



**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	01
Completion date of the monitoring report	18/07/2013
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
Project participant(s)	Raus Power Ltd. – India South Pole Carbon Asset Management Ltd. – Switzerland Climate Cent Foundation – Switzerland
Host Party(ies)	India
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope 1 – AMS-I.D. ver. 13 Sectoral Scope 13 – AMS-III.E. ver. 15
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	145,307 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	124,210 tCO ₂ e

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 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 biomass

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 124,210 tCO₂e.

A.2. Location of project activity

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Host party(ies): Raus Power Ltd.

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

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

Crediting period:27/03/2009-26/03/2016 (renewable)

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).

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

SI. 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 due to government procedures, there was delay in replacement of calibrated meter (refer Table 1). 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 (25/02/2010-31/012/2012), the project activity exported a total of 47,094 MWh of electricity to the grid. Further, plant operation levels were well below the capacity mentioned in the registered PDD: 3.66 MW at a plant load factor (PLF) of 80% for the present monitoring period. The details of monitoring equipments and calibration details are provided in Table 1.

Table 1: Installed Monitoring equipment and calibration details

Monitoring equipment and location	Monitoring parameter	Specification and calibration details	
		Monitoring Equipment	Main Meter*
Main Meter Location: Grid sub-station	EG _{export,y} and EG _{import,y}	Type	L&T
		Model	ER 300P
		Serial Number	07360987
		Accuracy	0.2
		Calibration frequency	Annually
		Date of last calibration	22/10/2008(validity: 21/10/2009) 29/10/2010 (validity:28/10/2011)
		Period when equipment is used	27/03/2009 to to 28/04/2010
		<p>*Main meter (S/N 07360987)was replaced on 28/04/2010 with new meter (S/No. 10403171). -Maximum possible error 0.2% as specified by meter manufacturer subtracted from export data and added to import data from for the period 25/02/2010 to 24/04/2010(Refer CER calculation sheet) to ensure conservative approach.</p>	

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.

Monitoring Equipment	Main Meter*
Type	Elster
Model	A1860RALNC
Serial Number	10403171
Accuracy	0.2S
Calibration frequency	annually
Date of last calibration	29/01/2010 (validity: 28/01/2011)
Period when equipment is used	28/04/2010 to 24/04/2011

*Main meter was replaced on 28/04/2011 with new meter S/No. 10403172

-Maximum possible error 0.2% as specified by meter manufacturer subtracted from export data and added to import data from for the period 25/04/2011 to 24/04/2011(Refer CER calculation sheet) to ensure conservative approach.

Monitoring Equipment	Main meter*
Make	Elster
Model	A1860RALNC
Serial Number	10403172
Accuracy	0.2S
Calibration frequency	Annually
Date of calibration	31/03/2011(validity:31/03/2012)
Period when equipment is used	24/04/2011 to 05/07/2012

*meter was replaced on 05/07/2012 with new meter S/No. 10403171

-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 05/07/2012(Refer CER calculation sheet) to ensure conservative approach.

Equipment	Main Meter*
Type	Elster
Model	A1860RALNC
Serial Number	10403171
Accuracy	0.2S
Calibration frequency	annually
Date of last calibration	08/05/2012(validity:07/05/2013)
Period when equipment is used	05/07/2012 to 31/12/2012

Gross Meter Location: TG control Panel	EG _{y,gross}	<table border="1"> <thead> <tr> <th>Monitoring Equipment</th> <th>Gross Meter</th> </tr> </thead> <tbody> <tr> <td>Type</td> <td>ER 300P</td> </tr> <tr> <td>Make</td> <td>Secure</td> </tr> <tr> <td>Model</td> <td>E3M 051</td> </tr> <tr> <td>Serial Number</td> <td>KVA03648</td> </tr> <tr> <td>Accuracy</td> <td>0.5</td> </tr> <tr> <td>Calibration frequency</td> <td>Annually</td> </tr> <tr> <td>Date of calibration</td> <td>20/11/2009(validity: 20/11/2010) 25/09/2010(validity:25/09/2011) 18/09/2011(validity:18/09/2012) 01/09/2012(validity:01/09/2012)</td> </tr> <tr> <td>Period when equipment is used</td> <td>27/03/2009 to 31/12/2012</td> </tr> </tbody> </table>	Monitoring Equipment	Gross Meter	Type	ER 300P	Make	Secure	Model	E3M 051	Serial Number	KVA03648	Accuracy	0.5	Calibration frequency	Annually	Date of calibration	20/11/2009(validity: 20/11/2010) 25/09/2010(validity:25/09/2011) 18/09/2011(validity:18/09/2012) 01/09/2012(validity:01/09/2012)	Period when equipment is used	27/03/2009 to 31/12/2012
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Auxiliary Meter Location: TG control Panel	EG _{y,aux}	<table border="1"> <thead> <tr> <th>Monitoring Equipment</th> <th>Aux. Meter</th> </tr> </thead> <tbody> <tr> <td>Make</td> <td>L& T</td> </tr> <tr> <td>Model</td> <td>ER 300P</td> </tr> <tr> <td>Serial Number</td> <td>08039874</td> </tr> <tr> <td>Accuracy</td> <td>0.2S</td> </tr> <tr> <td>Calibration frequency</td> <td>Annually</td> </tr> <tr> <td>Date of last calibration</td> <td>13/10/2009(validity:13/10/2010 25/09/2010(validity:25/09/2011) 18/09/2011(validity:18/09/2012) 01/09/2012(01/09/2013)</td> </tr> <tr> <td>Period when equipment is used</td> <td>25/02/2010 to 31/12/2012</td> </tr> </tbody> </table>	Monitoring Equipment	Aux. Meter	Make	L& T	Model	ER 300P	Serial Number	08039874	Accuracy	0.2S	Calibration frequency	Annually	Date of last calibration	13/10/2009(validity:13/10/2010 25/09/2010(validity:25/09/2011) 18/09/2011(validity:18/09/2012) 01/09/2012(01/09/2013)	Period when equipment is used	25/02/2010 to 31/12/2012		
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Period when equipment is used	25/02/2010 to 31/12/2012																			
Lorry Weight Bridge Location: Plant entry	Q _{y,w} or W _{i,x} Q _{y,fuel} , Q _{y,ash} , CT _{y,w} , CT _{y,ash} , DAF _w , DAF _{ash} BF _{y,w}	Monitoring Equipment: Lorry Weigh Bridge Make: Weitex Class: III Model No: IND/09/96/19 M/C Number: H 28111 Minimum sensible weight: 5 kg Calibration frequency: Annually Calibration date: 19/06/2009 (validity:18/06/2010) 15/06/2010(validity:14/06/2011) 22/06/2011(Validity:21/06/2011) 29/06/2012(validity:28/06/2013)																		

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
1 st 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 a afforestation or reforestation project.

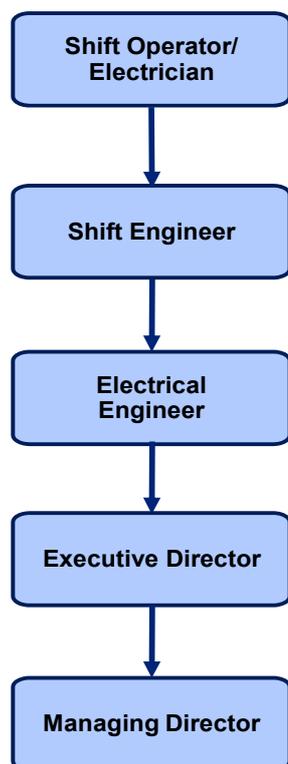
SECTION C. Description of monitoring system

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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

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 al. (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
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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	DOC_j
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. The wastes are available in dry form hence, % dry waste is considered. According to the methodological tool the factor DOC _j is 38% for the above category.

Data/Parameter	k_j
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 20°C 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}
Unit:	MWh
Description:	Net electricity exported to the grid system during the year <i>y</i>
Measured/ Calculated / Default:	Measured.
Source of data:	Plant operational history: Joint meter reading statements and power sale invoices
Value(s) of monitored parameter:	47,513
Monitoring equipment:	The total net energy exported by the project to the grid system is measured using energy meters. The data is measured continuously and aggregated monthly (in kWh and converted to MWh) in the form of joint meter reading statements, on the basis of which power sale invoices are also raised by the project proponent to the APEPDCL for obtaining payment. Monitoring equipment and calibration details are provided in Table 1(Section B of this report)
Measuring/ Reading/ Recording frequency:	Recorded monthly
Calculation method (if applicable):	Not Applicable
QA/QC procedures:	Energy meters are calibrated by the APEPDCL as per their internal calibration schedule outside the purview of the project proponent (once a year).
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 <i>y</i>
Measured/ Calculated / Default:	Measured
Source of data:	Plant operational history: Joint meter reading statements
Value(s) of monitored parameter:	418.7

Monitoring equipment:	The total net energy imported by the project from the grid system is measured using energy meters. The data is measured continuously and aggregated monthly (in kWh and converted to MWh) in the form of joint meter reading statements. The Import of electricity is monitored by main meter which is bidirectional meter installed at grid sub-station which is also used for export of electricity. The details of monitoring equipments including accuracy and calibration dates are provided in Table 1(Section B).
Measuring/ Reading/ Recording frequency:	Recorded monthly.
Calculation method (if applicable):	Not Applicable
QA/QC procedures:	Energy meters are calibrated by the APEPDCL as per their internal calibration schedule outside the purview of the project proponent (once a year).
Purpose of data:	Calculation of baseline emissions
Additional comment:	Energy meters are bidirectional meters that measure both exports and imports.
Data / Parameter:	$EG_{y,gross}$
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:	54810.00 (from 25/02/2010 to 31/12/2012)
Monitoring equipment:	The gross energy generated by the project activity is measured by using energy meters. The data is measured hourly and aggregated monthly.
Measuring/ Reading/ Recording frequency:	Recorded monthly
Calculation method (if applicable):	Measured from Gross generation energy meter
QA/QC procedures:	Energy meters are calibrated once a year.
Purpose of data:	Cross-checking of baseline emissions
Additional comment:	-
Data / Parameter:	$EG_{y,aux}$
Unit:	MWh
Description:	Auxiliary consumption by the project activity during the year y

Measured/ Calculated / Default:	Recorded monthly
Source of data:	Plant operational history: Log books
Value(s) of monitored parameter:	7083 (from 25/02/2010 to 31/12/2012)
Monitoring equipment:	The electricity consumed by plant auxiliary equipment is measured by using energy meters. The data is measured hourly and aggregated monthly. The monitoring equipment and calibration details are provided in Table 1(Section B).
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	NA
QA/QC procedures:	Energy meters are calibrated once a year.
Purpose of data:	Cross-checking of baseline emissions
Additional comment:	
Data / Parameter:	$Q_{y,w}$ or $W_{i,x}$
Unit:	tonnes
Description:	Quantity of waste type w or j transported to the project site during the year y
Measured/ Calculated / Default:	Measured
Source of data:	Plant operational records: Material log books
Value(s) of monitored parameter:	1,58,023 (from 25/02/2010 to 31/12/2012) (131488 tonnes Poultry litter and 26535 tonnes Rice husk)
Monitoring equipment:	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 monitoring equipment and calibration details are provided in Table 1(Section B).
Measuring/ Reading/ Recording frequency:	Recorded continuously and aggregated monthly
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 $\pm 1\%$.
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:	Each truck carrying the fuel 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 fuel weight is the difference in two weights. The monitoring equipment and calibration details are provided in Table 1(Section B).
Measuring/ Reading/ Recording frequency:	Recorded for each monitoring period
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 $\pm 1\%$.
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
Value(s) of monitored parameter:	33,114 (from 25/02/2010 to 31/12/2012)
Monitoring equipment:	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 details of monitoring equipment and calibration is provided in Table(Section B)
Measuring/ Reading/Recording frequency:	Recorded continuously and aggregated monthly

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 $\pm 1\%$.
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:	CT_{y,w}
Unit:	Tonnes
Description:	Average capacity of trucks used for carrying the materials
Measured/ Calculated / Default:	Measured
Source of data:	Plant operational records: Material log books
Value(s) of monitored parameter:	8.57 (Poultry litter) 10.18(Rice husk) From 25/02/2010 to 31/12/2012
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 monitoring equipment and calibration details are provided in Table 1(Section B).
Measuring/ Reading/ Recording frequency:	Recorded continuously and aggregated for each monitoring period.
Calculation method (if applicable):	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.
QA/QC procedures:	Weighing scale is regularly calibrated to industry standards, once in a year. Accuracy level of the weighbridge is $\pm 1\%$.
Purpose of data:	Calculation of project emissions
Additional comment:	Average truck capacity is determined by periodical or annual averaging of the measured weights.
Data / Parameter:	CT_{y,ash}
Unit:	Tonnes
Description:	Average capacity of trucks used for carrying the combustion residue
Measured/ Calculated /Default:	Measured
Source of data:	Plant operational records: Material log books
Value(s) of monitored parameter:	10.37 (From 25/02/2010 to 31/12/2012)

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 monitoring equipment and calibration details are provided in Table 1(Section B).
Measuring/Reading/Recording frequency:	Recorded continuously and aggregated for each monitoring period
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 $\pm 1\%$.
Purpose of data:	Calculation of project emissions
Additional comment:	Average truck capacity is determined by periodical or annual averaging of the measured weights.

Data / Parameter:	DAF_w
Unit:	Km/truck
Description:	Average distance travelled by trucks for carrying different types of materials of type <i>w</i>
Measured/Calculated /Default:	Measured.
Source of data:	Plant operational records: Material log books
Value(s) of monitored parameter:	6.59 (poultry litter) 13.14(Rice husk) (From 25/02/2010 to 31/12/2012)
Monitoring equipment:	Source of biomass materials and the distance travelled 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 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 periodically or annually by averaging the monitored data.

Data / Parameter:	DAF_{ash}
Unit:	Km/truck
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:	18.20
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 periodically or 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 - 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:	Recorded for each monitoring period
Calculation method (if applicable):	-
QA/QC procedures:	Not Applicable
Purpose of data:	Calculation of project emissions
Additional comment:	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:	Measured
Source of data:	IPCC - 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 fuel efficiency (5 km/l), density of diesel (0.86 kg/liter, Ref: IOCL) and COEF for diesel (3.185 kgCO ₂ /km, Ref: IPCC default value). ²

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 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
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

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:	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 monitoring equipment and calibration details are provided in Table 1(Section B).
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 $\pm 1\%$.
Purpose of data:	Calculation of leakage emissions
Additional comment:	The waste weight is the difference in two weights. The data is obtained by aggregating all the measured values for the full year. 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:	-
Monitoring equipment:	If leakage is considered, biomass residue is tested in reputed laboratories on yearly basis.
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:	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:	Measured
Source of data:	Official data
Value(s) of monitored parameter:	-
Monitoring equipment:	If regulations exist, this parameter shall be obtained from public domain sources/ relevant regulation documents

Measuring/Reading/Recording frequency:	Recorded for each monitoring period
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:	Recorded for each monitoring period
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:	Calculated.
Source of data:	Plant operational records: Test Reports
Value(s) of monitored parameter:	1930 (average of three years)
Monitoring equipment:	Poultry Litter is tested for NCV in external accredited laboratories
Measuring/Reading/ Recording frequency:	Quarterly
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:	3256 (Average)
Monitoring equipment:	Rice husk is tested for NCV in external accredited laboratories
Measuring/Reading/ Recording frequency:	Quarterly
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:	-
Unit:	-
Description:	Availability of biomass
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
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
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. 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:

$$BE_{y,Elec} = EG_y \cdot CEF_{Elec} \dots\dots\dots (1)$$

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:

$$EG_y = EG_{export,y} - EG_{import,y} \dots\dots\dots (2)$$

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 (25/02/2010-24/02/2011)

Electricity Generation Data Synopsis from plant records																
Measuring Period	For ER Calculations								Net Electricity Export to grid (Export-Import)	For Cross-Checking						
	1: Electricity Export Data				2: Electricity Import Data					3: Gross Electricity Generation Data			4: Auxiliary Consumption Data			
	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		Initial	Final	MWh	Initial	Final	MWh	
Feb-10	16317.0	18305.9	1988.9	1984.9	194.3	214.7	20.4	20.4	1964.5	18900.5	21195.3	2294.8	959.5	1544.2	292.4	
Mar-10	18305.9	20101.3	1795.4	1791.8	214.7	225.2	10.5	10.5	1781.3	21195.3	23265.7	2070.4	1544.2	2075.7	265.8	
Apr-10	20101.3	22091.4	1990.1	1986.1	225.2	238.6	13.4	13.4	1972.7	23265.7	25545.6	2279.9	2075.7	2646.4	285.4	
May-10	22091.4	22221.6	130.2	129.9	238.6	244.4	5.8	5.8	124.1	25545.6	27303.9	1758.3	2646.4	3131.1	242.4	
May-10	5.65	1391.8	1386.1	1386.1	71.55	90.5	19.0	19.0	1367.2	-	-	-	-	-	-	
Jun-10	1391.8	2964.2	1572.5	1572.5	90.5	103.9	13.4	13.4	1559.0	27303.9	29156.8	1852.9	3131.1	3673.1	271.0	
Jul-10	2964.2	3811.9	847.6	847.6	103.9	127.2	23.2	23.2	824.4	29156.8	30160.1	1003.3	3673.1	4003.4	165.2	
Aug-10	3811.9	4813.2	1001.4	1001.4	127.15	154.13	27.0	27.0	974.4	30160.1	31316.9	1156.8	4003.4	4342.6	169.6	
Sep-10	4813.23	5332.21	519.0	519.0	154.1	182.9	28.7	28.7	490.3	31316.9	31920.5	603.6	4342.6	4548.7	103.1	
Oct-10	5332.2	5832.2	500.0	500.0	182.9	198.4	15.5	15.5	484.5	31920.5	32509.1	588.6	4548.7	4737.4	94.3	
Nov-10	5832.5	6609.6	777.1	777.1	198.4	219.9	21.5	21.5	755.6	32509.1	33415.0	905.9	4737.4	5015.8	139.2	
Dec-10	6609.6	6827.4	217.8	217.8	219.9	233.7	13.8	13.8	204.0	33415.0	33667.0	252.0	5015.8	5104.8	44.5	
Jan-11	6827.4	7417.4	590.0	590.0	233.7	242.6	8.9	8.9	581.1	33667.0	34351.6	684.6	5104.8	5298.4	96.8	
				13304.3				221.3	13083.0				15451.1		2169.5	

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 (24th day of month). 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)

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 to till meter replacement on 24/04/2010 to ensure conservative	%	0.2
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Table 4: Electricity generation data synopsis from plant records (25/02/2011-24/02/2012)

Measuring Period	For ER Calculations								Net Export(Export-Import)	For Cross-Checking						
	1: Electricity Export Data				2: Electricity Import Data					3: Gross Electricity Generation Data			4: Auxiliary Consumption Data			
	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		Initial	Final	MWh	Initial	Final	MWh	
Feb-11	7417.4	9403.1	1985.7	1981.7	242.6	252.9	10.3	10.3	1971.4	34351.6	36624.6	2273.0	5298.4	5853.5	277.6	
Mar-11	9403.1	11551.9	2148.9	2144.6	252.9	256.3	3.4	3.4	2141.1	36624.6	39104.1	2479.5	5853.5	6475.5	311.0	
Apr-11	11551.9	13585.7	2033.8	2029.8	256.3	265.3	9.0	9.1	2020.7	39104.1	41470.3	2366.2	6475.5	7119.3	321.9	
May-11-1	13585.7	13585.7	0.0	0.0	265.3	267.0	1.7	1.7	-1.7	41470.3	42693.2	1222.9	7119.3	7456.1	168.4	
May-11-2	2.0	1064.7	1062.7	1062.7	15.0	35.9	20.9	20.9	1041.8	-	-	-	-	-	-	
Jun-11	1064.7	2548.7	1484.0	1484.0	35.9	49.1	13.3	13.3	1470.8	42693.2	44416.9	1723.7	7456.1	7906.9	225.4	
Jul-11	2548.7	4693.6	2144.9	2144.9	49.1	60.9	11.8	11.8	2133.1	44416.9	46909.5	2492.6	7906.9	8562.4	327.8	
Aug-11	4693.6	6697.0	2003.4	2003.4	60.9	70.4	9.5	9.5	1993.9	46909.5	49230.6	2321.1	8562.4	9170.4	304.0	
Sep-11	6697.0	8170.8	1473.8	1473.8	70.4	83.2	12.8	12.8	1461.0	49230.6	50937.0	1706.4	9170.4	9626.5	228.1	
Oct-11	8170.8	9280.4	1109.6	1109.6	83.2	90.4	7.2	7.2	1102.4	50937.0	52209.8	1272.8	9626.5	9945.4	159.5	
Nov-11	9280.4	9780.1	499.7	499.7	90.4	102.5	12.1	12.1	487.6	52209.8	52785.1	575.3	9945.4	10086.8	70.7	
Dec-11	9780.1	10236.9	456.8	456.8	102.5	113.2	10.8	10.8	446.1	52785.1	53309.9	524.8	10086.8	10249.7	81.5	
Jan-12	10236.9	11655.9	1419.0	1419.0	113.2	121.0	7.8	7.8	1411.2	53309.9	54931.2	1621.3	10249.7	10638.4	194.3	
				17810				130	17679				20580		2670	

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 ABT meter (S/N 10403171) was repalced on 24/04/2011 with calibrated meter (Sr.No.10403172)

Table 5: Electricity generation data Synopsis from plant records (25/02/2012 -31/12/2012)

Electricity Generation Data Synopsis from plant records																
Measuring Period	For ER Calculations								For Cross-Checking							
	1: Electricity Export Data				2: Electricity Import Data				Net Export (Export-Import)	3: Gross Electricity Generation Data			4: Auxiliary Consumption Data			
	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	11655.9	14259.6	2603.7	2603.7	121.0	121.5	0.4	0.4	2603.3	54931.2	57899.7	2968.5	10638.4	11311.5	336.6	
Mar-12	14250.6	16712.2	2461.6	2461.6	121.5	122.5	1.0	1.0	2460.6	57899.7	60690.9	2791.2	11311.5	11931.6	310.1	
Apr-12-1	16712.2	16823.0	110.8	110.6	122.5	128.0	5.6	5.6	105.1	60690.9	63136.6	2445.7	11931.6	12485.3	276.8	
Apr-12-2	16823.0	18862.6	2039.6	2035.5	128.0	128.3	0.2	0.2	2035.3	-	-	-	-	-	-	
May-12	18862.6	20898.2	2035.5	2031.4	128.3	136.2	7.9	8.0	2023.5	63136.6	65454.4	2317.8	12485.3	13022.3	268.5	
Jun-12	20898.2	22932.9	2034.7	2030.7	136.2	142.1	5.9	5.9	2024.8	65454.4	67792.8	2338.4	13022.3	13588.2	283.0	
Jul-12-1	22932.9	23819.0	886.2	884.4	142.1	143.2	1.1	1.1	883.3	67792.8	70578.3	2785.5	13588.2	14275.9	343.8	
Jul-12-2	10.7	1537.3	1526.7	1526.7	10.0	11.13	1.1	1.1	1525.6	-	-	-	-	-	-	
Aug-12	1537.3	1573.8	36.5	36.5	11.13	28.63	17.5	17.5	19.0	70578.3	70620.5	42.2	14275.9	14318.7	21.4	
Sep-12	1573.8	2233.8	660.0	660.0	28.6	46.7	18.0	18.0	642.0	70620.5	71382.3	761.8	14318.7	14537.9	109.6	
Oct-12	2233.8	4251.6	2017.8	2017.8	46.7	54.7	8.0	8.0	2009.8	71382.3	73710.7	2328.4	14537.9	15126.4	294.3	
Nov-12	4251.6	4251.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73710.7	73710.7	0.0	15126.4	15126.4	0.0	
Dec-12	4251.6	4251.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73710.7	73710.7	0.0	15126.4	15126.4	0.0	
				16398.9				66.9	16332.0			18779.5			2244.0	

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.

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-12 to till meter replacement on 05/07/2012 to ensure conservative approach

Table 6 : GHG Emission baseline from renewable energy generation(25/02/2010-31/12/2012)

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
Net electricity exported to the grid during 25/01/2010 to 31/12/2012	$EG_{export,y}$	MWh	47,513	Joint Meter Reading/cross checked with Power Sale Invoices
Net electricity Import from the grid during 25/01/2010 to 31/12/2012	$EG_{import,y}$	MWh	419	Joint Meter Reading/cross checked with Power Sale Invoices
Net electricity exported to the grid during 25/01/2010 to 31/12/2012	EG_y	MWh	47,094	Calculated as Export minus Import
Baseline Emissions				
Parameters		Unit	Value	Source
Baseline Emissions from Renewable Energy Generation	$BE_{y,Elec}$	tCO ₂	40,219	Calculated
Total Baseline Emissions		tCO₂	40,219	

The project activity exported a total of 47,094 MWh of net electricity to the grid. Hence $EG_y = 47,094$ MWh. The ex-ante grid emission factor (combined margin) is 0.854 tCO₂/MWh.

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

BE_y=47,094 MWh*0.854 tCO₂/MWh

BE_y = 40,219 tCO_{2e}

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 (Refer Table 1). 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:

$$BE_{CH_4, SWDS, Y} = \phi \cdot (1 - f) \cdot GWP_{CH_4} (1 - OX) \frac{16}{12} F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^y \sum_j W_{j,x} DOC_j e^{-k_j(y-x)} (1 - e^{-k_j})$$

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
GWP _{CH₄}	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)
DOC _f	Fraction of degradable organic carbon (DOC) that can decompose
MCF	Methane correction factor
W _{j,x}	Amount of organic waste type <i>j</i> prevented from disposal in the SWDS in the year <i>x</i> (tons)
DOC _j	Fraction of degradable organic carbon (by weight) in the waste type <i>j</i>
k _j	Decay rate for the waste type <i>j</i>
J	Waste type category (index)
X	Year during the crediting period: <i>x</i> runs from the first year of the first crediting period (<i>x</i> = 1) to the year <i>y</i> for which avoided emissions are calculated (<i>x</i> = <i>y</i>)
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.

Table 7: Fuel and ash transportation data synopsis from plant records(25/02/2010 -24/02/2011)

Fuel and Ash Transportation Data Synopsis from plant records

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	3706	139	1857.06	1488	111	1466.41	1936
Mar-10	662	5424.88	4289	58	700.14	793	111	1350.4	1895
Apr-10	689	5706.77	4145	171	1910.21	2337	145	1499.82	2569
May-10	367	3594.57	2392	112	1318.56	1453	90	1145.42	1551
Jun-10	395	3427.21	2400	59	711.29	1271	70	881.68	1187
Jul-10	385	3379.34	2356	8	103.61	96	63	683.975	1065
Aug-10	328	2949.05	2156	0	0	0	65	777.665	1118
Sep-10	221	1936.89	1788	0	0	0	35	405.205	608
Oct-10	120	923.87	813	76	638.12	0	75	403.175	1305
Nov-10	186	1664.83	1203	114	884.755	1499	135	979.48	2434
Dec-10	68	716.357	531	20	156.755	390	45	316.695	775
Jan-11	248	1286.19	1786	39	325.23	606	59	504.15	1019
Total	4267	36569	27565	796	8606	9933	1004	10414	17462
Average		8.57	6.46		10.81	12.48		10.37	17.39

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 2 data refers period from 25/02/2010 to 24/01/2011.

Table 8: Fuel and ash transportation data synopsis from plant records(25/02/2011 -24/02/2012)

Fuel and Ash Transportation Data Synopsis from plant records

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	6207.735	7370.000	149	1294.525	1484	188	1469.53	3226
Mar-11	955	5639.025	6401.000	105	957.35	1384	226	1795.08	3887
Apr-11	830	5505.285	5271.000	80	1204.455	1789	176	1646.095	3032
May-11	296	1903.475	1780.000	21	478.57	823	78	705.69	1471
Jun-11	540	3633.21	3164.000	78	615.455	1118	101	1052.54	1867
Jul-11	912	6219.329	5166.000	188	1536.632	2883	131	1345.34	2660
Aug-11	790	7471.57	5394.000	72	1074.235	912	113	1296.655	1999
Sep-11	496	5122.545	3191.000	75	990.42	1036	20	241.385	391
Oct-11	114	1211.679	701.000	75	871.827	466	45	492.515	814
Nov-11	198	2158.965	1486.000	38	516.265	466	30	425.735	557
Dec-11	191	1962.49	1149.000	45	627.79	581	37	481.955	715
Jan-12	344	2908.815	2180.000	68	745.2	1004	74	822.084	1315
Total	6698	49944.123	43253.000	994	10912.724	13946	1219	11774.604	21934
Average		7.46	6.46		10.98	14.03		9.66	17.99

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 3 data refers period from 25/02/2011 to 24/01/2012

Table 9: Fuel and ash transportation data synopsis from plant records(25/02/2012 -31/12/2012)

Fuel and Ash Transportation Data Synopsis from plant records									
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	8291.035	7193	106	1154.15	1146	169	1688.63	2894
Mar-12	682	5947.735	4772	221	221	3063	213	1881.45	3673
Apr-12	943	7582.863	6422	126	1235.715	1657	123	1227.355	2103
May-12	759	6979.049	5001	40	379.77	493	142	1616.01	2907
Jun-12	803	7452.441	5098	118	1492.304	1297	101	1785.14	2764
Jul-12	654	5779.188	4279	145	1839.104	2052	110	1461.42	2214
Aug-12	76	543.66	566	0	0	0	0	0	0
Sep-12	300	2300.07	1854	16	171.9	192	24	330.42	463
Oct-12	11	98.46	50	44	522.845	465	70	935.383	1384
Nov-12	0	0	0	0	0	0	0	0	0
Dec-12	0	0	0	0	0	0	0	0	0
Total	5136	44975	35235	816	7017	10365	952	10926	18402
Average		8.76	6.86		8.60	12.70		11.48	19.33

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 4 data refers period from 24/02/2012 to to 31/012/2012.

Table 10: Baseline emissions avoidance of methane emission

Parameters fixed Ex-ante					
Sl. No.	Parameters fixed Ex-ante	Symbol	Unit	Value	
1	Model correction factor to account for model	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) - $W_{j,x}$	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			
1	42566		9008	6038	4047
2	36569		11545	7739	5187
3	49944			15767	10569
4	44975				14199
Baseline					
	Parameters	Symbol	Unit	Value	
	Baseline Emissions	$BE_{CH4, SWDS, y}$	tCO ₂ e	84,100	

The baselines emissions for avoidance of methane that would have otherwise been caused by natural decay of poultry litter are calculated as 84,100tCO₂.

The total baseline emissions from both components are calculated as 40,219 tCO₂e + 84,100 tCO₂e = 124,318 tCO₂e.

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:

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

Where,

Q_v 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:

$$PE_{y,transp} = \left(Q_{y,w} / CT_{y,w} \right) \cdot DAF_w \cdot EF_{CO_2} + \left(Q_{y,ash} / CT_{y,ash} \right) \cdot DAF_{ash} \cdot EF_{CO_2} \dots\dots\dots (4)$$

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_{CO_2}	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 8

Table 11: Project emissions calculation

Parameters fixed Ex-ante	Symbol	Unit	Value	Source
Parameters monitored Ex-post				
Quantity of auxiliary fossil fuel used	$Q_{y,fuel}$	tonnes	0.00	Plant Records
CO ₂ emission factor for the combustion of the auxiliary fossil fuel	$EF_{y,fuel}$	tCO ₂ /ton	3.185	IPCC 2006
No. of trucks used for transportation of poultry litter from 25/01/2010 to 31/12/2012	-	Nos	16101	Plant Records
No. of trucks used for transportation of rice husk from 25/01/2010 to 31/12/2012	-	Nos	2606	Plant Records
No. of trucks used for transportation of combustion residue transported to the end user from 25/01/2010 to 31/12/2012	-	Nos	3175	Plant Records
Quantity of waste type w (poultry litter) transported to the project site from 25/01/2010 to 31/12/2012	$Q_{y,w-litter}$	tonnes	131488	Plant Records
Quantity of waste type j (rice-husk) transported to the project site from 25/01/2010 to 31/12/2012	$Q_{y,w-husk}$	tonnes	26535	Plant Records
Quantity of combustion residue transported to the end user from 25/01/2010 to 31/12/2012	$Q_{y,ash}$	tonnes	33114	Plant Records
Total distance travelled for transportation of poultry litter from 25/01/2010 to 31/12/2012		km	106053	Plant Records
Total distance travelled for transportation of rice husk from 25/01/2010 to 31/12/2012		km	34244	Plant Records
Total distance travelled for transportation of combustion residue to the end user from 25/01/2010 to 31/12/2012		km	57798	Plant Records
Average capacity of trucks used for carrying poultry litter from 25/01/2010 to 31/12/2012	$CT_{y,w-litter}$	tonnes	8.17	Plant Records
Average capacity of trucks used for carrying rice husk from 25/01/2010 to 31/12/2012	$CT_{y,w-husk}$	tonnes	10.18	Plant Records
Average capacity of trucks used for carrying combustion residue from 25/01/2010 to 31/12/2012	$CT_{y,ash}$	tonnes	10.43	Plant Records
Average distance travelled by trucks for carrying poultry litter from 25/01/2010 to 31/12/2012	$DAF_{w-litter}$	km/truck	6.59	Plant Records
Average distance travelled by trucks for carrying rice husk from 25/01/2010 to 31/12/2012	DAF_{w-husk}	km/truck	13.14	Plant Records
Average distance travelled by trucks for carrying combustion residue from 25/01/2010 to 31/12/2012	DAF_{ash}	km/truck	18.20	Plant Records
CO ₂ emission factor for the fossil fuel used for transportation	$EF_{CO_2,transp}$	tCO ₂ /K m	0.000548	IPCC 2006
Project Emissions				
Emissions from auxiliary fossil fuel combustion	$PE_{y,comb}$	tCO ₂	0	
Emissions from transportation of biomass wastes and combustion residues	$PE_{y,transp}$	tCO ₂	109	
Total Project Emissions	PE_y	tCO₂	109	

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

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

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 ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
Total	124,318	109	0	124,210

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 CO₂e)	145,307	124,210

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 CO₂e)	124,210	-

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
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).
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