td><td>7.91</td></tr>
<tr><td>2012</td><td>8.71</td></tr>
</table>
The above values have been determined as a weighted average of the waste material transported for each year.
</td></tr>
<tr><td>Monitoring equipment:</td><td>
Each truck is weighed twice using electronic weigh scale installed at the entrance of the plant premises, in loaded condition and in empty. The material weight is the difference in two weights. The calibration frequency of lorry weigh bridge is yearly and minimum sensible weight is 5 kg. The accuracy of the weigh-bridge is ±1%. The calibration details of monitoring equipment is given below;
<table>
<tr><th>Make</th><th>Sr. No.</th><th>Period when equipment is used.</th><th>Last calibration</th><th>Calibration validity date</th></tr>
<tr><td rowspan="4">Weitex</td><td rowspan="4">M/c number H 28111</td><td rowspan="4">Since commissioning of plant</td><td>29/06/2012</td><td>28/06/2013</td></tr>
<tr><td>22/06/2011</td><td>21/06/2011</td></tr>
<tr><td>15/06/2010</td><td>14/06/2011</td></tr>
<tr><td>19/06/2009</td><td>18/06/2010</td></tr>
</table>
There was a delay of 8 days in the calibration of the Weigh Bridge in the month of June 2011. The reports of the calibration exercise performed subsequently do not show any measurement error developed in the weighbridge. However, considering the calibration delay, the maximum permissible error (1%) as specified by the manufacturer has been used for the adjustment in the measured quantities of materials transported (poultry litter, rice-husk) recorded in the logbooks as per requirement of the para 238 (a) of VVS, version 04.0 to ensure a conservative approach.

Furthermore, there was another delay of 8 days in calibration of the weighbridge again in the month of June 2012 (22/06/2012-28/06/2012). Hence, the maximum permissible error (1%) as specified by the manufacturer has been used for the adjustment in the measured quantities of materials transported in logbooks where material received as per requirement of the para 238(a) of VVS, version 04.0 to ensure a conservative approach.
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Recorded continuously and aggregated annually.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Calculated as total average quantity of waste type w (poultry litter) and rice husk transported to the project site divided by average total no. of trucks used for transportation of poultry litter and rice husk.</td></tr>
</table>

QA/QC procedures:	Weighing scale is regularly calibrated to industry standards, once in a year. Accuracy level of the weighbridge is ±1%.
Purpose of data:	Calculation of project emissions
Additional comment:	Average truck capacity is determined annually averaging of the measured weights.

Data / Parameter:	**CTy,ash**
Unit:	Tonnes
Description:	Average capacity of trucks used for carrying the combustion residue
Measured/ Calculated /Default:	Calculated.
Source of data:	Plant operational records: Material log books
Value(s) of monitored parameter:	<table><tr><th>Year</th><th>Average capacity of truck used for carrying the combustion residue</th></tr><tr><td>2010</td><td>10.37</td></tr><tr><td>2011</td><td>9.66</td></tr><tr><td>2012</td><td>11.48</td></tr></table>
Monitoring equipment:	Each truck is weighed twice using electronic weigh scale installed at the entrance of the plant premises, in loaded condition and in empty. The material weight is the difference in two weights. The calibration frequency of lorry weigh bridge is yearly and minimum sensible weight is 5 kg. The accuracy is ±1%. The calibration details are provided below; <table><tr><th>Make</th><th>Sr. No.</th><th>Period when equipment is used.</th><th>Last calibration</th><th>Calibration validity date</th></tr><tr><td rowspan="4">Weitex</td><td rowspan="4">M/c number H 28111</td><td rowspan="4">Since commissioning of plant</td><td>29/06/2012</td><td>28/06/2013</td></tr><tr><td>22/06/2011</td><td>21/06/2011</td></tr><tr><td>15/06/2010</td><td>14/06/2011</td></tr><tr><td>19/06/2009</td><td>18/06/2010</td></tr></table> There was a delay of 8 days in the calibration of the Weigh Bridge in the month of June 2011. The reports of the calibration exercise performed subsequently do not show any measurement error developed in the weighbridge. However, considering the calibration delay, the maximum permissible error (1%) as specified by the manufacturer has been added in the measured quantities of combustion residue transported to the end users r recorded in the logbooks as per requirement of the para 238 (a) of VVS, version 04.0 to ensure a conservative approach.. Furthermore, there was another delay of 8 days in calibration of the weighbridge again in the month of June 2012(22/06/2012-28/06/2012). Hence, the maximum permissible error (1%) as specified by the manufacturer has been used for the adjustment in measured quantities of materials transported in logbooks where material received as per requirement of the para 238(a) of VVS, version 04.0 to ensure a conservative approach.
Measuring/Reading/ Recording frequency:	Recorded continuously and aggregated annually.

Calculation method (if applicable):	Calculated as total quantity of combustion residue transported to the end user/ No. of trucks used for transportation of combustion residue transported to the end user.
QA/QC procedures:	Weighing scale is regularly calibrated to industry standards, once in a year. Accuracy level of the weighbridge is ±1%.
Purpose of data:	Calculation of project emissions
Additional comment:	Average truck capacity is determined by annually averaging of the measured weights.

Data / Parameter:	**DAFw**
Unit:	Km
Description:	Average distance travelled by trucks for carrying different types of materials of type *w*
Measured/ Calculated /Default:	Measured.
Source of data:	Plant operational records: Material log books
Value(s) of monitored parameter:	<table><tr><th>Year</th><th>Average two-way distance travelled by trucks for carrying different types of materials</th></tr><tr><td>2010</td><td>15.61</td></tr><tr><td>2011</td><td>15.45</td></tr><tr><td>2012</td><td>15.43</td></tr></table> The above values have been determined as a weighted average of the distance travelled for transporting the waste materials (poultry litter and rice-husk).These values are considered as to and fro distance travelled by trucks (twice of distance value measured at one side)
Monitoring equipment:	Source of biomass materials and the distance travelled are recorded for each truck.
Measuring/ Reading/ Recording frequency:	Recorded continuously and aggregated annually for each monitoring period
Calculation method (if applicable):	Total distance travelled for transportation of poultry litter and rice husk divided by No. of trucks used for transportation of poultry litter and rice husk.
QA/QC procedures:	Not Applicable
Purpose of data:	Calculation of project emissions
Additional comment:	Average distance travelled by trucks is determined annually by averaging the monitored data.

Data / Parameter:	**DAF_{ash}**
Unit:	Km
Description:	Average distance travelled by trucks for carrying combustion residue
Measured/ Calculated / Default:	Measured

Source of data:	Plant operational records: Material log books
Value(s) of monitored parameter:	<table><tr><th>Year</th><th>Average two-way distance travelled by trucks for carrying combustion residue</th></tr><tr><td>2010</td><td>34.78</td></tr><tr><td>2011</td><td>35.99</td></tr><tr><td>2012</td><td>38.66</td></tr></table> The above values are considered as to and fro distance travelled by trucks (twice of distance value measured at one side)
Monitoring equipment:	End users of combustion residues are recorded for each truck.
Measuring/ Reading/ Recording frequency:	Recorded continuously and aggregated for each monitoring period
Calculation method (if applicable):	Total distance travelled for transportation of combustion residue to the end user divided by No. of trucks used for transportation of combustion residue transported to the end user
QA/QC procedures:	Not Applicable
Purpose of data:	Calculation of project emissions
Additional comment:	Average distance travelled by trucks is determined annually by averaging the monitored data.

Data / Parameter:	**$EF_{y,fuel}$**
Unit:	tCO_2/ton
Description:	Emission factor of the auxiliary fossil fuel used
Measured/ Calculated / Default:	Default
Source of data:	IPCC(2006) - Furnace oil/diesel oil is considered as an auxiliary fuel, for the purpose of ex ante emission calculations.
Value(s) of monitored parameter:	3.185
Monitoring equipment:	Not Applicable
Measuring/ Reading/ Recording frequency:	Not Applicable for all years. This is not applied since no fossil fuel is used during this monitoring period.
Calculation method (if applicable):	-
QA/QC procedures:	Not Applicable
Purpose of data:	Calculation of project emissions
Additional comment:	Furnace oil/diesel oil is considered as an auxiliary fuel for the purpose of ex-ante emission calculations. However, use of any fossil fuel is not permitted in the project activity as per the license document.

Data / Parameter:	**$EF_{CO2,transp}$**
Unit:	tCO_2/km
Description:	Emission factor of the fossil fuel used for transportation

Measured/ Calculated / Default:	Default value
Source of data:	IPCC (2006) - Diesel oil is the fuel to be used for transportation/ test reports
Value(s) of monitored parameter:	0.000548
Monitoring equipment:	Test reports
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	Testing by external agencies
QA/QC procedures:	Testing by external agencies
Purpose of data:	Calculation of project emissions
Additional comment:	Emission factor is calculated as the product of density of diesel (0.86 kg/liter, Ref: IOCL) and COEF for diesel (3.185 kgCO2/km, Ref: IPCC default value)[2] divided by fuel efficiency (5 km/l).The fuel efficiency test was conducted by third party "East Godavari District Lorry owner association" for the vehicles used i.e. tractor, truck (medium) and truck (heavy). The year wise fuel efficiencies are as follows:

Means of transportation	**Fuel efficiency in year (km/l)**			**Average of 2010,2011 and 2012**
	2010	**2011**	**2012**	
Tractor	7.79	7.86	7.43	7.69
Truck(medium):	5.27	5.08	5.03	5.13
Truck(Heavy):	5.07	4.96	5.08	5.04

The fuel efficiency has been considered ex-ante value i.e. 5.0 km/l which are conservative values in compare with the average fuel efficiency test values for the year 2010, 2011 and 2012.

Data / Parameter:	**$EF_{CO2,FF}$**
Unit:	tCO_2/GJ
Description:	Emission factor of the most carbon intensive fossil fuel in the country
Measured/ Calculated / Default:	Default
Source of data:	IPCC(2006) or local values – If leakage is considered, data is sourced for the appropriate fuel from IPCC/ local values. This data item is used for estimating leakage from shift of competing uses of rice husk.
Value(s) of monitored parameter:	0

[2] Fuel efficiency will be determined on yearly basis through sample measurements, using the monitored data on fuel type, fuel consumption and distance traveled for all truck types. Under the sample measurements, actual data on fuel type (Diesel oil), truck type (tractor trolley, light truck, medium truck etc.) and distance traveled. At least 10 measurements will be recorded for each fuel type and truck type. Fuel efficiencies will be determined for each set of data and an average of 10 values will be considered as the fuel efficiency for the year.

Monitoring equipment:	Not applicable
Measuring/ Reading/ Recording frequency:	Recorded for each monitoring period.
Calculation method (if applicable):	-
QA/QC procedures:	Not applicable
Purpose of data:	Calculation of leakage emissions
Additional comment:	No leakage is considered for the present monitoring period.

Data / Parameter:	**$BF_{y,w}$**
Unit:	Tonnes
Description:	Quantity of waste type *w* used in the project during the year *y* for which leakage cannot be ruled out.
Measured/Calculated / Default:	Measured
Source of data:	Plant operational records: Material log books.
Value(s) of monitored parameter:	0 This is because for the entire quantity of waste used by the project activity, leakage can be easily ruled out, as these are available in surplus quantities in the region.
Monitoring equipment:	If leakage is considered, each truck carrying the waste is weighed twice using electronic weigh bridge installed at the entrance of the plant premises, in loaded condition at the entry and in empty condition at the time of leaving. The waste if difference in two weights. The calibration frequency of lorry weigh bridge is yearly and minimum sensible weight is 5 kg. The accuracy is ±1%. The calibration details are provided below;

Make	Sr. No.	Period when equipment is used.	Last calibration	Calibration due date
Weitex	M/c number H 28111	Since commissioning of plant	29/06/2012	28/06/2013
			22/06/2011	21/06/2011
			15/06/2010	14/06/2011
			19/06/2009	18/06/2010

Calibration delay is not applied as quantity of waste type w is not used.

Measuring/Reading/ Recording frequency:	Recorded for each monitoring period
Calculation method (if applicable):	-
QA/QC procedures:	Weighing scale is regularly calibrated to industry standards, once in a year. Accuracy level of the weighbridge is ±1%.
Purpose of data:	Calculation of leakage emissions
Additional comment:	No leakage is considered for the present monitoring period.

Data / Parameter:	**NCV_w**

Unit:	GJ/Tonne
Description:	Net calorific value of the biomass type w for which leakage cannot be ruled out
Measured/Calculated / Default:	Measured
Source of data:	Plant operational records: Test Reports
Value(s) of monitored parameter:	Not applicable
Monitoring equipment:	Not Applicable. As only Poultry litter and rice-husk has been used during year 2010, 2011 and 2012.
Measuring/Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	Testing by external agencies
QA/QC procedures:	-
Purpose of data:	Calculation of leakage emissions
Additional comment:	Only poultry litter and rice-husk has been transported and used. Hence. No leakage is considered for the present monitoring period.

Data / Parameter:	**$MD_{reg,y}$**
Unit:	-
Description:	Methane that would be destroyed or removed in the year y for safety or legal regulation
Measured/Calculated / Default:	Since there is no regulation hence this not measured.
Source of data:	Official data (http://envfor.nic.in/)
Value(s) of monitored parameter:	-
Monitoring equipment:	Not applicable
Measuring/Reading/ Recording frequency:	Not applicable.
Calculation method (if applicable):	NA
QA/QC procedures:	Not applicable
Purpose of data:	Calculation of project emissions
Additional comment:	No regulations exist in the present monitoring period.

Data / Parameter:	**GWP_{CH4}**
Unit:	-
Description:	Global warming potential (GWP) of methane, valid for the relevant commitment period
Measured/Calculated / Default:	Default
Source of data:	Decisions under UNFCCC and the Kyoto Protocol.

Value(s) of monitored parameter:	A value of 21 is to be applied for the first commitment period of the Kyoto Protocol
Monitoring equipment:	UNFCCC reports
Measuring/Reading/ Recording frequency:	Default value.
Calculation method (if applicable):	-
QA/QC procedures:	Not applicable
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	**F**
Unit:	-
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Measured/Calculated / Default:	Measured
Source of data:	Local values
Value(s) of monitored parameter:	0
Monitoring equipment:	Written information from the operator of the solid waste disposal site and/or site visits at the solid waste disposal site
Measuring/Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	NA
QA/QC procedures:	Third party document
Purpose of data:	Calculation of project emissions
Additional comment:	This value is zero, since no amount of methane is captured at the SWDS presently.

Data / Parameter:	**NCV_{litter}**
Unit:	Kcal/kg
Description:	Net calorific value of the poultry litter
Measured/Calculated / Default:	Measured.
Source of data:	Plant operational records: Test Reports
Value(s) of monitored parameter:	Year / NCV_{litter}(Kcal/kg): 2010 – 1903; 2011 – 1922; 2012 – 1924. The above values are average of four annual tests reports.
Monitoring equipment:	Poultry Litter is tested for NCV in external accredited laboratories

Measuring/Reading/ Recording frequency:	Quarterly. Test of NCV value has been conducted by third party quarterly basis in the year 2010, 2011 and 2012 and average value for each year is determined.
Calculation method (if applicable):	Tested by external agencies
QA/QC procedures:	-
Purpose of data:	Calculation of leakage emissions
Additional comment:	There are no leakage emissions for the present monitoring period. Hence this parameter has not been used for GHG ER calculations.

Data / Parameter:	**NCV_{husk}**
Unit:	Kcal/kg
Description:	Net calorific value of the rice husk
Measured/Calculated / Default:	Measured
Source of data:	Plant operational records: Test Reports
Value(s) of monitored parameter:	<table><tr><th>Year</th><th>NCV_{husk}(Kcal/kg)</th></tr><tr><td>2010</td><td>3243</td></tr><tr><td>2011</td><td>3258</td></tr><tr><td>2012</td><td>3245</td></tr></table> The above values are average of four annual test reports.
Monitoring equipment:	Rice husk is tested for NCV in external accredited laboratories
Measuring/Reading/ Recording frequency:	Quarterly. NCV value has been measured quarterly in the year 2010, 2011 and 2012 and average value has been determined for each year.
Calculation method (if applicable):	NA
QA/QC procedures:	Testing by external agencies
Purpose of data:	Calculation of leakage emissions
Additional comment:	There are no leakage emissions for the present monitoring period. Hence this parameter has not been used for GHG ER calculations.

Data / Parameter:	Availability of biomass
Unit:	-
Description:	Availability of biomass within the project region i.e. within 50 kms radius from the project location.
Measured/Calculated / Default:	Calculated

Source of data:

External entity survey report: Availability of biomass within the project region i.e. within 50 kms radius from the project location. Biomass availability assessment studies have been conducted in the region at annual intervals through an independent consultant, and results of the same are summarised below:

- The biomass assessment study of September 2009 establishes the surplus availability (much in excess of 25%) of biomass fuels (poultry litter and rice husk) for the year 2010:

Surplus quantities of biomass within 50 km radius (%)

Type of waste material	Availability of biomass (tonnes)	Installed capacity of Plants including project cativity (MW	Estimated utilised biomass by power plants (tonnes)	Srplus biomass (tonnes)	Surplus biomass (%)
Poultry Litter	377410	3.66	45844	331566	723
Rice husk	1168000	36.66	321142	846858.4	264

- The biomass assessment study of December 2010 establishes the surplus availability (much in excess of 25%) of biomass fuels (poultry litter and rice husk) for the year 2011:

Type of waste material	Availability of biomass (tonnes)	Installed capacity of Plants including project cativity (MW)	Estimated utilised biomass by power plants (tonnes)	Srplus biomass (tonnes)	Surplus biomass (%)
Poultry Litter	391645	3.66	45844	345801	754
Rice husk	1168000	36.66	321142	846858.4	264

- The biomass assessment study of December 2011 establishes the surplus availability (much in excess of 25%) of biomass fuels (poultry litter and rice husk) for the year 2012:

Type of waste material	Availability of biomass (tonnes)	Installed capacity of Plants including project cativity (MW)	Estimated utilised biomass by power plants (tonnes)	Srplus biomass (tonnes)	Surplus biomass (%)
Poultry Litter	412815	3.66	45844	366971	800
Rice husk	1168000	41.66	364942	803058	220

Note:

1. The estimated utilized poultry litter is sourced from registered PDD as there is no poultry litter based power plant within 50 km radius.
2. The estimated utilized rice husk is estimated as: total installed capacities of power plants including project activity (MW) * 8760h* 1.0 t/MWh(1tonnes of rice -husk required producing 1.0MWhelectricity)[3]. Similarly applied for calculation of surplice biomass for other years. The esteemed utilization of rice-husk is conservative as project activity utilizes only 15% of rice husk.

Value(s) of monitored parameter:

Biomass used by the project (both poultry litter and rice husk) are abundantly available in the region within a 50Km radius from the plant

[3] http://www.smslucknow.com/test/fckeditor/file/all%20pdf/Archives/Vol%202(2)/Vol%202(2)-2011-P63-P76.pdf and http://www.bvucoepune.edu.in/pdf's/Research%20and%20Publication/Research%20Publications_2006-07/International%20Conference_2006-07/Waste%20to%20Wealth%20Prof%20MR%20Gidde.pdf

Monitoring equipment:	An annual survey has been commissioned to identify the sources of each type of biomass (poultry litter, rice husk, or other biomass materials) that are used in the project activity including assessment of common practices, existing consumers of biomass and the quantity of surplus biomass available for the project activity to an independent external entity once in a year.
Measuring/Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	-
QA/QC procedures:	Report by external agency
Purpose of data:	Calculation of leakage emissions
Additional comment:	There are no leakage emissions for the present monitoring period, as there is surplus availability in the region of the biomass fuels used by the project activity. Hence this parameter has not been used for GHG ER calculations.

D.3. Implementation of sampling plan

>>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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The project activity results in GHG emission reductions by means of two primary activities – generation of renewable energy and displacement of an equivalent quantum in the grid as well as avoidance of methane emissions from the poultry litter. Emission reductions have been calculated on the basis of following formulae as described in section B.6.3. of the PDD:

The GHG emission reduction calculation procedure has been further explained below diagrammatically.

	BASELINE EMISSIONS:		PROJECT EMISSIONS:		LEAKAGE EMISSIONS:		EMISSION REDUCTIONS:
RENEWABLE ENERGY GENERATION:	GHG emissions by the grid connected majority of fossil-fuel fired power plants constituting the grid mix that would have generated an equivalent quantity of electrical energy exported to the grid by the project activity.	+	GHG emissions in the project activity scenario attributable to fossil fuel consumption for the purposes of: • Power generation • Transportation	-	Zero	=	GHG Emission Reductions attributable to the project activity
METHANE EMISSIONS AVOIDANCE:	GHG emissions by production of methane from natural decay of poultry litter in the baseline scenario that is used by the project activity.		Accounted above		Zero		

a) Baseline Emissions as per AMS I.D, Version 13:

Baseline emissions for electricity generated at the grid connected power plants by the fossil fuel dominated grid mix are calculated using the following formula:

$$BE_{y,Elec} = EG_y \cdot CEF_{Elec} \quad \text{..... (1)}$$

Where,

EG_y Net electricity exported to the grid by the project activity

CEF_{Elec} Combined margin grid emission factor

In the above formula, EG_y is the net electricity exported to the grid, calculated as the difference of the electricity exported and the electricity imported, as shown below:

$$EG_y = EG_{export,y} - EG_{import,y} \quad \text{..... (2)}$$

Where $EG_{export,y}$ and $EG_{import,y}$ are the electricity exported and electricity imported respectively during the year y. Both parameters are monitored ex post using a single bidirectional energy meter.

The year wise export and import of electricity data are provided in following tables below;

Table 3: Electricity generation data synopsis from plant records (year 2010)

Electricity Generation Data Synopsis from plant records (Year 2010)															
Measuring Period	For ER Calculations									For Cross-Checking					
	1: Electricity Export Data($EG_{export,y}$)				2: Electricity Import Data($EG_{import,y}$)				Net Electricity Export to grid (EG_y=$EG_{export,y}$ - $EG_{import,y}$)	3: Gross Electricity Generation Data($EG_{y,gross}$)			4: Auxiliary Consumption Data($EG_{y,aux}$)		
	Meter Reading		Export Quantum	Adjustment for calibration delay	Meter Reading		Import Quantum	Adjustment for calibration delay		Meter Reading		Generation Quantum	Meter Reading		Aux. Cons. Quantum
	Initial	Final	MWh	MWh	Initial	Final	MWh	MWh	MWh	Initial	Final	MWh	Initial	Final	MWh
Feb-10	16317.00	18305.90	1988.90	1984.92	194.30	214.70	20.40	20.44	1964.48	18900.50	21195.30	2294.80	959.50	1544.20	292.35
Mar-10	18305.90	20101.30	1795.40	1791.81	214.70	225.20	10.50	10.52	1781.29	21195.30	23265.70	2070.40	1544.20	2075.70	265.75
Apr-10	20101.30	22091.40	1990.10	1986.12	225.20	238.60	13.40	13.43	1972.69	23265.70	25545.60	2279.90	2075.70	2646.40	285.35
May-10-1	22091.40	22221.60	130.20	129.94	238.60	244.40	5.80	5.81	124.13	25545.60	-	-	2646.40	-	-
May-10-2	5.65	1391.79	1386.14	1386.14	71.55	90.52	18.97	18.97	1367.17	-	27303.90	1758.30	-	3131.10	242.35
Jun-10	1391.79	2964.24	1572.45	1572.45	90.52	103.94	13.42	13.42	1559.03	27303.90	29156.80	1852.90	3131.10	3673.10	271.00
Jul-10	2964.24	3811.88	847.64	847.64	103.94	127.15	23.21	23.21	824.43	29156.80	30160.10	1003.30	3673.10	4003.40	165.15
Aug-10	3811.88	4813.23	1001.35	1001.35	127.15	154.13	26.98	26.98	974.37	30160.10	31316.90	1156.80	4003.40	4342.60	169.60
Sep-10	4813.23	5332.21	518.98	518.98	154.13	182.86	28.73	28.73	490.25	31316.90	31920.50	603.60	4342.60	4548.70	103.05
Oct-10	5332.21	5832.47	500.26	500.26	182.86	198.36	15.50	15.50	484.76	31920.50	32509.10	588.60	4548.70	4737.40	94.35
Nov-10	5832.47	6609.58	777.11	777.11	198.36	219.89	21.53	21.53	755.58	32509.10	33415.00	905.90	4737.40	5015.80	139.20
Dec-10	6609.58	6827.38	217.80	217.80	219.89	233.70	13.81	13.81	203.99	33415.00	33667.00	252.00	5015.80	5104.80	44.50
Jan-11	6827.38	7417.37	589.99	589.99	233.70	242.60	8.90	8.90	581.09	33667.00	34351.60	684.60	5104.80	5298.40	96.80
Total				**13304.51**				**221.25**	**13083.26**			**15451.10**			**2169.45**

Note 1: The "Measuring Period" refers to the duration between two consecutive grid electricity export meter readings, *i.e.*, from the date of previous month's (24th day of the Month) reading to the date of current month's reading(25th day of month), for example Feb- 10 indicates the data from 25/01/2010. All data has been measured and presented in similar time duration.
Note 2: ABT meter (Sr.No.S/N:07360987) was repalced on 28/04/2010 with calibrated meter (Sr.No. 10403171)
Note 3. Year 2010 refers period from 25/01/2010 to 24/01/2011.

Adjustment for calibration delay of energy import/export bidirectional meter at grid sub-station (maximum possible error as specified by meter manufacturer) subtracted from export data and added to import data from Feb-2010 (25/01/2010) to till meter replacement to ensure conservative approach.	%	0.2

Table 4: Electricity generation data synopsis from plant records (year 2011)

Electricity Generation Data Synopsis from plant records(year 2011)															
Measuring Period	For ER Calculations									For Cross-Checking					
	1: Electricity Export Data($EG_{export,y}$)				2: Electricity Import Data($EG_{import,y}$)				Net Export($EG_{export,y}$ - $EG_{import,y}$)	3: Gross Electricity Generation Data($EG_{y,gross}$)			4: Auxiliary Consumption Data($EG_{y,aux}$)		
	Meter Reading		Export Quantum	Adjustment for calibration delay	Meter Reading		Import Quantum	Adjustment for calibration delay		Meter Reading		Generation Quantum	Meter Reading		Aux. Cons. Quantum
	Initial	Final	MWh	MWh	Initial	Final	MWh	MWh	MWh	Initial	Final	MWh	Initial	Final	MWh
Feb-11	7417.37	9403.06	1985.69	1981.72	242.60	252.87	10.27	10.29	1971.43	34351.60	36624.60	2273.00	5298.40	5853.50	277.55
Mar-11	9403.06	11551.91	2148.85	2144.55	252.87	256.29	3.42	3.43	2141.13	36624.60	39104.10	2479.50	5853.50	6475.50	311.00
Apr-11	11551.91	13585.74	2033.83	2029.76	256.29	265.33	9.04	9.06	2020.70	39104.10	41470.30	2366.20	6475.50	7119.30	321.90
May-11-1	13585.74	13585.74	0.00	0.00	265.33	267.01	1.68	1.68	-1.68	41470.30	-	-	7119.30	-	-
May-11-2	2.00	1064.68	1062.68	1062.68	14.97	35.86	20.89	20.89	1041.79	-	42693.20	1222.90	-	7456.10	168.40
Jun-11	1064.68	2548.72	1484.04	1484.04	35.86	49.14	13.28	13.28	1470.76	42693.20	44416.90	1723.70	7456.10	7906.90	225.40
Jul-11	2548.72	4693.61	2144.89	2144.89	49.14	60.93	11.79	11.79	2133.10	44416.90	46909.50	2492.60	7906.90	8562.40	327.75
Aug-11	4693.61	6697.03	2003.42	2003.42	60.93	70.42	9.49	9.49	1993.93	46909.50	49230.60	2321.10	8562.40	9170.40	304.00
Sep-11	6697.03	8170.81	1473.78	1473.78	70.42	83.20	12.78	12.78	1461.00	49230.60	50937.00	1706.40	9170.40	9626.50	228.05
Oct-11	8170.81	9280.37	1109.56	1109.56	83.20	90.37	7.17	7.17	1102.39	50937.00	52209.80	1272.80	9626.50	9945.40	159.45
Nov-11	9280.37	9780.09	499.72	499.72	90.37	102.46	12.09	12.09	487.63	52209.80	52785.10	575.30	9945.40	10086.80	70.70
Dec-11	9780.09	10236.91	456.82	456.82	102.46	113.23	10.77	10.77	446.05	52785.10	53309.90	524.80	10086.80	10249.70	81.45
Jan-12	10236.90	11655.86	1418.96	1418.96	113.23	121.01	7.78	7.78	1411.18	53309.90	54931.20	1621.30	10249.70	10638.40	194.35
				17809.90				**130.50**	**17679.40**			**20579.60**			**2670.00**

Note 1: The "Measuring Period" refers to the duration between two consecutive grid electricity export meter readings, *i.e.*, from the date of previous month's reading(24th day of the month) to the date of current month's reading(25th day of the month), for example i.e. Feb- 11 indicates thet data from 25/01/2011. All data has been measured and presented in similar time duration.
Note:2 ABT meter (S/N 10403171) was repalced on 24/04/2011 with calibrated meter (Sr.No.10403172).
Note.3: Year 2011 refers period from 25/01/2011 to 24/01/2012.

Adjustment for calibration delay of energy import/export bidirectional meter at grid sub-station (maximum possible error as specified by meter manufacturer) subtracted from export data and added to import data from Feb-11 (25/01/2011) till meter replacement to ensure conservative approach	%	0.2

Table 5: Electricity generation data Synopsis from plant records (Year 2012)

Electricity Generation Data Synopsis from plant records (Year 2012)															
Measuring Period	For ER Calculations									For Cross-Checking					
	1: Electricity Export Data($EG_{export,y}$)				2: Electricity Import Data($EG_{import,y}$)				Net Export ($EG_{export,y}$ - $EG_{import,y}$))	3: Gross Electricity Generation Data($EG_{y,gross}$)			4: Auxiliary Consumption Data ($EG_{y,aux}$)		
	Meter Reading		Export Quantum	Adjustment for calibration delay	Meter Reading		Import Quantum	Adjustment for calibration delay		Meter Reading		Generation Quantum	Meter Reading		Aux. Cons. Quantum
	Initial	Final	MWh	MWh	Initial	Final	MWh	MWh	MWh	Initial	Final	MWh	Initial	Final	MWh
Feb-12	11655.86	14259.56	2603.70	2603.70	121.01	121.46	0.45	0.45	2603.25	54931.20	57899.70	2968.50	10638.40	11311.50	336.55
Mar-12	14250.56	16712.19	2461.63	2461.63	121.46	122.47	1.01	1.01	2460.62	57899.70	60690.90	2791.20	11311.50	11931.60	310.05
Apr-12	16712.19	18862.64	2150.45	2146.15	122.47	128.25	5.78	5.79	2140.36	60690.90	63136.60	2445.70	11931.60	12485.30	276.85
May-12	18862.64	20898.15	2035.51	2031.44	128.25	136.20	7.95	7.97	2023.47	63136.60	65454.40	2317.80	12485.30	13022.30	268.50
Jun-12	20898.15	22932.87	2034.72	2030.65	136.20	142.08	5.88	5.89	2024.76	65454.40	67792.80	2338.40	13022.30	13588.20	282.95
Jul-12-1	22932.87	23819.04	886.17	884.40	142.08	143.19	1.11	1.11	883.29	67792.80	-	-	13588.20	-	-
Jul-12-2	10.65	1537.32	1526.67	1526.67	10.01	11.13	1.12	1.12	1525.55	-	70578.30	2785.50	-	14275.90	343.85
Aug-12	1537.32	1573.77	36.45	36.45	11.13	28.63	17.50	17.50	18.95	70578.30	70620.50	42.20	14275.90	14318.70	21.40
Sep-12	1573.77	2233.79	660.02	660.02	28.63	46.67	18.04	18.04	641.98	70620.50	71382.30	761.80	14318.70	14537.90	109.60
Oct-12	2233.79	4251.57	2017.78	2017.78	46.67	54.69	8.02	8.02	2009.76	71382.30	73710.70	2328.40	14537.90	15126.40	294.25
Nov-12	4251.57	4251.57	0.00	0.00	54.69	63.90	9.21	9.21	-9.21	73710.70	73710.70	0.00	15126.40	15144.60	9.10
Dec-12	4251.57	4251.57	0.00	0.00	63.90	75.78	11.88	11.88	-11.88	73710.70	73710.70	0.00	15144.60	15165.60	10.50
				16398.89				**87.99**	**16310.89**			**18779.50**			**2263.60**

Note 1: The "Measuring Period" refers to the duration between two consecutive grid electricity export meter readings, *i.e.*, from the date of previous month's reading (24th day of the month)to the date of current month's(25th days of the month) reading, for example Feb-12 indicates data from 25/01/2012. All data has been measured and presented in similar time duration.

Note 2: New ABT Meter was replaced with S/N10403171 on 5/07/2012.

Note 3: Year 2012 refer period from 25/01/2012 to 31/012/2012.

Note 4: Measuring period:Dec-12 contains electricity export/ import data up to 31/12/2012.

Adjustment for calibration delay of energy import/export bidirectional meter at grid sub-station (maximum possible error as specified by meter manufacturer) subtracted from export data and added to import data from Apr-12 (25/03/2012) to till meter replacement to ensure conservative approach	%	0.2

Baseline emissions:

The ex-ante grid emission factor (combined margin) is 0.854 tCO_2/MWh.
The year wise baseline emissions are calculated below:

The baseline emissions for the year 2010:

The project activity exported a total of 13083.26 MWh of net electricity to the grid in the year 2010. Hence EG_y=13083.26 MWh. The baseline emissions are calculated using equation (1) as:

BEy=13083.26 MWh*0.854 tCO_2/MWh

$BE_{v,Elec}$ = 11,173 tCO2e

The baseline emissions for the year 2011:

The project activity exported a total of 17,679.40 MWh of net electricity to the grid in the year 2011. Hence EG_y=17,679.40 MWh.

The baseline emissions are calculated using equation (1) as:

BEy=17,679.40 MWh*0.854 tCO_2/MWh

$BE_{y,Elec}$ = 15,098 tCO2e

The baseline emissions for the year 2012:

The project activity exported a total of 16,310.89 MWh of net electricity to the grid in the year 2012. Hence EG_y=16,310.89 MWh.

The baseline emissions are calculated using equation (1) as:

BEy=16,310.89 MWh*0.854 tCO_2/MWh

$BE_{y,Elec}$ = 13,930 tCO2e

Total Emission reductions achieved by the project activity during the monitoring period are 40,201 tCO2e.

The year wise baseline emissions achieved by the project activity are provided in Table 6.

Table 6 : GHG Emission baseline from renewable energy generation(Year 2010, 2011,2012)

GHG Emission Baseline from Renewable Energy Generation						
Parameters fixed Ex-ante						
Parameters fixed Ex-ante	**Symbol**	**Unit**	**Value**			**Source**
CO_2 Emission Factor of the Southern Regional Electricity Grid of India	CEF_{Elec}	tCO_2/ MWh	0.854			CO_2 Baseline Database published by Central Electric Authority, Govt. of India
Parameters monitored Ex-post						
Parameters		**Unit**	**Value**			**Source**
			2010	**2011**	**2012**	
Electricity exported to grid	$EG_{export,y}$	**MWh**	13304.51	17809.90	16398.89	Joint Meter Reading/cross checked with Power Sale Invoices
Electricity imported from grid	$EG_{import,y}$	**MWh**	221.25	130.50	87.99	Joint Meter Reading/cross checked with Power Sale Invoices
Net electricity exported to the grid	EG_y	**MWh**	**13083.26**	**17679.40**	**16310.89**	Joint Meter Reading/cross checked with Power Sale Invoices
Baseline Emissions						
Parameters		**Unit**	**Value**			**Source**
			2010	**2011**	**2012**	
Baseline Emissions from Renewable Energy Generation	$BE_{y,Elec}$		**11173**	**15098**	**13930**	Calculated
Total Baseline Emissions from Renewable Energy Generation		**tCO_2**			**40,201**	

Note:

1) The power plant was commissioned for commercial operations on 27/02/2009.The CDM project activity achieved registration on 27/03/2009, which is start date of the crediting period of the project activity. However, the power plant operates on a monthly cycle from the 25th of each month to the 24th of the next month and the meter readings are taken and the JMR are dated on the 24th.
2) It may please be noted that the procedure followed at the site with respect to the calibration of the energy meters is: after the operation of an energy meter for the predetermined time period after which it is due for calibration, it is replaced by an already calibrated energy meter. The newly installed meter then operates for the same predetermined period of time, after which it is again replaced by another already calibrated energy meter. During this process, the delay replacement of calibrated meter has been identified (Table D.2). Accordingly, maximum permissible error has been applied in electricity export to grid and import from the grid in calculating the net electricity exported to grid.
3) The plant was shut down after recording of data on 24/10/2012 and remained in shut down mode till the end of this monitoring period. Hence, there are no electricity generation and transport of material from this date.

b) Baseline Emissions as per AMS III.E, version 15:

$$BE_{CH4,SWDS,Y} = \varphi \cdot (1-f) \cdot GWP_{CH4} (1-OX) \frac{16}{12} F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} DOC_j e^{-k_j (y-x)} (1-e^{-k_j})$$

Where,

Φ	Model correction factor to account for model uncertainties
F	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
GWPCH4	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOCf	Fraction of degradable organic carbon (DOC) that can decompose
MCF	Methane correction factor
Wj,x	Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x* (tons)
DOCj	Fraction of degradable organic carbon (by weight) in the waste type *j*
Kj	Decay rate for the waste type *j*
J	Waste type category (index)
X	Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)
Y	Year for which methane emissions are calculated

Presently there are no national or local regulations in the country; hence the methane that would have to be captured/ recovered/ flared due to legal mandate is zero. The year wise poultry litter and ash transportation data's are provided in following tables.

Table 7: Fuel and ash transportation data synopsis from plant records(Year 2010)

Fuel and Ash Transportation Data Synopsis from plant records(Year 2010)									
Measuring Period	1: Poultry Litter Data			2: Rice Husk Data			3: Ash Data		
	No. of Trucks	Material Quantity (tonnes)	Total Distance Travelled (km)	No. of Trucks	Material Quantity (tonnes)	Total Distance Travelled (km)	No. of Trucks	Material Quantity (tonnes)	Total Distance Travelled (km)
Feb-10	598	5558.96	3881	139	1857.06	1488	111	1466.41	1936
Mar-10	662	5424.88	4613	58	700.14	793	111	1350.40	1895
Apr-10	689	5706.77	4444	171	1910.21	2337	145	1499.82	2569
May-10	367	3594.57	2565	112	1318.56	1453	90	1145.42	1551
Jun-10	395	3427.21	2498	59	711.29	1271	70	881.68	1187
Jul-10	385	3379.34	2426	8	103.61	96	63	683.98	1065
Aug-10	328	2949.05	2191	0	0.00	0	65	777.67	1118
Sep-10	221	1936.89	1882	0	0.00	0	35	405.21	608
Oct-10	120	923.87	766	76	638.12	890	75	403.18	1305
Nov-10	186	1664.83	1204	114	884.76	1499	135	979.48	2434
Dec-10	68	716.36	477	20	156.76	390	45	316.70	775
Jan-11	248	1286.19	1738	39	325.23	606	59	504.15	1019
Total	**4267**	**36568.89**	**28685**	**796**	**8605.73**	**10823**	**1004**	**10414.07**	**17462**
Avearge value for the capacity of truck used for carrying the materials									**8.92**
Avearge capacity of trucks used for carrying the combustion residue									**10.37**
Average distance travelled by truck for carrying different types of material (twice of distance value)									**15.61**
Average distance travelled by the truck for carrying the combustion residue(twice of distance value)									**34.78**

Note: 1.The "Measuring Period" refers to the duration between two consecutive grid electricity export meter readings, *i.e.*, from the date of previous month's reading to the date of current month's reading. All data has been measured and presented in similar time duration.
Note: 2. Year 2010 refers period from 25/01/2010 to 24/01/2011.

Table 8: Fuel and ash transportation data synopsis from plant records (Year 2011)

Fuel and Ash Transportation Data Synopsis from plant records(Year 2011)									
Measuring Period	1: Poultry Litter Data			2: Rice Husk Data			3: Ash Data		
	No. of Trucks	Material Quantity (tonnes)	Total Distance Travelled (km)	No. of Trucks	Material Quantity (tonnes)	Total Distance Travelled (km)	No. of Trucks	Material Quantity (tonnes)	Total Distance Travelled (km)
Feb-11	1032	6207.74	7851.00	149	1294.53	1484.00	188	1469.53	3226.00
Mar-11	955	5639.03	6286.00	105	957.35	1384.00	226	1795.08	3887.00
Apr-11	830	5498.38	5325.00	80	1204.46	1789.00	176	1646.10	3032.00
May-11	296	1903.48	1869.00	21	478.57	823.00	78	705.69	1471.00
Jun-11	540	3621.20	3304.00	78	613.52	1118.00	101	1055.51	1867.00
Jul-11	912	6219.33	5390.00	188	1536.63	2883.00	131	1345.34	2660.00
Aug-11	790	7471.57	5861.00	72	1074.24	912.00	113	1296.66	1999.00
Sep-11	496	5122.56	3337.00	75	990.42	1036.00	20	241.39	391.00
Oct-11	114	1211.68	742.00	75	871.83	949.00	45	492.52	814.00
Nov-11	198	2158.97	1568.00	38	516.27	466.00	30	425.74	557.00
Dec-11	191	1962.49	1185.00	45	627.79	581.00	37	481.96	715.00
Jan-12	344	2908.82	2274.00	68	745.20	1004.00	74	822.09	1315.00
Total	**6698**	**49925.21**	**44992.00**	**994**	**10910.79**	**14429.00**	**1219**	**11777.58**	**21934.00**
Avearge value for the capacity of truck used for carrying the waste									**7.91**
Avearge capacity ogf trucks used for carrying the combustion residue									**9.66**
Average distance travelled by the truck for carrying the combustion residue(twice of distance value)									**15.45**
Average distance travelled by the truck for carrying the combustion residue(twice of distance value)									**35.99**

Note: The "Measuring Period" refers to the duration between two consecutive grid electricity export meter readings, *i.e.*, from the date of previous month's reading to the date of current month's reading. All data has been measured and presented in similar time duration.

Note: 2. Year 2011refers period from 25/01/2011 to 24/01/2012.

Note 3: There are 8 days delays in calibration of Weigh Bridge in June 2011. The calibration reports do not show any error in weigh bridge. The maximum permissible error (1%) as specified by meter manufacture has been substrated in waste transported to plant and added to combusted residue (ash) transported to end users during 15/06/2011 to 21/06/2011 in log book as as per requirement of para 238(b) of VVS for conservativeness.

Table 9: Fuel and ash transportation data synopsis from plant records(Year 2012)

Fuel and Ash Transportation Data Synopsis from plant records(Year 2012)									
Measuring Period	1: Poultry Litter Data			2: Rice Husk Data			3: Ash Data		
	No. of Trucks	Material Quantity (tonnes)	Total Distance Travelled (km)	No. of Trucks	Material Quantity (tonnes)	Total Distance Travelled (km)	No. of Trucks	Material Quantity (tonnes)	Total Distance Travelled (km)
Feb-12	908	8291.04	6986.00	106	1154.15	1146.00	169	1688.63	2894.00
Mar-12	682	5947.74	4889.00	221	221.00	3063.00	213	1881.45	3673.00
Apr-12	943	7582.87	6369.00	126	1235.72	1657.00	123	1227.36	2103.00
May-12	759	6979.05	5058.00	40	379.77	493.00	142	1616.01	2907.00
Jun-12	815	7446.74	5414.00	118	1492.31	1297.00	101	1785.45	2764.00
Jul-12	654	5762.55	4410.00	145	1832.06	2052.00	110	1467.78	2214.00
Aug-12	76	543.66	562.00	0	0.00	0.00	0	0.00	0.00
Sep-12	300	2300.07	1899.00	16	171.90	192.00	24	330.42	463.00
Oct-12	11	98.46	50.00	44	522.85	465.00	70	935.39	1384.00
Nov-12	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Dec-12	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Total	**5148**	**44952.17**	**35637.00**	**816**	**7009.75**	**10365**	**952**	**10932.48**	**18402.00**
Avearge value for the capacity of truck used for carrying the waste									**8.71**
Avearge capacity ogf trucks used for carrying the combustion residue									**11.48**
Average distance travelled by the truck for carrying the combustion residue(twice of distance value)									**15.43**
Average distance travelled by the truck for carrying the combustion residue(twice of distance value)									**38.66**

Note: The "Measuring Period" refers to the duration between two consecutive grid electricity export meter readings, *i.e.*, from the date of previous month's reading to the date of current month's reading. All data has been measured and presented in similar time duration.
Note: 2. Year 2012 refers period from 25/01/2012 to to 31/12/2012.
Note:3. There are 8 days delays in calibration of Weigh Bridge in June 2012 (from 22/06/2012 to 28/06/2012). Hence, the maximum permissible error (1%) as specified by manufacture has been substracted from the transported materials and added in combusted residue(ash) in logbooks for the requirement of para 238(a) of VVS for conservativeness.

Table 10: Baseline emissions avoidance of methane emission(Year 2010, 2011, 2012)

Parameters fixed Ex-ante				
Sl. No.	**Parameters fixed Ex-ante**	**Symbol**	**Unit**	**Value**
1	Model correction factor to account for model uncertainties	Φ	-	0.9
2	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)	OX	-	0
3	Fraction of degradable organic carbon (DOC) that can decompose	DOC_f	-	0.5
4	Methane correction factor	MCF	-	0.4
5	Fraction of degradable organic carbon (by weight) in the waste type j	DOC_j	-	38%
6	Decay rate for the waste type j	k_j	-	0.4
Parameters monitored Ex-post				
Sl. No.	**Parameters**	**Symbol**	**Unit**	**Value**
7	Fraction of methane captured at the SWDS and flared, combusted or used in another manner	f	-	0
8	Global warming potential of Methane	GWP_{CH4}	-	21
9	Fraction of methane in the SWDS gas (volume fraction)	F	-	0.5

Calculations					
	Year for which methane emissions are calculated - *y*	1	2	3	4
Year during the crediting period - *x*	**Amount of organic waste type j prevented from disposal in the SWDS in the year x (i.e., poultry litter) - *Wj,x***	**Methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site during the period from the start of the project activity to the end of the year y - *BECH4,SWDS,y***			
1	42566	13438	9008	6038	4047
2	36569		11545	7739	5187
3	49925			15761	10565
4	44952				14191

Baseline Emissions				
Parameters	**Unit**	**2010**	**2011**	**2012**
Baseline Emissions		**Value**		
Baseline Emissions (BECH4,SWDS,y)	**tCO_2e**	20553	29538	33992
Total Baseline emissions(from year 2010 to 2012)	**tCO_2e**	**84082.7**		

Note: The baseline emissions 13,438 tCO_2e of 2009 is directly sourced from the first verification report available at UNFCCC web site.

The baseline emissions for avoidance of methane that would have otherwise been caused by natural decay of poultry litter are achieved during 2010, 2011 and 2012 are 20,553, 29,538 and 33,992 tCO_2e respectively.

The total baseline emissions for avoidance of methane that would have otherwise been caused by natural decay of poultry litter during this monitoring period are 84,082.7tCO_2e.

The total baseline emissions from both components are calculated as 40,201 tCO2e + 84,082.7 tCO2e = 124,283.7 tCO2e

= 124,283 tCO_2e(rounded down)

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

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a) Project Emissions as per AMS I.D, Version 13:

Project emissions from fossil fuel combustion for the purpose of power generation are calculated as follows:

$$PE_{y,comb} = Q_{y,fuel} \cdot EF_{y,fuel} \quad \text{..... (3)}$$

Where,

Q_y Quantity of fossil fuels used

$EF_{y,fuel}$ Emission Factor of the fossil fuel

However, there has been no fossil-fuel usage in the plant premises for the monitoring period under consideration.

Project emissions from fossil fuel consumption for transportation are calculated using formula:

$$PE_{y,transp} = \left(Q_{y,w} / CT_{y,w}\right) \cdot DAF_w \cdot EF_{CO2} + \left(Q_{y,ash} / CT_{y,ash}\right) \cdot DAF_{ash} \cdot EF_{CO2} \quad \text{..... (4)}$$

Where,

$Q_{y,w}$	Quantity of waste type *w* combusted in the year *y* (tons)
$CT_{y,w}$	Average truck capacity for waste type *w* transportation, (tonnes/truck)
DAF_w	Average incremental distance for waste type *w* transportation (km/truck)
EF_{CO2}	CO_2 emission factor from fuel use due to transportation (tCO_2/km, IPCC default values or local values)
$Q_{y,ash}$	Quantity of combustion residues produced in the year *y* (tonnes)
$CT_{y,ash}$	Average truck capacity for combustion residues transportation (tonnes/truck)
DAF_{ash}	Average distance for combustion residues transportation (km/truck)

The calculation of project emissions are provided in Table 11

Table 11: Project emissions and Leakage calculation

Project Emissions and Leakage						
Parameters fixed Ex-ante	Symbol	Unit	Value			Source
			2010	2011	2012	
Parameters monitored Ex-post						
Quantity of auxiliary fossil fuel used	$Q_{y,fuel}$	tonnes	0.00	0.00	0.00	Plant Records. No auxilary fossil fuels have been used.
CO_2 emission factor for the combustion of the auxiliary fossil fuel	$EF_{y,fuel}$	tCO_2/ton	3.185			IPCC 2006
Quantity of waste type w (poultry litter) transported to the project site	$Q_{y,w\text{-}litter}$	tonnes	36569	49925	44952	Plant Records
Quantity of waste type j (rice-husk) transported to the project site	$Q_{y,w\text{-}husk}$	tonnes	8606	10911	7010	Plant Records
Quantity of combustion residue transported to the end user	$Q_{y,ash}$	tonnes	10414	11778	10932	Plant Records
Average capacity of trucks used for carrying the materials	$CT_{y,w}$	tonnes	8.92	7.91	8.71	Plant Records
Average capacity of trucks used for carrying combustion residue	$CT_{y,ash}$	tonnes	10.37	9.66	11.48	Plant Records
Average distance travelled by trucks for carrying the materials(twice of distance value)	DAF_w	km	15.61	15.45	15.43	Plant Records
Average distance travelled by trucks for carrying combustion residue to end users(twice of distance value)	DAF_{ash}	km	34.78	35.99	38.66	Plant Records
CO_2 emission factor for the fossil fuel used for transportation	$EF_{CO2,tra}$	tCO_2/Km	0.000548			IPCC 2006
Project Emissions						
Emissions from auxiliary fossil fuel combustion	$PE_{y,comb}$	tCO_2	0	0	0	Auxiliary fossil fuel is not used.
Emissions from transportation of biomass wastes and combustion residues	$PE_{y,transp}$	tCO_2	54	77	64	calculated.
Total Project Emissions	**PE_y**	**tCO_2**	**54**	**77**	**64**	**calculated.**
Total Project Emisisons during this monitoring period	**PE_y**	**tCO_3**	**195**			**calculated.**
Leakage Emissions						
Leakage Emissions	L_y	tCO_2	0	0	0	- Poultry Litter commercially not used for other purposes - Rice husk availability within 15km radius from project activity is more than 25% of usage by project - Equipment not transferred from any other project activity
Total Leakage Emissions		**tCO_2**	**0**	**0**	**0**	

The project emissions during the year 2010, 2011 and 2012 are 54, 77 and 64 tCO_2e respectively. The total project emissions during this monitoring period are 195 tCO2e.

b) Project Emissions as per AMS III.E, version 15.1:

Project emissions attributable to the project activity are considered to be zero, since they have already been considered in grid electricity displacement component.

Table 12: Summary of emissions reductions achieved by the project

Synopsis:					
Type:	Methodology	Symbol	GHG ER (tCO_2e)		
			2010	2011	2012
Baseline Emissions					
Baseline Emissions from Renewable Energy Generation	AMS-I.D.	$BE_{y,Elec}$	11173	15098	13930
Baseline Emissions from Methane Emissions Avoidance	AMS-III.E.	$BE_{y,CH4}$	20553	29538	33992
Project Emissions					
Project Emissions	AMS-III.E.	PE_y	**54**	**77**	**64**
Total project emissions during the monitoring period			**195**		
Leakage Emissions					
Leakage	AMS-I.D. AMS-III.E.	L_y	0	0	0
GHG Emission Reductions from the project activity	-	ER_y	**31,672**	**44,559**	**47,857**
Total GHG Emission Reductions during entire monitoring period	-	ER_y	**1,24,088**		

The total emission reductions achieved by the project activity during this monitoring period are 124,088 tCO2e.

E.3. Calculation of leakage

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There is no leakage to be considered for the project activity as all equipments employed for the project activity are newly procured and not transferred from any other project activity.

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

Item	Baseline emissions or baseline net GHG removals by sinks ($t CO_2e$)	Project emissions or actual net GHG removals by sinks ($t CO_2e$)	Leakage ($t CO_2e$)	Emission reductions or net anthropogenic GHG removals by sinks ($t CO_2e$)
Total	124,283	195	0	124,088

E.5. Comparison of actual emission reductions or net anthropogenic 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 ($t CO_2e$)	145,308	124,088

This monitoring period covers 25/01/2010 to 31/12/2012. The actual amount of the emission reductions achieved by the project activity is 124,088 tCO2e, which is 14.6% lower than the estimated values of 145,308 tCO_2e in registered PDD for this monitoring period. The estimated values are calculated as per ex-ante values in registered PDD i.e. 40,736 tCO2e in 2010 for 341 days (43,603 tCO_2e*341 days / 365

days) and complete years of 2011 (50,106 tCO_2e) & 2012 (54,466 tCO2e)..

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

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The actual GHG emission reduction values achieved during this monitoring period are lesser than the GHG emission reduction values estimated in ex-ante calculation of registered PDD.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO_2e)	124,088	Not applicable

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Document information

Version	*Date*	*Description*
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 anthropogenic 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).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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