Monitoring report form (Version 03.1)

Monitoring report

Title of the project activity	Tongcheng Kaidi Biomass Power Project
Reference number of the project activity	3061
Version number of the monitoring report	01
Completion date of the monitoring report	12/09/2013
Registration date of the project activity	06/01/2011
Monitoring period number and duration of this monitoring period	The 2nd monitoring period, the first day is 01/07/2011, and the last day is 31/12/2012
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 **China**, project owner, Tongcheng Kaidi Green Energy Development Co., Ltd
Host Party(ies)	China
Sectoral scope(s) and applied methodology(ies)	1 : Energy industries (renewable - / non-renewable sources) ACM0006 (Version 09) – "Consolidated methodology electricity generation from biomass residues" "Combined tool to identify the baseline scenario and demonstrate additionality". (Version 02.2) ACM0002 (Version 10) – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 02) "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01) "Tool to calculate the emission factor for an electricity system" (Version 02)
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the revised PDD	159,899tonnes[1] CO_2e (the version 5 CDM-PDD)
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	122,749tonnes CO_2e

[1]Cover the whole monitoring period,159,899= 106,308/365days*(365days+184days)

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Tongcheng Kaidi Biomass Power Project (hereafter referred to as the project) is a biomass utilization project developed by Tongcheng Kaidi Green Energy Development Co., Ltd. (hereafter referred to as the Project Owner) and is located in Tongcheng economic development district, Anhui Province, P.R. China. The project is designed to produce 126,720MWh of net electricity per year from burning biomass residues, displacing electricity generated by Eastern China Power Grid (ECPG), which is dominated by fossil fuel-fired power plants, and thus reducing greenhouse gas (CO_2) emissions.

The project processes and burns biomass residue, of which rice husk, bamboo crumbs, branches, barks, sawdust and wood chips are the biomass fuel. 2 sets of 65t/h Circulating Fluidized Bed (CFB) boiler and 2 sets of 12MW steam turbines generator units are installed. Therefore, the total installed capacity of the Project is 24MW and the project is estimated to achieve 106,308（the version 5 PDD, excluding $ER_{heat,y}$） tonnes of CO2e emissions reduction annually.

The project began to construct in May 2008, and was put into operation since 05/12/2009. The project has been registered as a CDM project on 06/01/2011 (The version of registered PDD is version 4).

The first monitoring period of 61,696tonnes CERs was issued by EB on 30/10/2012. During current monitoring period (01/07/2011-31/12/2012), the project has achieved emission reductions of 122,749tonnes CO_2e.

A.2. Location of project activity

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The project activity is located in the Southwest of Tongcheng economic development Area, Anhui Province, P.R. China.

The centre of plant has geographical coordinates of 116° 57′12″ east longitude 31° 02′44″ 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

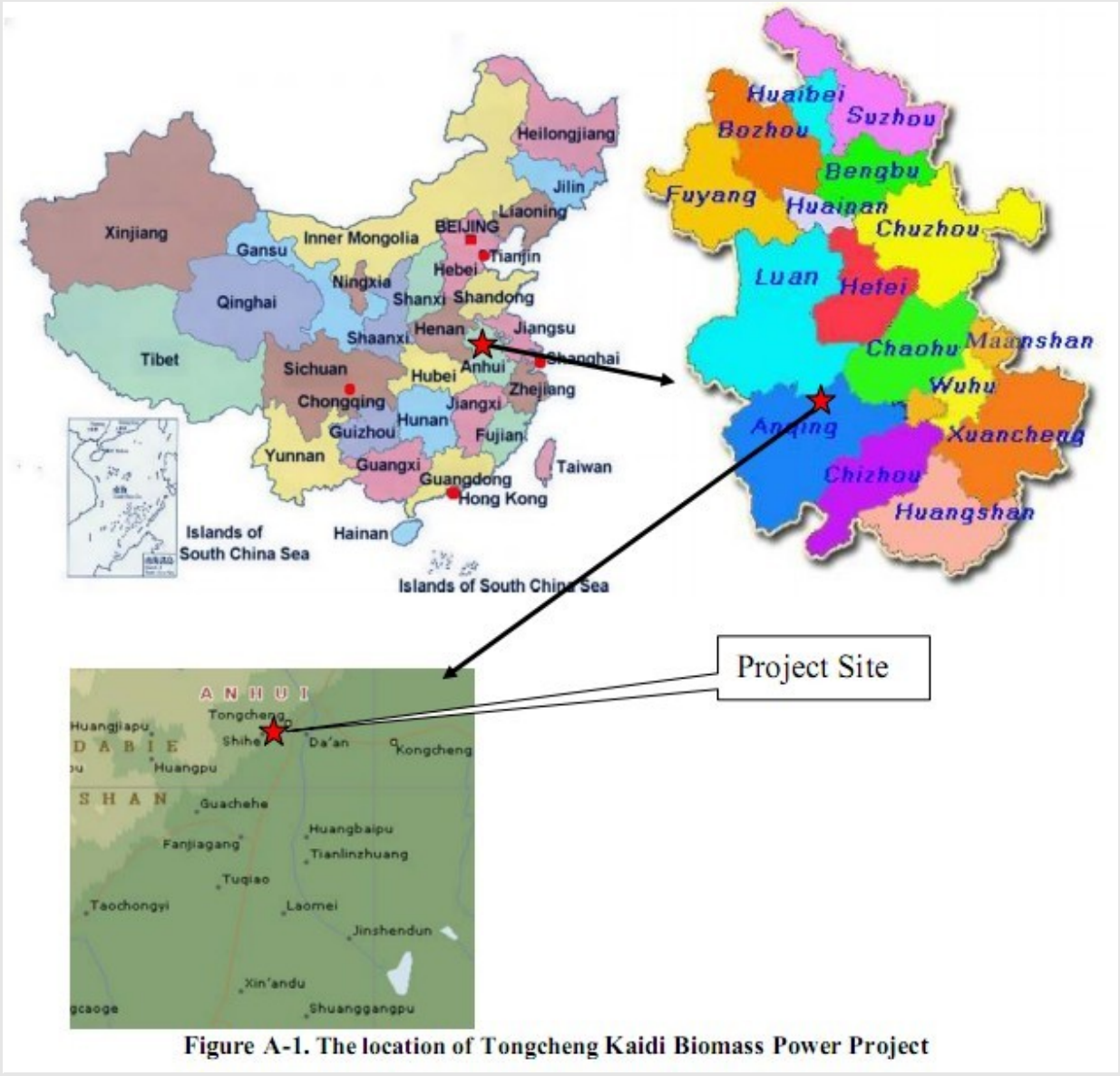

Figure A-1. The location of Tongcheng Kaidi Biomass Power Project

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)	Tongcheng 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: 06 Jan 2011 – 05 Jan 2018(Renewable)
The start date of the crediting period is 06 Jan 2011
This monitoring period: 01 Jul 2011 – 31 Dec 2012

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The project consists of one site, and has been implemented as described in the registered PDD. The project began to construct on 05/2008, and was put into operation since 05/12/2009. Please refer to the following table for details.

Activity	Date	
	1# Generator	2# Generator
Start of construction	05/2008	
Commissioning of core equipment	08/11/2009	27/01/2010
Operation of core equipment	05/12/2009	02/02/2010

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 both shutdown 16 times for maintenance.

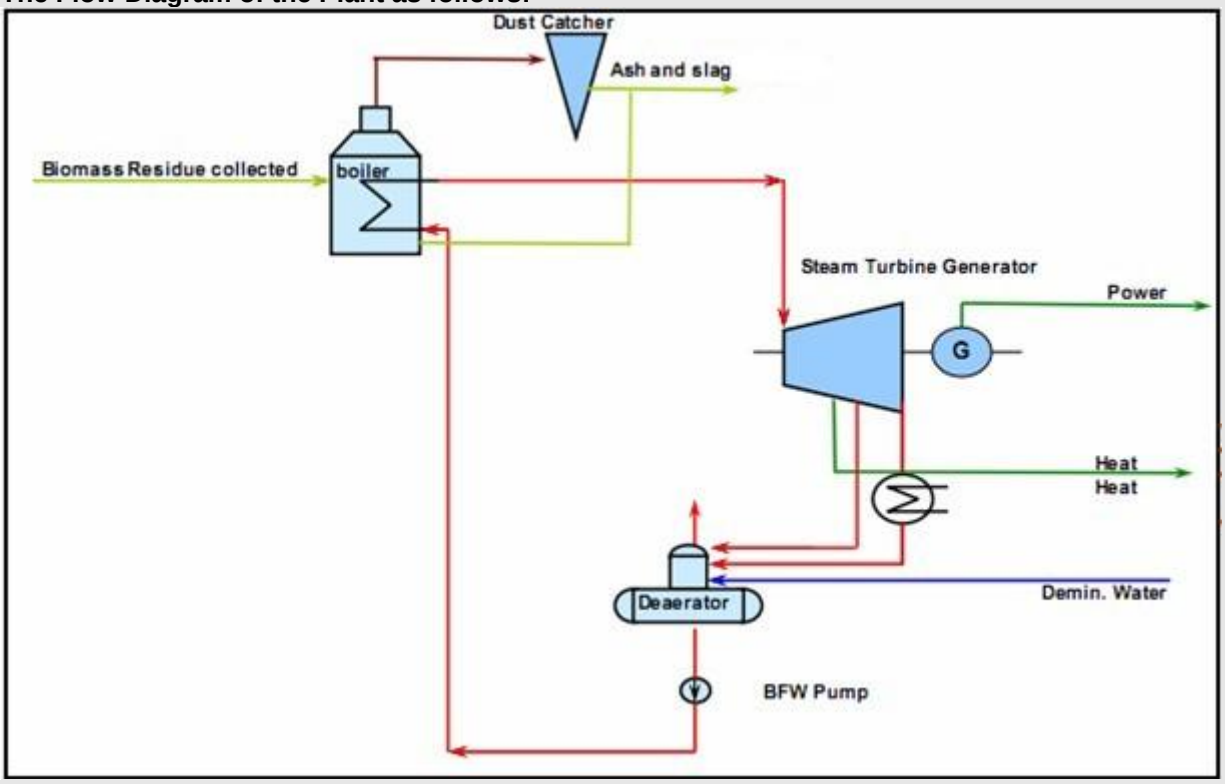
The technology employed by the project is advanced domestic technology. The project installs two sets of 65t/h circulating fluid bed (CFB) boilers with medium temperature and sub-high pressure. At the same time, two 12MW steam turbines and two associated generators are applied in the project .The steam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

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 06 Jun 2012.
Please refer to the link: http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1256208994.65/view

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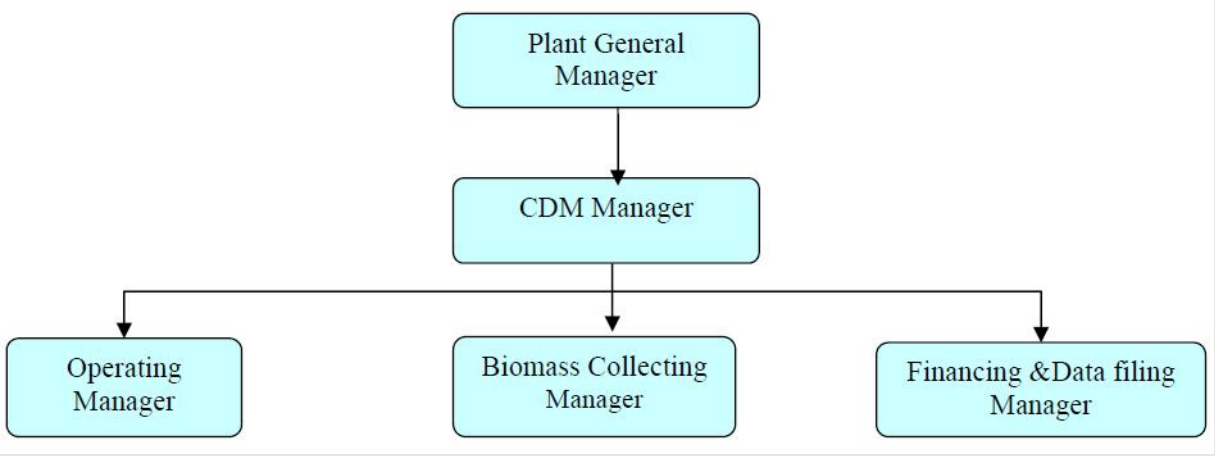
1. The organizational structure, roles and responsibilities of personnel:

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 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 gate way meter installed on the project site monitoring the electricity supplied to the grid and purchased from the grid. There is a back up meter installed at the project site monitoring the electricity supplied to the grid and purchased from the grid too. The accuracy is 0.2%

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 if available. The accuracy is 0.5%

The data of electricity supplied to the grid and purchased from the grid is measured and crosschecked by the invoices and the power transaction note if available.

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 also is monitored by sampling 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. The accuracy of the flow meters is 1%.

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 proposed project structures a recording and monitoring system within the biomass residues supply and management system covering all the biomass collection sites established by the proposed 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 proposed project needs a certain amount of electricity from grid. This amount is metered or calculated conservatively.

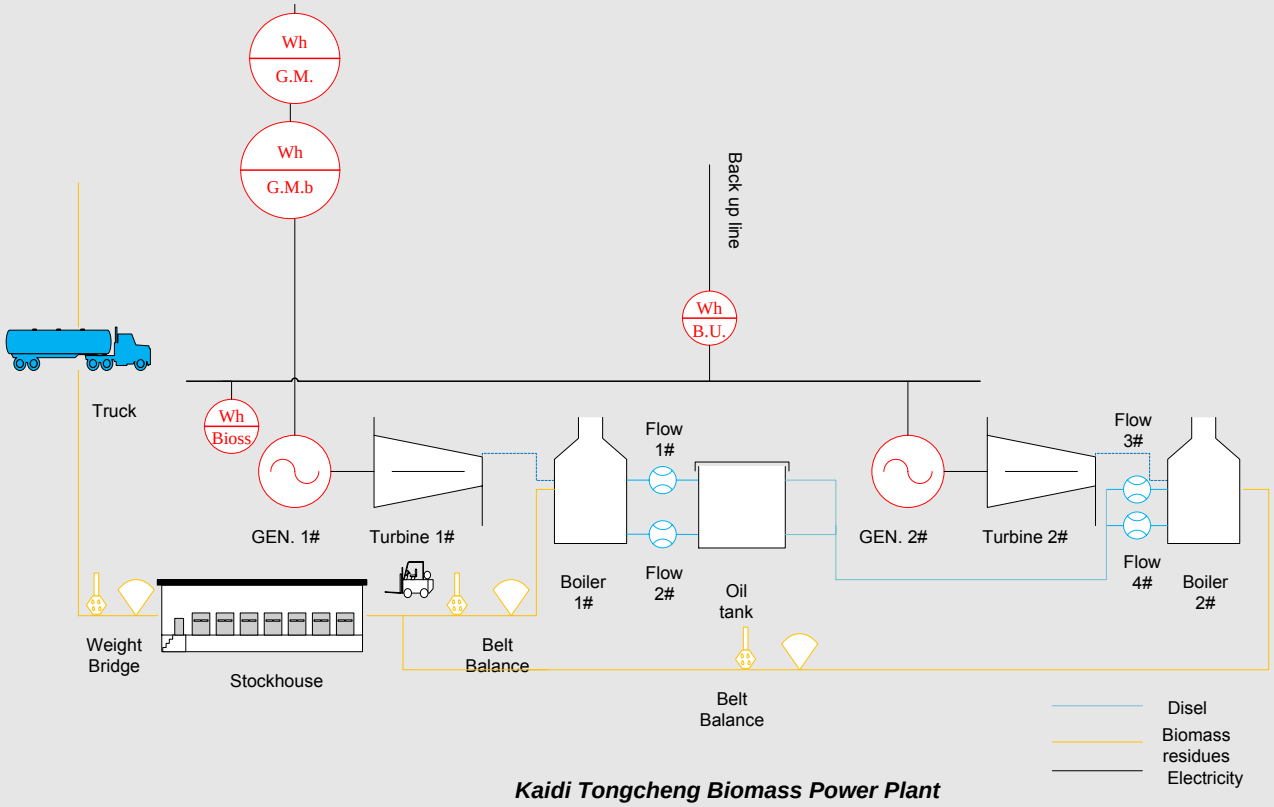
If the monitoring data is missing, or it is not feasible to install a dedicated meter to monitor this indicator, it is calculated conservatively as the weight of straws smashed in tons and the electricity consumption factor (kWh/ton). The electricity factor can be calculated as follows:

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 is monitored to check the leakage effect brought by the operation of the proposed 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 Tongcheng 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

Data / Parameter:	**EF_y**
Unit:	t CO_2e/MWh
Description:	Baseline emission factor of East China Power Grid
Source of data:	The revised PDD Version 5
Value(s) applied):	0.8888
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:	--

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 revised PDD Version 5
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 revised PDD Version 5
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:	CH_4 emission factor for uncontrolled burning of the biomass residue
Source of data:	The revised PDD Version 5
Value(s) applied):	0.001971
Purpose of data:	Baseline emission calculation
Additional comment:	--

D.2. Data and parameters monitored

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	Data
Rice husks	tonne	44,645.13
Sawdust	tonne	31,217.91
Wood chips	tonne	37,346.41
Barks	tonne	70,111.17
Branches	tonne	2,053.56
Bamboo crumbs	tonne	14,666.85
total	tonne	200,041.04

Monitoring equipment:	<table><tr><td>Meter name</td><td>Belt balance 1#</td><td>Belt balance 2#</td></tr><tr><td>Type/Model</td><td>ICS-1000</td><td>ICS-1000</td></tr><tr><td>Accuracy</td><td>0.5</td><td>0.5</td></tr><tr><td>SN</td><td>811116</td><td>811107</td></tr><tr><td>First calibration date</td><td>06-Jan-11</td><td>06-Jan-11</td></tr><tr><td>Last calibration date</td><td>05-Jan-12</td><td>05-Jan-12</td></tr><tr><td>valid Period</td><td>04-Jan-13</td><td>04-Jan-13</td></tr><tr><td>Calibration Frequency</td><td colspan="2">Once per year</td></tr></table>
Measuring/ Reading/ Recording frequency:	Continuously measurement and monthly recording; 100% of data is monitored and electronically archived.
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:	<table><tr><td>Meter name</td><td>Balance</td><td>Dry cabinet</td></tr><tr><td>Type/Model</td><td>FA214</td><td>GF-9070A</td></tr><tr><td>Accuracy</td><td>I level</td><td>0.1℃</td></tr><tr><td>SN</td><td>2866</td><td>90701</td></tr><tr><td>First calibration date</td><td>06-Dec-10</td><td>06-Dec-10</td></tr><tr><td>Second calibration date</td><td>03-Dec-11</td><td>03-Dec-11</td></tr><tr><td>Valid period</td><td>02-Dec-12</td><td>02-Dec-12</td></tr><tr><td>Calibration Frequency</td><td>Once per year</td><td>Once per year</td></tr></table>
Measuring/ Reading/ Recording frequency:	Daily measurement and monthly recording; 100% of data is monitored and electronically archived.
Calculation method (if applicable):	--
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:	See table below
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:	--

Type	MJ/Kg (06/2011)	MJ/Kg (01/2012)	MJ/Kg (07/2012)
Rice husks	12.82	12.97	12.70
Sawdust	11.48	11.83	12.52
Wood chips	11.97	11.76	11.80
Barks	10.84	10.47	10.55
Branches	11.10	--	11.14
Bamboo crumbs	12.64	13.49	12.52

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 maintained in the log books.
Value(s) of monitored parameter:	74.18
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: Continuously
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:	24,677
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: Continuously
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:	As local or national data are not available, the data 74,800 kg CO2e/TJ is used for conservativeness, which is the IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value(s) of monitored parameter:	74,800 The upper limit of IPCC 2006 default value , 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(NCVi) 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 2011, 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:	17.57tonne

Monitoring equipment:	

Meter name	Flow Meter 1#	Flow Meter 2#
Type/Model	ZYLWGY-10C	ZYLWGY-10C
Accuracy	1.0	1.0
SN	L1012027	L1012028
First calibration date	8-Jan-11	8-Jan-11
Last calibration date	6-Jan-12	6-Jan-12
Valid period	5-Jan-13	5-Jan-13
Calibration Frequency	Once per year	Once per year

Meter name	Flow Meter 3#	Flow Meter 4#
Type/Model	ZYLWGY-10C	ZYLWGY-10C
Accuracy	1.0	1.0
SN	L1012029	L1012030
First calibration date	8-Jan-11	8-Jan-11
Last calibration date	6-Jan-12	6-Jan-12
Valid period	5-Jan-13	5-Jan-13
Calibration Frequency	Once per year	Once per year

Measuring/ Reading/ Recording frequency:	Continuously measuring, read the data of fuel consumption after boiler start-up every time and record accordingly.
Calculation method (if applicable):	The monitored volume quantity of diesel for start-up was multiplied by the standard density of diesel 0.85kg/litre according to the registered PDD.
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:	--

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:	143.08tonne
Monitoring equipment:	N/A

Measuring/ Reading/ Recording frequency:	Each 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. The monitored volume quantity of diesel combusted in the project site for other purpose was multiplied by the standard density of diesel 0.85kg/litre according to the registered PDD.
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 biomass smashed in tons and the electricity consumption factor (kWh/ton)
Value(s) of monitored parameter:	396.17
Monitoring equipment:	
Measuring/ Reading/ Recording frequency:	Continuously measuring and monthly recoding; 100% of data is monitored and electronically archived.

Meter name	Meter 1# for biomass	Meter 2# for biomass
Type/Model	DSSD1008	DSSD1008
Accuracy	0.5s	0.5s
SN	804927	804910
First calibration date	5-Jan-11	5-Jan-11
Last calibration date	5-Jan-12	5-Jan-12
Valid period	4-Jan-13	4-Jan-13
Calibration Frequency	Once per year	Once per year

Calculation method (if applicable):	When the biomass residue is mechanically pretreated, the proposed 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: Collecting all the nameplates power (in kW) and capacity(t/h) of every straw crackers Calculating the electricity factor corresponding to each cracker in kWh/t 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:	134,372.498
Monitoring equipment:	

Meter name	Gate meter	Back up meter	10Kv Backup Meter
Type/Model	AINRTAL	AINRTAL	DSSD1008
Accuracy	0.2s	0.2s	0.5s
SN	02082132	02082173	0804923
First calibration date	10-Jan-11	10-Jan-11	5-Jan-11
Last calibration date	5-Jan-12	5-Jan-12	5-Jan-12
Valid period	4-Jan-13	4-Jan-13	4-Jan-13
Calibration Frequency	Once per year		

Measuring/ Reading/ Recording frequency:	Continuously measuring and monthly recoding; 100% of data is monitored and electronically archived.

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 1.

Date		Rice husk			Bamboo crumbs		
		$BF_{k,y}$	Moisture	NCV	$BF_{k,y}$	Moisture	NCV
from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton
		A	B	C	D	E	F
01/07/2011	31/07/2011	6,600.88	13.09	12.82	2,288.90	31.55	12.64
01/08/2011	31/08/2011	6,196.21	14.47	12.82	0.00	0.00	12.64
01/09/2011	30/09/2011	3,163.16	15.00	12.82	1,164.69	32.51	12.64
01/10/2011	31/10/2011	4,403.11	12.60	12.82	1,855.92	26.24	12.64
01/11/2011	30/11/2011	6,436.85	14.78	12.82	3,188.65	34.44	12.64
01/12/2011	31/12/2011	3,678.90	14.99	12.82	4,234.26	33.95	12.64
01/01/2012	31/01/2012	4,310.28	14.55	12.97	1,660.85	30.98	13.49
01/02/2012	29/02/2012	2,322.88	14.56	12.97	0.00	0.00	13.49
01/03/2012	31/03/2012	2,193.94	14.31	12.97	0.00	0.00	13.49
01/04/2012	30/04/2012	0.00	0.00	12.97	0.00	0.00	13.49
01/05/2012	31/05/2012	0.00	0.00	12.97	2,267.66	25.49	13.49
01/06/2012	30/06/2012	0.00	0.00	12.97	935.86	28.19	13.49
01/07/2012	31/07/2012	47.93	12.88	12.70	0.00	0.00	12.52
01/08/2012	31/08/2012	691.61	12.86	12.70	0.00	0.00	12.52
01/09/2012	30/09/2012	1,607.22	14.85	12.70	0.00	0.00	12.52
01/10/2012	31/10/2012	3,012.82	14.50	12.70	2,082.05	30.77	12.52
01/11/2012	30/11/2012	4,112.30	14.72	12.70	0.00	0.00	12.52
01/12/2012	31/12/2012	3,252.92	13.46	12.70	1,530.05	27.55	12.52
total		52,031.01	-	-	21,208.89	-	-
Date		Branches			Barks		
		$BF_{k,y}$	Moisture	NCV	$BF_{k,y}$	Moisture	NCV
from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton
		G	H	I	J	K	L
01/07/2011	31/07/2011	0.00	0.00	11.10	9,822.42	36.55	10.84
01/08/2011	31/08/2011	0.00	0.00	11.10	9,463.55	35.98	10.84
01/09/2011	30/09/2011	1,009.55	36.81	11.10	8,293.25	35.35	10.84
01/10/2011	31/10/2011	0.00	0.00	11.10	11,460.46	30.60	10.84
01/11/2011	30/11/2011	0.00	0.00	11.10	12,435.73	35.72	10.84
01/12/2011	31/12/2011	964.93	33.52	11.10	14,735.77	35.37	10.84
01/01/2012	31/01/2012	0.00	0.00	0.00	6,969.90	36.44	10.47
01/02/2012	29/02/2012	0.00	0.00	0.00	5,347.14	34.74	10.47
01/03/2012	31/03/2012	0.00	0.00	0.00	4,662.74	34.15	10.47
01/04/2012	30/04/2012	0.00	0.00	0.00	3,343.82	34.49	10.47
01/05/2012	31/05/2012	0.00	0.00	0.00	4,235.18	28.44	10.47

01/06/2012	30/06/2012	0.00	0.00	0.00	2,771.65	31.55	10.47
01/07/2012	31/07/2012	0.00	0.00	0.00	0.00	0.00	10.55
01/08/2012	31/08/2012	0.00	0.00	0.00	0.00	0.00	10.55
01/09/2012	30/09/2012	0.00	0.00	0.00	6,111.40	34.18	10.55
01/10/2012	31/10/2012	0.00	0.00	0.00	2,327.79	36.38	10.55
01/11/2012	30/11/2012	0.00	0.00	0.00	2,539.42	36.02	10.55
01/12/2012	31/12/2012	1,124.39	31.15	11.14	2,615.51	33.05	10.55
total		3,098.87	-	-	107,135.73		-

Date		Sawdust			Wood chips		
		$BF_{k,y}$	Moisture	NCV	$BF_{k,y}$	Moisture	NCV
from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton
		M	N	O	P	Q	R
01/07/2011	31/07/2011	4,269.21	31.19	11.48	3,426.30	28.84	11.97
01/08/2011	31/08/2011	2,346.74	32.15	11.48	2,940.40	31.23	11.97
01/09/2011	30/09/2011	4,867.31	30.08	11.48	4,549.72	29.77	11.97
01/10/2011	31/10/2011	6,067.74	26.17	11.48	1,931.51	25.57	11.97
01/11/2011	30/11/2011	2,595.00	29.56	11.48	3,933.33	32.13	11.97
01/12/2011	31/12/2011	0.00	0.00	11.48	7,077.15	31.28	11.97
01/01/2012	31/01/2012	5,536.74	30.81	11.83	2,386.40	31.47	11.76
01/02/2012	29/02/2012	0.00	0.00	11.83	905.05	29.79	11.76
01/03/2012	31/03/2012	1,490.93	30.86	11.83	3,129.62	30.83	11.76
01/04/2012	30/04/2012	3,656.86	32.68	11.83	2,966.41	32.88	11.76
01/05/2012	31/05/2012	2,909.63	23.72	11.83	5,438.99	24.97	11.76
01/06/2012	30/06/2012	0.00	0.00	11.83	3,151.08	28.46	11.76
01/07/2012	31/07/2012	390.97	26.15	11.16	202.33	24.85	11.80
01/08/2012	31/08/2012	0.00	0.00	11.16	0.00	0.00	11.80
01/09/2012	30/09/2012	2,535.57	31.61	11.16	1,455.46	31.02	11.80
01/10/2012	31/10/2012	2,312.17	30.85	11.16	6,220.44	30.83	11.80
01/11/2012	30/11/2012	2,614.76	29.29	11.16	0.00	0.00	11.80
01/12/2012	31/12/2012	2,747.71	28.54	11.16	3,447.48	27.49	11.80
total		44,341.34	-	-	53,161.67	-	-

Date		VD_y	N_y	$FF_{project\ plant,i,y}$	$FF_{project\ site,i,y}$	$EC_{PJ,y}$	$EG_{exported}$
from	to	km	-	Tonnes	Tonnes	MWh	MWh
		S	T	U	V	W	X
01/07/2011	31/07/2011	127,056	1,544	0.80	14.40	16.77	14,166.372
01/08/2011	31/08/2011	177,278	2,128	0.80	12.81	11.01	11,083.644
01/09/2011	30/09/2011	145,636	1,769	0.70	11.63	24.29	12,184.128
01/10/2011	31/10/2011	150,666	1,821	2.80	16.45	66.02	12,434.126
01/11/2011	30/11/2011	142,290	2,079	0.80	14.85	34.06	12,580.656
01/12/2011	31/12/2011	202,424	2,601	1.60	12.97	35.58	12,934.152
01/01/2012	31/01/2012	86,204	1,139	0.00	10.06	29.86	9,600.624
01/02/2012	29/02/2012	94,640	1,308	1.30	6.33	17.60	3,989.832
01/03/2012	31/03/2012	59,230	852	0.40	6.97	15.21	5,665.176
01/04/2012	30/04/2012	81,990	1,199	0.45	4.98	14.49	4,800.840
01/05/2012	31/05/2012	98,680	1,423	1.12	5.93	18.43	6,643.692
01/06/2012	30/06/2012	30,542	406	0.80	1.72	11.16	2,838.792
01/07/2012	31/07/2012	5,250	52	0.80	0.43	7.03	348.876
01/08/2012	31/08/2012	59,060	772	0.88	0.89	6.39	297.924
01/09/2012	30/09/2012	67,536	998	1.52	3.94	11.35	5,716.524
01/10/2012	31/10/2012	86,146	1,283	1.60	5.99	20.68	8,142.420
01/11/2012	30/11/2012	96,446	1,352	0.55	5.75	24.11	4,421.076

01/12/2012	31/12/2012	119,500	1,951	0.65	6.98	32.13	6,943.332
total		1,830,574	24,677	17.57	143.08	396.17	134,792.186

Date		$EG_{110Kv\ imported}$	$EG_{10Kv\ imported}$	$EG_{imported}$	$EG_{project\ plant,y}$
from	to	MWh	MWh	MWh	MWh
		Y	Z	AA=Y+Z	AB=X-AA
01/07/2011	31/07/2011	0.000	0.000	0.000	12,184.128
01/08/2011	31/08/2011	0.000	0.000	0.000	12,434.126
01/09/2011	30/09/2011	0.000	0.000	0.000	12,579.756
01/10/2011	31/10/2011	0.000	0.000	0.000	12,904.584
01/11/2011	30/11/2011	0.000	0.900	0.900	9,596.928
01/12/2011	31/12/2011	29.568	0.000	29.568	3,939.612
01/01/2012	31/01/2012	3.696	0.000	3.696	5,642.484
01/02/2012	29/02/2012	19.140	31.080	50.220	4,773.120
01/03/2012	31/03/2012	13.332	9.360	22.692	6,622.572
01/04/2012	30/04/2012	27.720	0.000	27.720	2,793.648
01/05/2012	31/05/2012	21.120	0.000	21.120	276.408
01/06/2012	30/06/2012	45.144	0.000	45.144	234.912
01/07/2012	31/07/2012	72.468	0.000	72.468	5,688.024
01/08/2012	31/08/2012	44.352	18.660	63.012	8,137.668
01/09/2012	30/09/2012	24.420	4.080	28.500	4,388.076
01/10/2012	31/10/2012	4.752	0.000	4.752	6,926.436
01/11/2012	30/11/2012	33.000	0.000	33.000	12,184.128
01/12/2012	31/12/2012	16.896	0.000	16.896	12,434.126
total		355.608	64.080	419.688	134,372.498

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:

ERelectricity,y Emission reductions due to displacement of electricity during the year y (tCO2/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 CO2 emission factor for the electricity displaced due to the project activity during the year y (tCO2/MWh), which is 0.8888 tCO2e/MWh (See revised PDD Version 5 available online at http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1256208994.65/view)

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

EGy = 134,792.186MWh

Therefore,

$$ER_{electricity,y} = 134{,}372.498MWh \times 0.8888tCO_2e/MWh = 119{,}430tCO_2e$$

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

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

Where:

$BE_{biomass,y}$	Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO_2e/yr)
GWP_{CH4}	Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH4)
$BF_{PJ,k,y}$	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

$$BE_{biomass,y} = 21tCO_2e/tCH_4 \times 200{,}041.04t \times 0.001971tCH_4/t = 8{,}279tCO_2e$$

So, the baseline emission reduction is:
$BE_y = ER_{elctricity.y} + ER_{heat.y} + BE_{biomass.y}$ =119,430 +0+8,279=127,709tCO_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:

- 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: 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,

$$PET_y = 24{,}677 \times 74.18 \times 0.001097 tCO_2e / km = 2{,}008.14 tCO_2e$$

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);
$FC_{i,j,y}$	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,

,

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

$$= (17.57 + 143.08)\ t \times 0.042652 TJ / t \times 74{,}800 kgCO_2e / TJ / 1 \times 10^3$$

$$= 512.53 tCO_2e$$

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)
$EF_{EL,i,y}$	Emission factor for electricity generation for source j in year y (tCO2/MWh)
$TDL_{i,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y

Therefore,

$$PE_{EC,y} = 396.17MWh \times 0.8888tCO_2e/MWh \times (1+20\%) = 422.54tCO_2e$$

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)
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 (tCH_4/GJ), according to ACM0006,Version 9, the $EF_{CH4,BF}$=41.1 kg CH_4/TJ

Therefore,

$$PE_{biomass,CH4,y} = 21tCO_2e/tCH_4 \times 41.1kgCH_4/TJ \times 2{,}336{,}140.07\text{Gj}/1\times10^6$$

$$= 2{,}016.32tCH_4$$

According the data calculated above,

$$PE_y = 2{,}008.14tCO_2e + 512.53tCO_2e + 422.54tCO_2e + 2{,}016.32tCO_2e$$
$$= 4{,}960tCO_2e \text{ (Round up)}$$

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:

Biomass type	Rice husks (t)	Forestry residue(t)					
		Bamboo crumbs	Saw dust	Branches	Barks	Wood chips	Total
Total biomass generation in the region	385,233.00	100,000.00	450,000.00				550,000.00
Biomass loss	171,617.00	20,000.00	90,000.00				110,000.00
Available Biomass in the region (full year)	213,616.00	80,000.00	360,000.00				440,000.00
Biomass utilised out of the project (full year)	21,361.60	12,000.00	54,000.00				66,000.00
Biomass utilised by the project (cover the whole monitoring period)	52,031.01	21,208.89	207,737.61				228,946.50
Total biomass utilised, including the project	73,392.61	33,208.89	261,737.61				294,946.50

Available Biomass/Total biomass utilised	291.06%	240.90%	137.54%	149.18%
Available Biomass/Total biomass utilised -100%	191.06%	140.90%	37.54%	49.18%
Abundant surplus? (more than 25%)	Yes	Yes	Yes	Yes

From the data in the above table, that the leakage of the project within the project boundary is zero, i.e.

LEy = 0 tCO2e.

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	127,709	4,960	0	122,749

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 revised PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	159,899	122,749

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

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The actual emission reductions achieved during this monitoring period is 23.23% lower than the values estimated in ex-ante calculation in the revised PDD.

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

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO_2e)	122,749	0

Annex 1: The Energy Balance for Toncheng 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 20.82%

Table4. The Energy Balance for Tongcheng Kaidi Biomass Project(01/07/2011-31/12/2012)

	$BF_{k,v}$（ton） (dry base)	NCV_k(GJ/t)	Energy(GJ)
Rice husk	44,645.13	12.83	572,797.08
Bamboo crumbs	14,666.85	12.88	188,957.96
Branches	2,053.56	11.12	22,835.62
Barks	70,111.17	10.62	744,580.64
Sawdust	31,217.91	11.49	358,693.75
Wood chips	37,346.41	11.84	442,305.94
Fossil Fuel	17.57	42.65	749.40
Total			2,330,920.38
		Electricity Exported（GJ）	485,251.87
		Efficiency	20.82%

Energy Balance：
$E_{total}=E_{biomasss}+E_{fossil\ fuel}$=2,330,920.38 GJ
Electricity exported= 485,251.87 GJ
Efficiency= Electricity exported/ E_{total} =20.82%

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Document information

Version	*Date*	*Description*
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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