Monitoring report form (Version 03.1)

Monitoring report

Title of the project activity	Jianli Kaidi Biomass Power Project
Reference number of the project activity	3044
Version number of the monitoring report	02
Completion date of the monitoring report	09/10/2013
Registration date of the project activity	12/08/2010
Monitoring period number and duration of this monitoring period	The 2nd monitoring period, the first day is 01/04/2011, 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 Participant: Camco International Limited **China**, project owner, Jianli 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 06.2) – "Consolidated methodology electricity generation from biomass residues" "Combined tool to identify the baseline scenario and demonstrate additionality". (Version 02.2) ACM0002 (Version 08) – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" "Tool to calculate project or leakage CO_2 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 01.1)
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the revised PDD	204,537 tonnes CO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	153,235 tonnes CO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Jianli Kaidi Biomass Power Project (hereafter referred to as the project) is a biomass utilization project developed by Jianli Kaidi Green Energy Development Co., Ltd. (hereafter referred to as the Project Owner) and is located in Chengdong Industrial Park, Jianli County, Hubei Province, P.R. China.

The project processes and burns biomass residue, of which rice husk, cotton straw, branches, barks, stumps and wood chips are the main 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. The annual equivalent operation hours at full load is estimated to be 6000 hours with a net electricity generation of 126,720MWh and a net heat generation of 541,602GJ per year. The project can replace the equivalent capacity of power plants on the CCPG, which is predominantly made up of coal fired power plants. The heat generated can be supplied to the plants in Chengdong Industrial Park to meet the process heat demand and replace the heat generated by the small coal-fired boilers within the independent industries, and thus reducing greenhouse gas (CO_2) emissions, the project is estimated to achieve 116,650 tonnes of CO_2e emissions reduction annually (Version 6 PDD, excluding ERheat,y).

The project began to construct on 14/04/2008, and was put into operation since 19/12/2009. The project has been registered as a CDM project on 12/08/2010.

The first monitoring period of 58,410 tonnes CERs was issued by EB on 03/09/2012. During current monitoring period (01/04/2011-31/12/2012), the project has achieved emission reductions of 153,235tonnes CO_2e.

A.2. Location of project activity

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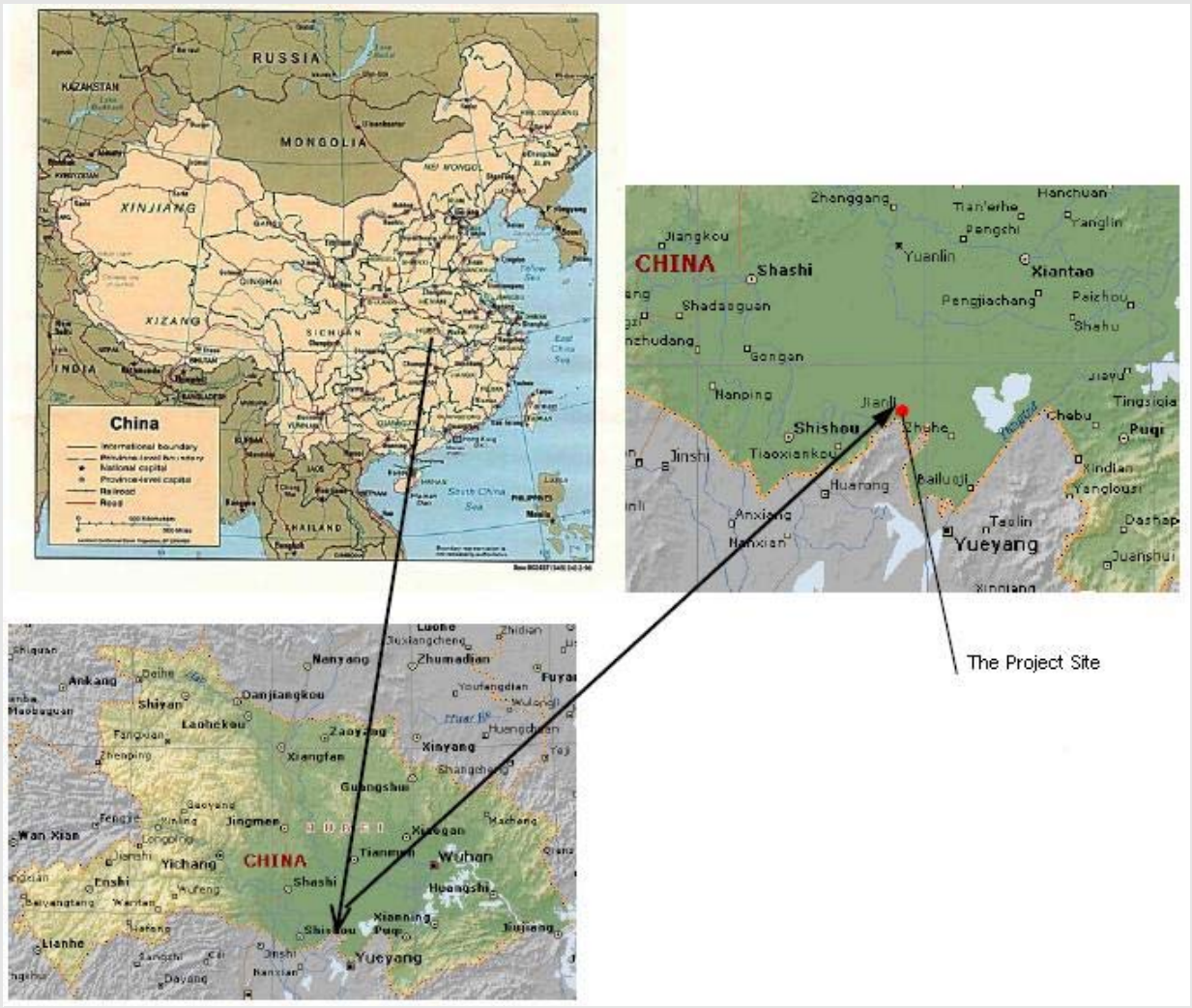
The project activity is located in the Chengdong Industrial Park, Jianli County, Hubei Province, P.R. China.

The centre of plant has geographical coordinates of 112° 54′18″ east longitude 29° 49′30″ 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)	Jianli 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 06.2) – "Consolidated methodology electricity generation from biomass residues"
2. "Combined tool to identify the baseline scenario and demonstrate additionality". (Version 02.2)
3. ACM0002 (Version 08) – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"
4. "Tool to calculate project or leakage CO_2 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 01.1)

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 12/08/2010 to 11/08/2017(Renewable)
The start date of the crediting period is 12/08/2010.
This monitoring period: from 01/04/2011 to 31/12/2012.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The project consists of one site, which began to construct on 14/04/2008, and was put into operation since 19/12/2009. Please refer to the following table for details.

Activity	Date	
	1# Generator	2# Generator
Start of construction	14/04/2008	
Commissioning of core equipment	07/12/2009	06/02/2010
Operation of core equipment	19/12/2009	10/02/2010

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 18 times and 14 times for maintenance from 01/04/2011 to 31/12/2012.

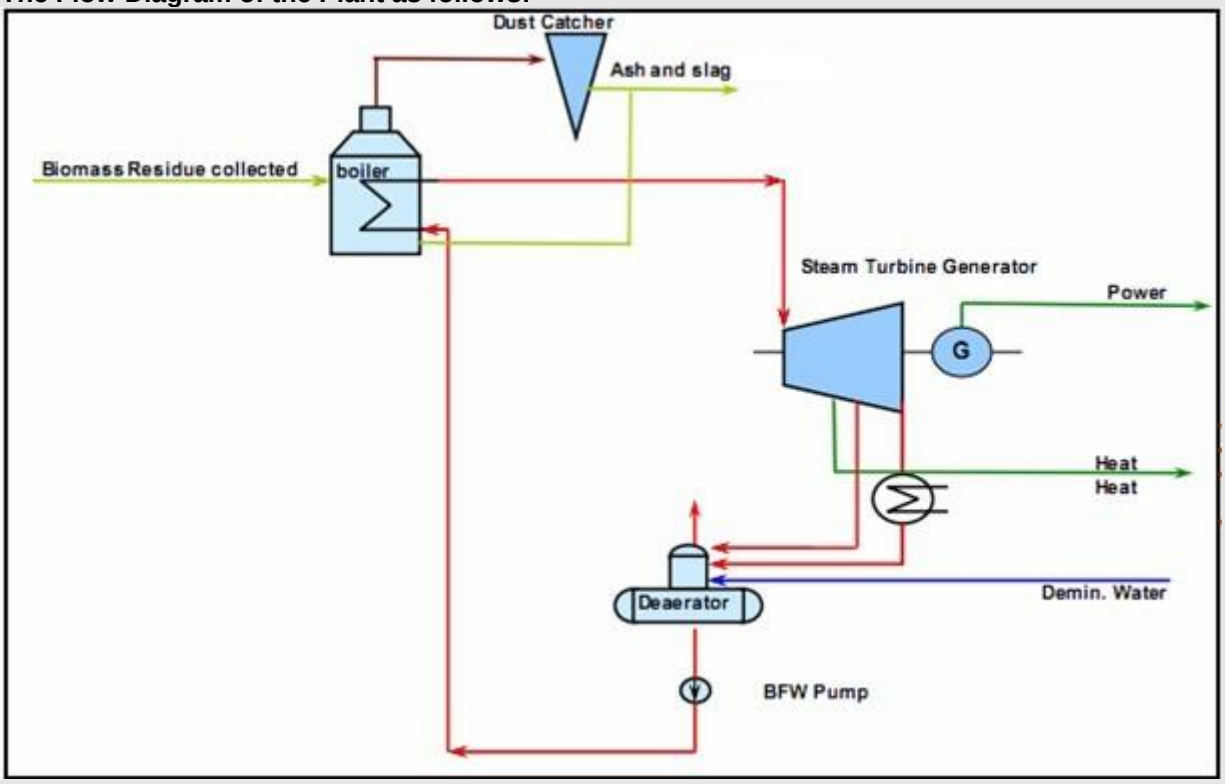
The technology employed by the project is advanced domestic technology. The project installs two sets of 65t/h circulating fluid bed (CFB) boilers with medium temperature and sub-high pressure. At the same time, two 12MW steam turbines and two associated generators are applied in the project .The steam 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	45t/h

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

The Flow Diagram of the Plant as follows:



B.2. Post registration changes

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

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N/A

B.2.2. Corrections

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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 of approval of changes regarding the biomass residue was submitted to the EB, and was approved on 28 Feb 2012.

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

http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1256015812.95/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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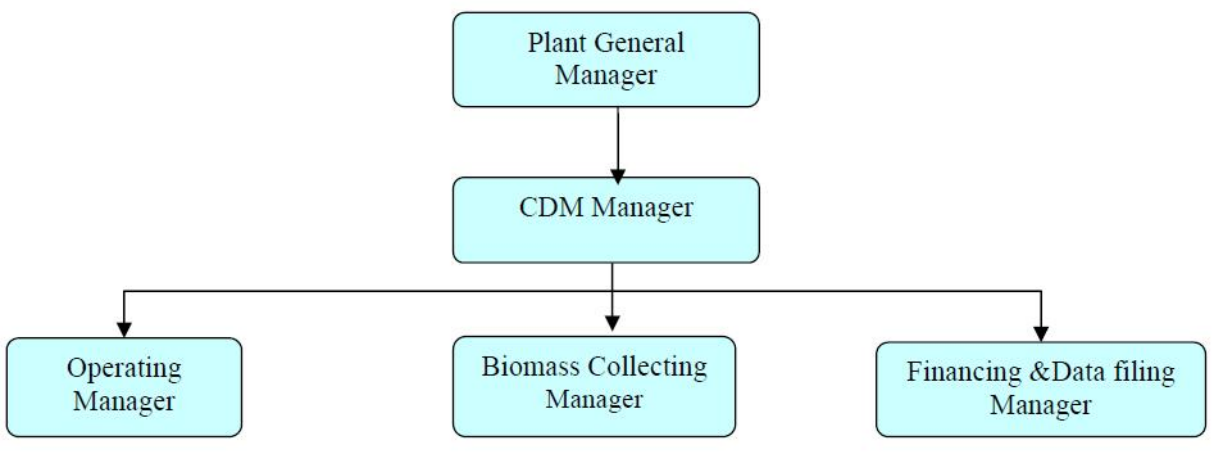
1. The organizational structure, roles and responsibilities of personnel:

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 and a back up meter installed on the project site monitoring the electricity supplied to the grid and purchased from the grid. They are double-way meters, and the accuracy of them is 0.2s.

In addition, a 10kv backup power meter is installed on the project site monitoring the electricity purchased from the grid. The accuracy is 0.5s.

The net electricity equals to electricity supplied to the grid minus electricity purchased from the grid minus electricity purchased from the 10kv backup power.

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 in the laboratory of the plant. The accuracy of the belt weighers is 0.5. An energy balance is recorded annually 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 1.0.

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.

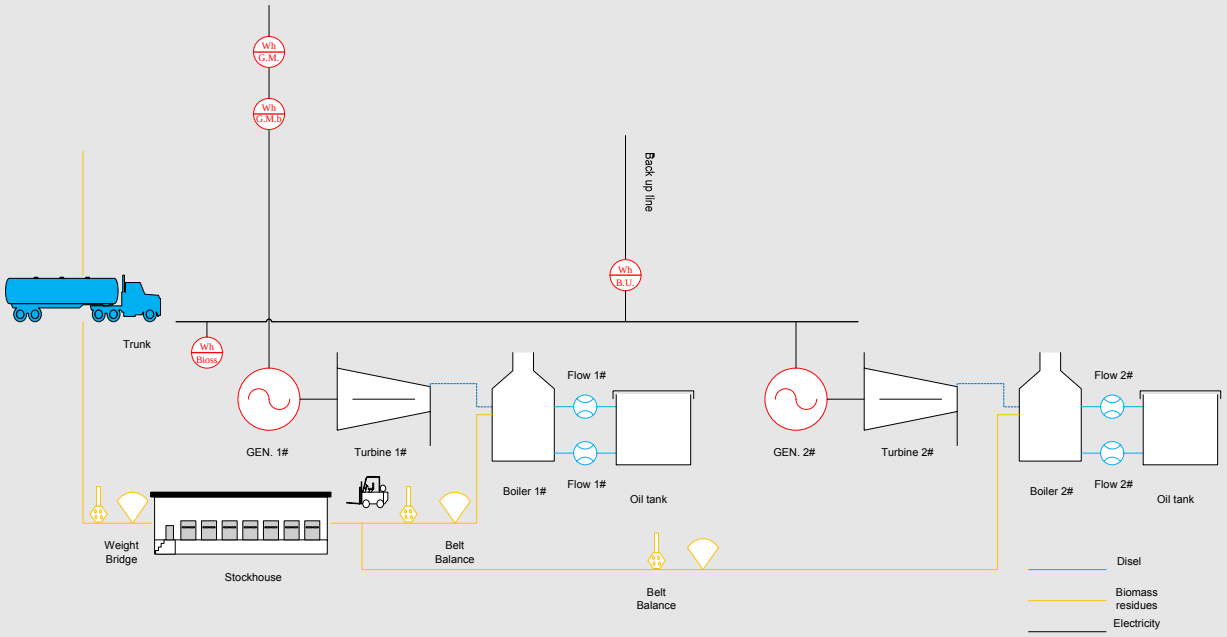
If the monitoring data is missing, or it is not feasible to install a dedicated meter to monitor this indicator, it is calculated conservatively as the weight of straws smashed in tons and the electricity consumption factor (kWh/ton). The electricity factor can be calculated as follows:

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 is monitored to check the leakage effect brought by the operation of the project. This is obtained from surveys or statistics from local agricultural bureau or other official public resource. If they are not available, the project owner will ask specialized institute or consulting company to do biomass availability research.

Figure 3: The monitoring system and power system connection



Kaidi Jianli 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 Central China Power Grid
Source of data:	The revised PDD Version 6
Value(s) applied):	0.9735
Purpose of data:	Baseline emission calculation
Additional comment:	--

Data / Parameter:	**GWP_{CH4}**
Unit:	t CO_2e /t CH_4
Description:	Global warming potential for CH_4
Source of data:	The revised PDD Version 6
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 6
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 6
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 6
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:	See table below
Monitoring equipment:	See tables below
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

Type	Units	Data
Rice husk	tonne	73,065.39
Cotton straws	tonne	23,305.37
Branches	tonne	41,463.88
Barks	tonne	72,280.36
Stumps	tonne	1,613.37
Wood chips	tonne	32,117.43

Meter name	Belt balance 1#	Belt balance 2#
Type/Model	ICS-ST4-1000	ICS-ST4-1000
SN	0811110	0811109
Accuracy	0.5%	0.5%
Calibration on	26/06/2010 25/06/2011	26/06/2010 25/06/2011
Accuracy	0.5%	1.0%
Calibration on	25/06/2012	25/06/2012
Valid period	24/06/2013	24/06/2013
Calibration Frequency	Once per year	

The calibration accuracy of belt balance 2# with the SN 0811109 dropped from 0.5% on 25 June 2011 to 1.0% on 25 June 2012 because of mechanical wear, but still meets the industrial standards. But for the sake of conservative, $BE_{biomass,y}$ will be multiplied by 99.5% and $PE_{biomass,CH4,y}$ will be multiplied by 100.5%.

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:	See tables below
Measuring/ Reading/ Recording frequency:	Daily measurement and monthly recording; 100% of data is monitored and electronically archived.
Calculation method (if applicable):	--

Meter name	Balance 1#	Balance 2#
Type/Model	YB2001	FA214
Accuracy	0.1g	0.1mg
SN	196	2672
Calibration on	26/06/2010	25/06/2011 25/06/2012
Valid period	25/06/2011	24/06/2013
Calibration Frequency	Once per year	Once per year

Meter name	Dry Cabinet 1#	Dry Cabinet 2#
Type/Model	101-1B	101-1A
Accuracy	0.1℃	0.1℃
SN	81213	171
Calibration on	27/06/2010 25/06/2011 25/06/2012	27/06/2010 25/06/2011 25/06/2012
Valid period	24/06/2013	24/06/2013
Calibration Frequency	Once per year	Once per year

The Balance 1# was calibrated on 26 June 2010 and valid to 25 June 2011, and it was replaced by Balance 2# with higher accuracy which was calibrated just on 25 June 2011. Monitoring was implemented continuously, without intervals.

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	Units	The year 2011		The year 2012	
		21-Jan	20-Jul	1-Jan	1-Jul
Rice husk	MJ/Kg	13.56	12.91	14.31	14.71
Cotton straws	MJ/Kg	13.47	12.96	12.38	12.46
Branches	MJ/Kg	12.66	12.24	12.40	13.93
Barks	MJ/Kg	13.98	13.14	13.65	13.98
Stumps	MJ/Kg	10.9	11.42	13.78	---
Wood chips	MJ/Kg	11.49	11.53	11.95	11.56

The NCV of barks tested on 1 July 2012 was only 7.72 MJ/kg, which differed significantly from previous measurements (13.14-13.98 MJ/kg). The low NCV was caused by low quality and high moisture content. To be conservative, the maximum value 13.98 MJ/kg is adopted to replace 7.72 MJ/kg to calculate project emission .

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:	58.1
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:	39,407
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 2010,2011,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:	25,952.94litre*0.85kg/litre/1000=22.06tonne

Monitoring equipment:	<table><tr><td>Meter name</td><td>Flow Meter 1#</td><td>Flow Meter 1#</td></tr><tr><td>Type/Model</td><td>LWY-10C</td><td>LWY-10C</td></tr><tr><td>Accuracy</td><td>1.0</td><td>1.0</td></tr><tr><td>SN</td><td>08059</td><td>08084</td></tr><tr><td>Calibration on</td><td>26/06/2010 25/06/2011 25/06/2012</td><td>26/06/2010 25/06/2011 25/06/2012</td></tr><tr><td>Valid period</td><td>24/06/2013</td><td>24/06/2013</td></tr><tr><td>Calibration Frequency</td><td>Once per year</td><td>Once per year</td></tr></table> <table><tr><td>Meter name</td><td>Flow Meter 2#</td><td>Flow Meter 2#</td></tr><tr><td>Type/Model</td><td>LWY-10C</td><td>LWY-10C</td></tr><tr><td>Accuracy</td><td>1.0</td><td>1.0</td></tr><tr><td>SN</td><td>08085</td><td>10620</td></tr><tr><td>Calibration on</td><td>26/06/2010</td><td>30/06/2010</td></tr><tr><td>Valid period</td><td>25/06/2011</td><td>25/06/2011</td></tr><tr><td>SN</td><td>08067</td><td>10620</td></tr><tr><td>Calibration on</td><td>25/06/2011 25/06/2012</td><td>25/06/2011 25/06/2012</td></tr><tr><td>Valid period</td><td>24/06/2013</td><td>24/06/2013</td></tr><tr><td>Calibration Frequency</td><td>Once per year</td><td>Once per year</td></tr></table> The Flow Meter 2# (SN 08085) was calibrated on 26 June 2010 and valid to 25 June 2011, and it was replaced by another flow meter (SN 08067) to meet the demand for maintenance of equipments, which was calibrated just on 25 June 2011. The type and accuracy didn't change. Monitoring was implemented continuously, without intervals.
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:	331,460.29litre*0.85kg/litre/1000=281.74tonne
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. 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:	Calculated
Source of data:	Calculated conservatively as the weight of biomass smashed in tons and the electricity consumption factor (kWh/ton)
Value(s) of monitored parameter:	1519.81 There are two machines installed on-site with the type Sida 93QS-3 and Vermeer HG365E. The machine Sida 93QS-3 is used to smash cotton straws and Vermeer HG365E is used to smash branches, barks, stumps and wood chips. The electricity consumption factor of Sida 93QS-3 is: 18.5KW/(3t/h)=6.1667KWh/t, and the electricity consumption factor of Vermeer HG365E is: 224.546KW/(33t/h)=6.8044KWh/t. The quantity of cotton straws consumed during the monitoring period is 30,205.72t and the quantity of braches, barks, stumps and wood chips is 195,981.55t totally. So the $EC_{PJ, y}$ is calculated conservatively as follow: $EC_{PJ,y}$ =(6.1667KWh/t×30,205.72t+6.8044KWh/t×195,981.55t)/1000 =1519.81MWh.

Monitoring equipment:	<table><tr><td>Meter name</td><td>Meter 1# for biomass</td></tr><tr><td>Type/Model</td><td>DSSD1008</td></tr><tr><td>Accuracy</td><td>0.5s</td></tr><tr><td>SN</td><td>30100516</td></tr><tr><td>Calibration on</td><td>11/10/2010 15/10/2011 15/11/2012</td></tr><tr><td>Valid period</td><td>14/11/2013</td></tr><tr><td>Calibration Frequency</td><td>Once per year</td></tr></table> In accordance with the QA/QC procedure in the registered PDD and methodology, $EC_{PJ,y}$ would be crosschecked with invoices for purchased electricity if available. But in fact, as part of internal electricity consumption system, there is not separate invoices of electricity consumption to crosscheck the quantity of electricity consumption, so the QA/QC procedure is not applicable to the PA. For the sake of conservative, $EC_{PJ,y}$ will be calculated as the weight of straws smashed in tons and the electricity consumption factor according to the registered PDD.
Measuring/ Reading/ Recording frequency:	Continuously measuring and monthly recoding; 100% of data is monitored and electronically archived.
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:	155,322.78
Monitoring equipment:	<table><tr><td>Meter name</td><td>Gate meter</td><td>Backup Meter</td><td>10KV Meter</td></tr><tr><td>Type/Model</td><td>MK6E</td><td>MK6E</td><td>DSSD5</td></tr><tr><td>Accuracy</td><td>0.2s</td><td>0.2s</td><td>0.5s</td></tr><tr><td>SN</td><td>206652850</td><td>206652837</td><td>53648</td></tr><tr><td>Calibration on</td><td>22/07/2010 19/07/2011 15/11/2012</td><td>22/07/2010 19/07/2011 15/11/2012</td><td>23/07/2010 19/07/2011 15/11/2012</td></tr><tr><td>Valid period</td><td>14/11/2013</td><td>14/11/2013</td><td>14/11/2013</td></tr><tr><td>Calibration Frequency</td><td colspan="3">Once per year</td></tr></table> The clarifications of gate meter, backup meter and 10kV meter were delayed (from 19 July 2012 to 14 November 2012). The accuracy of the gate meter, backup meter and 10kV meter are 0.2%, 0.2% and 0.5% respectively, so the maximum permissible error are ±0.2%, ±0.2% and ±0.5%. According to “Clean development mechanism validation and verification standard”, the value of $EG_{export,y}$ during the monitoring period(from 1 July 2012 to 30 November 2012) will be multiplied by 99.8%, and the value of $EG_{import\ 110kv,y}$ will be multiplied by 100.2%, the value of $EG_{import\ 10kv,y}$ will be multiplied by 100.5%.
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.

Table 1: Monitored Parameters

		Rice husk			Cotton straws		
		$BF_{k,y}$	Moisture	NCV	$BF_{k,y}$	Moisture	NCV
from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton
		A	B	C	D	E	F
01/04/2011	30/04/2011	6,630.30	14.13	13.56	2,685.60	22.80	13.47
01/05/2011	31/05/2011	194.51	13.78	13.56	143.02	25.43	13.47
01/06/2011	30/06/2011	5,104.12	14.63	13.56	1,170.98	22.81	13.47
01/07/2011	31/07/2011	9,397.61	13.92	12.91	0.00	0.00	0.00
01/08/2011	31/08/2011	11,387.21	13.65	12.91	0.00	0.00	0.00
01/09/2011	30/09/2011	6,827.81	14.03	12.91	0.00	0.00	0.00
01/10/2011	31/10/2011	10,480.00	14.18	12.91	0.00	0.00	0.00
01/11/2011	30/11/2011	2,987.91	14.57	12.91	4,225.18	23.09	12.96
01/12/2011	31/12/2011	4,153.94	14.38	12.91	4,607.73	22.98	12.96
01/01/2012	31/01/2012	2,034.06	14.15	14.31	4009.28	23.24	12.38
01/02/2012	29/02/2012	4,149.77	14.36	14.31	5443.26	22.79	12.38
01/03/2012	31/03/2012	1,658.41	14.68	14.31	4175.64	22.28	12.38
01/04/2012	30/04/2012	988.70	13.81	14.31	0.00	0.00	0.00
01/05/2012	31/05/2012	665.12	13.60	14.31	0.00	0.00	0.00
01/06/2012	30/06/2012	1,714.53	14.28	14.31	0.00	0.00	0.00
01/07/2012	31/07/2012	0.00	0.00	0.00	0.00	0.00	0.00
01/08/2012	31/08/2012	0.00	0.00	0.00	0.00	0.00	0.00
01/09/2012	30/09/2012	1,635.45	14.15	14.71	0.00	0.00	0.00
01/10/2012	31/10/2012	4,060.43	14.46	14.71	0.00	0.00	0.00
01/11/2012	30/11/2012	5,243.57	13.59	14.71	0.00	0.00	0.00
01/12/2012	31/12/2012	5,751.91	14.26	14.71	3745.03	22.63	12.46
Total		85,065.36	-	-	30,205.72	-	

	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
01/04/2011	30/04/2011	1,004.05	22.41	12.66	5384.5	25.19	13.98
01/05/2011	31/05/2011	0.00	0.00	0.00	0.00	0.00	0.00
01/06/2011	30/06/2011	0.00	0.00	0.00	2233.61	25.16	13.98
01/07/2011	31/07/2011	1,444.44	22.57	12.24	7470.65	25.56	13.14
01/08/2011	31/08/2011	507.68	23.10	12.24	9496.53	24.37	13.14
01/09/2011	30/09/2011	2,718.72	22.66	12.24	13456.34	25.02	13.14
01/10/2011	31/10/2011	6,326.55	22.97	12.24	11000.34	25.29	13.14
01/11/2011	30/11/2011	8,046.98	23.01	12.24	10890.03	25.52	13.14
01/12/2011	31/12/2011	504.92	22.94	12.24	6929.69	25.58	13.14
01/01/2012	31/01/2012	7691.51	23.59	12.40	2695.57	26.21	13.65
01/02/2012	29/02/2012	2542.13	23.18	12.40	6685.6	25.52	13.65
01/03/2012	31/03/2012	2898.83	23.39	12.40	3891.6	25.22	13.65
01/04/2012	30/04/2012	1825.53	23.10	12.40	2518.64	25.81	13.65
01/05/2012	31/05/2012	2822.51	23.46	12.40	4455.58	25.59	13.65
01/06/2012	30/06/2012	0.00	0.00	0.00	450.64	25.03	13.65
01/07/2012	31/07/2012	0.00	0.00	0.00	0	0.00	0.00
01/08/2012	31/08/2012	0.00	0.00	0.00	0	0.00	0.00
01/09/2012	30/09/2012	2505.33	23.45	13.93	0	0.00	0.00
01/10/2012	31/10/2012	4735.41	22.89	13.93	3001.65	25.19	13.98
01/11/2012	30/11/2012	4719.02	23.21	13.93	4086.46	25.26	13.98
01/12/2012	31/12/2012	3649.52	23.07	13.93	2078.71	24.90	13.98
Total		53,943.13	-	-	96,726.14	-	

		Stumps			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

01/04/2011	30/04/2011	907.52	31.81	10.90	1,455.13	25.23	11.49
01/05/2011	31/05/2011	0.00	0.00	0.00	0.00	0.00	0.00
01/06/2011	30/06/2011	0.00	0.00	0.00	4,396.95	25.69	11.49
01/07/2011	31/07/2011	0.00	0.00	0.00	3,769.55	26.29	11.53
01/08/2011	31/08/2011	0.00	0.00	0.00	2,550.64	25.74	11.53
01/09/2011	30/09/2011	305.74	32.10	11.42	226.67	26.37	11.53
01/10/2011	31/10/2011	0.00	0.00	0.00	1,415.96	25.75	11.53
01/11/2011	30/11/2011	0.00	0.00	0.00	0.00	0.00	0.00
01/12/2011	31/12/2011	0.00	0.00	0.00	2,291.67	24.26	11.53
01/01/2012	31/01/2012	1,114.32	29.38	13.78	1,842.40	25.33	11.95
01/02/2012	29/02/2012	0.00	0.00	0.00	5,202.02	24.75	11.95
01/03/2012	31/03/2012	0.00	0.00	0.00	3,399.15	25.27	11.95
01/04/2012	30/04/2012	0.00	0.00	0.00	1,831.66	25.56	11.95
01/05/2012	31/05/2012	0.00	0.00	0.00	2,357.49	25.36	11.95
01/06/2012	30/06/2012	0.00	0.00	0.00	832.20	24.04	11.95
01/07/2012	31/07/2012	0.00	0.00	0.00	0.00	0.00	0.00
01/08/2012	31/08/2012	0.00	0.00	0.00	0.00	0.00	0.00
01/09/2012	30/09/2012	0.00	0.00	0.00	2,440.08	25.38	11.56
01/10/2012	31/10/2012	0.00	0.00	0.00	4,972.22	25.25	11.56
01/11/2012	30/11/2012	0.00	0.00	0.00	2,928.44	24.44	11.56
01/12/2012	31/12/2012	0.00	0.00	0.00	1,072.47	25.45	11.56
Total		2,327.58	-	-	42,984.7	-	

		VD_y	N_y	$FF_{project\ plant,i,y}$	$FF_{project\ site,i,y}$	$EG_{export,y}$	$EG_{import110kv,y}$
from	to	km	-	Litre	Litre	MWh	MWh
		S	T	U	V	W	X
01/04/2011	30/04/2011	128,968	1,804	1,541.18	12,200.00	9266.928	31.588
01/05/2011	31/05/2011	48,722	760	1,752.94	1,400.00	149.622	79.794
01/06/2011	30/06/2011	69,766	1,090	3,341.18	10,300.00	6391.757	32.063

01/07/2011	31/07/2011	105,912	1,556	0.00	19,298.86	11116.565	17.239
01/08/2011	31/08/2011	149,486	2,201	2,211.76	22,000.00	12047.851	6.112
01/09/2011	30/09/2011	192,872	3,284	2,847.06	21,780.00	12107.436	5.98
01/10/2011	31/10/2011	161,744	2,786	1,329.41	26,233.25	15131.807	0
01/11/2011	30/11/2011	206,688	4,491	1,705.88	29,600.00	13133.142	0
01/12/2011	31/12/2011	292,822	4,766	1,188.24	29,894.10	9397.344	18.638
01/01/2012	31/01/2012	123,962	1,755	1,376.47	19,066.84	9614.009	31.442
01/02/2012	29/02/2012	157,464	2,242	858.82	22,032.47	12431.681	0.066
01/03/2012	31/03/2012	84,464	1,906	1,235.29	14,800.00	7969.038	0.33
01/04/2012	30/04/2012	56,324	1,262	1,694.12	17,843.30	3277.586	32.432
01/05/2012	31/05/2012	61,972	1,183	1,870.59	12,600.00	4897.464	31.957
01/06/2012	30/06/2012	8,200	148	0.00	6,540.80	1415.845	57.71
01/07/2012	31/07/2012	380	9	0.00	1,276.51	0	71.713
01/08/2012	31/08/2012	47,326	824	0.00	3,900.00	0	75.126
01/09/2012	30/09/2012	85,796	1,817	2,494.12	9,400.00	3208.430	78.789
01/10/2012	31/10/2012	78,840	1,391	505.88	13,557.49	8156.817	13.015
01/11/2012	30/11/2012	88,750	1,620	0.00	17,800.05	8254.670	0
01/12/2012	31/12/2012	138,686	2,512	0.00	19,936.62	8020.346	0
total		2,289,144	39,407	25,952.94	331,460.29	155,988.34	583.99

		$EG_{import\ 10kv,y}$	$EG_{project\ plant,y}$	$EC_{PJ,y}$
from	to	MWh	MWh	MWh
		Y	Z=W-X-Y	AA
01/04/2011	30/04/2011	2.04	9,233.30	76.11
01/05/2011	31/05/2011	9.68	60.15	0.88
01/06/2011	30/06/2011	1.2	6,358.49	52.34
01/07/2011	31/07/2011	0.12	11,099.21	86.31
01/08/2011	31/08/2011	0	12,041.74	85.43
01/09/2011	30/09/2011	6.44	12,095.02	113.68

01/10/2011	31/10/2011	0.2	15,131.61	127.54
01/11/2011	30/11/2011	1.28	13,131.86	154.91
01/12/2011	31/12/2011	2.24	9,376.47	94.60
01/01/2012	31/01/2012	3.28	9,579.29	115.52
01/02/2012	29/02/2012	40.92	12,390.70	131.75
01/03/2012	31/03/2012	0	7,968.71	95.09
01/04/2012	30/04/2012	14.04	3,231.11	42.02
01/05/2012	31/05/2012	0.12	4,865.39	65.56
01/06/2012	30/06/2012	0	1,358.14	8.73
01/07/2012	31/07/2012	0	-71.71	0.00
01/08/2012	31/08/2012	0	-75.13	0.00
01/09/2012	30/09/2012	0	3,129.64	33.65
01/10/2012	31/10/2012	0	8,143.80	86.48
01/11/2012	30/11/2012	0	8,254.67	79.84
01/12/2012	31/12/2012	0	8,020.35	69.37
total		81.56	155,322.78	1,519.81

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 (tCO_2/yr)
EGy	Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y (MWh)
EF,electricity,y	CO_2 emission factor for the electricity displaced due to the project activity during the year y (tCO2/MWh), which is 0.9735 tCO2e/MWh (See registered PDD Version 6 available online at http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1256015812.95/view)

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

EGy = 155,322.78MWh

Therefore,

$$ER_{electricity,y} = 155{,}322.78MWh \times 0.9735tCO_2e/MWh = 151{,}206.73tCO_2e$$

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)
$BF_{PJ,k,v}$	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

The calibration accuracy of belt balance 2# dropped from 0.5% on 25 June 2011 to 1.0% on 25 June 2012 because of mechanical wear, but still meets the industrial standards. For the sake of conservative, $BE_{biomass,y}$ will be multiplied by 99.5%.

$$BE_{biomass,y} = 21tCO_2e/tCH_4 \times 243{,}845.81t \times 0.001971tCH_4/t \times 99.5\% = 10{,}042.56tCO_2e$$

So, the baseline emission reduction is:

$BE_y=ER_{elctricity,y} + ER_{heat,y} + BE_{biomass,y}$ =151,206.73+0+10,042.56=161,249tCO_2e(Round down)

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

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According to methodology ACM0006 version 6.2, the emissions of the project within the project boundary include:

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

Project emissions are calculated as follows:

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

Where:

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

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

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

Where:

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

Therefore,

$$PET_y = 39{,}407 \times 58.1 \times 0.001097 tCO_2e / km = 2{,}511.19 tCO_2e$$

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

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

Where:

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

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

Where:

$COEF_{i,v}$	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)
$EF_{CO2,i,v}$	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,

,

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

$$= (25{,}952.94 + 331{,}460.29)\ L * 0.85kg/L/1000 \times 0.042652TJ/t \times 74{,}800kgCO_2e/TJ/1\times10^3$$

$$= 969.24tCO_2e$$

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

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

Where:

$EC_{PJ,i,v}$	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EL,i,v}$	Emission factor for electricity generation for source j in year y (tCO2/MWh)
$TDL_{i,v}$	Average technical transmission and distribution losses for providing electricity to source j in year y

Therefore,

$$PE_{EC,y} = 1519.81MWh \times 0.9735tCO_2e/MWh \times (1 + 20\%) = 1775.44tCO_2e$$

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:

$BF_{k,v}$	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 6.2, the $EF_{CH4,BF}$=41.1 kg CH_4/TJ

The calibration accuracy of belt balance 2# dropped from 0.5% on 25 June 2011 to 1.0% on 25 June 2012 because of mechanical wear, but still meets the industrial standards. For the sake of conservative, $PE_{biomass,CH4,y}$ will be multiplied by 100.5%.

$$PE_{biomass,CH4,y} = 41.1kgCH_4/TJ \times 3{,}178{,}937.15GJ/1\times10^6 \times 100.5\%$$

$$= 131.31tCH_4$$

According the data calculated above,

$$PE_y = 2{,}511.19tCO_2e + 969.24tCO_2e + 1775.44tCO_2e + 21tCO_2e/tCH_4 \times 131.31tCH_4$$

$$= 8{,}014tCO_2e \text{ (Round up)}$$

E.3. Calculation of leakage

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According to methodology ACM0006 version 6.2, 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:

Table 2: Demonstration of abundant surplus of biomass availability

Demonstration of abundant surplus of biomass availability for the year 2011						
Biomass Type	Rice husks	Cotton straws	Branches	Barks	Stumps	Wood chips
Total biomass generation in the region (kt)	267.8	102.6	550.0			
Biomass loss (kt)	26.8	15.4	55.0			
Available Biomass in the region (kt)	241.0	87.2	495.0			
Biomass utilised out of the project (kt)	48.2	13.1	99.0			
Biomass utilised by the project (kt) (01/04/2011～31/12/2011)	57.2	12.8	104.7			
Total biomass utilised, including the project (kt)	105.4	25.9	203.7			
Available Biomass/Total biomass utilised	229%	337%	243%			
Available Biomass/Total biomass utilised -100%	129%	237%	143%			
Abundant surplus? (more than 25%)	Yes	Yes	Yes			
Biomass utilised by the project (full year)	75.9	17.0	139.0			
Total biomass utilised, including the project (kt)	124.1	30.1	238.0			
Available Biomass/Total biomass utilised	194%	290%	208%			
Available Biomass/Total biomass utilised -100%	94%	190%	108%			
Abundant surplus? (more than 25%)	Yes	Yes	Yes			
Biomass utilised by the project (full year)=Biomass utilised by the project （01/04/2011~31/12/2011） /275*365						

Demonstration of abundant surplus of biomass availability for the year 2012						
Biomass Type	Rice husks	Cotton straws	Branches	Barks	Stumps	Wood chips
Total biomass generation in the region (kt)	268.7	103.9	560.0			
Biomass loss (kt)	26.9	15.6	56.0			
Available Biomass in the region (kt)	241.8	88.3	504.0			
Biomass utilised out of the project (kt)	48.4	13.2	100.8			

Biomass utilised by the project (kt)	27.9	17.4	91.2
Total biomass utilised, including the project (kt)	76.3	30.6	192.0
Available Biomass/Total biomass utilised	317%	288%	262%
Available Biomass/Total biomass utilised -100%	217%	188%	162%
Abundant surplus? (more than 25%)	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 tCO_2e.

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

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO_2e)
Total	161,249	8,014	0	153,235

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	204,857[1]	153,235

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

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From the data shown in the above table, the actual emission reduction achieved during current monitoring period is lower than the ex-ante estimation in registered CDM-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

[1] $204{,}857 tCO_2e = \frac{116{,}650 tCO_2e}{365 days} \times (275 days + 366 days)$

Emission reductions or GHG removals by sinks (t CO_2e)	153,235	0

Annex 1: The Energy Balance for Jianli 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 17.47%

Table3. The Energy Balance for Jianli Kaidi Biomass Project in this period

	$BF_{k,y}$（tonne） (dry base)	NCV_k(TJ/t)[2]	Energy(TJ)
Rice husk	73,065.39	0.01383	1010.764
Cotton straws	23,305.37	0.01288	300.199
Branches	41,463.88	0.01274	528.198
Barks	72,280.36	0.01357	900.783
Stumps	1,613.37	0.01203	19.414
Wood chips	32,117.43	0.01168	375.151
Fossil Fuel[3]	22.06	0.04265	0.941
Total			3,215.298
		Electricity Exported（GJ）	561.558
		Efficiency	17.47%

Energy Balance：

Etotal=Ebiomasss+Efossil fuel=3,215.298TJ

Electricity exported=155,988.34MWh=561.558 TJ

Efficiency= Electricity exported/ Etotal =17.47%

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[2] The average NCV is used here. For more information, please refer to the emission reduction calculation sheet.

[3] The consumption of fossil fuel is caused by boiler start-up only.

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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