MONITORING REPORT FORM (CDM-MR)
Version 01

CONTENTS

MONITORING REPORT
Version number: 1.0
Date 03/11/2011

Wangjiang Kaidi Biomass Power Project
Reference number: 3069
The 1st monitoring period:13/01/2011-30/06/2011

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

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

The project processes about 196,080tonnes (wet) of biomass residue annually, of which rice husk, cotton straws, branches, stumps and wood chips are the biomass fuel. 2 sets of 65t/h Circulating Fluidized Bed (CFB) boiler and 2 sets of 12MW steam turbines generator units are installed. Therefore, the total installed capacity of the Project is 24MW.The estimated GHG emission reduction is 105,200 tonnes of CO_2e per year.

The project began to construct on 16/12/2008, and was put into operation since 14/04/2010. The project has been registered as a CDM project on 13/01/2011 (The version of registered PDD is version 4). During current monitoring period (13/01/2011-30/06/2011), the project has achieved emission reductions of 59,970tonnes CO_2e.

A.2. Project Participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Party involved wishes to be considered as project participant (Yes/No)
Peoples' Republic of China (host)	Wangjiang 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

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.

A.3. Location of the project activity:

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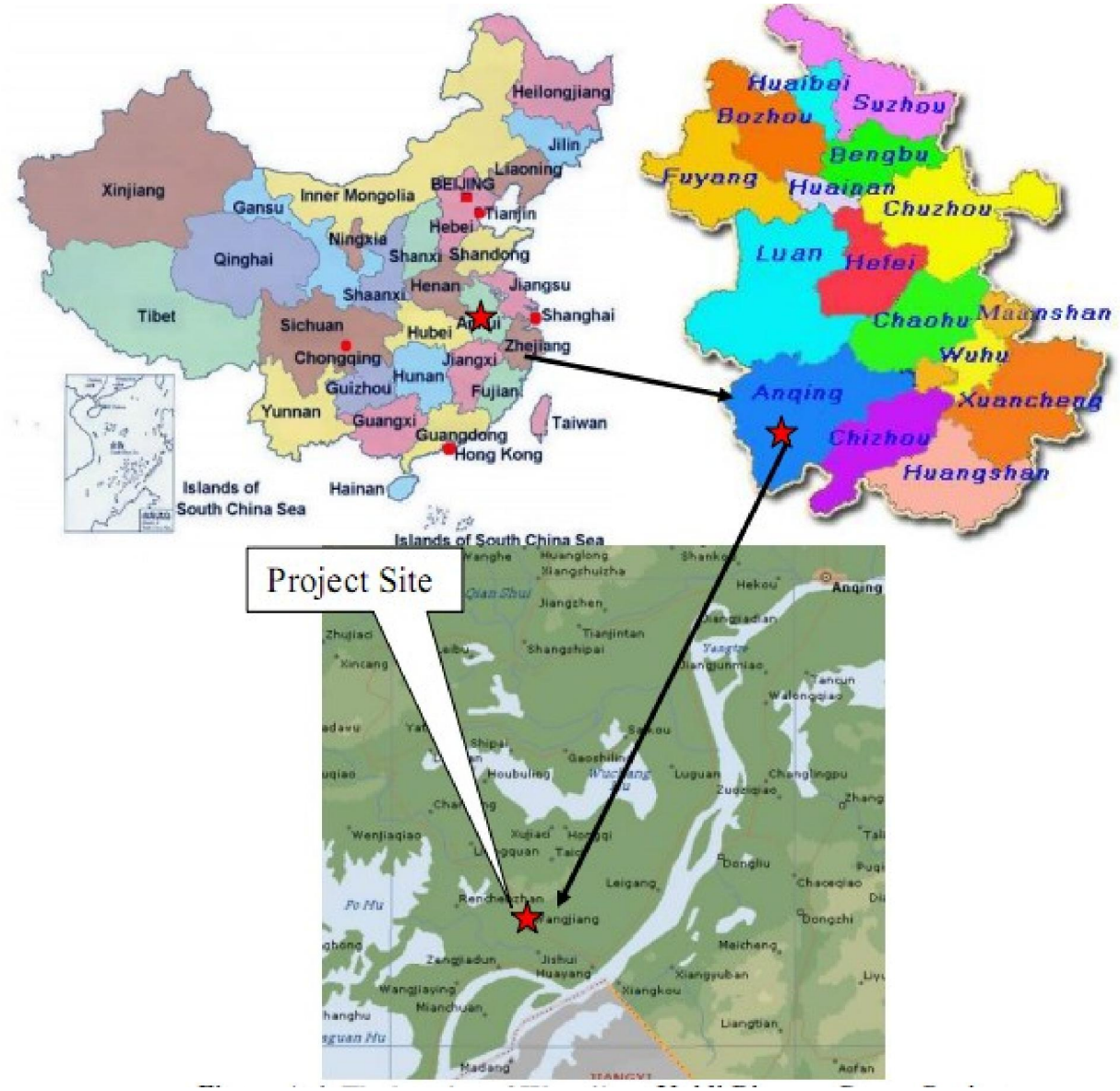
The project activity is located in the southeast of Wangjiang Economic Development District, Anhui Province, P.R. China.

The center of plant has geographical coordinates of 116°43′03″ east longitude 30°06′15″ 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.4. Technical description of the project

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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 and the total efficiency of the plant is approximately 42%.

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

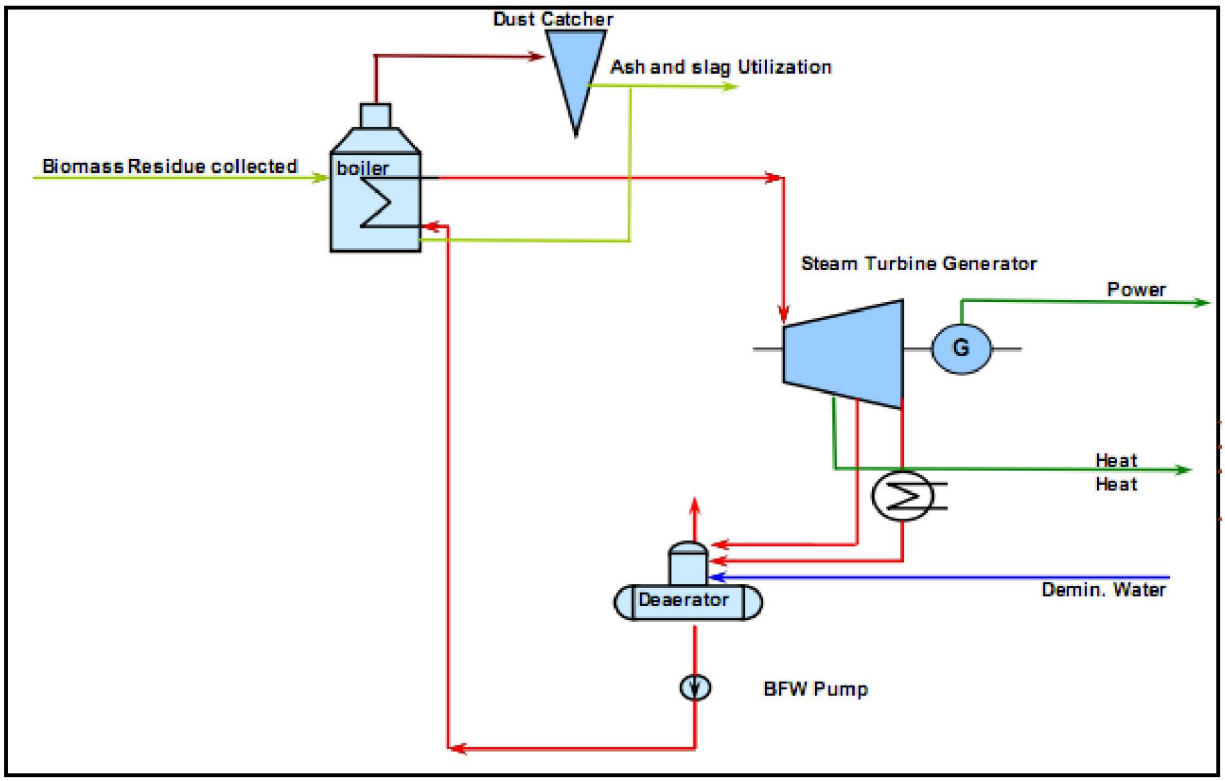
Type	Medium temperature and sub-high pressure Circulating Fluidized Bed
Maximum evaporation volume	65t/h
Rated steam pressure	5.29MPa
Rated steam temperature	450℃
Feed water temperature	153.2℃
Feed water pressure	5.72MPa
Efficiency	≥86 %
Quantity	2
STEAM TURBINE	
Manufacturer	NanJing Steam Turbine(Group) 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
Maximum Extraction steam volume when Rate electricity capacity is 6.59MW	45t/h
Quantity	2
GENERATOR	
Manufacturer	NanJing Steam Turbine(Group) Co., Ltd
Model	QFJ-15-2
Rated power	15MW
Rated voltage	10.5KV
Power factor	0.8
Efficiency	≥97%
Rated rotating speed	3000r/min
Rated frequency	50Hz
Quantity	2

The biomass residues are weighed by the weighbridge before being fed into the fuel entering system to the boiler for combustion or into the storehouse in the plant for future usage. The steam entered into the turbine is used for power generation.

The boiler smoke is treated by a high efficiency bag filter and then carried to the ash storeroom. The annual ash generated from the power plant is very limited which is stored or given to the local farmers for free.

The turbine and generator system used in the project is supplied by Chinese domestic suppliers as well as the other auxiliary equipments installed in the power plant.

A flow diagram showing the power plant operation is provided as below.



A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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1. ACM0006 (Version 09) – "Consolidated methodology electricity generation from biomass residues"
2. "Combined tool to identify the baseline scenario and demonstrate additionality". (Version 02.2)
3. ACM0002 (Version 10) – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"
4. "Tool to calculate project or leakage 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 02)

For more information regarding the methodology, please refer to the link:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

A.6. Registration date of the project activity:

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13 Jan 2011

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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Crediting period: 13 Jan 2011 –12 Jan 2018 (Renewable)
The start date of the crediting period is 13 Jan 2011.

A.8. Name of responsible person(s)/entity(ies):

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SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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The project consists of one site and has been implemented as described in the registered PDD. The project began to construct on 16/12/2008, and was put into operation since 14/04/2010. Please refer to the following table for details.

Activity	Date	
	1# Generator	2# Generator
Start of construction	16/12/2008	
Operation of core equipment	14/04/2010	26/01/2011

During current period, 1# steam turbine generator and 2# steam turbine generator were respectively shutdown 8 times and 8 times for maintenance.

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

B.2. Revision of the monitoring plan

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N/A

B.3. Request for deviation applied to this monitoring period

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N/A

B.4. Notification or request of approval of changes

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N/A

SECTION C. Description of the monitoring system

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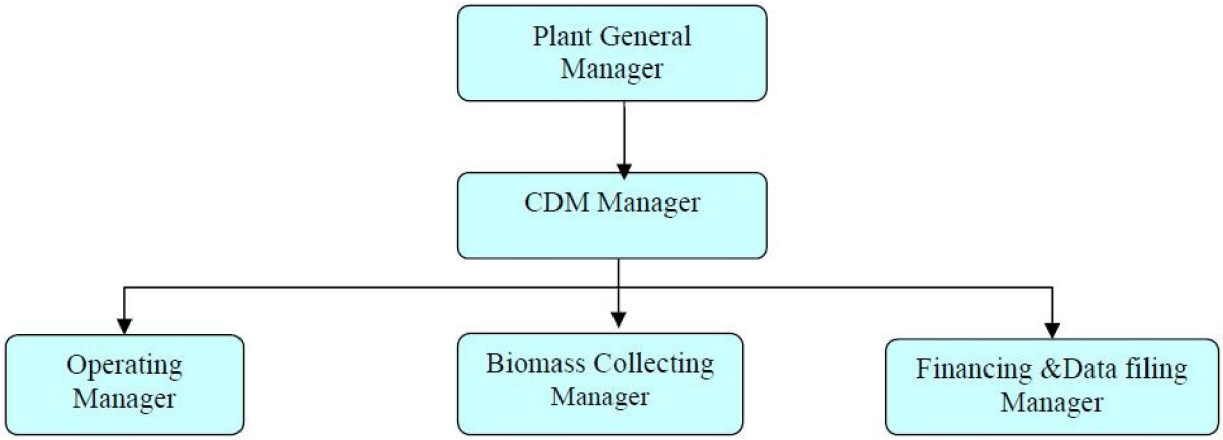
1. The organizational structure, roles and responsibilities of personnel:

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 pretreatment 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 are electricity meters installed on the project site monitoring the electricity supplied to the grid and purchased from the grid. The accuracy of the gate way meters are 0.2s.

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. The accuracy of the meter is 0.5.

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

2.2 Biomass residues consumption

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 sampled continuously at fixed time period and analyzed daily in the laboratory of the plant. The accuracy of the belt weighers are 1%.

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 are 1%.

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

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

2.4 Transportation of Biomass residues

The project developer of the 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.

3. Data collection procedures

The meters or monitoring equipment installed in the monitoring system will be 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 will be 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 has 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 has 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

1. Parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors	
Data / Parameter:	EF_y
Data unit:	t CO_2e/MWh
Description:	Baseline emission factor of East China Power Grid
Source of data used:	The registered PDD Version 4
Value(s) :	0.8888
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	--

Data / Parameter:	GWP_{CH4}
Data unit:	t CO_2e/t CH_4
Description:	Global warming potential for CH_4
Source of data used:	The registered PDD Version 4
Value(s) :	21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	--

Data / Parameter:	$TDL_{j,y}$
Data unit:	%
Description:	Average technical transmission and distribution losses for providing electricity to source j in year y.
Source of data used:	The registered PDD Version 4
Value(s) :	20
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation
Additional comment:	--

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

Data / Parameter:	NCV_{k*} $EF_{burning,CH4,k,y}$
Data unit:	t CH_4/tonne
Description:	CH_4 emission factor for uncontrolled burning of the biomass residue
Source of data used:	The registered PDD Version 4
Value(s) :	0.001971
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	--

D.2. Data and parameters monitored	
Data / Parameter:	$\boldsymbol{BF_{k,y}}$
Data unit:	Tons of dry matter
Description:	Quantity of each biomass residue type k combusted in the project plant in year, y.
Measured /Calculated /Default:	Measured
Source of data:	On-site measurements
Value(s) of monitored parameter:	

Type	Units	Data
Rice husk	tonne	24,933.98
Cotton straws	tonne	1,112.20
Branches	tonne	27,644.87
Stumps	tonne	6,271.58
Wood chips	tonne	25,019.07

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Meter name	Belt Balance 1#	Belt Balance 2#
Type/ Model	ICS-ST4-1000	ICS-ST4-1000
Accuracy	0.5	0.5
SN	0903108	0903109
Last calibration Date	7-Jan-11	7-Jan-11
Valid Period	6-Jan-12	6-Jan-12
Calibration Frequency	Once a year	Once a year

Measuring/ Reading/ Recording frequency:	Hourly measurement and monthly recording; 100% of data is monitored and electronically archived.
Calculation method (if applicable):	--
QA/QC procedures applied:	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.

Data / Parameter:	***Moisture content of the biomass residues***

Data 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
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline and project emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Meter name	Balance	Dry Cabinet
Type/ Model	FA214	101-2BS
Accuracy	0.1g	0.1°
SN	2767	100610909
Last calibration Date	5-Jan-11	6-Jan-11
Valid Period	4-Jan-12	5-Jan-12
Calibration Frequency	Once a year	Once a year

Measuring/ Reading/ Recording frequency:	Daily measurement and monthly recording; 100% of data is monitored and electronically archived.
Calculation method (if applicable):	--
QA/QC procedures applied:	The monitoring procedures in the laboratory of the plant is done according to authoritative instructions or guidance

Data / Parameter:	NCV_K
Data 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 international standards.
Value(s) of monitored parameter:	

Type	NCV(GJ/ton)
Rice husk	13.08
Cotton straws	12.91
Wood chips	12.86
Stumps	14.23
Branches	11.44

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions & project emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/	Six months, taking three samples for each measurement.

Recording frequency:	
Calculation method (if applicable):	--
QA/QC procedures applied:	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.

Data / Parameter:	AVD_y
Data unit:	km
Description:	Average round trip distance (from and to) between the biomass fuel supply sites and the project plant during the year y
Measured /Calculated /Default:	Measured
Source of data:	On site records maintained in the log books
Value(s) of monitored parameter:	71.1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	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 applied:	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.

Data / Parameter:	$\boldsymbol{N_y}$
Data 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:	9294
Indicate what the data are used for (Baseline/ Project/ Leakage emission	Project emissions

calculations)	
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	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 applied:	The consistency of the number of truck trips will be checked with the quantity of biomass combusted by the relation with previous years

Data / Parameter:	EF_{km,CO_2}
Data 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
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	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 applied:	--

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit:	kg CO_2e/TJ
Description:	CO_2 emission factor for fossil fuel type i (diesel)
Measured /Calculated /Default:	Default
Source of data:	IPCC default value
Value(s) of monitored parameter:	74,100 IPCC 2006 default value (Volume2.Chapter2.P16) , diesel emission factor
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	The appropriateness of the data is reviewed annually
Calculation method (if applicable):	--
QA/QC procedures applied:	The plant is designed to use diesel at this stage. Should any other fossil fuel be used during operation, the same monitoring procedures apply.

Data / Parameter:	NCV_i
Data 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 2007,Diesel NCV
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	The appropriateness of the data is reviewed annually
Calculation method (if applicable):	--
QA/QC procedures applied:	The plant is designed to use diesel at this stage. Should any other fossil fuel be used during operation, the same monitoring procedures apply.

Data / Parameter:	$FF_{project\ plant,i,y}$
Data 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:	14.45
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	Monitoring frequency: Continuously
Calculation method (if applicable):	--
QA/QC procedures applied:	The meters undergo calibration/maintenance subject to appropriate industrial standards. The measurements will be cross-checked by the purchased quantities and stock changes if available.

Meter name	Flow Meter 1#	Flow Meter 2#
Type/ Model	LWY－10	LWY－10
Accuracy	1.0	1.0
SN	11740	11745
Last calibration Date	10-Jan-11	10-Jan-11
Valid Period	9-Jan-12	9-Jan-12
Calibration Frequency	Once a year	Once a year

Meter name	Flow Meter 3#	Flow Meter 4#
Type/ Model	LWY－10C	LWY－10C
Accuracy	1.0	1.0
SN	08031	08063
Last calibration Date	10-Jan-11	10-Jan-11
Valid Period	9-Jan-12	9-Jan-12
Calibration Frequency	Once a year	Once a year

Data / Parameter:	$FF_{project\ site,,i,\ y}$
Data 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:	47.10
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monitoring frequency: Continuously
Calculation method (if applicable):	The consumption of diesel is monitored using diesel purchase and consumption log book.
QA/QC procedures applied:	The data is cross checked by the purchase receipts.

Data / Parameter:	$EC_{PJ,\ y}$

<table>
<tr><td>Data unit:</td><td>MWh</td></tr>
<tr><td>Description:</td><td>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</td></tr>
<tr><td>Measured /Calculated /Default:</td><td>Measured</td></tr>
<tr><td>Source of data:</td><td>On-site measurements by meter or calculated conservatively as the weight of straws smashed in tons and the electricity consumption factor (kWh/ton)</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>541.37</td></tr>
<tr><td>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</td><td>Project emission</td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td><table>
<tr><td>Meter name</td><td>Meter for biomass</td></tr>
<tr><td>Type/ Model</td><td>DTSD71</td></tr>
<tr><td>Accuracy</td><td>0.5S</td></tr>
<tr><td>SN</td><td>MSE707482</td></tr>
<tr><td>Last calibration Date</td><td>3-Jan-11</td></tr>
<tr><td>Valid Period</td><td>2-Jan-12</td></tr>
<tr><td>Calibration Frequency</td><td>Once a year</td></tr>
</table></td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Monitoring frequency: Continuously</td></tr>
<tr><td>Calculation method (if applicable):</td><td>When the biomass residue is mechanically pretreated, the project needs a certain amount of electricity from grid. This amount could be metered or calculated conservatively.

If the monitoring data is missing, or it is not feasible to install a dedicated meter to monitor this indicator, it will be calculated conservatively as the weight of straws smashed in tons and the electricity consumption factor (kWh/ton). The electricity factor can be calculated as follows:
1) Collecting all the nameplates power (in kW) and capacity(t/h) of every straw crackers
2) Calculating the electricity factor corresponding to each cracker in kWh/t
3) Using the largest number as a conservative electricity factor for the calculation

Monitoring frequency: Continuously ,aggregated at least annually</td></tr>
<tr><td>QA/QC procedures applied:</td><td>Cross-check measurement results with invoices for purchased electricity if available</td></tr>
</table>

Data / Parameter:	**$EG_{project\ plant,y}$**
Data unit:	MWh
Description:	Net quantity of increased electricity generated in the project plant during the year y
Measured /Calculated /Default:	Measured

<table>
<tr><td>Source of data:</td><td>On-site measurements</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>66237.01</td></tr>
<tr><td>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</td><td>Baseline emission</td></tr>
<tr><td>Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><td>Meter name</td><td>Gate Meter</td><td>Gate Meter(backup)</td></tr>
<tr><td>Type/ Model</td><td>DSSD135</td><td>DSSD135</td></tr>
<tr><td>Accuracy</td><td>0.2s</td><td>0.2s</td></tr>
<tr><td>SN</td><td>02082979</td><td>02082980</td></tr>
<tr><td>Last calibration Date</td><td>8-Jan-11</td><td>8-Jan-11</td></tr>
<tr><td>Valid Period</td><td>7-Jan-12</td><td>7-Jan-12</td></tr>
<tr><td>Calibration Frequency</td><td>Once a year</td><td>Once a year</td></tr>
</table>
<table>
<tr><td>Meter name</td><td>Backup Power Meter</td></tr>
<tr><td>Type/ Model</td><td>DSSD288</td></tr>
<tr><td>Accuracy</td><td>0.5</td></tr>
<tr><td>SN</td><td>SDN5005561</td></tr>
<tr><td>Last calibration Date</td><td>8-Jan-11</td></tr>
<tr><td>Valid Period</td><td>7-Jan-12</td></tr>
<tr><td>Calibration Frequency</td><td>Once a year</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Monitoring frequency: Continuously</td></tr>
<tr><td>Calculation method (if applicable):</td><td>Electricity supplied to the grid and purchased from the grid is monitored by a double way meter and the data is cross-checked by the invoices and the power transaction note. The meters are 0.2s double-way meters.

Electricity imported from a 10kv backup power is monitored by meter and the amount of electricity imported through this line is checked by the invoice. The accuracy of the meter is 0.5.

The net electricity equals to electricity supplied to the grid minus electricity purchased from the grid minus electricity purchased from the 10kv backup power.</td></tr>
<tr><td>QA/QC procedures applied:</td><td>The consistency of the data is cross-checked with receipts from electricity sales and 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.</td></tr>
</table>

Data / Parameter:	-
Data unit:	Tones
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	Please refer to Section E.3

parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	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 the biomass availability research.
QA/QC procedures applied:	This parameter will be reviewed annually according to the project data and official data.

2. Data monitored

The monitored parameters are given in the following table 1.

Table 1: Monitored Parameters

Parameter			Rice husk			Cotton straws			Branches		
			$BF_{k,y}$	Moisture	NCV	$BF_{k,y}$	Moisture	NCV	$BF_{k,y}$	Moisture	NCV
Month	from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton	tonne	%	GJ/ton
			A	B	C	D	E	F	G	H	I
Jan	*13/01/2011*	*31/01/2011*	*3,082.46*	*13.75*	*13.08*	*468.04*	*29.63*	*12.91*	*4,640.58*	*23.19*	*11.44*
Feb	*01/02/2011*	*28/02/2011*	*3,716.77*	*13.97*	*13.08*	*298.97*	*29.42*	*12.91*	*6,673.65*	*22.72*	*11.44*
Mar	*01/03/2011*	*31/03/2011*	*8,726.69*	*13.82*	*13.08*	*489.87*	*29.23*	*12.91*	*6,325.01*	*22.44*	*11.44*
Apr	*01/04/2011*	*30/04/2011*	*4,914.28*	*13.63*	*13.08*	*326.02*	*30.93*	*12.91*	*8,078.15*	*22.91*	*11.44*
May	*01/05/2011*	*31/05/2011*	*5,372.16*	*14.11*	*13.08*	*0.00*	*0.00*	*0.00*	*6,065.32*	*22.95*	*11.44*
Jun	*01/06/2011*	*30/06/2011*	*3,124.27*	*13.64*	*13.08*	*0.00*	*0.00*	*0.00*	*4,035.94*	*22.78*	*11.44*
Total			*28,936.63*	-	-	*1,582.90*	-	-	*35,818.65*	-	-

Parameter			Stumps			Wood chips		
			$BF_{k,y}$	Moisture	NCV	$BF_{k,y}$	Moisture	NCV
Month	from	to	tonne	%	GJ/ton	Tonne	%	GJ/ton
			M	N	O	P	Q	R
Jan	*13/01/2011*	*31/01/2011*	*0.00*	*0.00*	*0.00*	*2,290.55*	*27.72*	*12.86*
Feb	*01/02/2011*	*28/02/2011*	*0.00*	*0.00*	*0.00*	*1,658.52*	*27.81*	*12.86*
Mar	*01/03/2011*	*31/03/2011*	*0.00*	*0.00*	*0.00*	*4,170.76*	*27.90*	*12.86*
Apr	*01/04/2011*	*30/04/2011*	*0.00*	*0.00*	*0.00*	*11,435.14*	*27.87*	*12.86*
May	*01/05/2011*	*31/05/2011*	*0.00*	*0.00*	*0.00*	*9,978.28*	*28.00*	*12.86*
Jun	*01/06/2011*	*30/06/2011*	*8,776.82*	*28.54*	*14.23*	*5,172.23*	*27.96*	*12.86*
Total			*8,776.82*	-	-	*34,705.48*	-	-

Parameter			VD_y	N_y	$FF_{project\ plant,i,y}$	$FF_{project\ site,i,y}$	$EG_{project\ plant,y}$	$EC_{PJ,y}$
Month	from	to	km	-	Tonnes	Tonnes	MWh	MWh
			S	T	U	V	W	X
Jan	*13/01/2011*	*31/01/2011*	*40,508.00*	*578.00*	*2.10*	*8.20*	*6,333.37*	*51.85*
Feb	*01/02/2011*	*28/02/2011*	*49,050.00*	*696.00*	*1.30*	*6.30*	*7,484.73*	*63.77*
Mar	*01/03/2011*	*31/03/2011*	*149,538.00*	*2,050.00*	*2.80*	*6.10*	*11,678.11*	*74.88*
Apr	*01/04/2011*	*30/04/2011*	*166,060.00*	*2,382.00*	*1.75*	*7.20*	*15,077.17*	*124.08*
May	*01/05/2011*	*31/05/2011*	*163,074.00*	*2,318.00*	*4.10*	*7.80*	*12,983.59*	*98.41*
Jun	*01/06/2011*	*30/06/2011*	*92,936.00*	*1,270.00*	*2.40*	*11.50*	*12,680.05*	*128.36*
Total			*661,166*	*9,294*	*14.45*	*47.10*	*66,237.01*	*541.37*

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

Baseline emissions are calculated as:

a) Emission reduction due to displacement of electricity

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

Where:

$ER_{electricity,y}$	Emission reductions due to displacement of electricity during the year y (tCO_2/yr)
EGy	Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y (MWh)
$EF_{,electricity,y}$	CO_2 emission factor for the electricity displaced due to the project activity during the year y (tCO_2/MWh), which is 0.8888 tCO_2e/MWh (See registered PDD Version 4 available online at http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1256225056.8/view)

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

EG_y = 66,237.01MWh

Therefore,

$$ER_{electricity,y} = 66{,}237.01MWh \times 0.8888tCO_2e/MWh = 58{,}871.46tCO_2e$$

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:

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

$$BE_{biomass,y} = 21tCO_2e/tCH_4 \times 84{,}981.69t \times 0.001971tCH_4/t = 3{,}517.48tCO_2e$$

E.2. Project emissions calculation

>>

According to methodology ACM0006 version 09, 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 ($PE_{Biomass,CH4,y}$),

Project emissions are calculated as follows:

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

Where:

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

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

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

Where:

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

Therefore,

$$PET_y = 9{,}294 \times \frac{661{,}166 Km}{9{,}294} \times 0.001097 tCO_2e / km = 725.30 tCO_2e$$

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:

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

$COEF_{i,y}$	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i	Are the fuel types combusted in process j during the year y

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

Where:

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

Therefore,

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

$$= (14.45 + 47.10)\ t \times 0.042652TJ/t \times 74{,}100kgCO_2e/TJ/1\times10^3 = 194.53tCO_2e$$

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

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

Where:

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

Therefore,

$$PE_{EC,y} = 541.37MWh \times 0.8888tCO_2e/MWh \times (1 + 20\%) = 577.41tCO_2e$$

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

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

Where:

$BF_{k,y}$	Quantity of biomass residue type k combusted in the project plant during the year y (tons of dry matter)
NCV_k	Net calorific value of the biomass residue type k (GJ/ton of dry matter)
$EF_{CH4,BF}$	CH_4 emission factor for the combustion of biomass residues in the project plant (tCH4/GJ), according to ACM0006,Version 09, the $EF_{CH4,BF}$=41.1 kg CH_4/TJ

Therefore,

$$PE_{biomass,CH4,y} = 41.1kgCH_4/TJ \cdot (24933.98t \times 13.08GJ/t + 1112.20t \times 12.91GJ/t + 27644.87t \times$$

$$11.44GJ/t + 6271.58t \times 14.23GJ/t + 2{,}5019.07t \times 12.86GJ/t)/1\times10^6$$

$$= 43.88tCH_4$$

According the data calculated above,

$$PE_y = 725.30tCO_2e + 194.53tCO_2e + 577.41tCO_2e + 21tCO_2e/tCH_4 \times 43.88tCH_4$$

$= 2418.80 tCO_2e$

E.3. Leakage calculation

>>

According to methodology ACM0006 version 09, 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 as followed:

Demonstration of abundant surplus of biomass availability (tonne)					
	Rice husk	Cotton straws	Branches	Stumps	Wood chips
Available Biomass in the region	156673.94	552867.40	600000.00		
Biomass utilised out ot the project	31334.79	110573.48	120000.00		
Biomass utilised by the project	62496.27	3418.69	77359.81	18955.85	74955.62
Total biomass utilised(including the project)	93831.06	113992.17	291271.28		
Available Biomass/Total biomass utilised	166.97%	485.00%	205.99%		
Available Biomass/Total biomass utilised-100%	66.97%	385.00%	105.99%		
Abundant surplus? (more than 25%)	Yes	Yes	Yes	Yes	Yes

From the data in above table, that the leakage of the project within the project boundary is zero, i.e. LEy = 0 tCO_2e.

E.4. Emission reductions calculation / table

>>

The emission reductions achieved is calculated by the following formulae:

$$ER_y = ER_{heat,y} + ER_{elcetricity,y} + BE_{biomass,y} - PE_y - L_y$$
$$= 0 tCO_2e + 58,871.46\, tCO_2e + 3,517.48 tCO_2e - 2418.80 tCO_2e - 0 tCO_2e$$
$$= 59,970 tCO_2e$$

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

>>

This section shall include a comparison of actual values of the emission reductions achieved during the monitoring period with the estimations in the registered CDM-PDD.

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	**48,709[1]**	**59,970**

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

>>

[1] $48,709 tCO_2e = \frac{105,200 tCO_2e}{365 days} \times 169 days$

From the data shown in above table, the actual emission reduction achieved during current monitoring period is higher than the ex-ante estimation in registered CDM-PDD (Version 4), and the reasons are:

- The net electricity generation was 12.9% higher than the ex-ante estimation in registered CDM PDD (Version 4) due to higher operation hours, which could be considered as a result of the normal fluctuation from the designed operating hours of the project. As the project was just fully commissioned, the new facilities ensured the stable operation of the project activity.
- Project emissions were less than the ex-ante estimation in registered CDM PDD (Version 4). There main reason for this is the radius of the biomass residues collection is smaller than the ex-ante estimation in registered CDM PDD (Version 4).

The higher electricity generation has no impact on the additionality of the project activity as the sensitivity analysis of the project activity shows that the IRR will not exceeds benchmark until a 28% increase in operation hours.

- - - - -

History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		