



Monitoring report form (Version 03.2)

Monitoring report

Title of the project activity	Shandong Gaotang 30MW Biomass Power Generation Project
Reference number of the project activity	1375
Version number of the monitoring report	02
Completion date of the monitoring report	11/03/2014
Registration date of the project activity	20/03/2008
Monitoring period number and duration of this monitoring period	The 2 nd monitoring period, first and last days included (26/03/2009–25/12/2012)
Project participant(s)	National Bio Energy Co., Ltd. (as the project owner) EDF Trading Limited (as the CER buyer)
Host Party(ies)	People's Republic of China
Sectoral scope(s) and applied methodology(ies)	Sectoral scope 1: Energy Industries ACM0006 "Consolidated methodology for grid-connected electricity generation from biomass residues" (Version 04).
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	528,473tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	528,473tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	Not applicable
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	Not applicable

SECTION A. Description of project activity**A.1. Purpose and general description of project activity**

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The Shandong Gaotang 30MW Biomass Power Generation Project (hereafter referred to as the Project), developed by National Bio Energy Co., Ltd, is located in Gaotang County, Shandong Province, P.R.China. The Project collects and utilizes biomass residues (cotton straw, wood residues and wheat bran) to generate electricity and realizes biomass comprehensive utilization in the province served as a demonstration project in China.

The total installed capacity of the Project is 30 MW. And the straw-fired boiler is imported from Demark BWE Company, which is a world leading company in biomass boilers production and biomass cogeneration. So the project has also assisted in transferring advanced biomass technology to China. Electricity generated by the Project is exported into the Shandong provincial power grid that is a part of the North China Grid (NCG) to replace the capacity of coal-fired power plants and help reduce greenhouse gas (GHG) emission from the high-growth, coal-dominated power generation of NCG. Furthermore, the Project also accomplishes an extra benefit of GHG mitigation derived from a reduction of methane emission from biomass dumping or uncontrolled burning. The estimated annual GHG emission reductions are 180,881 tCO₂e in the approved changed PDD version 07, and the claimed annual GHG emission reductions shall be capped at the average annual emission reductions estimated in the original registered PDD, i.e. 140,695 tCO₂e.

This Project was constructed since 01/04/2006. It was put into trial operation on 29/01/2007 and in full commercial operation since April 2008. It is estimated that the Project can deliver 187,626 MWh of electricity to NCG with a biomass residues consumption of 247,506 tonnes per year (on wet base). In this monitoring period, the total emission reductions achieved are 659,061 tCO₂e. However, according to the requirement by EB 66th meeting, the annual amount of ERs to be issued to this Project shall be capped at the average annual emissions reductions estimated in the original registered PDD, i.e. 140,695 tCO₂ per year. So the amount of emission reductions which could be claimed during this monitoring period should be 528,473¹ tCO₂e.

A.2. Location of project activity

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The Project site is located in Gaotang Economic Development Zone, Gaotang County, Liaocheng City, Shandong Province, P.R.China. The Project has geographical coordinates with east longitude of 116°10'39" and north latitude of 36°54'36".

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)
People's Republic of China (host)	National Bio Energy Co., Ltd. (as the project owner)	No
United Kingdom of Great Britain and Northern Ireland	EDF Trading Limited (as the CER buyer)	No

A.4. Reference of applied methodology

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ACM0006 "Consolidated methodology for grid-connected electricity generation from biomass residues", version 04.

A.5. Crediting period of project activity

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The renewable crediting period (7yrs*3) is adopted. The start date of the first crediting period of the Project

¹ 528,473 tCO₂=140,695 tCO₂/365*1,371days

is 20/03/2008.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The total installed capacity of the Project is 30MW. The technology employed by the Project is from domestic and international advanced technologies. One biomass residues direct burning boiler of 130t/h with high temperature and high pressure is imported from Denmark BWE Company, with burning completely and no knotting residue. One 30MW steam turbines and one suited generator of 30MW have been applied in the Project.

The electricity output is transmitted through a transformer at the site to Huixin Substation, and then connected to Shandong Provincial Grid that is an integral part of NCG.

Table B.1 to Table B.3 list the key specifications of the main equipments, and Figure B.1 shows the technical diagram of the Project.

Table B.1 Key technical specifications of BWE boiler

Parameters Name	Unit	Value
Boiler maximum continuous rating	t/h	130
Superheated steam pressure	MPa	9.2
Superheated steam temperature	°C	540
Boiler feed-water temperature	°C	210
Boiler exhaust temperature	°C	130
Boiler efficiency	%	≥92
Boiler dirt-discharge Rate	%	2

Table B.2: Key technical specifications of turbine

Parameters Name	Unit	Data
Model	/	N30-8.83/535
Rated output	MW	30
Rated rotation speed	r/min	3000
Rated flow	t/h	120
Rated pressure	Mpa	8.83
Rated temperature	°C	535

Table B.3: Key technical specifications of generator

Parameters Name	Unit	Data
Model	/	QF-30-2
Rated output	MW	30
Rated voltage	kV	6.3
Rated electric current	A	3473
Rated rotation speed	r/min	3000

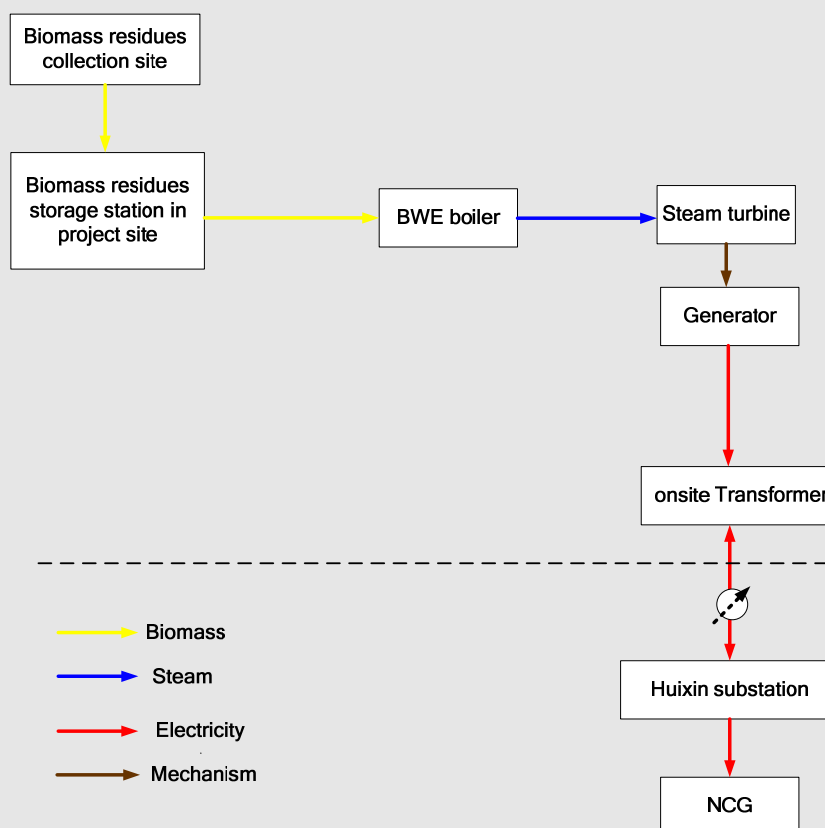


Figure B.1 Technical Diagram

The Project started to construct since 01/04/2006. It was put into trial operation on 29/01/2007 and in full commercial operation since April 2008.

During this monitoring period, all the monitoring equipments and facilities have been managed by responsible person, and the Project has been running normally. Local surplus biomass residues (cotton straw, wood residues and wheat bran) have been utilized by the Project for electricity generation. Data record and management system were in place and managed by designated persons. There was no special event or situation may impact the applicability of the methodology occurred over this monitoring period.

B.2. Post registration changes

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

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There is no temporary deviation from registered monitoring plan or applied methodology during this monitoring period.

B.2.2. Corrections

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There is no correction during this monitoring period.

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

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The revised monitoring plan has been approved with the revised PDD by EB on 02/03/2012 during the verification of the first monitoring period.

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

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Two permanent changes from project description in registered PDD occurred during the project actual activities, include:

Change1: three types of biomass residues (cotton straw, wood residues and wheat bran) have been applied

to the project;

Change2: higher power generation.

These changes in revised PDD version7 have been approved by EB on 02/03/2012 during the verification of the first monitoring period.

B.2.5. Changes to start date of crediting period

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There is no change to the start date of crediting period.

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

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Not applicable.

SECTION C. Description of monitoring system

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Organizational Structure

National Bio Energy Co., Ltd has established and maintained the appropriate monitoring systems and quality control, the responsibilities for carrying out these tasks are broadly elaborated in Figure C.1 below:

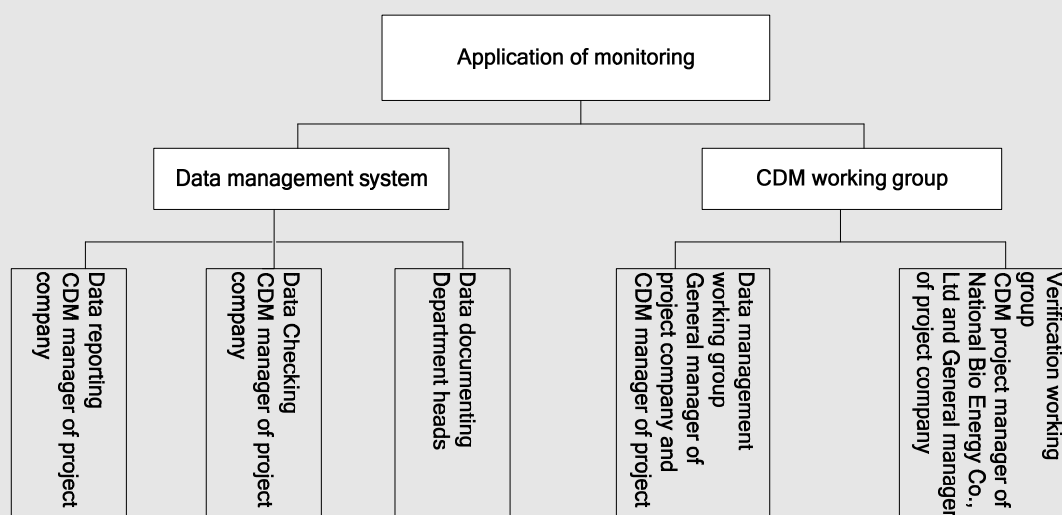


Figure C.1 Organizational Structure

Roles and responsibilities of personnel

National Bio Energy Co., Ltd. is the project owner. Staffs from the onsite company conduct the monitoring procedures and work based on the monitoring methodology described.

The application of monitoring includes two parts: data management system and CDM working group. The monitoring data such as all kinds of tables for different monitoring parameters, reports are processed and stored first in the plant office by operating manager and biomass purchase department manager, and are reported and checked by CDM manager of project company. The General manager and CDM manager of project company are in charge of the data management working group and the results are sent periodically to the manager of National Bio Energy Co., Ltd and a number of the verification working group, for quality assurance.

The personal responsibilities of the Project are:

Operating manager of the plant: Overall management of power plant operation and in charge of collecting monitoring data as requested by the monitoring plan.

Biomass purchase department manager: Biomass collection and summarizing the data collected at the collection stations in terms of types, amount, and transportation record, etc of straws. Ensuring the biomass

at the sites would not be stored over one year.

Data collection procedures

• Line diagrams

The line diagrams are shown in below:

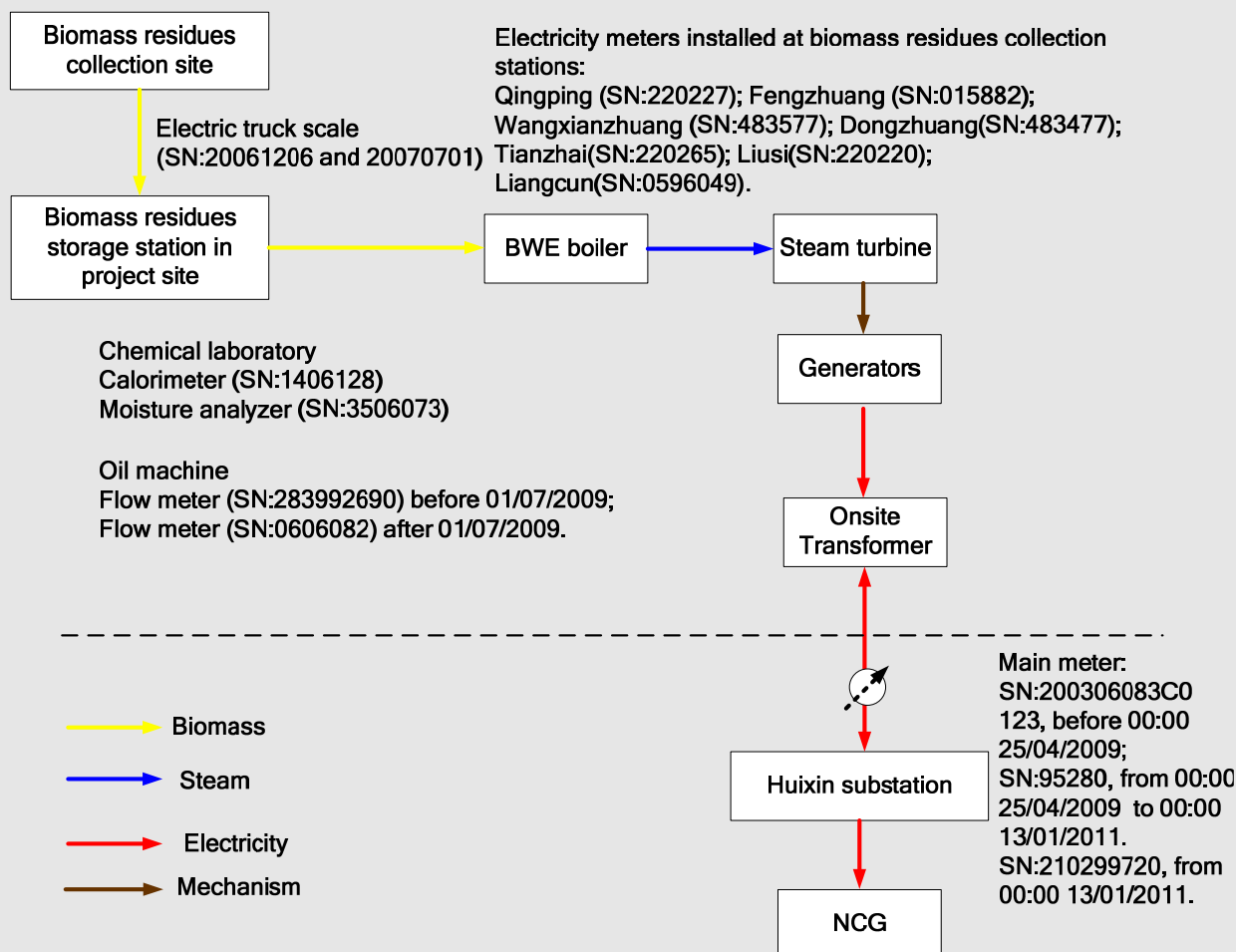


Figure C.2 Line diagrams

• Information flow

EG_v: Net quantity of electricity delivered to grid.

A main meter installed at the Huixin Substation is used for monitoring electricity supplied by the Project plant continuously. Data from the meter is monthly recorded by the grid company. The reading of main meter is cross checked by the electricity sales receipts, and the conservative values is applied in ER calculation.

BF_{k,v}: Quantity of biomass residues type *k* combusted in the Project plant.

On site measured by weight meters (two truck scales) and recorded by the procurement department of the plant. In order to determine the quantity of dry biomass, the moisture content of biomass residues is used for adjusting. Total consumptions are summarized in the monthly report.

Moisture: Moisture content of the biomass residues.

When biomass residues are transported to the plant, each batch of different biomass of homogeneous quality are sampled and monitored by the moisture analyzer at chemical laboratory on site. Mean values of each kind of biomass are calculated monthly.

NCV_k: Net Calorific Value of biomass residue type *k* consumed by the Project.

Biomass residues are sampled and NCV of them is monitored by a calorimeter at the chemical laboratory on site. The operator takes at least three samples of biomass residues for each measurement according to the monitoring plan of the approved changed PDD and national standard (GB/T213-2008). Measured records have been saved. Measurements are summarized monthly. Mean values of each kind of biomass are

calculated monthly.

AVD_y: Average return trip distance (from and to) between biomass fuel supply sites and the project site.

Whenever the truck arrives at the plant, the staff puts down the name of biomass supply site and trip distance provided by the truckers. The average value is adopted for every monitoring month.

N_y: Number of truck trips for the transportation of biomass.

Whenever the truck arrives in the power plant, the staff puts the number and the distance in the data collection system. It is summarized monthly.

FF_{project, site, i, y}: Quantity of diesel combusted at the Project for other purposes that are attributable to the project activity.

Diesel consumed by vehicles (grass-grasping machine and loader) which are used for preparation of biomass residues on site is measured by a volume flow meter installed on an oiling machine. It is summarized monthly.

EC_{PJ, y}: On-site electricity consumption attributable to the project activity.

The main meter installed at Huixin substation, which is the same one used for monitoring EG_y, is also used for monitoring the electricity consumed by the project plant continuously. The reading of main meter is cross checked by the electricity sales receipts, and the conservative value is applied in ER calculation. Meters installed at the biomass collection stations are used respectively for monitoring electricity consumed for the preparation of biomass continuously.

Emergency procedures

In case of emergencies, measures should be taken to guarantee the conservativeness of the project activities.

If the main meter is damaged or inaccurate, disposal of urgency would be implemented according to the stipulations in the Power Purchase Agreement, Parallel Operation Agreement, and so on.

For measurement of amount of biomass residues, if there is something wrong with the weight meter, the responsible person for CDM shall inform relevant staffs to repair and calibrate the equipments as soon as possible.

If malfunction of moisture analyzer/ calorimeter/ flow meter appears, the historical data will be used in the most conservative manner, and the responsible person for CDM shall inform relevant staffs to repair and calibrate the equipments as soon as possible.

SECTION D. Data and parameters

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

Data / Parameter:	GWP_{CH4}
Unit:	tCO ₂ e/tCH ₄
Description:	Global Warming Potential for CH ₄
Source of data:	IPCC default value
Value(s) applied:	21 for the first commitment period.
Purpose of data:	Baseline emission calculation (BF _{biomass, y}), and Project emission calculation (PE _y)
Additional comment:	Shall be updated according to any future COP/MOP decisions.

Data / Parameter:	EF_{electricity, y}
Unit:	tCO ₂ e/MWh
Description:	CO ₂ emission factor for the electricity displaced due to the project activity during the year y
Source of data:	Approved changed PDD

Value(s) applied):	0.975
Purpose of data:	Emission reductions due to displacement of electricity ($ER_{\text{electricity},y}$)
Additional comment:	-

Data / Parameter:	$EF_{\text{grid},y}$
Unit:	tCO ₂ e/MWh
Description:	CO ₂ emission factor for grid electricity during the year y
Source of data:	Approved changed PDD
Value(s) applied):	0.975
Purpose of data:	Project emission calculation ($PE_{\text{EC},y}$)
Additional comment:	-

D.2. Data and parameters monitored

Data / Parameter:	EG_y
Unit:	MWh
Description:	Net quantity of electricity delivered to grid in year y
Measured/ Calculated / Default:	Measured
Source of data:	Main meter reading at Huixin Substation
Value(s) of monitored parameter:	669,244.07

Monitoring equipment:	<p>EG_v is monitored continuously by a bidirectional electricity meter installed at Huixin Substation. The electricity meter was replaced at 25/04/2009 00:00 and 13/01/2011 00:00.</p> <table border="1" data-bbox="531 309 1329 656"> <thead> <tr> <th colspan="2">Electricity meter (Main meter)</th></tr> </thead> <tbody> <tr><td>Location</td><td>Huixin Substation</td></tr> <tr><td>Type</td><td>DTSD341</td></tr> <tr><td>Accuracy class</td><td>0.5</td></tr> <tr><td>Serial Number</td><td>200306083C0123</td></tr> <tr><td>Calibration frequency</td><td>Once per year</td></tr> <tr><td>Calibrated on</td><td>13/03/2009</td></tr> <tr><td>Valid date to</td><td>12/03/2010</td></tr> <tr><td>Comments</td><td>This electricity meter was replaced at 25/04/2009 00:00.</td></tr> </tbody> </table> <table border="1" data-bbox="531 689 1329 1137"> <thead> <tr> <th colspan="2">Electricity meter (Main meter)</th></tr> </thead> <tbody> <tr><td>Location</td><td>Huixin Substation</td></tr> <tr><td>Type</td><td>DTSD341</td></tr> <tr><td>Accuracy class</td><td>0.5s</td></tr> <tr><td>Serial Number</td><td>95280</td></tr> <tr><td>Calibration frequency</td><td>Once per year</td></tr> <tr><td>Calibrated on</td><td>10/02/2009 09/05/2009 10/04/2010</td></tr> <tr><td>Valid date to</td><td>09/04/2011</td></tr> <tr><td>Comments</td><td>This electricity meter was put into use at 25/04/2009 00:00, and was replaced at 13/01/2011 00:00.</td></tr> </tbody> </table> <table border="1" data-bbox="531 1171 1329 1552"> <thead> <tr> <th colspan="2">Electricity meter (Main meter)</th></tr> </thead> <tbody> <tr><td>Location</td><td>Huixin Substation</td></tr> <tr><td>Type</td><td>MK6E</td></tr> <tr><td>Accuracy class</td><td>0.2s</td></tr> <tr><td>Serial Number</td><td>210299720</td></tr> <tr><td>Calibration frequency</td><td>Once per year</td></tr> <tr><td>Calibrated on</td><td>06/01/2011 04/01/2012</td></tr> <tr><td>Valid date to</td><td>03/01/2013</td></tr> <tr><td>Comments</td><td>This electricity meter was put into use at 13/01/2011 00:00.</td></tr> </tbody> </table>	Electricity meter (Main meter)		Location	Huixin Substation	Type	DTSD341	Accuracy class	0.5	Serial Number	200306083C0123	Calibration frequency	Once per year	Calibrated on	13/03/2009	Valid date to	12/03/2010	Comments	This electricity meter was replaced at 25/04/2009 00:00.	Electricity meter (Main meter)		Location	Huixin Substation	Type	DTSD341	Accuracy class	0.5s	Serial Number	95280	Calibration frequency	Once per year	Calibrated on	10/02/2009 09/05/2009 10/04/2010	Valid date to	09/04/2011	Comments	This electricity meter was put into use at 25/04/2009 00:00, and was replaced at 13/01/2011 00:00.	Electricity meter (Main meter)		Location	Huixin Substation	Type	MK6E	Accuracy class	0.2s	Serial Number	210299720	Calibration frequency	Once per year	Calibrated on	06/01/2011 04/01/2012	Valid date to	03/01/2013	Comments	This electricity meter was put into use at 13/01/2011 00:00.
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Comments	This electricity meter was put into use at 13/01/2011 00:00.																																																						
Measuring/ Reading/ Recording frequency:	Continuous on-site measurements and monthly recording by the power distribution company																																																						
Calculation method (if applicable):	-																																																						

QA/QC procedures:	<p>The electricity meter is operated by the power distribution company and calibrated at least once a year by accredited entity. The monthly metered electricity records have been cross checked by electricity sales receipts.</p> <p>According to the approved PDD version7, PPs decided to discount 0.5% of EG_y monitored by electricity meter with accuracy 0.5 for conservation. In this monitoring period, the 0.5% discount was applied before 13/01/2011 00:00, as the main meter with accuracy of 0.2s was put into use since 13/01/2011 00:00.</p>																									
Purpose of data:	Emission reductions due to displacement of electricity ($ER_{\text{electricity},y}$)																									
Additional comment:	-																									
Data / Parameter:	$BF_{k,y}$																									
Unit:	Tons																									
Description:	Quantity of biomass residue type k combusted in the project plant during the year y																									
Measured/ Calculated / Default:	Measured																									
Source of data:	Project records from project procurement department of plant																									
Value(s) of monitored parameter:	365,871 tons (dry base) for cotton straw; 184,745 tons (dry base) for wood residues; 18,079 tons (dry base) for wheat bran																									
Monitoring equipment:	$BF_{k,y}$ is on site measured by weight meters (two truck scales) <table border="1" data-bbox="501 1102 1358 1787"> <thead> <tr> <th></th><th>Electric truck scale #1</th><th>Electric truck scale #2</th></tr> </thead> <tbody> <tr> <td>Location</td><td>East weight house</td><td>West weight house</td></tr> <tr> <td>Type</td><td>SCS-30</td><td>SCS-30</td></tr> <tr> <td>Accuracy class</td><td>class III</td><td>class III</td></tr> <tr> <td>Serial Number</td><td>20061206</td><td>20070701</td></tr> <tr> <td>Calibration frequency</td><td>Once per six months</td><td>Once per six months</td></tr> <tr> <td>Calibrated on</td><td> 22/03/2009² 23/09/2009 23/03/2010 01/09/2010 28/02/2011 31/05/2011 30/11/2011 28/05/2012 19/11/2012 </td><td> 22/03/2009³ 23/09/2009 23/03/2010 01/09/2010 28/02/2011 31/05/2011 30/11/2011 28/05/2012 19/11/2012 </td></tr> <tr> <td>Valid date to</td><td>18/05/2013</td><td>18/05/2013</td></tr> </tbody> </table>			Electric truck scale #1	Electric truck scale #2	Location	East weight house	West weight house	Type	SCS-30	SCS-30	Accuracy class	class III	class III	Serial Number	20061206	20070701	Calibration frequency	Once per six months	Once per six months	Calibrated on	22/03/2009 ² 23/09/2009 23/03/2010 01/09/2010 28/02/2011 31/05/2011 30/11/2011 28/05/2012 19/11/2012	22/03/2009 ³ 23/09/2009 23/03/2010 01/09/2010 28/02/2011 31/05/2011 30/11/2011 28/05/2012 19/11/2012	Valid date to	18/05/2013	18/05/2013
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Valid date to	18/05/2013	18/05/2013																								
Measuring/ Reading/ Recording frequency:	Continuous on-site measurements and summarized into monthly summary																									

² Valid date of this calibration certificate is 23/09/2009.

³ Valid date of this calibration certificate is 23/09/2009.

Calculation method (if applicable):	-																
QA/QC procedures:	All purchase records, invoices, biomass available in the store and biomass quantity combusted for production are all available at the plant site. $BF_{k,y}$ measurements had been crosscheck with an annual energy balance that is based on purchased quantities and stock change for QA/QC.																
Purpose of data:	Baseline emission calculations ($BE_{biomass,y}$) and Project emission calculations (PE_y)																
Additional comment:	-																
Data / Parameter:	Moisture content of the biomass residues																
Unit:	% water content																
Description:	Moisture content of each biomass residue type k																
Measured/ Calculated / Default:	Measured																
Source of data:	On-site measurements by moisture analyzer																
Value(s) of monitored parameter:	Please see the column of moisture content for each kind of biomass in Table E.2.																
Monitoring equipment:	<p>Moisture content of the biomass residues is on site measured by moisture analyzer.</p> <table border="1"> <tr> <td>Type</td><td>Moisture analyzer</td></tr> <tr> <td>Location</td><td>Chemical lab</td></tr> <tr> <td>Model</td><td>SDTGA300</td></tr> <tr> <td>Accuracy class</td><td>0.01</td></tr> <tr> <td>Serial Number</td><td>3506073</td></tr> <tr> <td>Calibration frequency</td><td>Once a year</td></tr> <tr> <td>Calibrated on</td><td>07/02/2009 05/01/2010 04/01/2011 04/04/2011 30/03/2012</td></tr> <tr> <td>Valid date to</td><td>29/03/2013</td></tr> </table>	Type	Moisture analyzer	Location	Chemical lab	Model	SDTGA300	Accuracy class	0.01	Serial Number	3506073	Calibration frequency	Once a year	Calibrated on	07/02/2009 05/01/2010 04/01/2011 04/04/2011 30/03/2012	Valid date to	29/03/2013
Type	Moisture analyzer																
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Model	SDTGA300																
Accuracy class	0.01																
Serial Number	3506073																
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Calibrated on	07/02/2009 05/01/2010 04/01/2011 04/04/2011 30/03/2012																
Valid date to	29/03/2013																
Measuring/ Reading/ Recording frequency:	Continuous on-site measurements and summarized in monthly measure report																
Calculation method (if applicable):	Weighted average values calculated for each kind of biomass residues during corresponding month																
QA/QC procedures:	-																
Purpose of data:	Baseline emission calculations ($BE_{biomass,y}$) and Project emission calculations (PE_y)																
Additional comment:	-																
Data / Parameter:	NCV_k																
Unit:	TJ/tonne																

Description:	Net Calorific Value of biomass residue type k consumed by the project																
Measured/ Calculated / Default:	Measured and calculated																
Source of data:	Measured in project plant																
Value(s) of monitored parameter:	Please see the columns of NCV_k for each kind of biomass in Table E.6.																
Monitoring equipment:	<p>NCV_k is on site measured by calorimeter.</p> <table border="1"> <tr> <td>Type</td><td>Calorimeter</td></tr> <tr> <td>Location</td><td>Chemical lab</td></tr> <tr> <td>Model</td><td>SDACM3000</td></tr> <tr> <td>Accuracy class</td><td>Qualified</td></tr> <tr> <td>Serial Number</td><td>1406128</td></tr> <tr> <td>Calibration frequency</td><td>Once a year</td></tr> <tr> <td>Calibrated on</td><td>09/01/2009 05/01/2010 04/01/2011 04/04/2011 30/03/2012</td></tr> <tr> <td>Valid date to</td><td>29/03/2013</td></tr> </table>	Type	Calorimeter	Location	Chemical lab	Model	SDACM3000	Accuracy class	Qualified	Serial Number	1406128	Calibration frequency	Once a year	Calibrated on	09/01/2009 05/01/2010 04/01/2011 04/04/2011 30/03/2012	Valid date to	29/03/2013
Type	Calorimeter																
Location	Chemical lab																
Model	SDACM3000																
Accuracy class	Qualified																
Serial Number	1406128																
Calibration frequency	Once a year																
Calibrated on	09/01/2009 05/01/2010 04/01/2011 04/04/2011 30/03/2012																
Valid date to	29/03/2013																
Measuring/ Reading/ Recording frequency:	Monthly measuring and taking at least three samples for each measurement. Meanwhile, the results are read and recorded.																
Calculation method (if applicable):	Mean values calculated for each kind of biomass residues during corresponding month.																
QA/QC procedures:	PO has checked consistency of measurements with public available data, i.e. default values by IPCC ⁴ . There is no significant difference between the measurement results and the default values, so PO did not collect additional information.																
Purpose of data:	Project emission calculation ($PE_{Biomass,CH_4,y}$)																
Additional comment:	-																
Data / Parameter:	AVD_y																
Unit:	km																
Description:	Average return trip distance (from and to) between biomass fuel supply sites and the project site																
Measured/ Calculated / Default:	Measured and calculated																
Source of data:	Records by project participants																
Value(s) of monitored parameter:	Please see the columns of AVD_y in Table E.3.																
Monitoring equipment:	-																

⁴ 2006 IPCC Guidelines for National Greenhouse Gas Inventories, table 1.2, Volume 2 Energy, chapter 1, Page 1.19.

Measuring/ Reading/ Recording frequency:	Recording distance when every truck arrived at project site.
Calculation method (if applicable):	The average value is adopted for each corresponding month.
QA/QC procedures:	PO has checked consistency of distance records in which those distances are provided by the truckers by comparing recorded distances with maps for QA/QC.
Purpose of data:	Project emission calculations (PET _y)
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 measurement
Value(s) of monitored parameter:	98,824
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	Recording distance when every truck arrived at project site.
Calculation method (if applicable):	Monthly data were summarized into monthly summary.
QA/QC procedures:	PP has checked consistency of the number of truck trips with the inventory of combusted biomass and quantity of biomass purchased for QA/QC.
Purpose of data:	Project emission calculations (PET _y)
Additional comment:	-
Data / Parameter:	EF_{km,CO2,y}
Unit:	tCO ₂ /km
Description:	Average CO ₂ emission factor for transportation of biomass with trucks
Measured/ Calculated / Default:	default
Source of data:	IPCC 2006 default value form Moderate Control index for the US heavy Duty Diesel Vehicle.
Value(s) of monitored parameter:	0.001011
Monitoring equipment:	-

Measuring/ Reading/ Recording frequency:	Review annually
Calculation method (if applicable):	-
QA/QC procedures:	The available IPCC default value is used, and has been reviewed for the appropriateness with the latest version of IPCC
Purpose of data:	Project emission calculations (PET _y)
Additional comment:	-
Data / Parameter:	FF_{project plant,i,y}
Unit:	tons
Description:	Quantity of diesel combusted in the biomass residue fired power plant during the year y
Measured/ Calculated / Default:	Measured
Source of data:	Project records from project procurement department of plant
Value(s) of monitored parameter:	0
Monitoring equipment:	According to the actual design, the boiler does not need any diesel for start-ups, so no monitoring equipment has been settled to monitor FF _{project plant,i,y}
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	-
Additional comment:	-
Data / Parameter:	FF_{project site,i,y}
Unit:	tons
Description:	Quantity of diesel combusted at the project site for other purposes that are attributable to the project activity during the year y
Measured/ Calculated / Default:	Measured
Source of data:	Direct measurement and calculation in the procurement department of plant
Value(s) of monitored parameter:	491.80

Monitoring equipment:	<p>The volume of diesel has been continuously monitored by flow meter.</p> <table> <tr> <th>Type</th><th>Flow meter</th></tr> <tr> <td>Location</td><td>Gaotang Petrol station</td></tr> <tr> <td>Model</td><td>CS2000-30CA</td></tr> <tr> <td>Accuracy class</td><td>Qualified</td></tr> <tr> <td>Serial Number</td><td>283992690</td></tr> <tr> <td>Calibration frequency</td><td>Once two years</td></tr> <tr> <td>Calibrated on</td><td>28/07/2007</td></tr> <tr> <td>Valid date to</td><td>27/07/2009</td></tr> <tr> <td>Comments</td><td>This flow meter was no longer used since 01/07/2009</td></tr> </table> <table> <tr> <th>Type</th><th>Flow meter</th></tr> <tr> <td>Location</td><td>Gaotang NBE petrol station</td></tr> <tr> <td>Model</td><td>JDK50C111</td></tr> <tr> <td>Accuracy class</td><td>0.3%</td></tr> <tr> <td>Serial Number</td><td>0606082</td></tr> <tr> <td>Calibration frequency</td><td>Once per year</td></tr> <tr> <td>Calibrated on</td><td>15/06/2009 05/06/2010 17/05/2011 15/05/2012</td></tr> <tr> <td>Valid date to</td><td>14/05/2013</td></tr> <tr> <td>Comments</td><td>This flow meter was used since 01/07/2009</td></tr> </table>	Type	Flow meter	Location	Gaotang Petrol station	Model	CS2000-30CA	Accuracy class	Qualified	Serial Number	283992690	Calibration frequency	Once two years	Calibrated on	28/07/2007	Valid date to	27/07/2009	Comments	This flow meter was no longer used since 01/07/2009	Type	Flow meter	Location	Gaotang NBE petrol station	Model	JDK50C111	Accuracy class	0.3%	Serial Number	0606082	Calibration frequency	Once per year	Calibrated on	15/06/2009 05/06/2010 17/05/2011 15/05/2012	Valid date to	14/05/2013	Comments	This flow meter was used since 01/07/2009
Type	Flow meter																																				
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Calibrated on	15/06/2009 05/06/2010 17/05/2011 15/05/2012																																				
Valid date to	14/05/2013																																				
Comments	This flow meter was used since 01/07/2009																																				
Measuring/ Reading/ Recording frequency:	Measuring continuously and recorded for each corresponding month																																				
Calculation method (if applicable):	<p>The volume of diesel has been multiplied by density of diesel to get the mass quantity of diesel.</p> $FF_{\text{project site},i,y} = \rho_{\text{diesel}} (\text{kg/liter}) * \text{volume flow}(\text{liter})/1000$																																				
QA/QC procedures:	The consistency of metered diesel consumption is crosschecked with purchase receipts.																																				
Purpose of data:	Project emission calculations (PEFF _y)																																				
Additional comment:	-																																				
Data / Parameter:	ρ_{diesel}																																				
Unit:	kg/liter																																				
Description:	Density of diesel																																				
Measured/ Calculated / Default:	Default																																				
Source of data:	The national standard “automobile diesel fuel GB/T 19147-2003”, “automobile diesel fuel GB 19147-2009” and “automobile diesel fuel GB 19147-2013”																																				

Value(s) of monitored parameter:	0.86 before 25/01/2010 according to GB/T 19147-2003; 0.85 after 25/01/2010 according to GB19147-2009 ⁵ and GB19147-2013 .
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	-
QA/QC procedures:	Default value from national standards GB/T 19147-2003, GB19147-2009 and GB19147-2013 are used in corresponding years in this monitoring period, and have been reviewed annually.
Purpose of data:	Project emission calculations (PEFF _y)
Additional comment:	-

Data / Parameter:	EF_{CO2,FF,i}
Unit:	tCO ₂ /GJ
Description:	CO ₂ Emission Factor for fossil fuel type i
Measured/ Calculated / Default:	Default
Source of data:	IPCC 2006 default value (table 1.4, chapter1, volume2: energy)
Value(s) of monitored parameter:	Diesel: 0.0741
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	Review annually
Calculation method (if applicable):	-
QA/QC procedures:	The available IPCC default value are used, and is reviewed for the appropriateness of data annually with latest version of IPCC
Purpose of data:	Project emission calculations (PEFF _y)
Additional comment:	-

Data / Parameter:	NCV_i
Unit:	GJ/ton fossil fuel
Description:	Net Calorific Value of fossil fuels combusted at the project site for other purposes that are attributable to the project activity during the year y

⁵ National standard GB19147-2009 was implemented on 01/01/2010, in which the default value of diesel density was updated to 0.85 kg/liter. To be conservative, the previous value 0.86 kg/liter is applied before 25/01/2010 and 0.85 kg/liter is applied after 25/01/2010.

Measured/ Calculated / Default:	Default
Source of data:	China Energy Statistical Yearbook 2013
Value(s) of monitored parameter:	Diesel : 42.652 GJ/ton
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	-
QA/QC procedures:	PO has checked the consistency of national data with default values by the IPCC, in table 1.2, Chapter 1, volum2 of IPCC 2006 manual, it stated that the Net Calorific Value of diesel is 0.043 TJ/tonne which differs little with China Energy Statistical Yearbook 2013. So, 42.652 GJ/tonne was thought to be suitable and accurate.
Purpose of data:	Project emission calculations (PEFF _y)
Additional comment:	-

Data / Parameter:	NCV_k*EF_{burning,CH4,k,y}
Unit:	tCH ₄ /ton biomass residue
Description:	CH ₄ emission factor for uncontrolled burning of the biomass residue type k during the year y
Measured/ Calculated / Default:	Default
Source of data:	IPCC 2006 default value 0.0027 tCH ₄ /ton is used as NCV _k *EF _{burning,CH4,k,y} , and the conservative factor of 0.73 is applied
Value(s) of monitored parameter:	0.001971
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	Baseline emission calculations (BE _{biomass,y})
Additional comment:	-

Data / Parameter:	EF_{CH4,BF}
Unit:	tCH ₄ /GJ

Description:	CH ₄ emission factor for the combustion of biomass residues in the project plant
Measured/ Calculated / Default:	Default
Source of data:	Default values, as provided in Table3 of ACM0006 (Version4) which sources from 2006 IPCC Guideline, Volume2, Chapter2, Tables 2.2 to 2.6
Value(s) of monitored parameter:	0.0000411
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	The available IPCC default value is used, and has been reviewed for the appropriateness with the latest version of IPCC
Purpose of data:	Project emission calculations ($PE_{\text{biomass,CH}_4,y}$)
Additional comment:	-

Data / Parameter:	EC_{PJ,y}																						
Unit:	MWh																						
Description:	On-site electricity consumption attributable to the project activity during the year y																						
Measured/ Calculated / Default:	Measured																						
Source of data:	Main meter reading at Huixin substation and electricity meters reading at collection stations																						
Value(s) of monitored parameter:	2,377.19																						
Monitoring equipment:	<p>Main meter installed at Huixin Substation was replaced at 25/04/2009 00:00 and 13/01/2011 00:00.</p> <table border="1"> <thead> <tr> <th colspan="2">Electricity meter (Main meter)</th></tr> </thead> <tbody> <tr> <td>Location</td><td>Huixin Substation</td></tr> <tr> <td>Type</td><td>DTSD341</td></tr> <tr> <td>Accuracy class</td><td>0.5</td></tr> <tr> <td>Serial Number</td><td>200306083C0123</td></tr> <tr> <td>Calibration frequency</td><td>Once per year</td></tr> <tr> <td>Calibrated on</td><td>13/03/2009</td></tr> <tr> <td>Valid date to</td><td>12/03/2010</td></tr> <tr> <td>Comments</td><td>This electricity meter was replaced at 25/04/2009 00:00.</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Electricity meter (Main meter)</th></tr> </thead> <tbody> <tr> <td> </td><td> </td></tr> </tbody> </table>	Electricity meter (Main meter)		Location	Huixin Substation	Type	DTSD341	Accuracy class	0.5	Serial Number	200306083C0123	Calibration frequency	Once per year	Calibrated on	13/03/2009	Valid date to	12/03/2010	Comments	This electricity meter was replaced at 25/04/2009 00:00.	Electricity meter (Main meter)			
Electricity meter (Main meter)																							
Location	Huixin Substation																						
Type	DTSD341																						
Accuracy class	0.5																						
Serial Number	200306083C0123																						
Calibration frequency	Once per year																						
Calibrated on	13/03/2009																						
Valid date to	12/03/2010																						
Comments	This electricity meter was replaced at 25/04/2009 00:00.																						
Electricity meter (Main meter)																							

Location	Huixin Substation
Type	DTSD341
Accuracy class	0.5s
Serial Number	95280
Calibration frequency	Once per year
Calibrated on	10/02/2009 09/05/2009 10/04/2010
Valid date to	09/04/2011
Comments	This electricity meter was put into use at 25/04/2009 00:00, and was replaced at 13/01/2011 00:00.

	Electricity meter (Main meter)
Location	Huixin Substation
Type	MK6E
Accuracy class	0.2s
Serial Number	210299720
Calibration frequency	Once per year
Calibrated on	06/01/2011 04/01/2012
Valid date to	03/01/2013
Comments	This electricity meter was put into use at 13/01/2011 00:00.

Electricity meters installed at biomass residues collection stations:

	#1 electricity meter
Location	Qingping collection station
Type	DT862
Accuracy class	2.0
Serial Number	220227
Calibration frequency	Once per five years
Calibrated on	20/09/2006 15/09/2011
Valid date to	14/09/2016

	#2 electricity meter
Location	Fengzhuang collection station
Type	DT862
Accuracy class	2.0
Serial Number	015882
Calibration frequency	Once per three years
Calibrated on	30/09/2006 20/09/2009 13/09/2012
Valid date to	12/09/2015

	#3 electricity meter
Location	Wangxianzhuang collection station
Type	DT862-4
Accuracy class	2.0
Serial Number	483577
Calibration frequency	Once per five years
Calibrated on	25/11/2006

	<table> <tr> <td></td><td>20/11/2011</td></tr> <tr> <td>Valid date to</td><td>19/11/2016</td></tr> </table>		20/11/2011	Valid date to	19/11/2016												
	20/11/2011																
Valid date to	19/11/2016																
	<table> <tr> <td></td><td>#4 electricity meter</td></tr> <tr> <td>Location</td><td>Dongzhuang collection station</td></tr> <tr> <td>Type</td><td>DT862-4</td></tr> <tr> <td>Accuracy class</td><td>2.0</td></tr> <tr> <td>Serial Number</td><td>483477</td></tr> <tr> <td>Calibration frequency</td><td>Once per five years</td></tr> <tr> <td>Calibrated on</td><td>05/11/2007 30/09/2012</td></tr> <tr> <td>Valid date to</td><td>29/09/2017</td></tr> </table>		#4 electricity meter	Location	Dongzhuang collection station	Type	DT862-4	Accuracy class	2.0	Serial Number	483477	Calibration frequency	Once per five years	Calibrated on	05/11/2007 30/09/2012	Valid date to	29/09/2017
	#4 electricity meter																
Location	Dongzhuang collection station																
Type	DT862-4																
Accuracy class	2.0																
Serial Number	483477																
Calibration frequency	Once per five years																
Calibrated on	05/11/2007 30/09/2012																
Valid date to	29/09/2017																
	<table> <tr> <td></td><td>#5 electricity meter</td></tr> <tr> <td>Location</td><td>Tianzhai collection station</td></tr> <tr> <td>Type</td><td>DT862</td></tr> <tr> <td>Accuracy class</td><td>2.0</td></tr> <tr> <td>Serial Number</td><td>220265</td></tr> <tr> <td>Calibration frequency</td><td>Once per three years</td></tr> <tr> <td>Calibrated on</td><td>21/08/2006 19/08/2009 15/08/2012</td></tr> <tr> <td>Valid date to</td><td>14/08/2015</td></tr> </table>		#5 electricity meter	Location	Tianzhai collection station	Type	DT862	Accuracy class	2.0	Serial Number	220265	Calibration frequency	Once per three years	Calibrated on	21/08/2006 19/08/2009 15/08/2012	Valid date to	14/08/2015
	#5 electricity meter																
Location	Tianzhai collection station																
Type	DT862																
Accuracy class	2.0																
Serial Number	220265																
Calibration frequency	Once per three years																
Calibrated on	21/08/2006 19/08/2009 15/08/2012																
Valid date to	14/08/2015																
	<table> <tr> <td></td><td>#6 electricity meter</td></tr> <tr> <td>Location</td><td>Liusi collection station</td></tr> <tr> <td>Type</td><td>DT862</td></tr> <tr> <td>Accuracy class</td><td>2.0</td></tr> <tr> <td>Serial Number</td><td>220220</td></tr> <tr> <td>Calibration frequency</td><td>Once per three years</td></tr> <tr> <td>Calibrated on</td><td>08/10/2006 06/10/2009 30/09/2012</td></tr> <tr> <td>Valid date to</td><td>29/09/2015</td></tr> </table>		#6 electricity meter	Location	Liusi collection station	Type	DT862	Accuracy class	2.0	Serial Number	220220	Calibration frequency	Once per three years	Calibrated on	08/10/2006 06/10/2009 30/09/2012	Valid date to	29/09/2015
	#6 electricity meter																
Location	Liusi collection station																
Type	DT862																
Accuracy class	2.0																
Serial Number	220220																
Calibration frequency	Once per three years																
Calibrated on	08/10/2006 06/10/2009 30/09/2012																
Valid date to	29/09/2015																
	<table> <tr> <td></td><td>#7 electricity meter</td></tr> <tr> <td>Location</td><td>Liangcun collection station</td></tr> <tr> <td>Type</td><td>DT862-4</td></tr> <tr> <td>Accuracy class</td><td>2.0</td></tr> <tr> <td>Serial Number</td><td>0596049</td></tr> <tr> <td>Calibration frequency</td><td>Once per five years</td></tr> <tr> <td>Calibrated on</td><td>05/12/2007 30/09/2012</td></tr> <tr> <td>Valid date to</td><td>29/09/2017</td></tr> </table>		#7 electricity meter	Location	Liangcun collection station	Type	DT862-4	Accuracy class	2.0	Serial Number	0596049	Calibration frequency	Once per five years	Calibrated on	05/12/2007 30/09/2012	Valid date to	29/09/2017
	#7 electricity meter																
Location	Liangcun collection station																
Type	DT862-4																
Accuracy class	2.0																
Serial Number	0596049																
Calibration frequency	Once per five years																
Calibrated on	05/12/2007 30/09/2012																
Valid date to	29/09/2017																
Measuring/ Reading/ Recording frequency:	<p>Electricity consumed by the project plant is continuously on-site measured and monthly recorded by the power distribution company.</p> <p>Electricity consumed by the biomass collection stations is continuously measured by meters installed at the collection stations. It is read and recorded according to the schedule of the power distribution company.</p>																
Calculation method (if applicable):	The seven out site collection stations were not used in this monitoring period and there was no electricity consumed in these stations in this monitoring period.																

	Thus, $EC_{PJ,y}$ = electricity consumption at the project site
QA/QC procedures:	<p>The electricity meter installed at Huixin Substation is operated by the power distribution company and calibrated at least once a year by accredited entity.</p> <p>The monthly metered electricity records have been cross checked by electricity sales receipts.</p> <p>The electricity meters installed at the collection stations are calibrated periodically according to relevant national standards.</p>
Purpose of data:	Project emission calculations ($PE_{EC,y}$)
Additional comment:	-
Data / Parameter:	-
Unit:	Tons
Description:	Quantity of available biomass residues of type k in the region
Measured/ Calculated / Default:	Calculated
Source of data:	Statistics from local governments
Value(s) of monitored parameter:	This is obtained from official data. Please refer to Table E.7 below for more details.
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	Data was obtained from statistic or survey conducted by local government annually.
Calculation method (if applicable):	It is equal to the sum of statistics of available biomass residues which is reported by regional Statistic Bureaus
QA/QC procedures:	The statistic data of biomass in the region was provided by local government which is official and authoritative
Purpose of data:	Leakage emission calculations
Additional comment:	-
Data / Parameter:	-
Unit:	Tons
Description:	Quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region
Measured/ Calculated / Default:	Calculated
Source of data:	Statistics from local governments
Value(s) of monitored parameter:	This is obtained from official data. Please refer to Table E.7 below for more details.

Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	Data was obtained from statistic or survey conducted by local government annually.
Calculation method (if applicable):	Sum of biomass residues utilized out of this project and biomass residues utilized by this project
QA/QC procedures:	The statistic data of biomass in the region was provided by local government which is official and authoritative
Purpose of data:	Leakage emission calculations
Additional comment:	-
D.3. Implementation of sampling plan >> Not applicable.	

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

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

>>

According to the approved change PDD, the emission reductions by the project are calculated as follows:

$$ER_y = ER_{\text{electricity},y} + ER_{\text{heat},y} + BE_{\text{biomass},y} - PE_y - L_y$$

a) Emission reductions due to displacement of electricity ($ER_{\text{electricity},y}$)

$$ER_{\text{electricity},y} = EG_y * EF_{\text{electricity},y}$$

Where:

$ER_{\text{electricity},y}$ are the emission reductions due to displacement of electricity during the year y (tCO₂/yr).

EG_y is the net quantity of electricity delivered to grid in year y.

$EF_{\text{electricity},y}$ is the CO₂ emission factor for the electricity displaced due to the project activity during the year y (tCO₂/ MWh), which is 0.975 tCO₂e/MWh.

$EG_y = 669,244.07\text{MWh}$, please refer to Table E.1 for monthly monitoring data.

Therefore,

$$ER_{\text{electricity},y} = EG_y * EF_{\text{electricity},y} = 669,244.07\text{MWh} * 0.975\text{tCO}_2\text{e/MWh} = 652,512.97\text{tCO}_2\text{e}$$

Table E.1. Monitored data for EG_y

Period	Data from meter reading (MWh)	Data on sales receipt (MWh)	Minimum value of meter reading and sales receipt (MWh)	Data for ERs calculation (MWh)
	D1	E1	F1=MIN(D1,E1)	Before: 13/01/2011 00:00 G1=F1*(1-0.5%); After 13/01/2011 00:00 G1=F1
26/03/2009-24/04/2009	11,254.32	11,254.32	11,254.32	11,198.05
25/04/2009-25/05/2009	7,476.48	7,476.48	7,476.48	7,439.10
26/05/2009-24/06/2009	3,523.08	3,523.08	3,523.08	3,505.46
25/06/2009-25/07/2009	16,049.88	16,049.88	16,049.88	15,969.63
26/07/2009-25/08/2009	16,476.24	16,476.24	16,476.24	16,393.86
26/08/2009-24/09/2009	15,814.92	15,814.92	15,814.92	15,735.85
25/09/2009-25/10/2009	19,217.88	19,217.88	19,217.88	19,121.79
26/10/2009-24/11/2009	15,434.76	15,434.76	15,434.76	15,357.59
25/11/2009-25/12/2009	18,812.64	18,812.64	18,812.64	18,718.58
26/12/2009-25/01/2010	16,209.60	16,209.60	16,209.60	16,128.55
26/01/2010-22/02/2010	14,337.84	14,337.84	14,337.84	14,266.15
23/02/2010-25/03/2010	14,089.68	14,089.68	14,089.68	14,019.23
26/03/2010-24/04/2010	16,521.12	16,521.12	16,521.12	16,438.51
25/04/2010-25/05/2010	16,107.96	16,107.96	16,107.96	16,027.42
26/05/2010-24/06/2010	18,692.52	18,692.52	18,692.52	18,599.06
25/06/2010-25/07/2010	15,400.44	15,400.44	15,400.44	15,323.44
26/07/2010-25/08/2010	15,405.72	15,405.72	15,405.72	15,328.69
26/08/2010-24/09/2010	14,083.08	14,083.08	14,083.08	14,012.66
25/09/2010-25/10/2010	15,558.84	15,558.84	15,558.84	15,481.05
26/10/2010-24/11/2010	17,590.32	17,590.32	17,590.32	17,502.37
25/11/2010-25/12/2010	15,874.32	15,874.32	15,874.32	15,794.95

26/12/2010-12/01/2011	7,597.92	7,597.92	7,597.92	7,559.93
13/01/2011-24/01/2011	4,285.91	4,285.91	4,285.91	4,285.91
25/01/2011-22/02/2011	16,193.36	16,193.36	16,193.36	16,193.36
23/02/2011-24/03/2011	15,452.98	15,452.98	15,452.98	15,452.98
25/03/2011-24/04/2011	18,316.98	18,316.98	18,316.98	18,316.98
25/04/2011-24/05/2011	16,753.57	16,753.57	16,753.57	16,753.57
25/05/2011-24/06/2011	12,446.28	12,446.28	12,446.28	12,446.28
25/06/2011-24/07/2011	16,453.80	16,453.80	16,453.80	16,453.80
25/07/2011-24/08/2011	14,160.96	14,160.96	14,160.96	14,160.96
25/08/2011-24/09/2011	16,014.24	16,014.24	16,014.24	16,014.24
25/09/2011-24/10/2011	12,669.36	12,669.36	12,669.36	12,669.36
25/10/2011-24/11/2011	15,750.24	15,750.24	15,750.24	15,750.24
25/11/2011-25/12/2011	11,501.16	11,501.16	11,501.16	11,501.16
26/12/2011-25/01/2012	14,205.84	14,205.84	14,205.84	14,205.84
26/01/2012-24/02/2012	14,494.92	14,494.92	14,494.92	14,494.92
25/02/2012-25/03/2012	13,518.12	13,518.12	13,518.12	13,518.12
26/03/2012-24/04/2012	13,192.08	13,192.08	13,192.08	13,192.08
25/04/2012-25/05/2012	18,161.88	18,161.88	18,161.88	18,161.88
26/05/2012-24/06/2012	16,096.08	16,096.08	16,096.08	16,096.08
25/06/2012-25/07/2012	11,148.72	11,148.72	11,148.72	11,148.72
26/07/2012-25/08/2012	15,643.32	15,643.32	15,643.32	15,643.32
26/08/2012-24/09/2012	15,441.36	15,441.36	15,441.36	15,441.36
25/09/2012-25/10/2012	13,960.32	13,960.32	13,960.32	13,960.32
26/10/2012-24/11/2012	15,015.00	15,015.00	15,015.00	15,015.00
25/11/2012-25/12/2012	18,445.68	18,445.68	18,445.68	18,445.68
Total				669,244.07

b) Emission reductions due to displacement of heat ($ER_{heat,y}$)

Emission reductions due to displacement of heat ($ER_{heat,y}$) is not considered for the project. Therefore, $ER_{heat,y} = 0 \text{ tCO}_2\text{e}$

c) Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues ($BE_{biomass,y}$)

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

Where:

$BE_{biomass,y}$ is baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO₂e/year).

GWP_{CH_4} is the Global Warming Potential for methane valid for the relevant commitment period which is determined in the PDD as 21 tCO₂/tCH₄.

NCV_k is the net calorific value of the biomass residue type k in GJ per tons of dry matters.

$BF_{PJ,k,y}$ is the incremental quantity of biomass residue type k used as fuel in the project plant during the year y in tons.

$EF_{burning,CH_4,k,y}$ is the CH₄ emission factor for uncontrolled burning of the biomass residue type k in tCH₄/GJ.

According to the changed PDD, $NCV_k * EF_{burning,CH_4,k,y} = 0.001971 \text{ tCH}_4/\text{ton}$.

$$\sum_k \text{BF}_{\text{PJ}, k, y} = \text{BF1} + \text{BF2} + \text{BF3}^6 = 365,871\text{t} + 184,745\text{t} + 18,079\text{t} = 568,696\text{ t}$$

Please refer to Table E.2 for monthly monitoring data.

Therefore,

$$\text{BE}_{\text{biomass}, y} = \text{GWP}_{\text{CH}_4} * \sum_k \text{BF}_{\text{PJ}, k, y} * \text{NCV}_k * \text{EF}_{\text{burning}, \text{CH}_4, k, y}$$

$$= 21\text{tCO}_2/\text{tCH}_4 * 568,696\text{t} * 0.001971\text{tCH}_4/\text{ton} = 23,538.88\text{ tCO}_2\text{e}$$

Table E.2. Monitored data for $\sum_k \text{BF}_{\text{PJ}, k, y}$

Period	BF1, wet base (t)	Moist ure 1 (%)	BF1, dry base (t)	BF2, wet base (t)	Moist ure 2 (%)	BF2, dry base (t)	BF3, wet base (t)	Moist ure 3 (%)	BF3, dry base (t)
	K1	L1	M1=K1*(1-L1/100)	K2	L2	M2=K2*(1-L2/100)	K3	L3	M3=K3*(1-L3/100)
26/03/2009-24/04/2009	2,077	16.55	1,733	8,210	24.27	6,218	511	15.98	429
25/04/2009-25/05/2009	3,994	15.67	3,368	2,875	21.31	2,262	758	11.31	672
26/05/2009-24/06/2009	1,335	18.12	1,093	2,391	30.99	1,650	49	9.21	44
25/06/2009-25/07/2009	9,131	19.72	7,330	5,989	20.05	4,788	1,675	27.02	1,222
26/07/2009-25/08/2009	14,804	24.23	11,217	1,448	20.62	1,149	1,705	16.03	1,432
26/08/2009-24/09/2009	13,299	22.69	10,282	2,608	24.37	1,973	977	15.79	823
25/09/2009-25/10/2009	14,075	20.93	11,129	3,642	22.53	2,821	1,584	14.89	1,348
26/10/2009-24/11/2009	9,599	23.23	7,369	5,376	24.32	4,068	1,585	13.43	1,372
25/11/2009-25/12/2009	15,999	26.93	11,690	4,382	24.18	3,322	658	15.28	557
26/12/2009-25/01/2010	13,191	19.91	10,565	1,309	34.41	859	1,335	24.05	1,014
26/01/2010-22/02/2010	10,422	22.69	8,058	3,067	37.16	1,927	1,181	21.55	926
23/02/2010-25/03/2010	9,577	24.85	7,197	4,704	32.60	3,171	1,189	25.36	888
26/03/2010-24/04/2010	7,372	20.82	5,837	9,720	28.31	6,968	934	25.59	695
25/04/2010-25/05/2010	7,415	17.83	6,093	7,515	24.04	5,708	905	23.73	690
26/05/2010-24/06/2010	13,905	20.78	11,016	4,237	21.30	3,334	1,194	23.15	918
25/06/2010-25/07/2010	11,463	19.00	9,285	5,001	31.27	3,437	1,147	24.52	866
26/07/2010-25/08/2010	10,328	28.33	7,402	8,148	30.52	5,661	1,150	30.52	799
26/08/2010-24/09/2010	8,189	18.42	6,681	7,989	38.44	4,918	141	25.48	105
25/09/2010-25/10/2010	8,369	38.87	5,116	13,418	38.46	8,258	0	25.50	0
26/10/2010-24/11/2010	10,141	30.86	7,011	12,830	35.58	8,266	0	25.48	0
25/11/2010-25/12/2010	11,429	27.05	8,338	10,090	37.81	6,275	0	25.77	0
26/12/2010-24/01/2011	14,066	24.63	10,602	2,014	36.64	1,276	0	26.21	0
25/01/2011-22/02/2011	19,465	20.93	15,392	1,738	33.94	1,148	0	27.98	0
23/02/2011-24/03/2011	10,976	23.36	8,412	8,009	38.43	4,931	0	34.85	0
25/03/2011-24/04/2011	7,501	28.58	5,357	15,621	33.81	10,339	40	33.81	26
25/04/2011-24/05/2011	7,354	29.95	5,152	13,401	32.23	9,082	25	32.23	17
25/05/2011-24/06/2011	6,617	31.30	4,546	9,413	35.61	6,061	50	35.61	32
25/06/2011-24/07/2011	9,143	30.06	6,395	11,509	33.13	7,696	20	33.13	13
25/07/2011-24/08/2011	8,308	29.31	5,873	9,171	31.89	6,246	170	31.89	116
25/08/2011-24/09/2011	6,045	32.30	4,093	13,562	30.76	9,390	0	33.59	0

⁶ BF₁=Cotton straw; BF₂=Wood residues; BF₃=Wheat bran

25/09/2011-24/10/2011	9,153	29.70	6,434	6,239	29.07	4,425	0	33.38	0
25/10/2011-24/11/2011	15,548	28.75	11,078	3,906	31.86	2,662	280	28.43	200
25/11/2011-25/12/2011	11,748	29.36	8,299	2,346	34.49	1,537	0	32.67	0
26/12/2011-25/01/2012	10,006	23.65	7,640	5,796	32.98	3,884	302	26.66	221
26/01/2012-24/02/2012	9,897	21.41	7,778	5,627	30.91	3,888	228	33.93	151
25/02/2012-25/03/2012	7,995	23.97	6,079	6,664	26.30	4,911	0	12.67	0
26/03/2012-24/04/2012	6,790	25.83	5,036	8,233	27.83	5,942	0	14.29	0
25/04/2012-25/05/2012	14,218	32.49	9,598	8,956	32.49	6,046	0	14.19	0
26/05/2012-24/06/2012	13,621	28.52	9,737	6,508	31.36	4,467	0	13.20	0
25/06/2012-25/07/2012	7,694	30.37	5,357	5,397	30.31	3,761	490	10.18	440
26/07/2012-25/08/2012	20,197	33.50	13,432	0	29.87	0	0	11.20	0
26/08/2012-24/09/2012	19,745	32.33	13,360	0	34.67	0	0	14.82	0
25/09/2012-25/10/2012	15,884	27.21	11,562	0	30.91	0	0	20.71	0
26/10/2012-24/11/2012	17,209	26.42	12,663	14	36.41	9	0	27.82	0
25/11/2012-25/12/2012	18,737	24.27	14,189	17	33.79	11	2,882	28.50	2,061
Total			365,871			184,745			18,079

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

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According to the approved changed PDD, project emissions GHG emissions from the project activity in year y are calculated on the following equation:

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

Where:

PE_y are project CO₂ emissions during the year y (tCO₂e/year),

PET_y are CO₂ emissions during the year y due to transportation of the biomass to the project plant (tCO₂e/year),

$PEFF_y$ are the CO₂ emissions during the year y due to fossil fuels co-fired by the generation facility or other fossil fuels consumption at the project site that is attributable to the project activity (tCO₂e/year),

$PE_{EC,y}$ are the CO₂ emissions during the year y due to electricity consumption at the project that is attributable to the project activity (tCO₂e/year).

GWP_{CH_4} is the Global Warming Potential for methane valid for the relevant commitment period,

$PE_{biomass,CH_4,y}$ is the CH₄ emissions from the combustion of biomass residues during the year y (tCH₄/year).

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

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

Where:

PET_y are CO₂ emissions during the year y due to transport of biomass residues to the project plant (tCO₂e/year)

AVD_y is the 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)

$EF_{km,CO_2,y}$ is the average CO₂ emission factor for the trucks measured during the year y (tCO₂e/km)

N_y is the number of truck trips during the year y

According to the data in Table E.3,

$$PET_y = 5,444.19 \text{ tCO}_2\text{e}$$

Table E.3. Monitored data and calculation for PET_y

Period	N _y	AVD _y (km)	EF _{km,CO2} (tCO ₂ /km)	PET _y (tCO ₂ e)
	T	U	V	W=T*U*V
26/03/2009-24/04/2009	2,045	44.89	0.001011	92.81
25/04/2009-25/05/2009	1,135	44.13	0.001011	50.63
26/05/2009-24/06/2009	665	52.86	0.001011	35.54
25/06/2009-25/07/2009	1,099	53.31	0.001011	59.23
26/07/2009-25/08/2009	1,868	59.36	0.001011	112.10
26/08/2009-24/09/2009	2,080	70.07	0.001011	147.34
25/09/2009-25/10/2009	2,221	55.84	0.001011	125.39
26/10/2009-24/11/2009	1,570	52.12	0.001011	82.72
25/11/2009-25/12/2009	3,885	58.34	0.001011	229.13
26/12/2009-25/01/2010	4,705	54.03	0.001011	257.01
26/01/2010-22/02/2010	2,765	47.99	0.001011	134.14
23/02/2010-25/03/2010	3,395	53.56	0.001011	183.84
26/03/2010-24/04/2010	1,304	50.25	0.001011	66.25
25/04/2010-25/05/2010	1,075	60.68	0.001011	65.95
26/05/2010-24/06/2010	886	59.46	0.001011	53.26
25/06/2010-25/07/2010	1,968	71.72	0.001011	142.69
26/07/2010-25/08/2010	756	75.85	0.001011	57.97
26/08/2010-24/09/2010	1,102	78.92	0.001011	87.93
25/09/2010-25/10/2010	2,363	73.10	0.001011	174.64
26/10/2010-24/11/2010	1,066	52.63	0.001011	56.72
25/11/2010-25/12/2010	2,465	61.48	0.001011	153.22
26/12/2010-24/01/2011	3,619	47.41	0.001011	173.46
25/01/2011-22/02/2011	1,012	46.35	0.001011	47.43
23/02/2011-24/03/2011	2,398	57.81	0.001011	140.15
25/03/2011-24/04/2011	2,412	54.78	0.001011	133.59
25/04/2011-24/05/2011	1,743	62.96	0.001011	110.94
25/05/2011-24/06/2011	779	63.56	0.001011	50.06
25/06/2011-24/07/2011	663	64.40	0.001011	43.17
25/07/2011-24/08/2011	956	62.01	0.001011	59.94
25/08/2011-24/09/2011	1,209	44.23	0.001011	54.06
25/09/2011-24/10/2011	11,402	22.43	0.001011	258.59
25/10/2011-24/11/2011	10,681	43.03	0.001011	464.61
25/11/2011-25/12/2011	4,035	54.50	0.001011	222.31
26/12/2011-25/01/2012	1,822	70.19	0.001011	129.30
26/01/2012-24/02/2012	1,084	65.68	0.001011	71.98
25/02/2012-25/03/2012	2,812	68.38	0.001011	194.40
26/03/2012-24/04/2012	1,793	66.94	0.001011	121.34
25/04/2012-25/05/2012	998	82.43	0.001011	83.17
26/05/2012-24/06/2012	878	78.09	0.001011	69.32
25/06/2012-25/07/2012	1,033	80.95	0.001011	84.54
26/07/2012-25/08/2012	1,212	80.33	0.001011	98.43
26/08/2012-24/09/2012	1,123	86.51	0.001011	98.22
25/09/2012-25/10/2012	1,384	75.27	0.001011	105.31
26/10/2012-24/11/2012	1,850	80.23	0.001011	150.06
25/11/2012-25/12/2012	1,508	72.99	0.001011	111.28

Total	98,824		5,444.19
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b) Carbon dioxide emissions from fossil fuel consumption in the power plant ($PEFF_y$)

Following ACM0006 version 04 in the PDD, the project owner established the formulae for calculating the emissions from fossil fuel use in the project plant, using the quantity of each fuel combusted and the appropriate emissions coefficient, as follows:

$$PEFF_y = \Sigma (FF_{project\ plant,i,y} + FF_{project\ site,i,y}) * NCV_i * EF_{co2,FF,i}$$

Where:

$PEFF_y$ are CO₂ emissions from on-site consumption of fossil fuels in the biomass power plant during the year y in tons of CO₂ equivalents (tCO₂/yr),

$FF_{project, plant,i,y}$ is the quantity of fossil fuel type i combusted in the project plant during the year y (ton/year), which is 0 in this project,

$FF_{project, site,i,y}$ is the quantity of fossil fuel type i combusted at the project site during the year y (ton/year),

NCV_i is the Net calorific value of diesel (GJ/ton), which is 42.652 GJ/ton,

$EF_{co2,FF,i}$ is CO₂ emission factor for the diesel (tCO₂/GJ), which is 0.0741 tCO₂/GJ.

There is no fossil fuel was combusted as auxiliary fuel for boiler start up, thus,

$$FF_{project\ plant,i,y} = 0 \text{ tCO}_2$$

$FF_{project, site,i,y} = 491.80 \text{ t}$, please refer to Table E.4 for monthly monitoring data.

Therefore, $PEFF_y = \Sigma (FF_{project\ plant,i,y} + FF_{project\ site,i,y}) * NCV_i * EF_{co2,FF,i}$

$$= (0 \text{ t} + 491.80 \text{ t}) * 42.652 \text{ GJ/ton} * 0.0741 \text{ tCO}_2/\text{GJ} = 1,554.35 \text{ tCO}_2 \text{e}$$

Table E.4 Monitored data for $FF_{project, site,i,y}$

Period	Volume (liter)	ρ_{diesel} (kg/liter)	$FF_{project\ site,i,y}$ (t)
	Y2	Z2	X2=Y2*Z2/1000
26/03/2009-24/04/2009	5,947	0.86	5.11
25/04/2009-25/05/2009	6,080	0.86	5.23
26/05/2009-24/06/2009	3,680	0.86	3.16
25/06/2009-25/07/2009	7,096	0.86	6.10
26/07/2009-25/08/2009	8,040	0.86	6.91
26/08/2009-24/09/2009	9,870	0.86	8.49
25/09/2009-25/10/2009	10,376	0.86	8.92
26/10/2009-24/11/2009	9,037	0.86	7.77
25/11/2009-25/12/2009	10,226	0.86	8.79
26/12/2009-25/01/2010	10,715	0.86	9.21
26/01/2010-22/02/2010	8,895	0.85	7.56
23/02/2010-25/03/2010	11,244	0.85	9.56
26/03/2010-24/04/2010	12,606	0.85	10.72
25/04/2010-25/05/2010	13,258	0.85	11.27
26/05/2010-24/06/2010	11,060	0.85	9.40
25/06/2010-25/07/2010	17,799	0.85	15.13
26/07/2010-25/08/2010	12,556	0.85	10.67
26/08/2010-24/09/2010	10,337	0.85	8.79
25/09/2010-25/10/2010	9,070	0.85	7.71
26/10/2010-24/11/2010	8,683	0.85	7.38

25/11/2010-25/12/2010	9,618	0.85	8.18
26/12/2010-24/01/2011	8,990	0.85	7.64
25/01/2011-22/02/2011	11,001	0.85	9.35
23/02/2011-24/03/2011	10,457	0.85	8.89
25/03/2011-24/04/2011	15,676	0.85	13.32
25/04/2011-24/05/2011	17,857	0.85	15.18
25/05/2011-24/06/2011	16,227	0.85	13.79
25/06/2011-24/07/2011	17,490	0.85	14.87
25/07/2011-24/08/2011	17,825	0.85	15.15
25/08/2011-24/09/2011	17,893	0.85	15.21
25/09/2011-24/10/2011	15,767	0.85	13.40
25/10/2011-24/11/2011	18,070	0.85	15.36
25/11/2011-25/12/2011	17,548	0.85	14.92
26/12/2011-25/01/2012	15,624	0.85	13.28
26/01/2012-24/02/2012	9,651	0.85	8.20
25/02/2012-25/03/2012	14,008	0.85	11.91
26/03/2012-24/04/2012	15,517	0.85	13.19
25/04/2012-25/05/2012	18,617	0.85	15.82
26/05/2012-24/06/2012	14,814	0.85	12.59
25/06/2012-25/07/2012	14,749	0.85	12.54
26/07/2012-25/08/2012	16,978	0.85	14.43
26/08/2012-24/09/2012	17,816	0.85	15.14
25/09/2012-25/10/2012	15,383	0.85	13.08
26/10/2012-24/11/2012	19,203	0.85	16.32
25/11/2012-25/12/2012	14,283	0.85	12.14
Total			491.80

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

$$PE_{EC,y} = EC_{PJ,y} * EF_{grid,y}$$

Where:

$PE_{EC,y}$ are CO₂ emissions from on-site electricity consumption attributable to the project activity (tCO₂e/year) .

$EC_{PJ,y}$ is the on-site electricity attributable to the project activity during the year y (MWh),

$EF_{grid,y}$ is the CO₂ emission factor for grid electricity during the year y (tCO₂/ MWh), which is 0.975 tCO₂e/MWh.

Since the seven out site collection stations were not used in this monitoring period and there was no electricity consumed in these stations in this monitoring period. $EC_{PJ,y}$ = electricity consumption at the project site measured by main meter installed at Huixin Substation.

$EC_{PJ,y}$ = 2,377.19MWh, please refer to Table E.5 for monthly monitoring data. Therefore

$$PE_{EC,y} = EC_{PJ,y} * EF_{grid,y} = 2,377.19MWh * 0.975tCO_2e/MWh = 2,317.76tCO_2e$$

Table E.5. Monitored data for $EC_{PJ,y}$

Period	Data from meter reading (MWh)	Data on Sales Receipt (MWh)	Maximum value of meter reading and sales receipt (MWh)	Data for ERs calculation (MWh)
	D2	E2	F2=MAX(D2,E2)	G2=F2
26/03/2009-24/04/2009	42.24	42.24	42.24	42.24
25/04/2009-25/05/2009	48.84	48.84	48.84	48.84
26/05/2009-24/06/2009	72.60	72.60	72.60	72.60
25/06/2009-25/07/2009	13.20	13.20	13.20	13.20
26/07/2009-25/08/2009	47.52	47.52	47.52	47.52
26/08/2009-24/09/2009	52.80	52.80	52.80	52.80
25/09/2009-25/10/2009	0.00	0.00	0.00	0.00
26/10/2009-24/11/2009	85.80	85.80	85.80	85.80
25/11/2009-25/12/2009	39.60	39.60	39.60	39.60
26/12/2009-25/01/2010	108.24	108.24	108.24	108.24
26/01/2010-22/02/2010	26.40	26.40	26.40	26.40
23/02/2010-25/03/2010	96.36	96.36	96.36	96.36
26/03/2010-24/04/2010	47.52	47.52	47.52	47.52
25/04/2010-25/05/2010	34.32	34.32	34.32	34.32
26/05/2010-24/06/2010	0.00	0.00	0.00	0.00
25/06/2010-25/07/2010	67.32	67.32	67.32	67.32
26/07/2010-25/08/2010	46.20	46.20	46.20	46.20
26/08/2010-24/09/2010	64.68	64.68	64.68	64.68
25/09/2010-25/10/2010	62.04	62.04	62.04	62.04
26/10/2010-24/11/2010	0.00	0.00	0.00	0.00
25/11/2010-25/12/2010	60.72	60.72	60.72	60.72
26/12/2010-12/01/2011	102.96	102.96	102.96	102.96
13/01/2011-24/01/2011	116.16	116.16	116.16	116.16
25/01/2011-22/02/2011	0.00	0.00	0.00	0.00
23/02/2011-24/03/2011	59.80	59.80	59.80	59.80
25/03/2011-24/04/2011	0.00	0.00	0.00	0.00
25/04/2011-24/05/2011	0.00	0.00	0.00	0.00
25/05/2011-24/06/2011	144.80	144.80	144.80	144.80
25/06/2011-24/07/2011	7.52	7.52	7.52	7.52
25/07/2011-24/08/2011	98.08	98.08	98.08	98.08
25/08/2011-24/09/2011	0.00	0.00	0.00	0.00
25/09/2011-24/10/2011	118.93	118.93	118.93	118.93
25/10/2011-24/11/2011	0.26	0.26	0.26	0.26
25/11/2011-25/12/2011	157.21	157.21	157.21	157.21
26/12/2011-25/01/2012	11.62	11.62	11.62	11.62
26/01/2012-24/02/2012	22.70	22.70	22.70	22.70
25/02/2012-25/03/2012	69.30	69.30	69.30	69.30
26/03/2012-24/04/2012	81.84	81.84	81.84	81.84
25/04/2012-25/05/2012	0.00	0.00	0.00	0.00

26/05/2012-24/06/2012	38.28	38.28	38.28	38.28
25/06/2012-25/07/2012	157.08	157.08	157.08	157.08
26/07/2012-25/08/2012	18.48	18.48	18.48	18.48
26/08/2012-24/09/2012	0.00	0.00	0.00	0.00
25/09/2012-25/10/2012	73.92	73.92	73.92	73.92
26/10/2012-24/11/2012	81.84	81.84	81.84	81.84
25/11/2012-25/12/2012	0.00	0.00	0.00	0.00
Total				2,377.19

d) Methane emissions from combustion of biomass residues ($PE_{\text{biomass,CH}_4,y}$)

$$PE_{\text{biomass,CH}_4,y} = EF_{\text{CH}_4,BF} * \sum_k BF_{k,y} * NCV_k$$

Where:

$PE_{\text{biomass,CH}_4,y}$ are the project emissions from biomass controlled burning (tCO₂e/year) ,

$BF_{k,y}$ is the quantity of the biomass residues used as fuel in the project plant during the year y in tons

NCV_k is the net calorific value of the biomass residues type k in GJ per ton, and

$EF_{\text{CH}_4,BF}$ is the CH₄ emission factor for controlled burning of the biomass residues in tCH₄/TJ, which is 0.0000411 tCH₄/GJ.

$PE_{\text{biomass,CH}_4,y} = 365.43tCH_4$, please refer to Table E.6 for details.

Table E.6. Monitoring data and calculation of $PE_{\text{biomass,CH}_4,y}$

Period	BF1, dry base (t)	BF2, dry base (t)	BF3, dry base (t)	NCV1, dry base (GJ/t)	NCV2, dry base (GJ/t)	NCV3, dry base (GJ/t)	$EF_{\text{CH}_4,BF}$ (tCH ₄ /GJ)	$PE_{\text{biomass,CH}_4,y}$ (tCH ₄)
	M1	M2	M3	Q1	Q2	Q3	R	$S=R*(M1*Q1+M2*Q2+M3*Q3)$
26/03/2009-24/04/2009	1,733	6,218	429	16.94	18.27	14.27	0.0000411	6.13
25/04/2009-25/05/2009	3,368	2,262	672	14.98	17.68	12.83	0.0000411	4.07
26/05/2009-24/06/2009	1,093	1,650	44	16.10	17.34	10.57	0.0000411	1.92
25/06/2009-25/07/2009	7,330	4,788	1,222	16.63	16.66	9.05	0.0000411	8.74
26/07/2009-25/08/2009	11,217	1,149	1,432	16.25	15.62	12.61	0.0000411	8.97
26/08/2009-24/09/2009	10,282	1,973	823	16.48	15.09	12.77	0.0000411	8.62
25/09/2009-25/10/2009	11,129	2,821	1,348	16.96	17.29	12.76	0.0000411	10.47
26/10/2009-24/11/2009	7,369	4,068	1,372	17.12	15.55	11.12	0.0000411	8.41
25/11/2009-25/12/2009	11,690	3,322	557	15.80	17.44	12.17	0.0000411	10.25
26/12/2009-25/01/2010	10,565	859	1,014	17.17	18.01	17.64	0.0000411	8.83
26/01/2010-22/02/2010	8,058	1,927	926	18.28	18.26	8.16	0.0000411	7.81
23/02/2010-25/03/2010	7,197	3,171	888	17.09	16.53	12.77	0.0000411	7.67
26/03/2010-24/04/2010	5,837	6,968	695	15.56	16.98	14.03	0.0000411	9.00
25/04/2010-25/05/2010	6,093	5,708	690	17.10	18.23	7.61	0.0000411	8.78
26/05/2010-24/06/2010	11,016	3,334	918	16.28	16.66	13.88	0.0000411	10.18
25/06/2010-25/07/2010	9,285	3,437	866	14.75	16.48	12.11	0.0000411	8.39
26/07/2010-25/08/2010	7,402	5,661	799	13.98	16.22	11.21	0.0000411	8.40
26/08/2010-24/09/2010	6,681	4,918	105	16.39	15.43	11.94	0.0000411	7.67
25/09/2010-25/10/2010	5,116	8,258	0	14.58	15.94	11.80	0.0000411	8.47
26/10/2010-24/11/2010	7,011	8,266	0	15.24	15.28	11.43	0.0000411	9.58
25/11/2010-25/12/2010	8,338	6,275	0	13.29	15.86	12.06	0.0000411	8.65

26/12/2010-24/01/2011	10,602	1,276	0	12.97	15.67	11.76	0.0000411	6.47
25/01/2011-22/02/2011	15,392	1,148	0	12.85	14.68	12.10	0.0000411	8.82
23/02/2011-24/03/2011	8,412	4,931	0	14.91	16.19	11.65	0.0000411	8.43
25/03/2011-24/04/2011	5,357	10,339	26	14.68	15.85	11.26	0.0000411	9.98
25/04/2011-24/05/2011	5,152	9,082	17	14.80	16.03	11.99	0.0000411	9.12
25/05/2011-24/06/2011	4,546	6,061	32	14.56	16.24	11.91	0.0000411	6.78
25/06/2011-24/07/2011	6,395	7,696	13	14.77	16.05	10.88	0.0000411	8.96
25/07/2011-24/08/2011	5,873	6,246	116	14.70	16.02	11.23	0.0000411	7.71
25/08/2011-24/09/2011	4,093	9,390	0	14.60	16.24	11.49	0.0000411	8.72
25/09/2011-24/10/2011	6,434	4,425	0	15.03	16.09	11.46	0.0000411	6.90
25/10/2011-24/11/2011	11,078	2,662	200	14.86	15.95	8.25	0.0000411	8.58
25/11/2011-25/12/2011	8,299	1,537	0	15.39	16.05	10.87	0.0000411	6.26
26/12/2011-25/01/2012	7,640	3,884	221	15.75	16.90	10.33	0.0000411	7.74
26/01/2012-24/02/2012	7,778	3,888	151	16.10	16.81	9.98	0.0000411	7.89
25/02/2012-25/03/2012	6,079	4,911	0	16.21	16.42	10.44	0.0000411	7.36
26/03/2012-24/04/2012	5,036	5,942	0	15.62	16.19	10.80	0.0000411	7.19
25/04/2012-25/05/2012	9,598	6,046	0	15.14	15.76	10.69	0.0000411	9.89
26/05/2012-24/06/2012	9,737	4,467	0	14.94	15.18	10.33	0.0000411	8.77
25/06/2012-25/07/2012	5,357	3,761	440	15.34	16.21	10.51	0.0000411	6.07
26/07/2012-25/08/2012	13,432	0	0	15.43	16.09	11.30	0.0000411	8.52
26/08/2012-24/09/2012	13,360	0	0	15.31	16.78	9.84	0.0000411	8.41
25/09/2012-25/10/2012	11,562	0	0	16.00	15.98	11.29	0.0000411	7.60
26/10/2012-24/11/2012	12,663	9	0	15.70	15.90	10.39	0.0000411	8.18
25/11/2012-25/12/2012	14,189	11	2,061	15.83	16.12	9.51	0.0000411	10.05
Total								365.43

$$PE_v = PET_v + PEFF_v + PE_{EC,v} + GWP_{CH_4} * PE_{biomass,CH_4,v}$$

$$= 5,444.19tCO_2e + 1,554.35tCO_2e + 2,317.76tCO_2e + 365.43tCH_4 * 21 tCO_2e/tCH_4 = 16,990.27 tCO_2e$$

E.3. Calculation of leakage

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The data of available biomass and biomass utilized out of the project in the region covering a radius of 50km around the project activity was calculated from official data provided by local government, i.e. Statistic Bureaus of Gaotang County, Xiajin County, Guan County, Linqing County, Pingyuan County, Wucheng County, Yucheng County and Chiping County. Please refer to Table E.7 for details.

Table E.7 Demonstration of abundant surplus of biomass availability

Year		Cotton Straw	Wood residues	Wheat bran
2009	Annual available amount (10 ⁴ tonnes)	98.00	124.70	9.21
	Other use, excluding the Project (10 ⁴ tonnes)	19.70	31.20	1.44
	Biomass utilized by the project (10 ⁴ tonnes)	12.01	8.51	1.47
	Total biomass utilized, including the project	31.71	39.71	2.91
	(Available Biomass/Total biomass utilized) -100%	209%	214%	216%

	Abundant surplus? (more than 25%)	Yes	Yes	Yes
2010	Annual available amount (10 ⁴ tonnes)	99.50	123.50	9.35
	Other use, excluding the Project (10 ⁴ tonnes)	20.30	31.70	1.39
	Biomass utilized by the project (10 ⁴ tonnes)	12.18	8.80	0.92
	Total biomass utilized, including the project	32.48	40.50	2.31
	Available Biomass/Total biomass utilized -100%	206%	205%	305%
	Abundant surplus? (more than 25%)	Yes	Yes	Yes
2011	Annual available amount (10 ⁴ tonnes)	100.50	124.40	9.44
	Other use, excluding the Project (10 ⁴ tonnes)	21.20	31.70	1.41
	Biomass utilized by the project (10 ⁴ tonnes)	12.59	9.69	0.06
	Total biomass utilized, including the project	33.79	41.39	1.47
	Available Biomass/Total biomass utilized -100%	197%	201%	543%
	Abundant surplus? (more than 25%)	Yes	Yes	Yes
2012	Annual available amount (10 ⁴ tonnes)	100.60	123.40	9.78
	Other use, excluding the Project (10 ⁴ tonnes)	20.81	33.15	1.42
	Biomass utilized by the project (10 ⁴ tonnes)	16.20	4.72	0.39
	Total biomass utilized, including the project	37.01	37.87	1.81
	Available Biomass/Total biomass utilized -100%	172%	226%	440%
	Abundant surplus? (more than 25%)	Yes	Yes	Yes

From Table E.7, it can be concluded that the available quantity of biomass in the region in year 2009~2012 is 25% larger than the quantity of biomass that is utilized, including the project.

Therefore, according to the approved changed PDD,

$$L_v = 0tCO_2e$$

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

The project achieves the GHG emissions by the way of CO₂ emission reductions through the substitution of electricity generation in North China Grid (NCG), CH₄ emission reductions from a reduction of natural decay or uncontrolled burning of biomass ($ER_{\text{electricity},y}$, $BE_{\text{biomass},y}$) by deducting the project emissions (PE_y) and leakage emissions (L_y).

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)		Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
	ER _{electricity,y} (t CO ₂ e)	BE _{biomass,y} (t CO ₂ e)	PE _y	L _y	ER _y
Total	652,512.97	23,538.88	16,990.27	0	659,061

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

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO₂e)	528,473⁷	528,473

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

>>

The total emission reductions achieved in this monitoring period (26/03/2009 ~ 25/12/2012) is 659,061 tCO₂e which is 3.0% lower compared with the estimated value^{8 9}, which is reasonable.

According to the requirement by EB 66th meeting, the annual amount of ERs to be issued to this project activity shall be capped at the average annual emissions reductions estimated in the original registered PDD, i.e. 140,695tCO₂e.

Therefore, the total emissions reductions achieved during this monitoring period (1,371days) should be 528,473 tCO₂e

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

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO₂e)	Not applicable	Not applicable

⁷ According to the requirement by EB 66th meeting, the annual amount of ERs to be issued to this Project shall be capped at the average annual emissions reductions estimated in the original registered PDD, i.e. 140,695 tCO₂ per year. Therefore, the amount of emission reductions which could be claimed during this monitoring period should be 528,473 tCO₂=140,695 tCO₂/365*1,371days.

⁸ 679,419 tCO₂e=180,881 tCO₂/365*1,371 days

⁹ 3.0% = (679,419 tCO₂e - 659,064.24 tCO₂e) / 679,419 tCO₂e * 100%

Annex I. The energy balance calculation for the verification period

The total inputs of all types of fuels combusted and useful output of electricity from the project are presented below. From this data the conversion efficiency of the project in this period is calculated as 27.16%.

Table 1. The energy input and electricity output in the project activity in this period

	BFi, dry base (t)	Energy (GJ)
BF1	365,871	5,666,323.54
BF2	184,745	3,013,548.14
BF3	18,079	211,314.02
Total	-	8,891,185.70
Electricity exported (GJ)	-	2,415,066.19
Efficiency	-	27.16%

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Document information

Version	Date	Description
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
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