



Monitoring report form (Version 03.1)

Monitoring report

Title of the project activity	Hunan Yueyang Kaidi Biomass Power Project
Reference number of the project activity	3065
Version number of the monitoring report	2.0
Completion date of the monitoring report	22/07/2013
Registration date of the project activity	31/12/2010
Monitoring period number and duration of this monitoring period	The 1 st monitoring period, from 01/01/2011 to 31/12/2011
Project participant(s)	United Kingdom of Great Britain and Northern Ireland , involved indirectly authorized Participants: Camco International Limited, Camco Carbon Limited Switzerland , involved indirectly authorized Participants: Camco International Limited project owner , Yueyang 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	121,840tonnes CO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	143,852tonnes CO ₂ e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Hunan Yueyang Kaidi Biomass Power Project (hereafter referred to as the project) is a biomass utilization project developed by Yueyang Kaidi Green Energy Development Co., Ltd. (hereafter referred to as the Project Owner) and is located in Economic Management Zone, Qu Yuan Management District, Yueyang City, Hunan Province, P.R.China. The project is designed to produce 253,440MWh of net 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 straw, maize straw, wood chips, branches and barks are the biomass fuel. The project is designed as a total installation of 48MW, and will be 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 24MW will be possibly constructed in 2014. Therefore, the total installed capacity of the project is 48MW and the project is estimated to achieve 121,840tonnes of CO₂e emissions reduction annually (PDD of Version 5).

The project began to construct in February 2008, and was put into operation since 28/09/2009. The project has been registered as a CDM project on 31/12/2010 (The version of registered PDD is version 4). The crediting period is from 01/01/2011 to 31/12/2017 (Renewable).

During current monitoring period (01/01/2011-31/12/2011), the project has achieved emission reductions of 143,852tonnes CO₂e.

A.2. Location of project activity

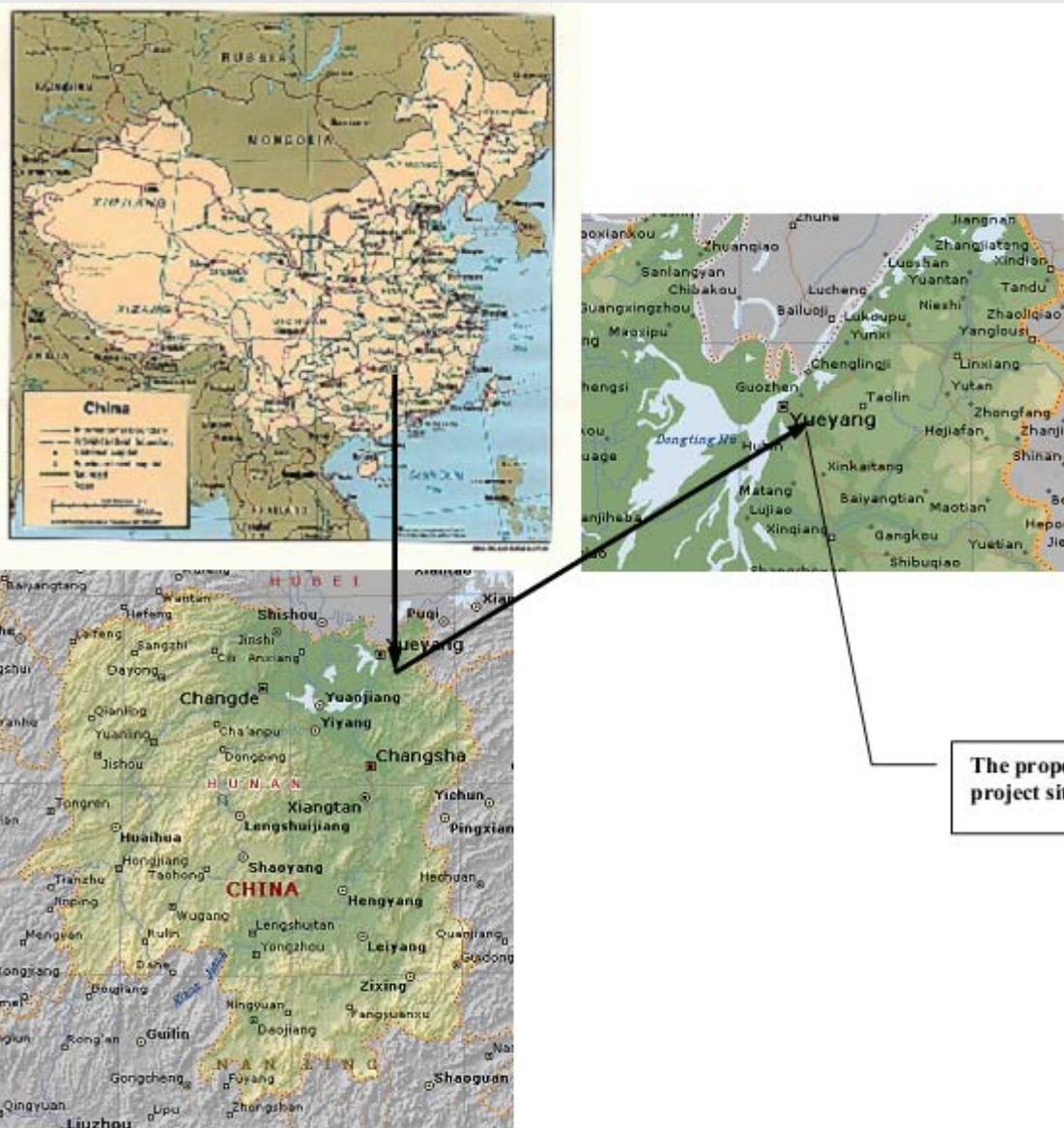
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The project activity is located in the Economic Management Zone, Qu Yuan Management District, Yueyang City, Hunan Province, P.R. China.

The center of plant has geographical coordinates of 112°54'30" east longitude 28°51'18" north latitude.

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)	Yueyang Kaidi Green Energy Development Co., Ltd	No
United Kingdom of Great Britain and Northern Ireland	Camco International Limited	No
United Kingdom of Great Britain and Northern Ireland	Camco Carbon Limited	No
Switzerland	Camco International Limited	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.

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 on February 2008, and put into operation since 28/09/2009. Please refer to the following table for details.

Activity	Date	
	1# Generator	2# Generator
Start of construction	February 2008	
Operation of core equipment	28/09/2009	15/02/2010

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 5 times and 8 times for maintenance.

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

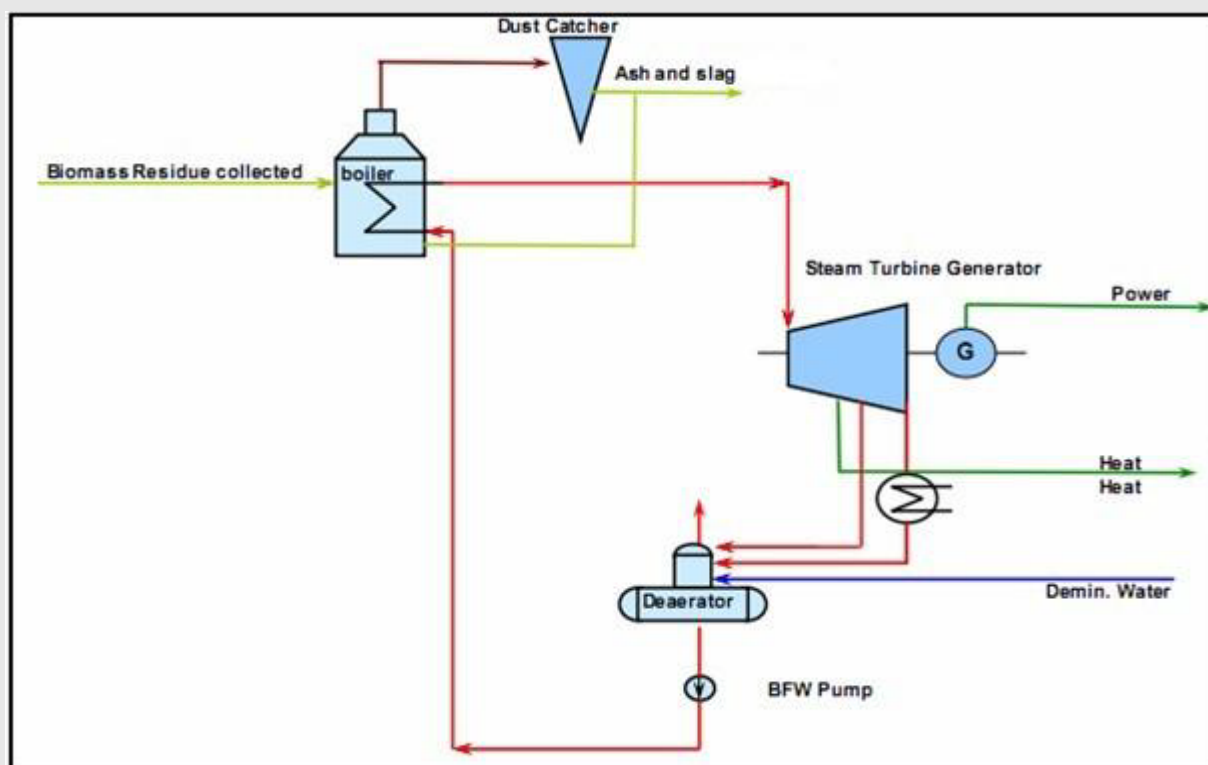
The technology employed by the project is advanced domestic technology. The project installs two sets of 65t/h circulating fluid bed (CFB) boilers with medium temperature and sub-high pressure. At the same time, two 12MW steam turbines and two associated generators are applied in the project. The steam 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°C
Feed water temperature	153.2°C
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°C
Type	Medium temperature and sub-high pressure extraction condensing steam turbine
Rated power	12MW
Main steam pressure	4.9MPa.a
Main steam temperature	435°C
Rate extraction steam volume	15t/h
Maxium Extraction steam volume when Rate electricity capacity is 6.59MW	45t/h
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 has been corrected in the updated PDD.

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 biomass types used by the proposed project has been changed from Rice husk, Rice straw, Oil seed rape straw, cotton straw, maize straw and wheat straw to Rice husk, Rice straw, maize straw, wood chips, branches and barks.

The loading capacity of the trucks used to transport the biomass is changed from the estimated value of 3t in the registered PDD to the annual actual value of 10.7t.

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

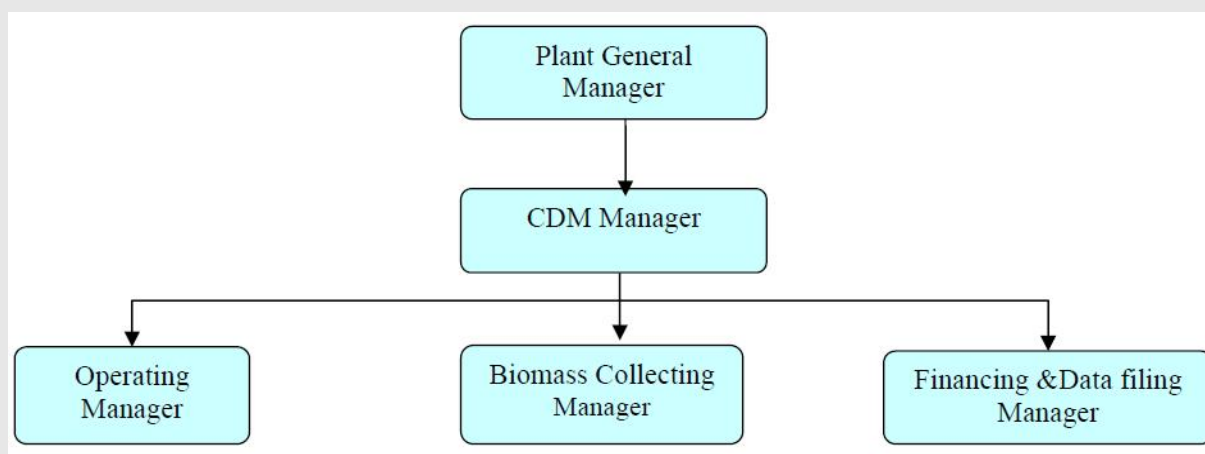
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1. The organizational structure, roles and responsibilities of personnel:

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 liaising 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 Manager 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 Manager 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 each 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 weigher. 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.

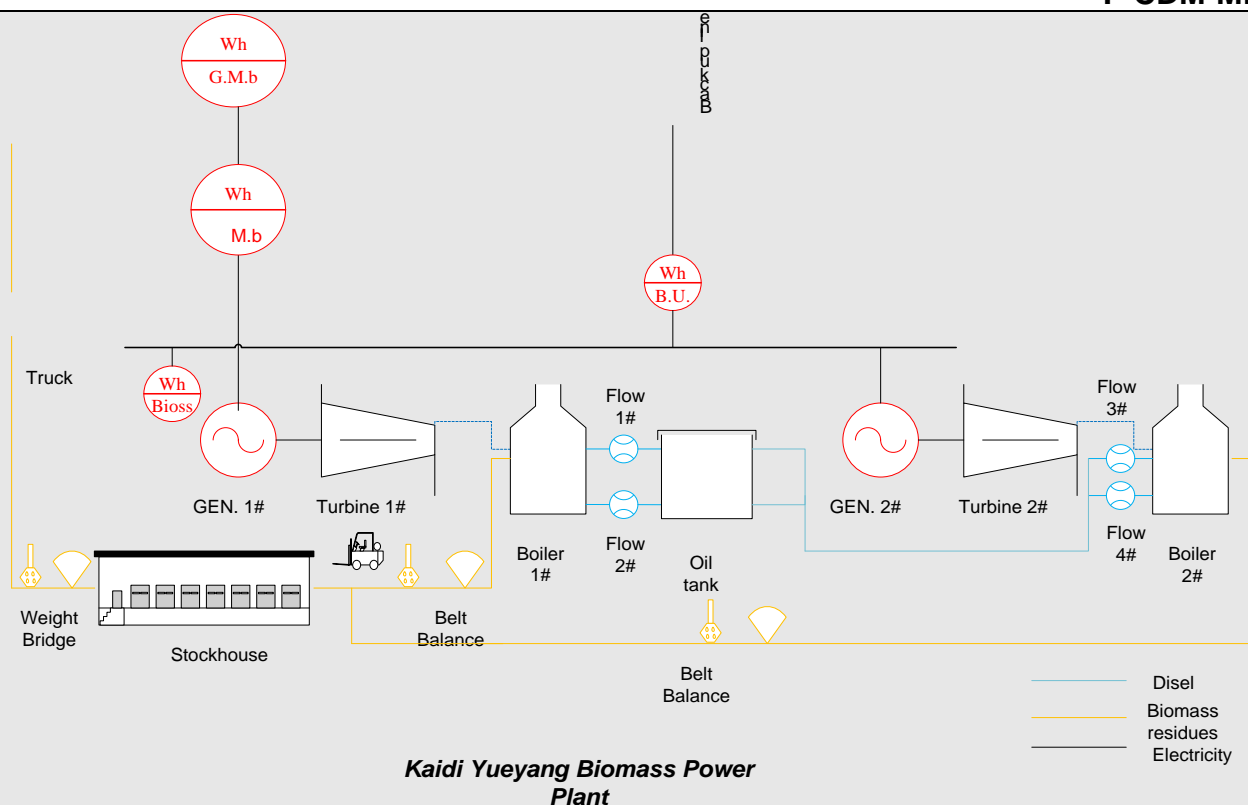
If the monitoring data is missing, or it is not feasible to install a dedicated meter to monitor this indicator, it is calculated conservatively as the weight of straws smashed in tons and the electricity consumption factor (kWh/ton). The electricity factor can be calculated as follows:

- 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



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 ₂ e/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 ₂ e/t CH ₄
Description:	Global warming potential for CH ₄
Source of data:	The registered PDD Version 4
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}
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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:	$EF_{CH_4,BF}$
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:	$NCV_k * EF_{burning,CH_4,k,y}$
Unit:	t CH ₄ /tonne
Description:	CH ₄ 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.)

Data / Parameter:	$BF_{k,y}$
Unit:	Tons of dry matter
Description:	Quantity of each biomass residue type k combusted in the project plant in year, y.
Measured/ Calculated / Default:	Measured
Source of data:	On-site measurements

Value(s) of monitored parameter:	Type	Units	Monitored Data	Minimum Data	Maximum Data
	Wood chips	tonne	70,354.79	70,119.61	70722.04
	Rice husk	tonne	96,656.49	96,615.36	96685.17
	Maize straw	tonne	4,420.40	4,402.99	4451.69
	Barks	tonne	27,734.52	27,652.44	27804.10
	Branches	tonne	20,742.23	20,678.63	20796.78
	Rice straws	tonne	3,256.12	3,256.12	3,256.12
	The minimum data is used to calculate the $BE_{biomass,y}$, and the maximum data is used to calculate the $PE_{biomass, CH_4,y}$, due to the delayed calibration of Dry cabinets in December 2011.				
Monitoring equipment:	Meter name		Belt balance 1#	Belt balance 2#	
	Type/Model		ICS-ST4-1000	ICS-ST4-1000	
	Accuracy class		1.0	1.0	
	SN		0811114	0811113	
	First calibration date		18/10/2010	18/10/2010	
	Last calibration date		17/10/2011	17/10/2011	
	Valid period		16/10/2012	16/10/2012	
	Calibration Frequency		Once per year		
Measuring/ Reading/ Recording frequency:	Daily measurement and recording				
Calculation method (if applicable):	Use weigh meters, adjust for the moisture content in order to determine the quantity of dry biomass.				
QA/QC procedures:	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.				
Purpose of data:	Baseline and project emissions				
Additional comment:	-				

Data / Parameter:	Moisture content of the biomass residues
Unit:	% water content
Description:	Moisture content of the biomass residues
Measured/ Calculated / Default:	Measured
Source of data:	Measured by balance and dry cabinet
Value(s) of monitored parameter:	Please refer to the spread sheet

Monitoring equipment:	Meter name	Balance 1#	Balance 2#
	Type/Model	YB2001	FA214
	Accuracy class	III level	I level
	SN	145	2769
	First calibration date	05/12/2010	05/12/2010
	Last calibration date	04/12/2011	04/12/2011
	Valid period	03/12/2012	03/12/2012
	Calibration Frequency	Once per year	Once per year
	Meter name	Dry Cabinet 1#	Dry Cabinet 2#
	Type/Model	101-1B	101-1B
	Accuracy class	$\pm 0.1^{\circ}\text{C}$	$\pm 0.1^{\circ}\text{C}$
	SN	0912013	081216
	First calibration date	09/12/2010	09/12/2010
	Last calibration date	26/12/2011	26/12/2011
	Valid period	25/12/2012	25/12/2012
	Calibration Frequency	Once per year	Once per year
Measuring/ Reading/ Recording frequency:	Daily measurement and recording		
Calculation method (if applicable):	Due to the delayed calibration of Dry Cabinets in Dec. 2011, when calculating the $BE_{\text{biomass},y}$, the moisture of December of each biomass adopted the highest value during this monitoring period; when calculating the $PE_{\text{biomass}, \text{CH}_4,y}$, the moisture of December of each biomass adopted the highest value during this monitoring period.		
QA/QC procedures:	The monitoring procedures in the laboratory of the plant is done according to authoritative guidance		
Purpose of data:	Baseline and project emissions		
Additional comment:	--		
Data / Parameter:	NCV_K		
Unit:	GJ/ton of dry matter		
Description:	Net calorific value of each biomass residue of type k		
Measured/ Calculated / Default:	Measured		
Source of data:	Report from a reputed laboratory and according to relevant standards.		

Value(s) of monitored parameter:	Type	Units	22/12/2010	18/06/2011	06/08/2011	18/10/2011
	Wood chips	GJ/ton	10.79	11.26		
	Rice husk	GJ/ton	13.04	12.86		
	Maize stalks	GJ/ton				11.35
	Barks	GJ/ton	11.48	11.32		
	Branches	GJ/ton	11.63	11.29		
	Rice straws	GJ/ton			11.18	
Monitoring equipment:	N/A					
Measuring/ Reading/ Recording frequency:	Six months, taking three samples for each measurement.					
Calculation method (if applicable):	--					
QA/QC procedures:	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.					
Purpose of data:	Baseline emissions & project emission					
Additional comment:	--					
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:	Measured					
Source of data:	On site records maintained in the log books					
Value(s) of monitored parameter:	95.91					
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:	<p>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).</p> <p>If data is missing for a particular round trip, the following backup data apply in their order:</p> <ul style="list-style-type: none"> ➤ 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:	27,694
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,CO_2}
Unit:	tCO ₂ e/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:	$EF_{CO_2, I, y}$
Unit:	kg CO ₂ e/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:	74,100 IPCC 2006 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:	0.042652 China Energy Statistical Yearbook 2012,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:	13.86

Monitoring equipment:	Meter name	Flow Meter 1#	Flow Meter 2#
	Type/Model	LWY-10C	LWY-10C
	Accuracy class	1.0	1.0
	SN	08024	08036
	First calibration date	19/11/2010	19/11/2010
	Valid period	18/11/2011	18/11/2011
	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	08043	08029
	First calibration date	19/11/2010	19/11/2010
	Valid period	18/11/2011	18/11/2011
	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	L10111052	L10111053
	First calibration date	15/11/2011	15/11/2011
	Valid period	14/11/2012	14/11/2012
	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	L10111054	L10111056
	First calibration date	15/11/2011	15/11/2011
	Valid period	14/11/2012	14/11/2012
	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 meters undergo calibration/maintenance subject to appropriate industrial standards. The measurements could be cross-checked by the purchased quantities and stock changes if available.		
Purpose of data:	Project emission		
Additional comment:	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 four ones(1#,2#,3#,4#)		

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:	149.03
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:	390.86		
Monitoring equipment:	Meter name	Meter 1#	Meter 2#
	Type/Model	DS862-4	DT862-4
	Accuracy class	2.0	2.0
	SN	86064245	90043215
	First calibration date	11/10/2010	21/02/2011
	Last calibration date	08/10/2011	/
	Valid period	07/10/2012	20/02/2012
	Calibration Frequency	Once per year	Once per year

Measuring/ Reading/ Recording frequency:	Daily measured and recorded accordingly. Monitoring frequency: continuously.
Calculation method (if applicable):	<p>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.</p> <p>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:</p> <ol style="list-style-type: none"> 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 <p>Monitoring frequency: Continuously, aggregated at least monthly.</p>
QA/QC procedures:	Cross-check measurement results with invoices for purchased electricity if available
Purpose of data:	Project emission
Additional comment:	The new shredder for the mechanical preparation of the biomass residues monitored by the Meter 2# independently was installed in 02/03/2011, and the electricity used has been measured and recorded daily.

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:	144,603.89			
Monitoring equipment:	Meter name	Gate meter	Backup meter	10KV meter
	Type/Model	MK6E	MK6E	DSSD1008
	Accuracy class	0.2S	0.2S	0.5
	SN	208368473	208206500	0802876
	First calibration date	07/12/2010	07/12/2010	07/12/2010
	Last calibration date	04/12/2011	04/12/2011	04/12/2011
	Valid period	03/12/2012	03/12/2012	03/12/2012
	Calibration Frequency	Once per year	Once per year	Once per year

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:	The electricity exported by the daily meter records is cross-checked with the receipts, and the minimum values are adopted for conservation.

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:	Biomass Availability Report of Yueyang project, 2012
Value(s) of monitored parameter:	Rice husk: 17.76×10^4 t Straws: 19.89×10^4 t rice straw and 2.6×10^4 t maize straw Forestry residues: 24.74×10^4 t
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:	Biomass Availability Report of Yueyang project, 2012
Value(s) of monitored parameter:	Rice husk: 27.67*10 ⁴ t Straws: 97.17*10 ⁴ t rice straw and 9.86*10 ⁴ t maize straw Forestry residues: 49.5*10 ⁴ t
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 1.

Table 1: Monitored Parameters

		Rice husk			Rice straws		
		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
01/01/2011	31/01/2011	4984.9	14.11	13.04	0	0	0
01/02/2011	28/02/2011	4847.36	13.61	13.04	0	0	0
01/03/2011	31/03/2011	10786.91	13.37	13.04	0	0	0
01/04/2011	30/04/2011	6820.47	14.06	13.04	0	0	0
01/05/2011	31/05/2011	11634.54	14.04	13.04	0	0	0
01/06/2011	30/06/2011	11160.26	13.90	13.04	0	0	0
01/07/2011	31/07/2011	11560.88	13.96	12.86	0	0	0
01/08/2011	31/08/2011	11281.07	14.25	12.86	1532.11	28.74	11.18
01/09/2011	30/09/2011	9240.78	14.09	12.86	3019.37	28.32	11.18
01/10/2011	31/10/2011	10776.36	13.58	12.86	0	0.00	11.18
01/11/2011	30/11/2011	11495.29	14.27	12.86	0	0.00	11.18
01/12/2011	31/12/2011	7700.75	13.74	12.86	0	0.00	11.18
		112,289.57	-	-	4,551.48	-	-

		Maize stalks			Wood chips		
		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
01/01/2011	31/01/2011	0	0.00	0.00	4601.46	30.83	10.79
01/02/2011	28/02/2011	0	0.00	0.00	3654.5	33.14	10.79
01/03/2011	31/03/2011	0	0.00	0.00	7253.32	31.62	10.79

01/04/2011	30/04/2011	0	0.00	0.00	5364.53	34.70	10.79
01/05/2011	31/05/2011	0	0.00	0.00	11422.38	32.54	10.79
01/06/2011	30/06/2011	0	0.00	0.00	9316.14	29.62	10.79
01/07/2011	31/07/2011	0	0.00	0.00	10264.31	32.66	11.26
01/08/2011	31/08/2011	0	0.00	0.00	12998.04	30.41	11.26
01/09/2011	30/09/2011	0	0.00	0.00	7802.56	29.70	11.26
01/10/2011	31/10/2011	899.61	29.09	11.35	7091.39	31.44	11.26
01/11/2011	30/11/2011	1053.19	30.21	11.35	11342.19	31.94	11.26
01/12/2011	31/12/2011	4341.51	29.81	11.35	11860.68	32.72	11.26
		6,294.31	-	-	102,971.50	-	-

		Branches			Barks		
		BF _{k,y} (wet)	Moistur e	NCV	BF _{k,y} (wet)	Moisture	NCV
from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton
		M	N	O	P	Q	R
01/01/2011	31/01/2011	1788.46	29.38	11.63	3452.97	33.67	11.48
01/02/2011	28/02/2011	1939.96	31.53	11.63	2496.05	29.54	11.48
01/03/2011	31/03/2011	4568.57	32.36	11.63	4086.18	34.58	11.48
01/04/2011	30/04/2011	4213.74	27.96	11.63	4377.91	31.36	11.48
01/05/2011	31/05/2011	1885.23	27.22	11.63	4058.91	31.65	11.48
01/06/2011	30/06/2011	2792.1	28.57	11.63	1768.5	33.55	11.48
01/07/2011	31/07/2011	4356.76	27.43	11.29	3710.46	32.45	11.32
01/08/2011	31/08/2011	3854.75	28.76	11.29	0	0.00	11.32
01/09/2011	30/09/2011	0	0.00	11.29	4311.22	32.64	11.32
01/10/2011	31/10/2011	1605.35	29.39	11.29	5702.86	30.88	11.32
01/11/2011	30/11/2011	0	0.00	11.29	3789.24	29.96	11.32
01/12/2011	31/12/2011	2297.62	29.59	11.29	3009.71	31.85	11.32
		29,302.54	-	-	40,764.01	-	-

		AVD _y	N _y	FF _{project plant,i,y}	FF _{project site,i,y}
from	to	km	-	Tonnes	Tonnes
		T	S	U	V
01/01/2011	31/01/2011	82.81	1,761	0.00	8.45
01/02/2011	28/02/2011	95.41	1,365	1.00	6.53
01/03/2011	31/03/2011	75.09	3,148	0.00	12.61
01/04/2011	30/04/2011	88.20	2,007	2.27	10.31
01/05/2011	31/05/2011	92.56	2,674	0.94	14.44
01/06/2011	30/06/2011	102.51	2,299	1.10	13.15
01/07/2011	31/07/2011	109.61	2,096	1.18	13.82
01/08/2011	31/08/2011	107.92	2,894	0.00	12.84
01/09/2011	30/09/2011	110.01	2,358	3.50	12.84
01/10/2011	31/10/2011	108.69	2,487	3.12	13.00
01/11/2011	30/11/2011	93.01	2,059	0.00	14.79
01/12/2011	31/12/2011	86.51	2,546	0.75	16.25
		95.91	27,694	13.86	149.03

		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
01/01/2011	31/01/2011	7854.26	10.69	2.49	7,841.08
01/02/2011	28/02/2011	6138.79	0.00	48.45	6,090.34
01/03/2011	31/03/2011	13929.64	0.00	162.18	13,767.46
01/04/2011	30/04/2011	10323.06	11.48	134.07	10,177.51
01/05/2011	31/05/2011	14508.52	0.00	180.84	14,327.68
01/06/2011	30/06/2011	12633.01	20.20	130.35	12,482.46
01/07/2011	31/07/2011	15192.14	4.22	543.75	14,644.17
01/08/2011	31/08/2011	16170.20	0.00	632.19	15,538.01
01/09/2011	30/09/2011	12655.36	26.93	711.78	11,916.65
01/10/2011	31/10/2011	12963.58	3.83	758.22	12,201.53
01/11/2011	30/11/2011	13353.91	1.06	803.61	12,549.24
01/12/2011	31/12/2011	13806.40	0.00	738.63	13,067.77
		149,528.85	78.41	4,846.56	144,603.89

		EC _{PJ1,y}	EC _{PJ2,y}	EC _{PJ,y}
from	to	MWh	MWh	MWh
		AA	AB	AC=AA+AB
01/01/2011	31/01/2011	29.6	0	29.60
01/02/2011	28/02/2011	10.82	0	10.82
01/03/2011	31/03/2011	17.82	11.283	29.10
01/04/2011	30/04/2011	19.98	15.813	35.79
01/05/2011	31/05/2011	8.5	21.14	29.64
01/06/2011	30/06/2011	13.6	30.47	44.07
01/07/2011	31/07/2011	7.38	27.60	34.98
01/08/2011	31/08/2011	7.58	24.59	32.17
01/09/2011	30/09/2011	11.72	18.11	29.83
01/10/2011	31/10/2011	11.54	21.62	33.16
01/11/2011	30/11/2011	20.74	15.64	36.38
01/12/2011	31/12/2011	12.62	32.697	45.32
		171.90	218.963	390.86

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)
EG_y	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 ₂ e/MWh (See registered PDD Version 4 available online at http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1256216278.37/view)

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

$$EG_y = 144,604.20 \text{ MWh}$$

Therefore,

$$ER_{electricity,y} = 144,603.89 \text{ MWh} \times 0.9735 \text{ tCO}_2\text{e} / \text{MWh} = 140,771.88 \text{ tCO}_2\text{e}$$

- b) Emission reductions or increases due to displacement of heat

Since the emission reductions were not claimed for heating, the $ER_{heat,y} = 0$

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

$$BE_{biomass,y} = GWP_{CH_4} \cdot \sum_k BF_{PJ,k,y} \cdot NCV_k \cdot EF_{burning,CH_4,k,y}$$

Where:

$BE_{biomass,y}$	Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO ₂ e/yr)
GWP_{CH_4}	Global Warming Potential of methane valid for the commitment period (tCO ₂ e/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)
$EF_{burning,CH_4,k,y}$	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

$$BE_{biomass,y} = 21 \text{ tCO}_2\text{e} / \text{tCH}_4 \times 222,725.16 \times 0.00197 \text{ tCH}_4 / \text{t} = 9,218.82 \text{ tCO}_2\text{e}$$

So, the baseline emission reduction is:

$$BE_y = ER_{electricity,y} + ER_{heat,y} + BE_{biomass,y} = 140,771.88 + 0 + 9,218.82 = 149,990.70 \text{ tCO}_2\text{e}$$

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:

- CO₂ emissions from transportation of biomass residues to the project site (PET_y),
- CO₂ emissions from on-site consumption of fossil fuels due to the project activity (PEFF_y),
- CO₂ 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: CH₄ emissions from waste water.

Project emissions are calculated as follows:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH_4} \cdot PE_{biomass,CH_4,y}$$

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)

$$PET_y = N_y \cdot AVD_y \cdot EF_{km,CO_2,y}$$

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,

$$PET_y = 27,694 \times 95.91 \times 0.001097 tCO_2e / km = 2,913.85 tCO_2e$$

- 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

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO_2,i,y}$$

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)

$EF_{CO_2,i,y}$ 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,

$$PEFF_y = \sum_i FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}$$

$$= (13.86 + 149.03) \text{ t} \times 0.042652 \text{ TJ} / \text{t} \times 74,100 \text{ kg } CO_2e / \text{TJ} / 1 \times 10^3 = 457.01 \text{ t } CO_2e$$

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:

$EC_{PJ,j,y}$ Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)

$EF_{EL,j,y}$ Emission factor for electricity generation for source j in year y (tCO_2 /MWh)

$TDL_{j,y}$ Average technical transmission and distribution losses for providing electricity to source j in year y

Therefore,

$$PE_{EC,y} = 390.863 \text{ MWh} \times 0.9735 \text{ t } CO_2e / \text{MWh} \times (1 + 20\%) = 456.61 \text{ t } CO_2e$$

d) Methane emissions from combustion of biomass residues ($PE_{Biomass,CH_4,y}$)

$$PE_{biomass,CH_4,y} = EF_{CH_4,BF} \cdot \sum_k BF_{k,y} \cdot NCV_k$$

Where:

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

NCV_k Net calorific value of the biomass residue type k (GJ/ton of dry matter)

$EF_{CH_4,BF}$ CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4 /GJ), according to ACM0006, Version 9, the $EF_{CH_4,BF} = 41.1 \text{ kg } CH_4 / \text{TJ}$

Therefore,

$$PE_{biomass,CH_4,y} = 41.1 \text{ kg } CH_4 / \text{TJ} \times 2,676,932.68 \text{ GJ} / 1 \times 10^6 = 110.02 \text{ t } CH_4$$

According the data calculated above,

$$PE_y = 2,913.85 \text{ t } CO_2e + 457.01 \text{ t } CO_2e + 456.61 \text{ t } CO_2e + 21 \text{ t } CO_2e / \text{t } CH_4 \times 110.02 \text{ t } CH_4 = 6,137.93 \text{ t } CO_2e$$

E.3. Calculation of leakage

>>

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						
Biomass type	Rice Husk	Straw		Forestry residues		
		Rice Straw	Maize Straw	Wood chip	Branch	Bark
Available Biomass(10,000t)	27.67	97.17	9.86	49.50		
Biomass Consumption other than the project (10,000t)	5.53	19.43	1.97	7.43		
Biomass Consumption in the project plant (10,000t)	12.23	0.46	0.63	10.30	2.93	4.08
Total used biomass Consumption(10,000t)	17.76	19.89	2.60	24.74		
Available Biomass/Total biomass utilised	156%	488%	379%	200%		
Available Biomass/Total biomass Utilized - 100%	56%	388%	279%	100%		
Leakage? (if it is more than 25%,No; if not,Yes)	No	No	No	No		

From the data in the above table, that the leakage of the project within the project boundary is zero, i.e. $LE_y = 0 \text{ tCO}_2\text{e}$.

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	149,990.70	6,137.93	0	143,852(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
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Emission reductions or GHG removals by sinks (t CO₂e)	121,840¹	143,852
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E.6. Remarks on difference from estimated value in registered PDD

>>

The actual emission reduction achieved during current monitoring period is 18.1% (22,012tCO₂e) higher than the ex-ante estimation in registered CDM-PDD, and the main reasons are below:

- 1) The net electricity generation was 14.11% higher than the ex-ante estimation in registered CDM PDD (Version 5) due to higher operation hours, which accounts for 79% of the differences above. The main reason for higher operation hours is because the current monitoring period happened to fall into a relatively stable operation period of the project activity as the project was just fully commissioned; the equipments were in good operation. If the project is assessed from 01/01/2011 to 31/12/2012, the net electricity generation of the project is only 73 % of the ex-ante estimation in registered CDM PDD (Version 5)
- 2) PET_y was 41% less than the ex-ante estimation in registered CDM PDD (Version 5), which accounts for 9% of the differences above. That's because the conservative value of AVD_y(200km) was adopted in registered CDM PDD (Version 5), and the actual value of AVD_y in monitoring period is much smaller.

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)	143,852	--

¹ The value estimated in ex-ante calculation of revised PDD (version 05) under the situation of 24MW is adopted.

Annex 1: The Energy Balance for Yueyang 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 20.2%

Table4. The Energy Balance for Yueyang Kaidi Biomass Project (01/01/2011-31/12/2011)

	BF _{k,y} (ton) (dry base)	NCV _k (TJ/t) ²	Energy(TJ)
Rice husk	96615.36	0.012950	1251.169
Rice straws	3256.12	0.011180	36.403
Maize straws	4402.99	0.011350	49.974
Wood chips	70119.61	0.011025	773.069
Branches	20678.63	0.011494	237.680
Barks	27652.44	0.011407	315.439
Fossil Fuel ³	13.86	0.042652	0.591
Total			2664.325
Electricity Exported (TJ)			538.305
Efficiency			20.20%

Energy Balance:

$$E_{\text{total}} = E_{\text{biomass}} + E_{\text{fossil fuel}} = 2,664.325 \text{ TJ}$$

$$\text{Electricity exported} = 538.305 \text{ TJ}$$

$$\text{Efficiency} = \text{Electricity exported} / E_{\text{total}} = 20.2\%$$

² The average NCV_i is used.

³ Only contain fossil fuel for start-up.

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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