Monitoring report form
(Version 03.2)

Monitoring report

Title of the project activity	Hunan Yiyang Kaidi Biomass Power Project
Reference number of the project activity	3072
Version number of the monitoring report	1.0
Completion date of the monitoring report	15/04/2014
Registration date of the project activity	28/12/2010
Monitoring period number and duration of this monitoring period	The 2nd monitoring period, from 01/01/2012 to 30/09/2013
Project participant(s)	**United Kingdom of Great Britain and Northern Ireland** , involved indirectly authorized Participants: Camco Clean Energy Plc., Camco Carbon Limited **Switzerland** , involved indirectly authorized Participants: Camco Clean Energy Plc. project owner, Yiyang Kaidi Green Energy Development Co., Ltd
Host Party(ies)	China
Sectoral scope(s) and applied methodology(ies)	Sectoral scope: 1 : Energy industries (renewable - / non-renewable sources) Methodologies Used ACM0002 ver. 10 - Consolidated methodology for grid-connected electricity generation from renewable sources ACM0006 ver. 9 - Consolidated methodology for electricity generation from biomass residues
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	206,061tCO_{2e}
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	145,229 tCO_{2e}
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	69,553 tCO_{2e}
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	75,676 tCO_{2e}

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Hunan Yiyang Kaidi Biomass Power Project (hereafter referred to as the project) is a biomass utilization project developed by Yiyang Kaidi Green Energy Development Co., Ltd.(hereafter referred to as the Project Owner) and is located in Xielingang County, High-Tech development District, Yiyang City, Hunan Province, P.R. China. The project is designed to produce 253,440MWh of electricity per year from burning biomass residues, displacing electricity generated by Central China Power Grid (CCPG), which is dominated by fossil fuel-fired power plants, and thus reducing greenhouse gas (CO2) emissions.

The project processes and burns biomass residue, of which rice husk, rice straws, Cotton straws, Oil seed rape straw, wood chips and barks are the biomass fuel. The project is designed as a total installation of 48MW. The project is built into two phases, each of them is 24MW. 2 sets of 65t/h Circulating Fluidized Bed (CFB) boiler and 2 sets of 12MW steam turbines generator units are installed at the first phase. The second phase of the project hasn't been put into construction yet, and it is planned to construct in 2014.Therefore, the total installed capacity of the project is 24MW and the project is estimated to achieve 206,061tonnes of CO_2e emissions reduction in this monitoring period.

The project began to construct in March 2008, and was put into operation since 06/02/2010. The project has been registered as a CDM project on 28/12/2010 (The version of registered PDD is version 4), the crediting period is form 01/01/2011 to 31/12/2017 (Renewable).

During current monitoring period (01/01/2012 -30/09/2013), the project has achieved emission reductions of 145,229tonnes CO_2e.

A.2. Location of project activity

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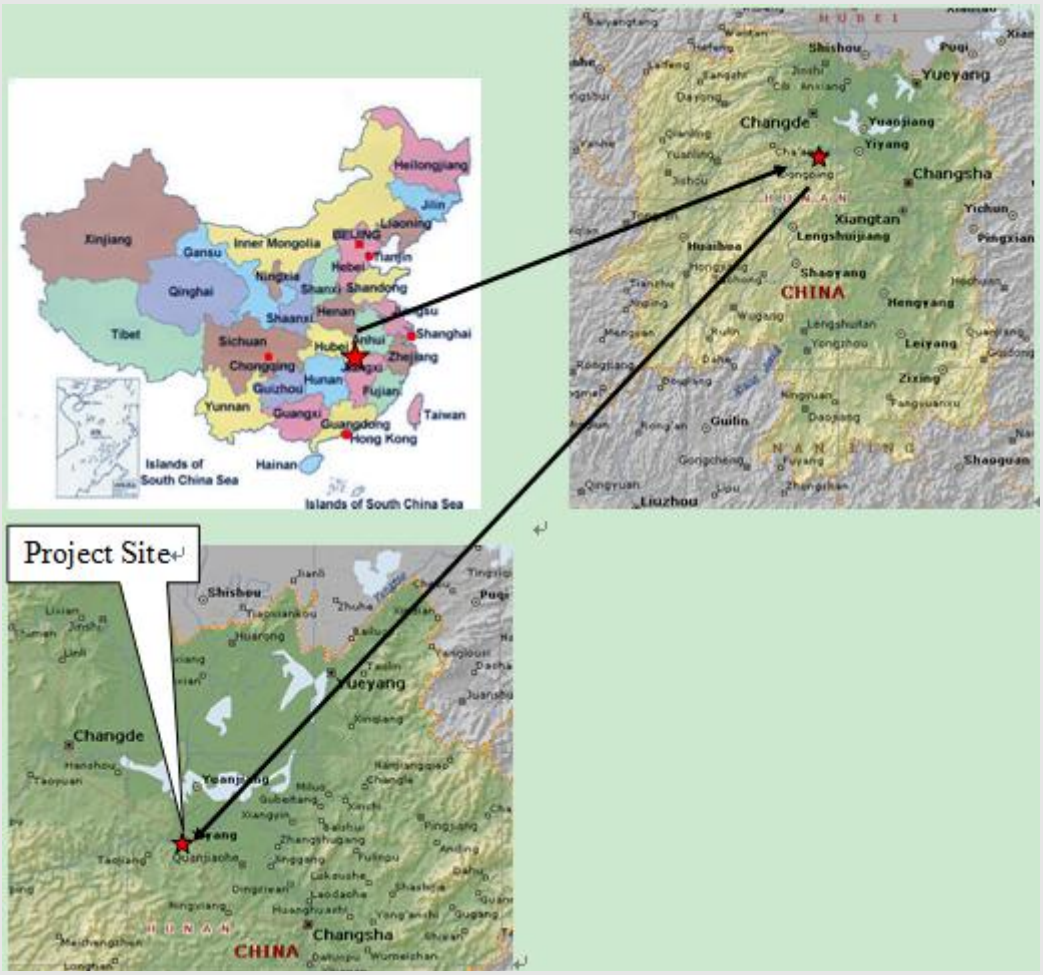
The project activity is located in Xielingang County, High-Tech development District, Yiyang City, Hunan Province, P.R. China

The center of plant has geographical coordinates of 112 °17 ′51″ east longitude 28 °31 ′53″north latitude. The figureA-1 shows the location of the project.

Please refer to the following drawing for the geographic location of the project activity.

Figure 1: Map showing the location of the project site



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)
Peoples' Republic of China (host)	Yiyang Kaidi Green Energy Development Co., Ltd	No
United Kingdom of Great Britain and Northern Ireland	Camco Clean Energy Plc.	No
United Kingdom of Great Britain and Northern Ireland	Camco Carbon Limited	No
Switzerland	Camco Clean Energy Plc.	No

A.4. Reference of applied methodology

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1. ACM0006 (Version 09) – "Consolidated methodology electricity generation from biomass residues"
2. "Combined tool to identify the baseline scenario and demonstrate additionality". (Version 02.2)
3. ACM0002 (Version 10) – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"
4. "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 02)
5. "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01)
6. "Tool to calculate the emission factor for an electricity system" (Version 02)

For more information regarding the methodology, please refer to the link:

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

A.5. Crediting period of project activity

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Crediting period: from 01/01/2011 to 31/12/2017(Renewable)
The start date of the crediting period is 01/01/2011.
This monitoring period: from 01/01/2012 to 30/09/2013

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The project consists of one site, which began to construct in March 2008, and put into operation since 06/02/2010. Please refer to the following table for details.

Activity	Date	
	1# Generator	2# Generator
Start of construction	March 2008	
Operation of core equipment	06/02/2010	06/07/2010

During current period, the project has been operating normally as described in the registered PDD. 1# steam turbine generator and 2# steam turbine generator were respectively shutdown 16 times and 14 times for maintenance.

No events or situations, which may impact the applicability of the methodology, occurred during the current monitoring period.

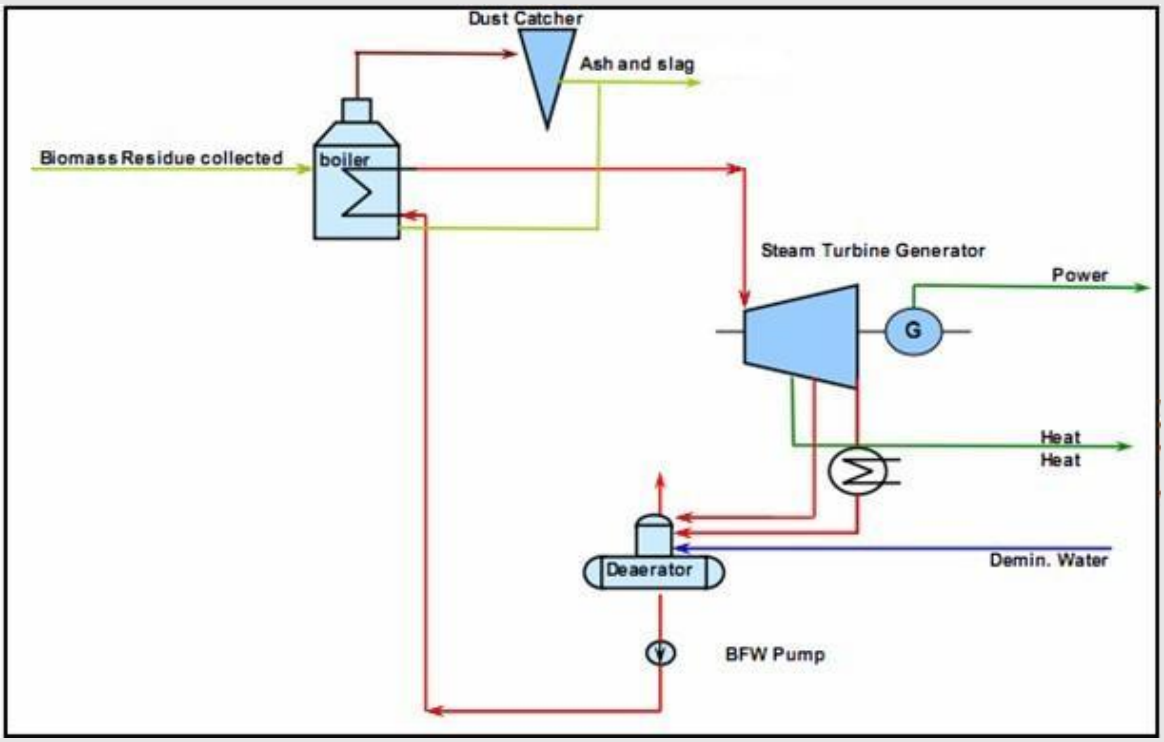
The technology employed by the project is advanced domestic technology. The project installs two sets of 65t/h circulating fluid bed (CFB) boilers with medium temperature and sub-high pressure. At the same time, two 12MW steam turbines and two associated generators are applied in the project .The steam turbine employed is medium temperature and sub-high pressure extraction condensing steam turbine. The total installed capacity of the project is 24MW.

The key technical specifications of the boiler, turbine and generator are listed in the table below.

BOILER	
Manufacturer	Jiangxi Jianglian Energy and Environmental Protection Co., Ltd
Model	KG65-450/5.29-FSWZ-Ⅰ
Type	Medium temperature and sub-high pressure Circulating Fluidized Bed
Maximum evaporation volume	65t/h
Rated steam pressure	5.29MPa
Rated steam temperature	450℃
Feed water temperature	153.2℃
Feed water pressure	5.72MPa
Efficiency	≥86 %
Quantity	2
STEAM TURBINE	
Manufacturer	NanJing Steam Turbine(Group) Co., Ltd
Model	C12-4.90/0.981-12/435℃
Type	Medium temperature and sub-high pressure extraction condensing steam turbine
Rated power	12MW
Main steam pressure	4.9MPa.a
Main steam temperature	435℃
Rate extraction steam volume	15t/h
Maxium Extraction steam volume when Rate electricity capacity is	45t/h

6.59MW	
Quantity	2
GENERATOR	
Manufacturer	NanJing Steam Turbine(Group) Co., Ltd
Model	QFJ-15-2
Rated power	15MW
Rated voltage	10.5KV
Power factor	0.8
Efficiency	≥97%
Rated rotating speed	3000r/min
Rated frequency	50Hz
Quantity	2

The Flow Diagram of the Plant as follows:



B.2. Post registration changes

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

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N/A

B.2.2. Corrections

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The name of manufacturer (NanJing Steam Turbine (Group) Co., Ltd) for generator in Table A-2 of registered PDD was mistyped as ‘ Nanjing Steam Turbine(Group) Co., , and it was approved by EB on 16 Sep 2013.

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

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N/A

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

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The request for post-registration changes related to the change of biomass types of the project to the PDD was approved by EB on 16 Sep 2013.

B.2.5. Changes to start date of crediting period

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N/A

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

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N/A

SECTION C. Description of monitoring system

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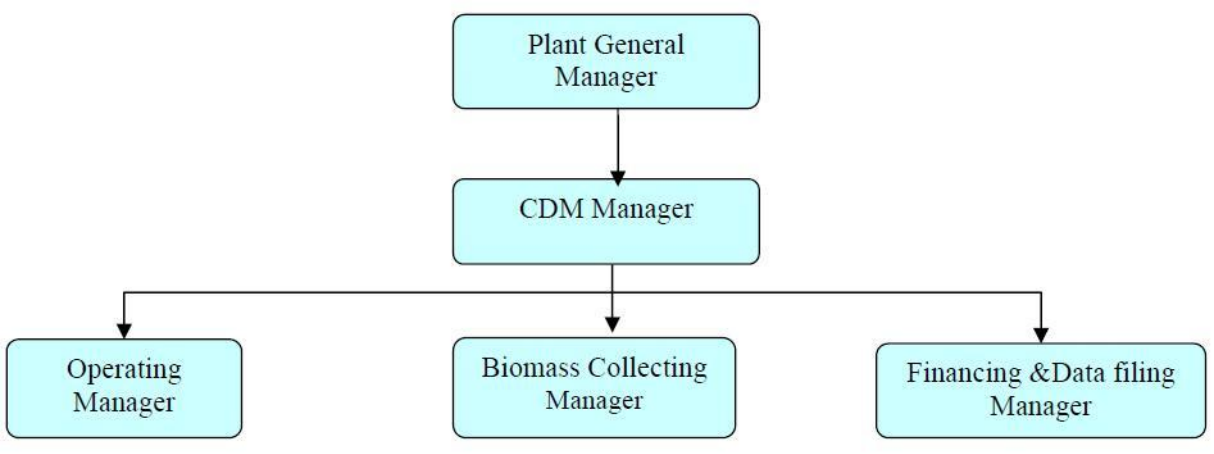
1. The organizational structure, roles and responsibilities of personnel:

In order to ensure monitoring of the project is in accordance with the monitoring plan and methodology, a specific CDM office had been established before the registration of the project. Figure 2 shows the organizational structure of the CDM office.

Figure 2 Organizational structure of the CDM office



The responsibilities of the sections are briefly described as following:

The plant manager is in charge of approving the monitoring report, appointing the CDM manager and the relevant monitoring team members and responsible for the monitoring outcome.

The CDM manager is responsible for liaisoning with DOE and the buyers, organizing the relevant training, reviewing all the documents related with the monitoring of the project, correcting any errors in time and acting as the quality supervisor of the monitoring process.

The Operating Manger is responsible for the monitoring associated with operation of the plant, the net electricity generation, the start-up diesel consumption and the dry biomass combusted. In addition, the Operating Manager supervises meter maintenance and manages the calibration process.

The Biomass Collecting Manager is responsible for the monitoring associated with biomass collection, the transportation emission, the mechanical biomass pre-treatment emissions and assisting the annual leakage analysis.

The Financing &Data filing Manager prepares the available original invoices or receipts associated with the whole monitoring process. Besides, the Financing &Data filing Manager collects the relevant data from the Operating Manger and the Biomass Collecting Manager, summarize the data, file the data and submit reports to the CDM manager in time.

The monitoring report is generated based on the monthly reports before every verification. The monitoring report is reviewed by the office manager before submitted to DOE.

2. Monitoring system:

2.1 Net electricity generation

There is a double way meter installed on the project site monitoring the electricity supplied to the grid and purchased from the grid.

In addition, a 10KV backup power supply is available in site in the early time of the project and the amount of electricity imported through this line is monitored and checked by the invoice.

The data of electricity supplied to the grid and purchased from the grid is measured and cross-checked by the invoices and the power transaction note if available. The meters are all 0.5 double-way meters.

2.2 Biomass residues consumption and moisture of the biomass residues

The amount of biomass residues combusted in the boiler is monitored by the belt weightier. The moisture of the biomass residues combusted is also monitored by sampled continuously at fixed time period and analyzed daily. An energy balance is recorded monthly to assist verifying the biomass combusted.

2.3 Fossil Fuel Consumption in the power plant

For fossil fuel used for starting up, flow meters are equipped in the supply and return pipe to monitor the quantity of diesel consumption.

If there is any fossil fuel used for the shredders, forklifts or any other machines for the mechanical biomass pre-treatment in the project site(including the biomass collection sites） is monitored by the diesel purchase and consumption log book.

The purchase receipt is used for cross-check. If there is any data missing or significant error exists, the entire quantity of fossil fuel purchased in a particular monitoring period would be considered as combusted in the power plant for conservativeness.

2.4 Transportation of Biomass residues

The project developer of the project structures a recording and monitoring system within the biomass residues supply and management system covering all the biomass collection sites established by the project. Each time each truck transporting the biomass into the project site is counted and recorded in the log book. The transportation distance to the collection sites is recorded by company staffs at the sites and the data is recorded in the log books. The data on distance of fuel supply site from the plant can be verified by cross checking data records on the distances available with information from other sources (e.g. maps).

If data is missing for a particular round trip, the following backup data apply in their order:

- The round trip distance between the farthest biomass fuel supply site and the project plant is used.
- If the farthest biomass fuel supply site could not be verified, 200km would be used for conservativeness

2.5 Electricity consumed on site

When the biomass residue is mechanically pre-treated, the project needs a certain amount of electricity from grid. This amount is metered or calculated conservatively.

If the monitoring data is missing, or it is not feasible to install a dedicated meter to monitor this indicator, it is calculated conservatively as the weight of straws smashed in tons and the electricity consumption factor (kWh/ton). The electricity factor can be calculated as follows:

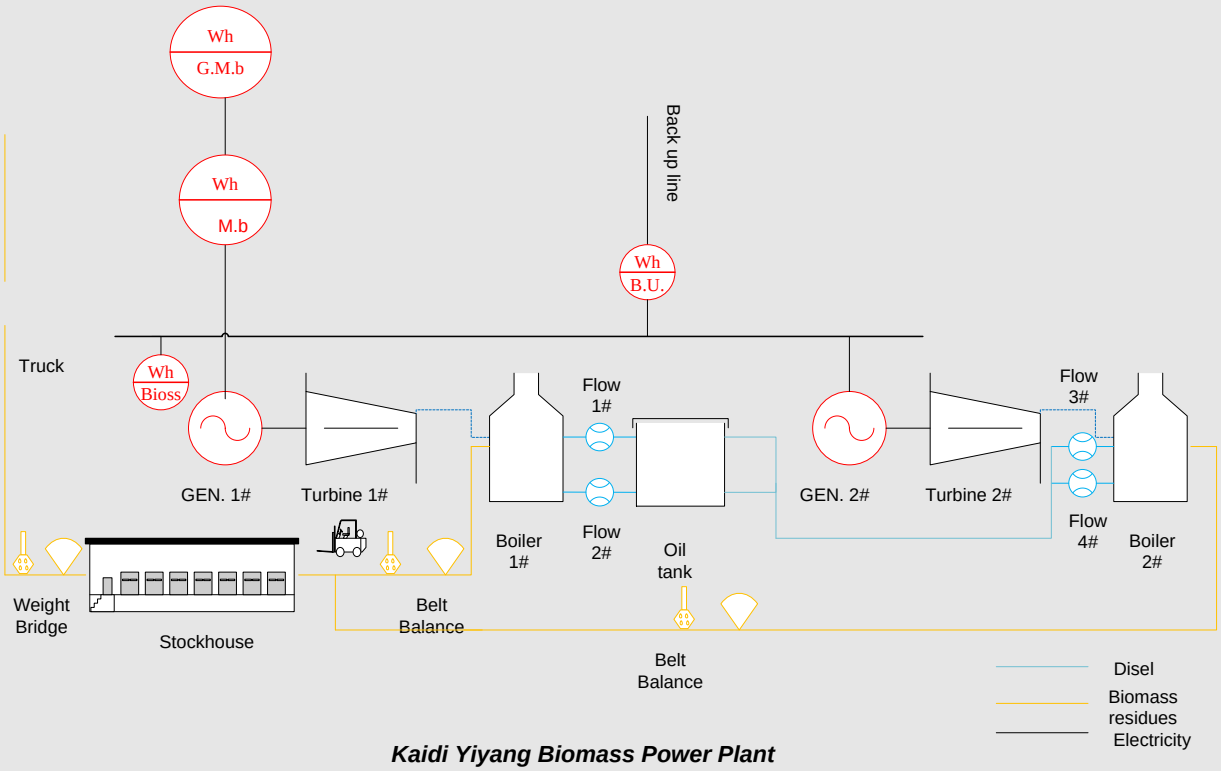
1) Collecting all the nameplates power (in kW) and capacity (t/h) of every straw crackers
2) Calculating the electricity factor corresponding to each cracker in kWh/t

3) Using the largest number as a conservative electricity factor for the calculation

2.6 Leakage

The project consumption and availabilities in the defined geographical area of each type of biomass residue not only the biomass types mentioned above but also other biomass residues utilized in the project has been monitored to check the leakage effect brought by the operation of the project. This is obtained from surveys or statistics from local agricultural bureau or other official public resource. If they are not available, the project owner will ask specialized institute or consulting company to do biomass availability research.

Figure 3: The monitoring system and power system connection



Kaidi Yiyang Biomass Power Plant

3. Data collection procedures

The meters or monitoring equipment installed in the monitoring system have been calibrated by a certified Party in accordance with the manufacturer's recommendations and National Regulations for ensuring reliability of the system. Calibrations shall be evidenced with certificates of calibration for the relevant meter(s) issued by a qualified body. A calibration and error log have been maintained to provide transparency and sound management.

All the electronic and paper documents relevant to CDM must be archived for more than two years since the end of the crediting period.

4. Emergency procedures for the monitoring system

4.1 Training

Members of staff who are involved in the CDM project have been given training on the CDM and reporting requirements, prior to registration of the project. New members of staff joining the CDM project team will also be given training in relation to their responsibilities. Full training procedures and a training plan have been detailed in the CDM Manual.

4.2 Record Keeping and Internal Reporting Procedure

The data associated with the emission reduction will be kept for at least 2 years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

4.3 Error Handling Procedure

In the event that a meter has lost calibration over the allowable error limit then this shall be corrected at the earliest opportunity and re-calibrated and the data recorded from this meter since the last successful calibration shall be ignored.

The check of the CDM Project manager and then the third party verifier prior to issuance of the CERs is considered adequate for errors in the calculations. Where errors in the calculations are discovered by either of these Parties, the monitoring report shall be modified and the corrected version shall be resubmitted to the verifier.

4.4 External Reporting Procedure

After signing by the CDM Project manager, the report is sent to the third party verifier who is contracted to verify the emissions reductions during the crediting period of the project.

4.5 Procedure for corrective actions arising

The CDM manager is responsible for identifying corrective actions arising from the above procedures and for liaising with the purchaser, the third party verifiers and other stakeholders to take necessary steps to implement the corrective actions.

4.6 Emergency procedures

In the unlikely event of an emergency, set procedures will be followed. Details of the procedures to be followed are described in the relevant Operation Manuals. The key points include:

- The Distributed Control System (DCS) will automatically shut off the boilers upon detecting an emergency.
- The operators can also remotely shut off the boilers if they find an emergency situation has occurred.

SECTION D. Data and parameters

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

(Copy this table for each piece of data and parameter.)

Data / Parameter:	EF_y
Unit:	t CO_2e/MWh
Description:	Baseline emission factor of Central China Power Grid
Source of data:	The registered PDD Version 4
Value(s) applied):	0.9735
Purpose of data:	Baseline emission calculation
Additional comment:	--

Data / Parameter:	GWP_{CH4}
Unit:	t CO_2e/t CH_4
Description:	Global warming potential for CH_4
Source of data:	The revised PDD Version 5
Value(s) applied):	21
Purpose of data:	Baseline emission calculation
Additional comment:	Before 1 January 2013, 21 for the first commitment period is adopted, and from 1 January 2013 onwards 25 for the second commitment period is adopted.

Data / Parameter:	$TDL_{j,y}$
Unit:	%
Description:	Average technical transmission and distribution losses for providing electricity to source j in year y.
Source of data:	The registered PDD Version 4
Value(s) applied):	20
Purpose of data:	Project emission calculation
Additional comment:	--

Data / Parameter:	$EF_{CH4,BF}$
Unit:	t CH_4/GJ
Description:	CH_4 emission factor for controlled burning of the biomass residue in the project plant
Source of data:	The registered PDD Version 4
Value(s) applied):	41.1
Purpose of data:	Project emission calculation
Additional comment:	--

Data / Parameter:	NCV_k*$EF_{burning,CH4,k,y}$
Unit:	t CH_4/tonne
Description:	CH4 emission factor for uncontrolled burning of the biomass residue
Source of data:	The registered PDD Version 4
Value(s) applied):	0.001971
Purpose of data:	Baseline emission calculation
Additional comment:	--

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.

<table>
<tr><td>Data / Parameter:</td><td>$BF_{k,y}$</td></tr>
<tr><td>Unit:</td><td>Tons of dry matter</td></tr>
<tr><td>Description:</td><td>Quantity of each biomass residue type k combusted in the project plant in year, y.</td></tr>
<tr><td>Measured/ Calculated / Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>On-site measurements</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>
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<tr><th>Type</th><th>Units</th><th>Data</th></tr>
<tr><td>Rice husk</td><td>tonne</td><td>73,119.39</td></tr>
<tr><td>Wood chips</td><td>tonne</td><td>78,087.51</td></tr>
<tr><td>Oil seed rape straws</td><td>tonne</td><td>2,774.2</td></tr>
<tr><td>Cotton straws</td><td>tonne</td><td>15,688.32</td></tr>
<tr><td>Rice straws</td><td>tonne</td><td>4,755.55</td></tr>
<tr><td>Barks</td><td>tonne</td><td>53,527.81</td></tr>
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<tr><td>Monitoring equipment:</td><td>
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<tr><td>Meter name</td><td>Belt balance 1#</td><td>Belt balance 2#</td></tr>
<tr><td>Type/Model</td><td>ICS-ST4-1000</td><td>ICS-ST4-1000</td></tr>
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<tr><td>Second calibration date</td><td>24/11/2011</td><td>24/11/2011</td></tr>
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</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Daily measurement and monthly recording; 100% of data is monitored and electronically archived.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Use weigh meters, adjust for the moisture content in order to determine the quantity of dry biomass</td></tr>
<tr><td>QA/QC procedures:</td><td>The meter undergoes calibration/maintenance subject to appropriate industrial standards. Direct measurements at the plant site could be crosschecked with an annual energy balance that is based on purchased quantities and stock changes.</td></tr>
<tr><td>Purpose of data:</td><td>Baseline and project emissions</td></tr>
<tr><td>Additional comment:</td><td>-</td></tr>
</table>

<table>
<tr><td>Data / Parameter:</td><td>Moisture content of the biomass residues</td></tr>
<tr><td>Unit:</td><td>% water content</td></tr>
<tr><td>Description:</td><td>Moisture content of the biomass residues</td></tr>
<tr><td>Measured/ Calculated / Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>Measured by balance and dry cabinet</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>Please refer to the spread sheet</td></tr>
<tr><td>Monitoring equipment:</td><td>
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<tr><td>Accuracy Class</td><td>Ⅰlevel</td></tr>
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<tr><td>Second calibration date</td><td>24/11/2011</td></tr>
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<tr><td>Calibration Frequency</td><td>Once per year</td><td>Once per year</td></tr>
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</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Daily measurement and monthly recording; 100% of data is monitored and electronically archived.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>--</td></tr>
<tr><td>QA/QC procedures:</td><td>The monitoring procedure in the laboratory of the plant is done according to authoritative guidance.</td></tr>
<tr><td>Purpose of data:</td><td>Baseline and project emissions</td></tr>
<tr><td>Additional comment:</td><td>--</td></tr>
</table>

<table>
<tr><td>Data / Parameter:</td><td>NCV_K</td></tr>
<tr><td>Unit:</td><td>GJ/ton of dry matter</td></tr>
<tr><td>Description:</td><td>Net calorific value of each biomass residue of type k</td></tr>
<tr><td>Measured/ Calculated / Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>Report from a reputed laboratory and according to relevant standards.</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>
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<tr><th>Type</th><th>Units</th><th>05/01/2012</th><th>28/07/2012</th><th>26/01/2013</th><th>23/07/2013</th></tr>
<tr><td>Rice husk</td><td>GJ/ton</td><td>13.33</td><td>13.81</td><td>14.42</td><td>13.17</td></tr>
<tr><td>Wood chips</td><td>GJ/ton</td><td>10.94</td><td>11.26</td><td>11.42</td><td>11.17</td></tr>
<tr><td>Oil seed rape straws</td><td>GJ/ton</td><td></td><td></td><td></td><td>11.72</td></tr>
<tr><td>Cotton straws</td><td>GJ/ton</td><td>11.37</td><td></td><td>11.20</td><td></td></tr>
<tr><td>Barks</td><td>GJ/ton</td><td>11.36</td><td>11.74</td><td>12.27</td><td>12.31</td></tr>
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<table>
<tr><th>Type</th><th>Units</th><th>16/09/2012</th><th>24/10/2012</th></tr>
<tr><td>Oil seed rape straws</td><td>GJ/ton</td><td>11.03</td><td></td></tr>
<tr><td>Rice straws</td><td>GJ/ton</td><td></td><td>10.28</td></tr>
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</td></tr>
<tr><td>Monitoring equipment:</td><td>N/A</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Six months, taking three samples for each measurement.</td></tr>
<tr><td>Calculation method (if applicable):</td><td>--</td></tr>
<tr><td>QA/QC procedures:</td><td>The consistency of the measurements is checked by comparing the measurement results with measurements from previous years, relevant data sources. If the measurement results differ significantly from previous measurements or other relevant data sources, Additional measurements are conducted.</td></tr>
<tr><td>Purpose of data:</td><td>Baseline emissions & project emission</td></tr>
<tr><td>Additional comment:</td><td>--</td></tr>
</table>

Data / Parameter:	AVD_y
Unit:	km
Description:	Average round trip distance (from and to) between the biomass fuel supply sites and the project plant during the year y
Measured/ Calculated / Default:	Default
Source of data:	On-site records in the log books
Value(s) of monitored parameter:	200
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Each time every truck which transports biomass residue to the plant is counted and recorded in the log books. Monitoring frequency: Every trip
Calculation method (if applicable):	Aggregated monthly and taken the average
QA/QC procedures:	The data on distance of fuel supply site from the plant can be verified by cross checking data records on the distances available with information from other sources (e.g. maps). If data is missing for a particular round trip, the following backup data apply in their order: ➢ The round trip distance between the farthest biomass fuel supply site and the project plant will be used. ➢ If the farthest biomass fuel supply site could not be verified, 200km would be used for conservativeness.
Purpose of data:	Project emission
Additional comment:	--

Data / Parameter:	N_y
Unit:	--
Description:	Number of truck trips for the transportation of biomass
Measured/ Calculated / Default:	Measured
Source of data:	On site records maintained in the log books
Value(s) of monitored parameter:	58,852
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Each time every truck which transports biomass residue to the plant is counted and recorded in the log books. Monitoring frequency: Every trip

Calculation method (if applicable):	--
QA/QC procedures:	The consistency of the number of truck trips could be checked with the quantity of biomass combusted by the relation with previous years
Purpose of data:	Project emissions
Additional comment:	--

Data / Parameter:	$EF_{km,CO2}$
Unit:	tCO_2e/km
Description:	Average CO_2 Emission Factor for transportation of biomass with trucks during year y
Measured/ Calculated / Default:	Default
Source of data:	IPCC default value
Value(s) of monitored parameter:	0.001097 Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (Table 1-32 on Page 1.75) of the Reference Manual (Estimated Emission Factors for US Heavy Duty Diesel Vehicles)
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Choose emission factors applicable for the truck types used from the literature in a conservative manner. The appropriateness of the data is reviewed annually
Calculation method (if applicable):	--
QA/QC procedures:	--
Purpose of data:	Project emission
Additional comment:	--

Data / Parameter:	$EF_{CO2,I,y}$
Unit:	kg CO_2e/TJ
Description:	CO_2 emission factor for fossil fuel type i (diesel)
Measured/ Calculated / Default:	Default
Source of data:	IPCC default value
Value(s) of monitored parameter:	74,800 IPCC default value (Volume2.Chapter2.P16) , diesel emission factor
Monitoring equipment:	N/A

Measuring/ Reading/ Recording frequency:	The appropriateness of the data i reviewed annually
Calculation method (if applicable):	--
QA/QC procedures:	The plant is designed to use diesel at this stage. Should any other fossil fuel be used during operation, the same monitoring procedures apply.
Purpose of data:	Project emission
Additional comment:	--

Data / Parameter:	NCV_i
Unit:	TJ/tonne
Description:	Net Calorific Value(NCV_i) of fossil fuel type i(diesel)
Measured/ Calculated / Default:	Default
Source of data:	Reliable National Data
Value(s) of monitored parameter:	0.0433 China Energy Statistical Yearbook 2013,Diesel NCV
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	The appropriateness of the data is reviewed annually
Calculation method (if applicable):	--
QA/QC procedures:	The plant is designed to use diesel at this stage. Should any other fossil fuel be used during operation, the same monitoring procedures apply.
Purpose of data:	Project emission
Additional comment:	--

Data / Parameter:	$FF_{project\ plant\ ,i,\ y}$
Unit:	tonne
Description:	Quantity of fossil fuel type *i*(diesel) combusted in the project plant during year y
Measured/ Calculated / Default:	Measured
Source of data:	Flow meters
Value(s) of monitored parameter:	22.68

Monitoring equipment:

Meter name	Flow Meter 1#	Flow Meter 2#
Type/Model	LWY-10C	LWY-10C
Accuracy Class	1.0	1.0
SN	08069	08066
First calibration date	19/11/2010	19/11/2010
Last calibration date	10/01/2012	10/01/2012
Valid period	09/01/2013	09/01/2013
Calibration Frequency	Once per year	Once per year

Meter name	Flow Meter 3#	Flow Meter 4#
Type/Model	LWY-10C	LWY-10C
Accuracy Class	1.0	1.0
SN	08025	08027
First calibration date	19/11/2010	19/11/2010
Last calibration date	10/01/2012	10/01/2012
Valid period	09/01/2013	09/01/2013
Calibration Frequency	Once per year	Once per year

Meter name	Flow Meter 5#	Flow Meter 6#
Type/Model	LWY-10C	LWY-10C
Accuracy Class	1.0	1.0
SN	NQ2013090909	NQ2013082001
First calibration date	28/02/2013	28/02/2013
Valid period	27/02/2014	27/02/2014
Calibration Frequency	Once per year	Once per year

Meter name	Flow Meter 7#	Flow Meter 8#
Type/Model	LWY-10C	LWY-10C
Accuracy Class	1.0	1.0
SN	NQ2013082002	NQ2013090908
First calibration date	28/02/2013	28/02/2013
Valid period	27/02/2014	27/02/2014
Calibration Frequency	Once per year	Once per year

Measuring/ Reading/ Recording frequency:	Read the fuel consumption data after boiler start-up every time and record accordingly. Monitoring frequency: continuously
Calculation method (if applicable):	--
QA/QC procedures:	The diesels used for start-up are more viscous than water, and the equipment wear of flow meter for diesel is comparatively easier. So the manufacturer advised to replace the equipment every 3 years. To avoid the potential risk of equipment failures , the project owner has purchased and installed new four Flow meters (5#,6#,7#,8#) to replace the old two ones(1#,2#,3#,4#) on 07 Jan 2013. The calibration of Flow meters does not cover the period of 01/01/2012 to 09/01/2012and the period of 10/01/2013 to 27/02/2013. Moreover, the accuracy of the flow meters are 1%.So the $FF_{project\ plant,i,y}$ in January 2012,January 2013 and February 2013 are multiplied by 1.01 for conservativeness.
Purpose of data:	Project emission
Additional comment:	--

Data / Parameter:	$FF_{project\ site,,i,y}$
Unit:	tonne
Description:	Quantity of fossil fuel type *i* combusted in the project site(including the collection sites) for other purposes that are attributable to the project activity during year *y*
Measured/ Calculated / Default:	Measured
Source of data:	On site consumption records maintained in the log books
Value(s) of monitored parameter:	199.63
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Each time consumption of fossil fuel in the project is recorded on the log books. Monitoring frequency: continuously.
Calculation method (if applicable):	The consumption of diesel is monitored using diesel purchase and consumption log book.
QA/QC procedures:	The data is cross checked by the purchase receipts.
Purpose of data:	Project emission
Additional comment:	--

Data / Parameter:	$EC_{PJ,y}$
Unit:	MWh
Description:	On-site electricity consumption(including the electricity consumption for the mechanical treatment of the biomass in the biomass collection sites and the project site) attributable to the project activity during the year y

Measured/ Calculated / Default:	Measured
Source of data:	On-site measurements by meter or calculated conservatively as the weight of straws smashed in tons and the electricity consumption factor (kWh/ton)
Value(s) of monitored parameter:	1,224.85
Monitoring equipment:	<table><tr><td>Meter name</td><td>Meter 1#</td><td>Meter 2#</td></tr><tr><td>Type/Model</td><td>DTSD876-TF4</td><td>DTSD876-TF4</td></tr><tr><td>Accuracy Class</td><td>1.0</td><td>1.0</td></tr><tr><td>SN</td><td>70153991</td><td>70100099</td></tr><tr><td>Second calibration date</td><td>13/11/2011</td><td>13/11/2011</td></tr><tr><td>Last calibration date</td><td>12/11/2012</td><td>12/11/2012</td></tr><tr><td>Valid period</td><td>11/11/2013</td><td>11/11/2013</td></tr><tr><td>Calibration Frequency</td><td>Once per year</td><td>Once per year</td></tr></table>
Measuring/ Reading/ Recording frequency:	Daily measured and recorded accordingly. Monitoring frequency: continuously.
Calculation method (if applicable):	When the biomass residue is mechanically pretreated, the project needs a certain amount of electricity from grid. This amount could be metered or calculated conservatively. If the monitoring data is missing, or it is not feasible to install a dedicated meter to monitor this indicator, it will be calculated conservatively as the weight of straws smashed in tons and the electricity consumption factor (kWh/ton). The electricity factor can be calculated as follows: 1) Collecting all the nameplates power (in kW) and capacity(t/h) of every straw crackers 2) Calculating the electricity factor corresponding to each cracker in kWh/t 3) Using the largest number as a conservative electricity factor for the calculation Monitoring frequency: Continuously, aggregated at least monthly.
QA/QC procedures:	Cross-check measurement results with invoices for purchased electricity if available
Purpose of data:	Project emission
Additional comment:	--

Data / Parameter:	$EG_{project\ plant,y}$
Unit:	MWh
Description:	Net quantity of increased electricity generated in the project plant during the year y
Measured/ Calculated / Default:	Measured
Source of data:	On-site measurements

Value(s) of monitored parameter:	156,941.05
Monitoring equipment:	<table><tr><td>Meter name</td><td>Gate meter</td><td>Backup meter</td><td>10KV meter</td></tr><tr><td>Type/Model</td><td>MK6E</td><td>MK6E</td><td>DSSD876</td></tr><tr><td>Accuracy Class</td><td>0.2S</td><td>0.2S</td><td>0.5S</td></tr><tr><td>SN</td><td>209475523</td><td>209475524</td><td>70028827</td></tr><tr><td>Second calibration date</td><td>28/02/2011</td><td>28/02/2011</td><td>08/07/2011</td></tr><tr><td>Third calibration date</td><td>27/02/2012</td><td>27/02/2012</td><td>07/07/2012</td></tr><tr><td>Last calibration date</td><td>26/02/2013</td><td>26/02/2013</td><td>06/07/2013</td></tr><tr><td>Valid period</td><td>25/02/2014</td><td>25/02/2014</td><td>05/07/2014</td></tr><tr><td>Calibration Frequency</td><td>Once per year</td><td>Once per year</td><td>Once per year</td></tr></table>
Measuring/ Reading/ Recording frequency:	Daily measured and recorded accordingly. Monitoring frequency: continuously.
Calculation method (if applicable):	The net electricity equals to electricity supplied to the grid minus electricity purchased from the grid minus electricity purchased from the 10kv backup power.
QA/QC procedures:	The consistency of the data is cross-checked with receipts from electricity sales and purchase invoices, if available; and the quantity of fuels fired to see whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency.
Purpose of data:	Baseline emission
Additional comment:	--

Data / Parameter:	--
Unit:	Tonnes
Description:	Quantity of each biomass residues type k that are utilized in the defined geographical region
Measured/ Calculated / Default:	Measured
Source of data:	Surveys or Statistics
Value(s) of monitored parameter:	Please refer to Section E.3
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures:	This parameter is reviewed annually according to the project data and official data.

Purpose of data:	Leakage
Additional comment:	--

Data / Parameter:	--
Unit:	Tonnes
Description:	Quantity of each biomass residues type k that are available in the region
Measured/ Calculated / Default:	Measured
Source of data:	Surveys or Statistics
Value(s) of monitored parameter:	Please refer to Section E.3
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures:	This parameter is reviewed annually according to the project data and official data.
Purpose of data:	Leakage
Additional comment:	--

The monitored parameters are given in the following table.

		Rice husk			Wood chips		
		$BF_{k,y}$(wet)	Moisture	NCV	$BF_{k,y}$(wet)	Moisture	NCV
from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton
		A	B	C	D	E	F
01/01/2012	31/01/2012	8274	14.56	13.33	9650	38.54	10.94
01/02/2012	28/02/2012	1431	14.63	13.33	2409	40.54	10.94
01/03/2012	31/03/2012	8944	14.44	13.33	4804	39.88	10.94
01/04/2012	30/04/2012	2551	14.77	13.33	5087	38.77	10.94
01/05/2012	31/05/2012	4366	14.33	13.33	4202	40.17	10.94
01/06/2012	30/06/2012	2546	14.41	13.33	4277	38.27	10.94
01/07/2012	31/07/2012	0					
01/08/2012	31/08/2012	949	14.44	13.81	1369	39.71	11.26
01/09/2012	30/09/2012	5814	14.43	13.81	8663	38.71	11.26
01/10/2012	31/10/2012	5139	14.70	13.81	5862	39.59	11.26
01/11/2012	30/11/2012	8338	14.42	13.81	5647	39.19	11.26
01/12/2012	31/12/2012	4411	14.50	13.81	5770	38.31	11.26
01/01/2013	31/01/2013	2990	14.63	14.42	5827	38.03	11.42
01/02/2013	28/02/2013	1347	14.53	14.42	2518	38.83	11.42
01/03/2013	31/03/2013	3230	14.62	14.42	7586	39.23	11.42

01/04/2013	30/04/2013	5940	14.39	14.42	8710	38.93	11.42
01/05/2013	31/05/2013	5215	14.61	14.42	7320	38.77	11.42
01/06/2013	30/06/2013	3585	14.52	14.42	10864	40.36	11.42
01/07/2013	31/07/2013	1195	14.59	13.17	11015	39.44	11.17
01/08/2013	31/08/2013	4954	14.61	13.17	8054	38.38	11.17
01/09/2013	30/09/2013	4314	14.51	13.17	8397	37.82	11.17
		85,533.00	-	-	128,031.00	-	-

		Oil seed rape straws			Cotton straws		
		$BF_{k,y}$(wet)	Moisture	NCV	$BF_{k,y}$(wet)	Moisture	NCV
from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton
		G	H	I	J	K	L
01/01/2012	31/01/2012				1841	30.72	11.37
01/02/2012	28/02/2012				1837	30.63	11.37
01/03/2012	31/03/2012				3975	30.35	11.37
01/04/2012	30/04/2012				1576	30.50	11.37
01/05/2012	31/05/2012				97	30.70	11.37
01/06/2012	30/06/2012						
01/07/2012	31/07/2012						
01/08/2012	31/08/2012						
01/09/2012	30/09/2012	353	30.02	11.03			
01/10/2012	31/10/2012						
01/11/2012	30/11/2012						
01/12/2012	31/12/2012						
01/01/2013	31/01/2013				1508	30.83	11.20
01/02/2013	28/02/2013				800	31.33	11.20
01/03/2013	31/03/2013				3259	30.34	11.20
01/04/2013	30/04/2013				5696	30.67	11.20
01/05/2013	31/05/2013				1995	30.04	11.20
01/06/2013	30/06/2013						
01/07/2013	31/07/2013						
01/08/2013	31/08/2013	2436	30.58	11.72			
01/09/2013	30/09/2013	1204	30.55	11.72			
		3,993.00	-	-	22,584.00	-	-

		Rice straws			Barks		
		$BF_{k,y}$(wet)	Moisture	NCV	$BF_{k,y}$(wet)	Moisture	NCV
from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton
		M	N	O	P	Q	R
01/01/2012	31/01/2012				4628	38.96	11.36
01/02/2012	28/02/2012				2588	38.60	11.36
01/03/2012	31/03/2012				2419	39.33	11.36
01/04/2012	30/04/2012						
01/05/2012	31/05/2012						
01/06/2012	30/06/2012						
01/07/2012	31/07/2012						

01/08/2012	31/08/2012						
01/09/2012	30/09/2012				3968	38.88	11.74
01/10/2012	31/10/2012	1110	30.26	10.28	7556	38.56	11.74
01/11/2012	30/11/2012	2677	30.81	10.28	2911	39.24	11.74
01/12/2012	31/12/2012	3070	30.65	10.28	7006	39.36	11.74
01/01/2013	31/01/2013				8982	40.12	12.27
01/02/2013	28/02/2013				2206	39.18	12.27
01/03/2013	31/03/2013				3465	38.99	12.27
01/04/2013	30/04/2013				1035	39.97	12.27
01/05/2013	31/05/2013				5739	37.53	12.27
01/06/2013	30/06/2013				7626	39.29	12.27
01/07/2013	31/07/2013				13564	38.92	12.31
01/08/2013	31/08/2013				10132	38.13	12.31
01/09/2013	30/09/2013				3827	38.94	12.31
		6,857.00	-	-	87,652.00	-	-

		VD_y	N_y	$FF_{project\ plant,i,y}$	$FF_{project\ site,i,y}$
from	to	km	-	Tonnes	Tonnes
		T	S	U	V
01/01/2012	31/01/2012	489,600	2448	0.00	11.16
01/02/2012	28/02/2012	542,200	2711	0.00	6.74
01/03/2012	31/03/2012	517,800	2589	4.16	11.16
01/04/2012	30/04/2012	367,200	1836	0.00	11.00
01/05/2012	31/05/2012	495,000	2475	1.42	10.80
01/06/2012	30/06/2012	52,400	262	0.92	8.96
01/07/2012	31/07/2012	53,800	269	0.00	1.70
01/08/2012	31/08/2012	240,600	1203	1.46	5.58
01/09/2012	30/09/2012	370,600	1853	1.47	9.12
01/10/2012	31/10/2012	539,400	2697	1.66	9.19
01/11/2012	30/11/2012	611,800	3059	0.93	10.40
01/12/2012	31/12/2012	512,000	2560	2.07	10.52
01/01/2013	31/01/2013	544,800	2724	1.90	5.62
01/02/2013	28/02/2013	207,600	1038	0.63	3.81
01/03/2013	31/03/2013	1,160,600	5803	1.81	9.80
01/04/2013	30/04/2013	1,087,800	5439	0.60	10.01
01/05/2013	31/05/2013	863,200	4316	0.58	12.24
01/06/2013	30/06/2013	800,000	4000	0.64	12.29
01/07/2013	31/07/2013	781,400	3907	0.59	14.21
01/08/2013	31/08/2013	640,800	3204	0.60	14.32
01/09/2013	30/09/2013	891,800	4459	1.25	11.00
		11,770,400	58,852	22.68	199.63

		$EG_{export,y}$	$EG_{import\ 110kv,y}$	$EG_{import\ 10kv,y}$	$EG_{project\ plant,y}$
from	to	MWh	MWh	MWh	MWh
		W	X	Y	Z=W-X-Y
01/01/2012	31/01/2012	11420.904	0.000	0.00	11,420.90
01/02/2012	28/02/2012	3946.536	39.776	0.00	3,906.76
01/03/2012	31/03/2012	9487.632	18.436	0.00	9,469.20
01/04/2012	30/04/2012	3989.612	30.844	0.00	3,958.77
01/05/2012	31/05/2012	3909.224	92.972	0.00	3,816.25
01/06/2012	30/06/2012	2793.472	77.528	0.00	2,715.94
01/07/2012	31/07/2012	0.000	101.684	0.00	-101.68
01/08/2012	31/08/2012	1058.816	126.280	0.75	931.79
01/09/2012	30/09/2012	8388.468	2.420	0.00	8,386.05
01/10/2012	31/10/2012	9826.476	0.000	0.00	9,826.48
01/11/2012	30/11/2012	10192.204	0.000	0.00	10,192.20
01/12/2012	31/12/2012	10044.320	26.664	0.00	10,017.66
01/01/2013	31/01/2013	8227.956	22.528	0.00	8,205.43
01/02/2013	28/02/2013	3081.980	58.036	0.00	3,023.94
01/03/2013	31/03/2013	8282.956	22.792	0.00	8,260.16
01/04/2013	30/04/2013	9772.048	3.080	0.00	9,768.97
01/05/2013	31/05/2013	9352.684	0.484	0.00	9,352.20
01/06/2013	30/06/2013	9257.116	2.200	0.00	9,254.92
01/07/2013	31/07/2013	12281.368	0.000	0.00	12,281.37
01/08/2013	31/08/2013	13273.436	0.000	0.00	13,273.44
01/09/2013	30/09/2013	9014.148	33.836	0.00	8,980.31
		157,601.36	659.56	0.75	156,941.05

		$EC_{PJ,y}$
from	to	MWh
		AA
01/01/2012	31/01/2012	84.77
01/02/2012	28/02/2012	23.24
01/03/2012	31/03/2012	67.94
01/04/2012	30/04/2012	49.46
01/05/2012	31/05/2012	33.41
01/06/2012	30/06/2012	98.20
01/07/2012	31/07/2012	0.00
01/08/2012	31/08/2012	9.80
01/09/2012	30/09/2012	48.42
01/10/2012	31/10/2012	60.80
01/11/2012	30/11/2012	68.77
01/12/2012	31/12/2012	71.19
01/01/2013	31/01/2013	38.00
01/02/2013	28/02/2013	21.94

01/03/2013	31/03/2013	90.20
01/04/2013	30/04/2013	95.26
01/05/2013	31/05/2013	98.96
01/06/2013	30/06/2013	94.03
01/07/2013	31/07/2013	76.41
01/08/2013	31/08/2013	35.69
01/09/2013	30/09/2013	58.36
		1,224.85

D.3. Implementation of sampling plan

>>

N/A

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

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

>>

Baseline emissions are calculated as:

a) Emission reduction due to displacement of electricity

$$ER_{electricity,y} = EG_y \times EF_{electricity,y} \quad (1)$$

Where:

$ER_{electricity,y}$ Emission reductions due to displacement of electricity during the year y (tCO_2/yr)

EGy Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y (MWh)

$EF_{,electricity,y}$ CO_2 emission factor for the electricity displaced due to the project activity during the year y (tCO_2/MWh), which is 0.9735 tCO_2e/MWh (See registered PDD Version 4 available online at http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1256229649.44/view)

During the current monitoring period, the net electricity supplied to the grid is:

EG_y = 156,941.05MWh

Therefore,

$$ER_{electricity,y} = 156{,}941.05MWh \times 0.9735tCO_2e / MWh = 152{,}782.11tCO_2e$$

b) Emission reductions or increases due to displacement of heat

Since there is no steam is supplied to user, so the $ER_{heat,y}$ =0

c) Baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues

$$BE_{biomass,y} = GWP_{CH4} \cdot \sum_k BF_{PJ,k,y} \cdot NCV_k \cdot EF_{burningCH4,k,y}$$

Where:

$BE_{biomass,v}$ Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO_2e/yr)

GWP_{CH4} Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)

$BF_{PJ,k,y}$ Incremental quantity of biomass residue type k used as a result of the project activity in the project plant during the year y (tons of dry matter)

NCV_k	Net calorific value of the biomass residue type k (GJ/ton of dry matter)
$EF_{burning,CH4,k,y}$	CH_4 emission factor for uncontrolled burning of the biomass residue type k during the year y (tCH_4/GJ)
k	Types of biomass residues for which the identified baseline scenario is B1 or B3 and for which leakage effects could be ruled out with one of the approaches L1, L2 or L3 described in the leakage section

According to the revised PDD (version 05), before 1 January 2013, 21 for the first commitment period is adopted. From 1 January 2013 onwards 25 for the second commitment period is adopted.

Therefore, from 01/01/2012 to 31/12/2012,

$$BE_{biomass,y} = 21 tCO_2e / tCH_4 \times 110{,}756.65t \times 0.001971 tCH_4 / t = 4584.33 tCO_2e$$

From 01/01/2013 to 30/09/2013,

$$BE_{biomass,y} = 25 tCO_2e / tCH_4 \times 117{,}196.12t \times 0.001971 tCH_4 / t = 5{,}774.84 tCO_2e$$

The $BE_{biomass,y}$ in this monitoring period from 01/01/2012 to 30/09/2013,

$BE_{biomass,y}$= $4584.33 tCO_{2e}$ + $5{,}774.84 tCO_2e$ =10,359.17 tCO_{2e}

So, the baseline emission reduction is:

$BEy=ER_{elctricity,y} + ER_{heat,y} + BE_{biomass,y}$ =152,782.11+0+8,10,359.17 =163,141.28tCO_2e

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

>>

According to methodology ACM0006 version9, the emissions of the project within the project boundary include:

- CO_2 emissions from transportation of biomass residues to the project site (PET_y),
- CO_2 emissions from on-site consumption of fossil fuels due to the project activity ($PEFF_y$),
- CO_2 emissions from consumption of electricity ($PE_{EC,y}$),
- Where this emission source is included in the project boundary and relevant: CH4 emissions from the combustion of biomass residues ($PE_{Biomass,CH4,y}$),
- Where waste water from the treatment of biomass residues degrades under anaerobic conditions: CH_4 emissions from waste water.

Project emissions are calculated as follows:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \cdot PE_{biomass,Ch4,y}$$

Where:

PET_y	CO_2 emissions during the year y due to transport of the biomass residues to the project plant (tCO_2/yr)
$PEFF_y$	CO_2 emissions during the year y due to fossil fuels co-fired by the generation facility or other fossil fuel consumption at the project site that is attributable to the project activity (tCO_2/yr)
$PE_{EC,y}$	CO_2 emissions during the year y due to electricity consumption at the project site that is attributable to the project activity (tCO_2/yr)
GWP_{CH4}	Global Warming Potential for methane valid for the relevant commitment period
$PE_{Biomass,CH4,y}$	CH_4 emissions from the combustion of biomass residues during the year y (tCH_4/yr)

a) Carbon dioxide emissions from combustion of fossil fuels for transportation of biomass residues to the project plant (PET_y)

$$PET_y = N_y \cdot AVD_y \cdot EF_{km,CO2,y}$$

Where:

PET_y	CO_2 emissions during the year y due to transport of the biomass residues to the project plant (tCO_2/yr)

N_y	Number of truck trips during the year y
AVD_y	Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the year y (km)
$EF_{km,CO2,y}$	Average CO_2 emission factor for the trucks measured during the year y (tCO_2/km)

Therefore,

$$PET_y = 58{,}852 * 200 \times 0.001097 tCO_2e / km = 12{,}912.13 tCO_2e$$

b) Carbon dioxide emissions from on-site consumption of fossil fuels ($PEFF_y$)

$$PEFF_y = PE_{FC,j,y} = \sum_i FC_{i.j.y} \times COEF_{i,y}$$

Where:

$PE_{FC,i,y}$	Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);
$FC_{i,i,y}$	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i	Are the fuel types combusted in process j during the year y

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:

$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
$NCV_{i,y}$	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)
i	Are the fuel types combusted in process j during the year y

Therefore,

,

$$PEFF_y = \sum_i FC_{i.j.y} \times NCV_{i,y} \times EF_{CO2,i,y}$$

$=(22.68t^1+199.63t)\times 0.0433TJ/t\times 74{,}800kgCO_{2e}/TJ/1000=720.03tCO_{2e}$

c) CO_2 emissions from electricity consumption ($PE_{EC,y}$)

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

Where:

$EC_{PJ,i,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EL,j,y}$	Emission factor for electricity generation for source j in year y (tCO_2/MWh)
$TDL_{i,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y

Therefore,

$$PE_{EC,y} = 1224.85 MWh \times 0.9735 tCO_2e / MWh \times (1 + 20\%) = 1430.87 tCO_2e$$

d) Methane emissions from combustion of biomass residues ($PE_{Biomass,CH4,y}$)

$$PE_{biomass,CH4,y} = EF_{CH4,BF} \cdot \sum_k BF_{k,y} \cdot NCV_k$$

Where:

$BF_{k,y}$	Quantity of biomass residue type k combusted in the project plant during the year y (tons of dry matter)

[1] The calibration of Flow meters does not cover the period of 01/01/2012 to 09/01/2012and the period of 10/01/2013 to 27/02/2013. Moreover, the accuracy of the flow meters are 1%.So the $\boldsymbol{FF_{project\ plant,i,y}}$ in January 2012,January 2013 and February 2013 are multiplied by 1.01 for conservativeness.

NCV_k	Net calorific value of the biomass residue type k (GJ/ton of dry matter)
$EF_{CH4,BF}$	CH_4 emission factor for the combustion of biomass residues in the project plant (tCH4/GJ), according to ACM0006,Version 9, the $EF_{CH4,BF}$=41.1 kg CH_4/TJ

According to the revised PDD (version 05), before 1 January 2013, 21 for the first commitment period is adopted. From 1 January 2013 onwards 25 for the second commitment period is adopted.

Therefore, from 01/01/2012 to 31/12/2012,

$$GWP_{CH4} \times PE_{biomass,CH4,y} = 21tCO_2e / tCH_4 \times 41.1kgCH_4 / TJ \times 1{,}347{,}565.23\text{Gj}/1 \times 10^6$$
$$= 1163.08tCO_{2e}$$

From 01/01/2013 to 30/09/2013,

$$GWP_{CH4} \times PE_{biomass,CH4,y} = 25tCO_2e / tCH_4 \times 41.1kgCH_4 / TJ \times 1{,}435{,}787.67\text{Gj}/1 \times 10^6$$
$$= 1475.27tCO_{2e}$$

The $GWP_{CH4} \times PE_{biomass,CH4,y}$ in this monitoring period from 01/01/2012 to 30/09/2013,

$GWP_{CH4} \times PE_{biomass,CH4,y}$ =1163.08 tCO_{2e} +1475.27 tCO_{2e} =2638.36 tCO_{2e}

According the data calculated above,

According to the revised PDD (version 05), before 1 January 2013, 21 for the first commitment period is adopted. From 1 January 2013 onwards 25 for the second commitment period is adopted.

$$PE_y = 12{,}912.13tCO_2e + 720.03tCO_2e + 1430.87tCO_2e + 2638.36tCO_2e = 17{,}701.38tCO_2e$$

E.3. Calculation of leakage

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According to methodology ACM0006 version 9, the main potential source of leakage for this project activity is an increase in emissions from fossil fuel combustion or other sources due to diversion of biomass residues from other uses to the project plant as a result of the project activity. Changes in carbon stocks in the LULUCF sector are expected to be insignificant since this methodology is limited to biomass residues.

A statistic is issued by a reputed institute on the biomass availability, and the data are as followed:

Demonstration of abundant surplus of biomass availability in 2012 (tonne)

	Rice husks (t)	Rice stalks(t)	cotton straws(t)	Oil seed rape straws(t)	Wood chips (t)	Barks（t）
Available Biomass in the region	261,954	1,022,261	66,526	222,886	450,000	
Biomass utilised out of the project	52,391	204,452	13,305	44,577	67,500	
Biomass utilised by the project	52,763	6,857	9,326	353	57,740	31,076
Total biomass utilised, including the project	105,154	211,309	22,631	44,930	156,316	

Available Biomass/Total biomass utilised	249.12%	483.77%	293.96%	496.07%	287.88%	
Available Biomass/Total biomass utilised -100%	149.12%	383.77%	193.96%	396.07%	187.88%	
Abundant surplus? (more than 25%)	Yes	Yes	Yes	Yes	Yes	

Demonstration of abundant surplus of biomass availability in 2013 (tonne)

	Rice husks	Rice stalks	cotton straws	Oil seed rape straws	Wood chips	Barks
Available Biomass in the region	272,948	1,065,168	74,416	221,521	450,000	
Biomass utilised out of the project	54,590	213,034	14,883	44,304	67,500	
Biomass utilised by the project (01/01/2013 - 30/09/2013)	32,770	0	13,258	3,640	70,291	56,576
Biomass utilised by the project (for the whole 2013)	43,813	0	17,726	4,867	93,979	75,642
Total biomass utilised, including the project	98,403	213,034	32,609	49,171	237,121	
Available Biomass/Total biomass utilised	277.38%	500.00%	228.21%	450.51%	189.78%	
Available Biomass/Total biomass utilised -100%	177.38%	400.00%	128.21%	350.51%	89.78%	
Abundant surplus? (more than 25%)	Yes	Yes	Yes	Yes	Yes	

From the data in the above tables, that the leakage of the project within the project boundary is zero, i.e. $LE_v = 0\ tCO_2e$.

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	163,141.28	17,701.38	0	145,229(rounded down)

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)	**206,061**[2]	**145,229**

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

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From the data shown in the above table, the actual emission reduction achieved during current monitoring period is only 70.48% of the ex-ante estimation in CDM-PDD (version 05).

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)	69,553(rounded down)	75,676(rounded down)

[2] According to the revised PDD (version 05), global warming potential for methane has adopted 21 for the first commitment period to calculate the estimated Emission reduction, and from 1 January 2013 onwards it has adopted 25. So, the ex-ante estimated emission reduction is 117,426 tCO_{2e} in 2012 and118,505 tCO_{2e} in 2013 . 206,061tCO_{2e}=117,426 tCO_{2e} +118,505 tCO_{2e} *273/365

Annex 1: The Energy Balance for Yiyang Kaidi Biomass Project

The total inputs of biomass residues combusted and useful output of electricity from the project are shown below. From this data the conversion efficiency of the project in this monitoring period is calculated as 20.41%

Table4. The Energy Balance for Yiyang Kaidi Biomass Project (01/01/2012-30/09/2013)

	$BF_{k,y}$（ton） (dry base)	NCV_k(TJ/t)[3]	Energy(TJ)
Rice husk	73119.39	0.01375	1005.611
Rice straws	78087.51	0.01120	874.463
Wood chips	2774.20	0.01149	31.876
Stumps	15688.32	0.01129	177.043
Branches	4755.55	0.01028	48.887
Barks	53527.81	0.01197	640.962
Fossil Fuel[4]	22.68	0.043300	0.982
Total			2779.823
Electricity Exported（TJ）			567.365
Efficiency			20.41%

Energy Balance：

$E_{total}=E_{biomasss}+E_{fossil\ fuel}$ =2,779.823TJ
Electricity exported=567.365 TJ
Efficiency= Electricity exported/ E_{total} =20.41%

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[3] The average NCVi is used.
[4] Only contain fossil fuel for start-up.

Document information

Version	*Date*	*Description*
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net 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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