Monitoring report form for CDM project activity (Version 09.0)

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT

Title of the project activity	Yicheng Biomass Cogeneration Project in Hubei Province, China		
UNFCCC reference number of the project activity	3089		
Version number of the PDD applicable to this monitoring report	05		
Version number of this monitoring report	01		
Completion date of this monitoring report	18/01/2022		
Monitoring period number	Third Monitoring period		
Duration of this monitoring period	01/01/2013-29/11/2017		
Monitoring report number for this monitoring period	NA		
Project participants	Project Owner: Anneng (Yicheng) Biomass Thermo-Electricity Co., Ltd. CERs Buyer: Emissionshandels Gesellschaft Bavaria GmbH		
Host Party	People's Republic of China		
Applied methodologies and standardized baselines	Applied methodology: ACM0006, "Consolidated methodology for electricity generation from biomass residues", version10		
Sectoral scopes	1 : Energy industries (Renewable/ non-renewable sources)		
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	0	738,693	0
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	703,017		

SECTION A. Description of project activity

A.1. General description of project activity

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Yicheng Biomass Cogeneration Project in Hubei Province, China (hereafter referred to as "the project") is a newly-built biomass cogeneration project. It installs two 75 t/h biomass direct burning boilers and two 12 MW steam turbines and two generators, so the total installed capacity is 24 MW. In the registered PDD , the annual operation hours are estimated to be 6,500h with a load factor of 74.2 % (6,500h/8,760h), the estimated annual electricity generation is 156,000 MWh, the estimated annual grid connected electricity is 141,960MWh, and the estimated annual steam generation is 529,740 GJ. The generated electricity is delivered to the Central China Power Grid (hereafter referred to as CCPG) and it is estimated that the heat will be supplied to surrounding industrial and commercial heat/steam end users.

When the project is put into operation, it can help reduce GHG emissions from CCPG, which is dominated by fossil fuel fired power plants, and can reduce CO_2 emissions from coal fired boilers through clean heat/steam generation. Moreover, the project uses biomass in high efficiency for energy purpose, which can reduce CH4 emissions due to the biomass is dumped or left to decay or burned in an uncontrolled manner in the absence of the project.

In the registered PDD, it is stated that "Considering the conservativeness of the emission reductions, the project owner finally decided not to claim the emission reductions due to displacement of heat. So the emission reductions due to displacement of heat ($ER_{Heat,y}$) is zero in all the crediting periods".

The estimated annual GHG emission reductions are 143,033 tCO_2e in the registered PDD.

The Project was registered on 30/11/2010 and this monitoring period was 01/01/2013 – 29/11/2017.

The total emission reductions achieved in this monitoring period are 738,693 tCO_2.

A.2. Location of project activity

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The project is located in Yicheng City, Hubei Province, P.R. of China, The concrete coordinate at the gate of the power plant was north latitude of 31.71° (i.e. 31°42′36″) and east longitude of 112.28°(i.e112°16′48″) .

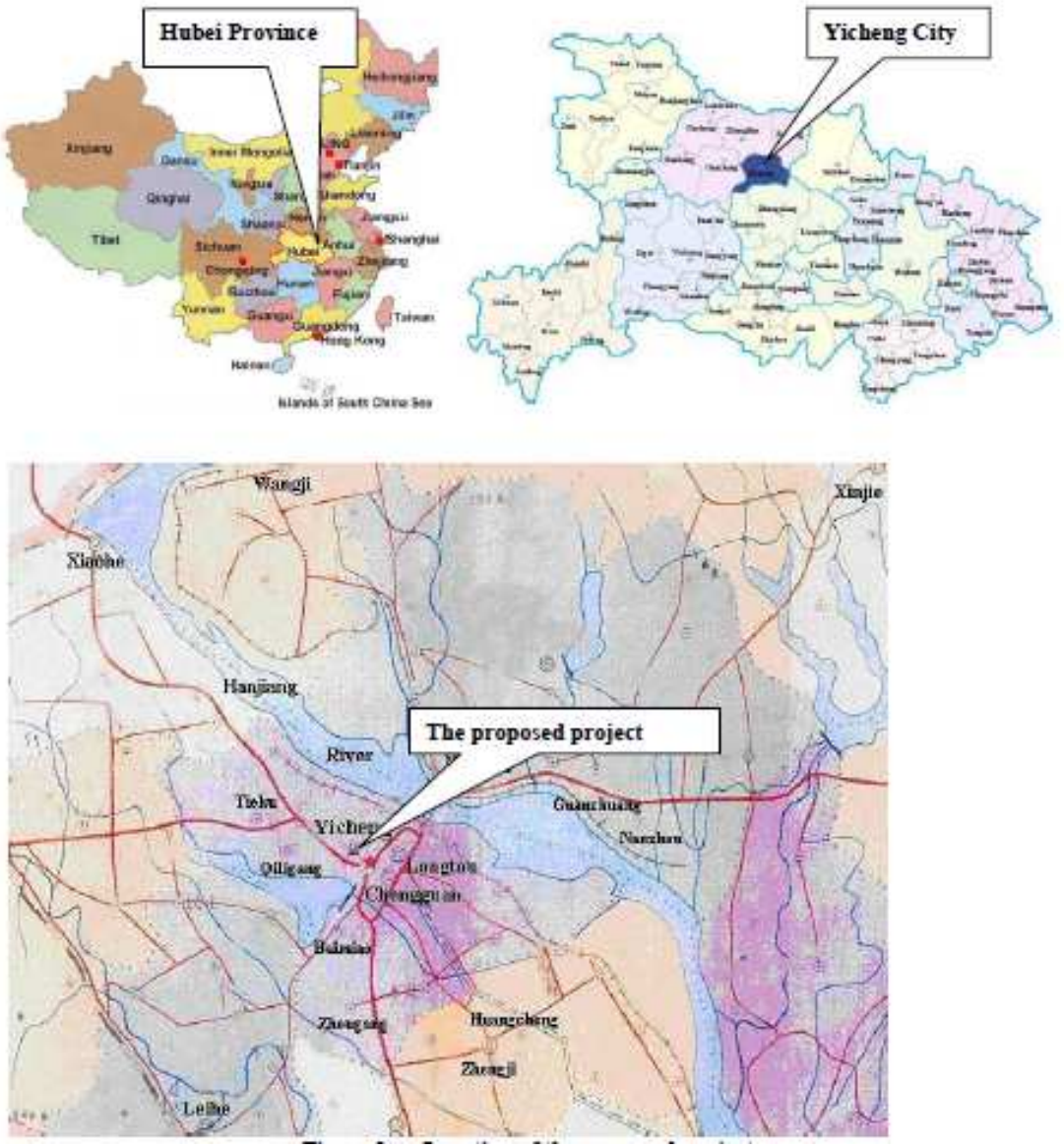

Figure 1 Location of the proposed project

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R. China (host)	Anneng (Yicheng) Biomass Thermo Electricity Co. Ltd	No
Germany	Emissionshandels Gesellschaft Bavaria GmbH	No

A.4. References to applied methodologies and standardized baselines

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The approved baseline and monitoring methodology applied in the proposed project activity is ACM0006, “Consolidated methodology for electricity generation from biomass residues” (version 10, EB 52)

Tools and other methodologies to which the applied methodology refers include:

1. Methodology ACM0002, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (version 11, EB52),

2. “Tool to calculate the emission factor for an electricity system” (version 02, EB50),

3. “Combined tool to identify the baseline scenario and demonstrate additionality” (version 02.2, EB 28),

4. “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” (version 02, EB 41), and

5. “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (version 01, EB39).

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

A.5. Crediting period type and duration

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The Project employs the renewable crediting period (3×7yrs), the first crediting period of the project is from 30/11/2010 to 29/11/2017.

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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The project adopts biomass direct combustion technology for power generation. The biomass fuels are collected at the straw-collecting stations at first, and then packed and transported to the project power plant. The biomass fuels may be stored and then are shredded before being fed into the power generating system and burnt. The power generating system consists of two 75 t/h biomass direct burning boilers and two 12 MW steam turbines and two generators, which are manufactured by domestic companies. Key technical specifications of boilers, steam turbines and generators are listed as Table 1 below:

Table 1 Key technical specifications of boilers, steam turbines and generators

Boilers	
Items	Parameters
Model	HX75/9.8-IV1
Quantity	2
Manufacturer	China Western Power Industrial Co. Ltd.
Boiler rated evaporating capacity (t/h)	75
Rated pressure at the exit of Super heater (MPa)	9.8
Rated Temperature at the exit of Super heater (℃)	540
Boiler feed-water temperature (℃)	215
Lifetime of the boilers	30 years

Steam turbines	
Model	C12-8.83/0.98
Quantity	2
Manufacturer	Qingdao Jieneng Steam Turbines Group Sharing Co. Ltd
Rated capacity (MW)	12
Rated put-in steam pressure (MPa)(a)	8.83±0.49
Rated put-in steam temperature (℃)	535（+5, -10）
Rated rotating speed (r/min)	3,000
Rated Extraction steam pressure (MPa)(a)	0.98
Rated/Maximum Extraction steam amount(t/h)	30/50
Lifetime of the steam turbines	No less than 30 years
Generators	
Model	QF-12-2 (or QF1-12-2A)
Quantity	2
Manufacturer	Qingdao Jieneng Steam Turbines Group Sharing Co. Ltd and Dongfang Electric Consortium Dongfeng Electric Machinery Co., Ltd.
Rated capacity (MW)	12
Rated voltage (kV)	6.3
Capacity factor	0.8
Rated frequency (HZ)	50
Rated rotating speed (r/min)	3,000
The efficiency	≥97%
Lifetime of the generators	No less than 30years

Note:

1. Explanation Letter on the change of the model and manufacture of the boiler issued by the manufacture has been submitted to DOE. Furthermore, the change is only for the nameplate and the name of manufacture, and it will have none of effect on essence and performance of equipments.
2. As for the model of the generators, according to the purchase agreement of turbines and generators the model is QF-12-2, and the model in the nameplate is QF1-12-2A. “12” means 12MW, and “2” means two poles, and “1” in the QF1-12-2A means the first time design, and “A” in the QF1-12-2A means the design serial number. The basic and key parameters of them are the same.
3. As for the manufacture of the generators, according to the purchase agreement of turbines and generators signed between the project owner and Qingdao Jieneng Steam Turbines Group Sharing Co. Ltd, it is regulated and said in this agreement that the generator will be manufactured by Dongfang Electric Consortium Dongfeng Electric Machinery Co., Ltd. So the manufacture of the generators in the nameplates is Dongfang Electric Consortium Dongfeng Electric Machinery Co., Ltd.

The voltage of electricity at the outlets of the two generators is 6.3 kV, and will be increased to 35 kV by the main transformers and then sent to Baimiao Substation through two 35 kV circuits, finally to CCPG.

The construction of the project started on 23/07/2008. The first set of steam turbine and generator unit was commissioned at 2:00 on 09/03/2010, and the second at 16:00 on 16/05/2010.

No malfunction or change of equipment has taken place. Moreover, no events or situations have occurred during this monitoring period that could have impacted the applicability of the applied methodology.

The biomass fuels are directly combusted in boilers to generate steam, which is subsequently expanded through turbines to drive generators to produce electricity.

The whole technical process, as described above, is summarized in the following diagram.

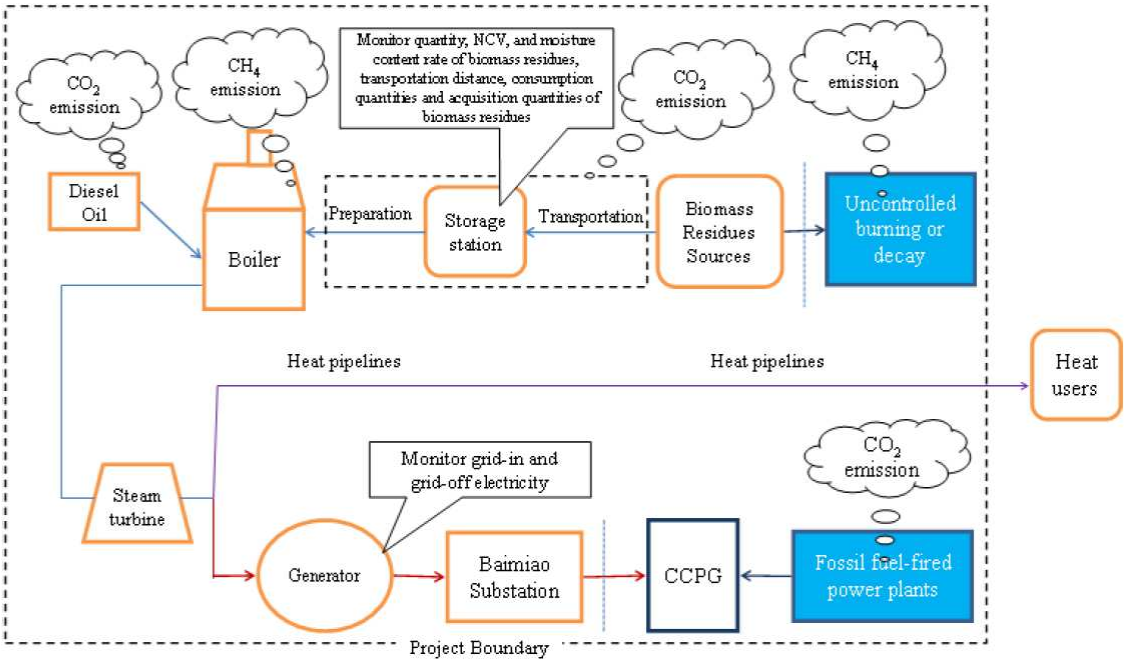

Figure 2. The flow diagram of the project

Relevant dates for the Project are as follows:

The construction of the project started on 23/07/2008.

The first set of steam turbine and generator unit was commissioned at 2:00 on 09/03/2010, and the second at 16:00 on 16/05/2010.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

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The project is implemented as the registered PDD and no deviation applied to this monitoring period.

B.2.2. Corrections

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The project is implemented as the registered PDD and no corrections applied to this monitoring period.

B.2.3. Changes to the start date of the crediting period

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There are no changes to the start date of the crediting period.

B.2.4. Inclusion of monitoring plan

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There is no change to include a monitoring palne for the proposed project.

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

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The project is implemented as the registered PDD and no permanent changes.

B.2.6. Changes to project design

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The project is implemented as the registered PDD and no changes.

B.2.7. Changes specific to afforestation or reforestation project activity

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Not applicable.

SECTION C. Description of monitoring system

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The monitoring system is designed in accordance with the requirements of “Consolidated methodology for electricity generation from biomass residues” (version 10). and implemented by the project owner.

1. Data collection procedures

For all data need to be monitored and detailed monitoring information, please see section D of this monitoring report.

2. Organizational structure and responsibilities

The organization for CDM monitoring of Anneng (Yicheng) Biomass Thermo-Electricity Co. Ltd. is as follows:

The vice president is in charge of CDM

The vice president of Anneng (Yicheng) Biomass Thermo-Electricity Co. Ltd. is the person in charge of CDM, who is in charge of issues related to CDM projects, in particular: track the

development of CDM, keep in touch with EB, DOE and relevant agencies; supervise the project operation related to data monitoring and the monitoring process as well and ensure a smooth and orderly monitoring process.

The CDM manager

One of the engineers will be the CDM manager, who is in charge of the everyday CDM management, including the statistics of the monitored data, calculation of emission reduction and work with DOE to do the validation and verification work.

The CDM monitoring team

Several workers will form the CDM monitoring team to do the concrete monitoring work including monitoring, record, calibration and maintenance of the equipment etc.

The above can be figured out as follows:

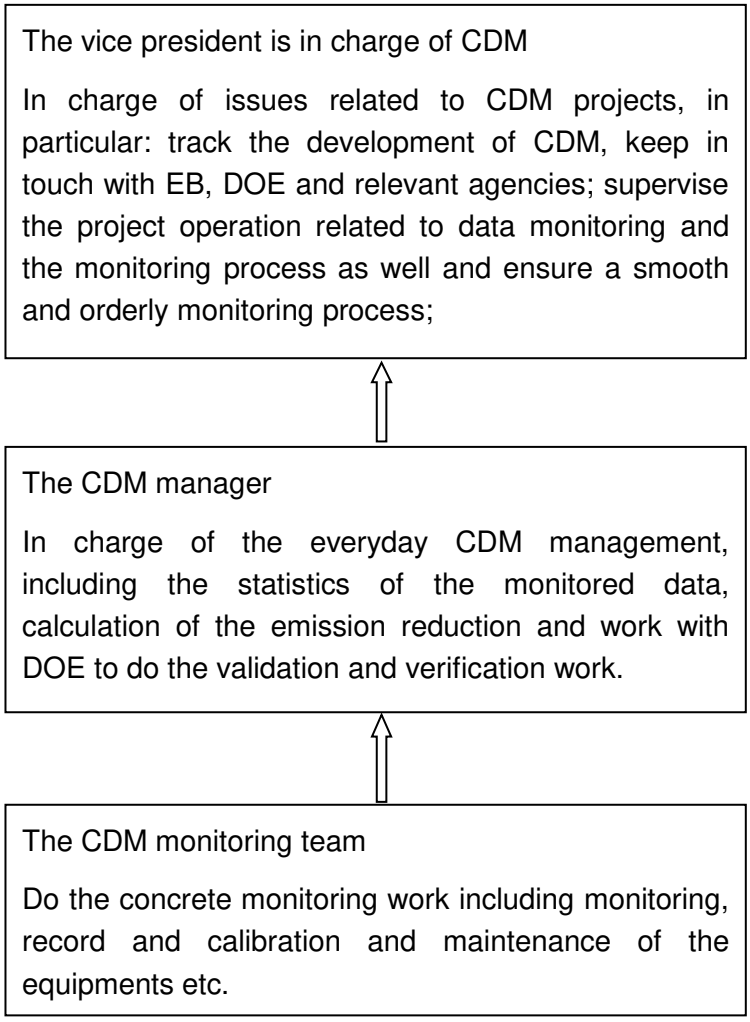

Figure 3 Organizational structure

3. Monitoring diagram

3.1 The meters

As the registered PDD, grid-connected electricity will be recorded in the positive way and the electricity provided by the grid to the plant will be recorded in the negative way by the main meters of the project. Furthermore, the backup meters will be installed at the output ends of the generators and at the output of the high voltage side of the main transformer. The backup meters are the back-ups of the main meters. The accuracy level for all main meters and backup meters is 0.2S.

The meters are listed as follows:

Table2 List of the meters adopted by the project

Name	Num.	Place	Location points	Model	Serial number	Accuracy level
Anyi51 (backup)	M1	Exit of #1 generator	Equipment cabinet	DTSD341	20081167020074	0.2S
Anyi71 (backup)	M2	Exit of #2 generator	Equipment cabinet	DTSD341	20081167020076	0.2S
Anyi 31 (backup)	M3	High voltage side of #1 main transformer	Equipment cabinet	DTSD341	9040060580297	0.2S
Anyi 32 (backup)	M4	High voltage side of #2 main transformer	Equipment cabinet	DTSD341	9040060580296	0.2S
Anyi 34 (main)	M5	Ⅰ grid connected line	35kv switch house	MK6E	S/N:209151404	0.2S
Anyi 35 (main)	M6	Ⅱ grid connected line	35kv switch house	MK6E	S/N:209151403	0.2S

The monitoring system diagram of the electricity of the project is as follows:

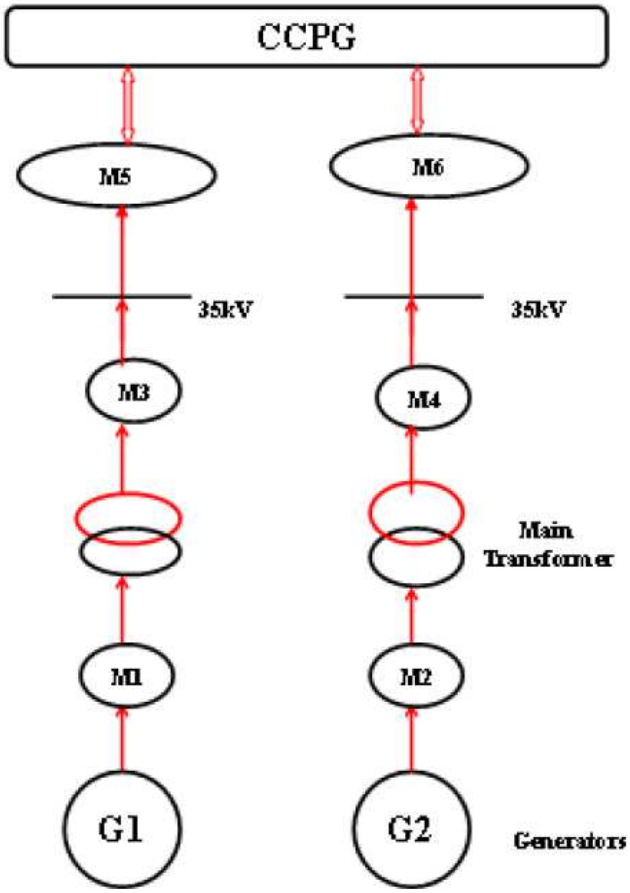

Figure 4 Monitoring system diagram of the electricity generation

3.2 The monitoring equipments for biomass

The monitoring equipment for the biomass quantities transported to the project site ($BF_{T,k,y}$) and combusted in the project plant ($BF_{k,y}$), moisture content rate, and NCV of biomass residues (NCV_k) are listed below:

Table3 List of the monitoring equipments related to the biomass utilization

Name	Location point	Model	Manufacturing number	Accuracy level
#1 the electronic truck scale	Storage yard	SCS-50	9050001	0.3S
#2 the electronic truck scale	Storage yard	SCS-50	11050003	0.3S
#1 the electronic belt	The place before the boilers	WPC-2000	JB1400-1	0.3S
#2 the electronic belt	The place before the boilers	WPC-2000	JB1400-2	0.3S
#1 electronic moisture analyzer	Laboratory inside the project	MA150	24208686	0.1S
#1 calorimetric meter	Laboratory inside the project	SDC5015	1809099	0.1S
#1 moisture meter	Weighbridge house	MS100	1222	0.1S
#2 moisture meter	Weighbridge house	MS100	1264	0.1S

#3 moisture meter	Weighbridge house	MS100	1266	0.1S

The monitoring diagram is shown below.

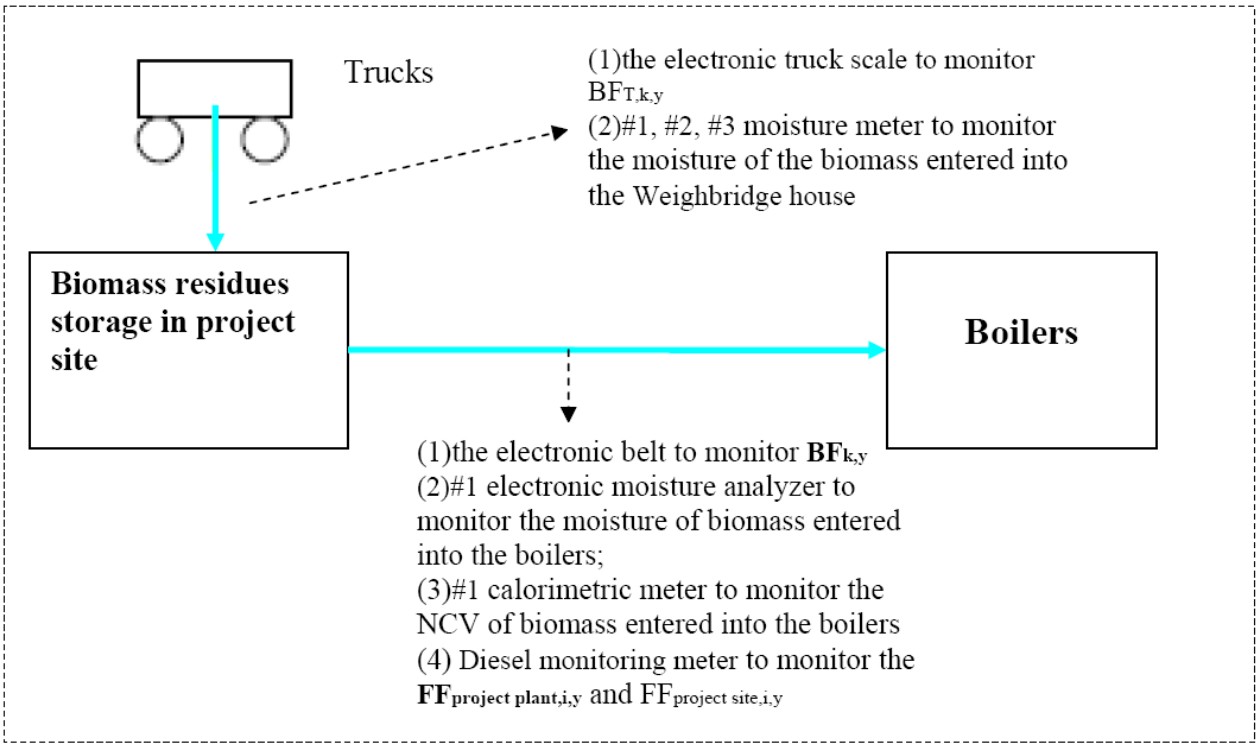

Figure 5 Monitoring system diagram of biomass utilization

During this monitoring period, the meters and monitoring equipment operated normally and no emergency occurred.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/parameter:	$EF_{grid,CM,y}$
Unit	tCO_2e/MWh
Description	Emission factor of CCPG in the monitoring period.
Source of data	Registered PDD
Value(s) applied	For first crediting period: 0.99695
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This parameter is ex ante determined in PDD and fixed during the first crediting periods.

D.2. Data and parameters monitored

Data/parameter	BFk,y
Unit	tons of dry matter

Description	Quantity of biomass residue type k combusted in the project plant during the year y
Measured/calculated/default	Measured (for wet matter), adjusted based on the moisture content
Source of data	On-site measurements
Value(s) of monitored parameter	1,002,789
Monitoring equipment	Equipment: #1 the electronic belt Type: WPC-2000 Accuracy class: 0.3S Serial number: JB1400-1 Calibration frequency: Once per year Date of last calibration: 1/3/2013, 28/02/2014, 27/2/2015, 25/2/2016, 22/02/2017 Validity Up to 21/02/2018 Equipment: #2 the electronic belt Type: WPC-2000 Accuracy class: 0.3S Serial number: JB1400-2 Calibration frequency: Once per year Date of last calibration: 1/3/2013, 28/02/2014, 27/2/2015, 25/2/2016, 22/02/2017 Validity Up to 21/02/2018
Measuring/reading/recording frequency	Measuring continuously and recording monthly
Calculation method (if applicable)	Quantity of dry matter = quantity of wet matter × (1-moisture content)
QA/QC procedures	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Purpose of data/parameter	Calculation of baseline emissions and project emissions
Additional comments	-

Data/parameter:	BFT,k,y
Unit	tons of dry matter
Description	Quantity of biomass residue type k that has been transported to the project site during the year y where k are the types of biomass residues used in the project plant in year y
Measured/calculated/default	Measured (for wet matter), adjusted based on the moisture content
Source of data	On-site measurements
Value(s) of monitored parameter	1,002,842.72

Monitoring equipment	Equipment: #1 the electronic truck scale Type: SCS-50 Accuracy class: 0.3S Serial number: 9050001 Calibration frequency: Once per year Date of last calibration: 28/02/2013, 27/02/2014, 25/02/2015, 22/02/2016, 20/02/2017 Validity: Up to 19/02/2018 Equipment: #2 the electronic truck scale Type: SCS-50 Accuracy class: 0.3S Serial number: 11050003 Calibration frequency: Once per year Date of last calibration: 28/02/2013, 27/02/2014, 25/02/2015,22/02/2016, 20/02/2017 Validity: Up to 19/02/2018
Measuring/reading/recording frequency	Measuring continuously and recording monthly
Calculation method (if applicable)	Quantity of dry matter = quantity of wet matter × (1-moisture content)
QA/QC procedures	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Purpose of data	Calculation of project emissions
Additional comments	-

Data/parameter:	Moisture content of the biomass residues
Unit	% Water content
Description	Moisture content of biomass residue type k
Measured/calculated/default	Measured
Source of data	On-site measurements
Value(s) of monitored parameter	As for rice straw, the weighted mean value of moisture content in this monitoring period is 19.13%; As for rape stalk, the weighted mean value of moisture content in this monitoring period is 21.61%; As for cotton stalk, the weighted mean value of moisture content in this monitoring period is 19.78%;

Monitoring equipment	The details please refer to in section E.1 and the data base. (1)As for the moisture of the biomass entered into the Weighbridge house, it is monitored by #1, #2, #3 moisture meter: Equipment: #1, #2, #3 moisture meter Accuracy class: 0.1S Serial number: 1222, 1264, 1266 Type: MS100 Calibration frequency: once half a year Date of calibration for 1#, 2#, 3#, 26/08/2013,21/02/2014,20/08/2014,13/02/2015,11/08/2015,1/02/2016,20/07/2016,16/01/2017,10/07/2017. Validity: valid to 09/01/2018; (2)As for the moisture of biomass entered into the boilers (This parameter is used to calculate $BE_{biomass,y}$ and $PE_{Biomass,CH4,y}$ in the following section E.): Equipment: #1 electronic moisture analyzer Accuracy class: 0.1S Serial number: 24208686 Type: MA150 Calibration frequency: once half a year Date of calibration: 26/08/2013, 21/02/2014, 20/08/2014, 13/02/2015, 11/08/2015, 1/02/2016,20/07/2016,16/01/2017,10/07/2017 Validity: valid to 09/01/2018;
Measuring/reading/recording frequency	Measured continuously, recorded monthly
Calculation method (if applicable)	The monthly simple mean value of each type of biomass is worked out.
QA/QC procedures	The monitoring instrument will be regularly calibrated as per related technical standard.
Purpose of data/parameter	Calculation of baseline emissions and project emissions
Additional comments	-

Data/parameter:	AVDy
Unit	km
Description	Average round trip distance (from and to) between biomass fuel supply sites and the project site
Measured/calculated/default	Records
Source of data	Records by project participants
Value(s) of monitored parameter	50*2=100 To be conservative, the longest distance between biomass fuel supply sites and the project site is used.

Monitoring equipment	Check consistency of distance records provided by the truckers by comparing recorded distances with other information from other sources (e.g. maps); The relative maps have been submitted to DOE.
Measuring/reading/recording frequency	Continuously,
Calculation method (if applicable)	-
QA/QC procedures	Check consistency of distance records provided by the truckers by comparing recorded distances with other information from other sources (e.g. maps).
Purpose of data/parameter	Calculation of project emissions
Additional comments	-

Data/parameter:	Ny
Unit	-
Description	Number of truck trips for the transportation of biomass.
Measured/calculated/default	On-site measurements
Source of data	Records by project participants
Value(s) of monitored parameter	139,511
Monitoring equipment	Since the quantity of the biomass residues and the transportation times of each truck is continuously recorded at the plant site, the total amount of truck numbers are recorded continuously correspondingly.
Measuring/reading/recording frequency	Continuously,
Calculation method (if applicable)	-
QA/QC procedures	Check consistency of the number of truck trips with the quantity of biomass combusted, e.g. by the relation with previous years
Purpose of data/parameter	Calculation of project emissions
Additional comments	-

Data/parameter:	$EF_{km,CO2,y}$
Unit	tCO_2/km
Description	Average CO2 emission factor for the trucks during the year y
Measured/calculated/default	Default
Source of data	Default value for the Moderate Control in Table 1-32 of “Estimated Emission Factors for US Heavy Duty Diesel Vehicles” on Page 1.75 in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual
Value(s) of monitored parameter	1.011×10^{-3}

Monitoring equipment	Review the appropriateness of the data
Measuring/reading/recording frequency	Review the appropriateness of the data annually
Calculation method (if applicable)	Not applicable
QA/QC procedures	Cross check with the values from literature at least annually
Purpose of data/parameter	Calculation of project emissions
Additional comments	-

Data/parameter	$EF_{CO2,diesel,y}$
Unit	tCO2/TJ
Description	CO2 emission factor for diesel
Measured/calculated/default	Default
Source of data	The table1.3 "default values of carbon content" Chapter 1 of 2006 IPCC Guidelines for national greenhouse gas inventories :default carbon content for diesel oil: 20.2 kg/GJ
Value(s) of monitored parameter	0.07406667=20.2*44/12000
Monitoring equipment	Review the appropriateness of the data
Measuring/reading/recording frequency	Review the appropriateness of the data annually
Calculation method (if applicable)	Not applicable
QA/QC procedures	Not applicable
Purpose of data/parameter	Calculation of project emissions
Additional comments	-

Data/parameter:	$FF_{project\ plant,i,y}$
Unit	ton/year
Description	Quantity of fossil fuel type i combusted in the project plant during the year y.
Measured/calculated/default	Measured
Source of data	Readings records
Value(s) of monitored parameter	As stated in the registered PDD, according to the Explanation and Clarification for the Start-up way of the boiler provided by China City Environment Protection Engineering Limited Company and by the boiler manufacturer, the project will use the dry biomass to start up the boiler and the fossil fuels such as the diesel or natural gas won't be used. Furthermore, it is stated in the registered PDD that "This should include fossil fuels co-fired in the project plant but not any other fuel consumption at the project site that is attributable to the project activity (e.g. for mechanical preparation of the biomass residues)". In this monitoring period, the project indeed hasn't used the diesel to start up, thus 0 was combusted in the project plant.

Monitoring equipment	Diesel monitoring meter
Measuring/reading/recording frequency:	Continuously measuring and monthly recording
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Not applicable
Purpose of data/parameter	Calculation of project emissions
Additional comments	-

Data/Parameter	$FF_{project\ site,i,y}$
Unit	ton
Description	Quantity of fossil fuel type i combusted at the project site for other purposes that are attributable to the project activity during the year y
Measured/calculated/ default	On-site measurements
Source of data	Readings records
Value(s) of monitored parameter	860.22
Monitoring equipment	Diesel monitoring meters Type JK1100GG Serial Numbers: 090620190 and 090620191 Accuracy class: ＜±0.30%, and the industry standard of accuracy class is ±0.30%, so the accuracy class fully meets the industry standard. Calibration frequency: at least once three months Date of calibration: 7/05/2013 | 4/08/2013 | 1/11/2013 | 22/1/2014 | 21/4/2014 | 18/7/2014 | 17/10/2014 16/1/2015 | 15/4/2015 | 14/7/2015 | 13/10/2015 8/1/2016 | 7/4/2016 | 6/7/2016 | 29/9/2016 26/12/2016 | 24/3/2017 | 22/6/2017 | 20/09/2017 Validity: valid to 19/12/2017
Measuring/reading/recording frequency	Continuously measuring and monthly recording
Calculation method (if applicable)	Not applicable
QA/QC procedures	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes. The data from the invoices of diesel has been collected and the invoices have been submitted to DOE for cross check.
Purpose of data/parameter	Calculation of project emissions

Additional comments	-

Data/Parameter	$EG_{project\ plant,y}$
Unit	MWh
Description	Net quantity of electricity generated in the project plant during the year y
Measured/calculated/ default	Measured
Source of data	Meter readings records
Value(s) of monitored parameter	729,364.775
Monitoring equipment	M5 and M6 (main meters) Accuracy class: both 0.2S Type: both MK6E Serial number: S/N:209151404 (For M5), S/N:209151403 (For M6) Calibration frequency: once a year Date of calibration: 18/06/2013, 15/06/2014, 12/06/2015, 10/06/2016, 08/06/2017 for both Validity: valid to 07/06/2018 for both M1,M2,M3, M4(backup meters) Accuracy class: 0.2S for all Type: DTSD341 for all Serial number: 20081167020074(For M1), 20081167020064(For M2), 9040060580297(For M3), 9040060580296(For M4) Calibration frequency: once a year Date of calibration: 18/06/2013, 15/06/2014, 12/06/2015, 10/06/2016, 08/06/2017 for all Validity: valid to 07/06/2018 for all
Measuring/reading/recording frequency	Continuously measuring and monthly recording
Calculation method (if applicable)	Not applicable
QA/QC procedures	The consistency of metered net electricity generation should be crosschecked with receipts from electricity sales (if available) and the quantity of fuels fired (e.g. check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years).
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter:	$EC_{1,PJ,y}$
Unit	MWh
Description	$EC_{1,PJ,y}$ in the formula of "Emission reductions due to displacement of electricity", and it means "the auxiliary electricity consumption by the project plant (e.g. for pumps, vans, etc)".
Measured/calculated/default	Measured
Source of data	Meter readings records
Value(s) of monitored parameter	1,703.856
Monitoring equipment	M5 and M6 (main meters) Accuracy class: both 0.2S Type: both MK6E Serial number: S/N:209151404 (For M5), S/N:209151403 (For M6) Calibration frequency: once a year Date of calibration: 18/06/2013, 15/06/2014, 12/06/2015, 10/06/2016, 08/06/2017 for both Validity: valid to 07/06/2018 for both M1,M2,M3, M4(backup meters) Accuracy class: 0.2S for all Type: DTSD341 for all Serial number: 20081167020074(For M1), 20081167020064(For M2), 9040060580297(For M3), 9040060580296(For M4) Calibration frequency: once a year Date of calibration: 18/06/2013, 15/06/2014, 12/06/2015, 10/06/2016, 08/06/2017 for all Validity: valid to 07/06/2018 for all
Measuring/reading/recording frequency	Continuously measuring and monthly recording
Calculation method (if applicable)	Not applicable
QA/QC procedures	Cross-check measurement results with invoices for purchased electricity if available
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	TDL_y
Unit	%
Description	The average technical distribution losses rate from power transmission site to power consumption site
Measured/calculated/ default	Default

Source of data	According to “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, adopt the default value
Value(s) of monitored parameter	20%
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Not applicable
Calculation method (if applicable)	Not applicable
QA/QC procedures	Not applicable
Purpose of data/parameter	Calculation of project emissions
Additional comments	-

Data/Parameter	NCV_i
Unit	GJ/t
Description	Net calorific value of the fossil fuel type i (i: diesel)
Measured/calculated/ default	Default
Source of data	China Energy Statistical Yearbook
Value(s) of monitored parameter	42.652
Monitoring equipment	Review the appropriateness of the data annually
Measuring/reading/recording frequency	Review the appropriateness of the data annually
Calculation method (if applicable)	Not applicable
QA/QC procedures	Project owner 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 updated China Energy Statistical Yearbook 2011. So, 42.652 GJ/ton was thought to be suitable and accurate.
Purpose of data/parameter	Calculation of project emissions
Additional comments	-

Data/parameter	NCVk
Unit	GJ/t
Description	Net calorific value of biomass residue type k
Measured/calculated/default	Measured
Source of data	As for calculation of baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues, to use 0.0027 tCH4 per ton of biomass as a default value for the product of NCVk and EFburning,CH4,k,y. As for calculation of methane emissions from combustion of biomass residues, the NCV must be monitored ex-ante.
Value(s) of monitored parameter	As for calculation of baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues, to determine the CH4 emission factor, project participants will use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 t CH4 per ton of biomass as a default value for the product of NCV_k and $EF_{burning,CH4,k,y.}$ As for calculation of methane emissions from combustion of biomass residues, measurements shall be carried out according to relevant international standards. Measure the NCV based on dry biomass. The details please see section E.
Monitoring equipment	The measurements for NCVk of biomass residues have been carried out at reputed laboratory (the national key laboratory on coal burning, Huazhong University of Science and Technology) and according to relevant international standards at least every six months. The test reports have been submitted to DOE. The data from internal lab of the project is used for cross-check. The monitoring equipment of the internal lab of the project is as follows: Type: #1 calorimetric meter Accuracy class: 0.1S Serial number:1809099 Calibration frequency: once a year Date of calibration: 28/02/2013; 27/02/2014, 26/02/2015, 25/02/2016, 22/02/2017 Validity: valid to21/02/2018
Measuring/reading/recording frequency	As for the measurements for NCVk of biomass residues carried out at reputed laboratory: at least every six months. As for internal lab of the project, during the operation day, when which kind of biomass is combusted, its NCV is monitored once on this day.
Calculation method (if applicable)	Not applicable
QA/QC procedures	-
Purpose of data/patameter	Calculation of baseline emissions and project emissions
Additional comments	-

Data/parameter	$EF_{burning,CH4,k,y}$
Unit	tCH_4/GJ
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
Value(s) of monitored parameter	As for calculation of baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues, to determine the CH_4 emission factor, project participants will use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 t CH4 per ton of biomass as a default value for the product of NCV_k and $EF_{burning,CH4,k,y}$.
Monitoring equipment	Review of default values
Measuring/reading/recording frequency	Review of default values: annually
Calculation method (if applicable)	Not applicable
QA/QC procedures	Value is from latest version of IPCC, so the uncertainty is low.
Purpose of data/patameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	$BF_{utilized,k,y}$
Unit	tons
Description	Quantity of biomass residues of type k that are utilized for energy generation and as feedstock etc in the defined geographical region
Measured/calculated/default	Measured
Source of data	Directly from the statistics issued by the local agriculture government
Value(s) of monitored parameter	Refer to the table in section E.3 of the monitoring report
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Measured and recorded annually
Calculation method (if applicable)	Not applicable
QA/QC procedures	Not applicable
Purpose of data/patameter	Calculation of leakage
Additional comments	-

Data/parameter	$BF_{available,k,y}$
Unit	tons
Description	Quantity of biomass residues of type k available in the region

Measured/calculated/default	Measured
Source of data	Directly from the statistics issued by the local agriculture government
Value(s) of monitored parameter	Refer to the table in section E.3 of the monitoring report
Monitoring equipment	Not applicable
Measuring/reading/recording frequency	Measured and recorded annually
Calculation method (if applicable)	Not applicable
QA/QC procedures	Not applicable
Purpose of data/patameter	Calculation of leakage
Additional comments	-

D.3. Implementation of sampling plan

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Not applicable.

SECTION E. Calulation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

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(1) Emission reductions due to displacement of electricity

Emission reductions due to the displacement of electricity are calculated as follows:

$ER_{electricity,y} = EG_y \times EF_y = (EG_{project\ plant,y} - EC_{1,PJ,y}) \times EF_y$

Where:

$ER_{electricity,y}$ Emission reductions due to displacement of electricity during the year y (tCO_2e/yr)

EG_y Net quantity of increased electricity generation as a result of the project activity (incremental to baseline generation) during the year y (MWh)

EF_y CO_2 emission factor for the electricity displaced due to the project activity during the year y (tCO_2/MWh)

$EG_{project\ plan,y}$ Net quantity of electricity generated in the project plant during the year y

$EC_{1,PJ,y}$ The auxiliary electricity consumption by the project plant

According to regulation by methodology ACM0006, the on-site electricity consumption attributable to the project activity ($EC_{PJ,y}$) should include all electricity consumption that is consumed by the project activity (e.g. for mechanical treatment of the biomass), except for auxiliary electricity consumption by the project plant (e.g. for pumps, vans, etc).The auxiliary electricity consumption by the project plant should be considered in the calculation of the net quantity of electricity generation in the project plant ($EG_{project\ plant,y}$). According to the above regulation by methodology ACM0006, $EC_{1,PJ,y}$ in the formula of “Emission reductions due to displacement of electricity” means “the auxiliary electricity consumption by the project plant (e.g. for pumps, vans, etc)”. Thus the net

quantity of increased electricity generation as a result of the project activity (EGy) equals to the net quantity of electricity generated in the project plant ($EG_{Project\ Plant,\ y}$) minus the auxiliary electricity consumption by the project plant ($EC_{1,PJ,y}$).

Because the capacity of the project plant is more than 15MW, $EF_{grid,CM,y}$ is calculated as a combined margin (CM) of the CCPG, following the guidance in the section "Baselines" in methodology ACM0002 (version 11). And as per ACM0002 (version 11), the emission factor $EF_{grid,CM,y}$ is calculated according to "Tool to calculate the emission factor for an electricity system" (version 02). In the registered PDD of the project, $EF_{grid,CM,y}$ is determined ex ante as 0.99695 tCO_2/MWh, which will be fixed during the first crediting period.

During the monitoring period, Emission reductions due to the displacement of electricity are described as follows:

Period	$EG_{project\ plant,y}$	$EC_{1,PJ,y}$	EF_y	$ER_{Electricity,y}$
	MWh	MWh	tCO_2/MWh	tCO_2
2013	149,158.026	305.212	0.99695	148,398.81
2014	148,706.040	315.080	0.99695	147,938.37
2015	148,101.370	336.841	0.99695	147,313.85
2016	149,189.366	389.141	0.99695	148,346.38
2017	134,209.973	357.582	0.99695	133,444.14
Total	**729,364.775**	**1,703.856**		**725,441.55**

Note: For the year of 2017,only until to 29/11/2017

(2) Emission reductions or increases due to displacement of heat ($ER_{Heat,y}$)

Because the project owner finally decided not to claim the emission reductions due to displacement of heat, this step is not applicable.

(3) Baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass

The calculation formula of baseline emission produced by biomass residues uncontrolled burning or aerobic decay is as below:

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

Where:

$BE_{biomass,y}$ Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO_2e/yr)

GWP_{CH4} Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4), which is 21 tCO_2e/tCH_4 for the crediting period

$BF_{PJ,k,y}$ 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

It is recommended in methodology ACM0006 to use 0.0027 tCH_4/t of biomass as a default value for the product of NCV_k and $EF_{burning,CH4,k,y}$, and the uncertainty can be deemed to be greater than 100%, resulting in a conservativeness factor of 0.73. Thus, in this case an emission factor of 0.001971 tCH_4/t biomass should be used.

During the monitoring period, Emission reductions due to natural decay or uncontrolled burning of anthropogenic sources of biomass are described as follows:

Period	GWP_{CH4}	BF1 (wet,ton)	Mositure1	BF1 (dry,ton)	BF2 (wet,ton)	Mositure2	BF2 (dry,ton)	BF3 (wet,ton)	Mositure3	BF3 (dry,ton)	NCV_k and $EF_{burning,CH4,k,y}$	$BE_{biomass,y}$ tCO_2e
2013	21	210,784.76	18.98%	170,781.80	34,861.16	21.73%	27,287.07	9,643.05	19.85%	7,728.95	0.001971	8,518.18
2014	21	210,992.32	19.45%	169,951	33,701.27	22.50%	26,119	9,598	19.06%	7,769.06	0.001971	8,437.08
2015	21	210,159.54	19.47%	69,236.98	35,551.77	21.12%	28,044.4	8,119	18.98%	6,578.67	0.001971	8,437.97
2016	21	212,129.40	19.04%	171,749.72	36,599.02	21.62%	28,686.27	,6374.49	19.65%	5,121.87	0.001971	8,508.25
2017	21	186,137.03	18.68%	151,373.86	32,614.64	21.11%	25,729.97	8,436.42	21.40%	6,631.11	0.001971	7,604.97
Total		**1,030,203**	**19.13%**	**833,093**	**173,328**	**21.61%**	**135,867**	**42,172**	**19.78%**	**33,830**		**41,506.45**

Note: 1) For the year of 2017,only until to 29/11/2017

2) The biomass residue type in “BF1”is rice straw, the biomass residue type in “BF2”is rape stalk and the biomass residue type in “BF3”is cotton stalk.

(4) Total baseline emissions

The baseline emissions of the project are the sum of emission reductions due to displacement of electricity and baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues:

$$BEy = ER_{electricity,y} + BE_{biomass,y}$$

Where:

BEy Baseline emissions during the year y (tCO_2e/yr)

$ER_{electricity,y}$ Emission reductions due to displacement of electricity during the year y (tCO_2e/yr)

$BE_{biomass,y}$ Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO_2e/yr)

During the monitoring period, the total baseline emission are described as follows:

Period	$ER_{electricity,y}$	$ER_{heat,y}$	$BE_{biomass,y}$	BE_y
2013	148,398.81	0	8,518.18	156,916.99
2014	147,938.37	0	8,437.08	156,375.45
2015	147,313.85	0	8,437.97	155,751.82
2016	148,346.38	0	8,508.25	156,854.63
2017	133,444.14	0	7,604.97	141,049.11
Total	**725,441.55**	**0**	**41,506.45**	**766,948**

Note: 1) For the year of 2017,only until to 29/11/2017

E.2. Calculation of project emissions or actual net removals

>>

Project emissions include CO_2 emissions from transportation of biomass residues to the project site (PETy), CO_2 emissions from on-site consumption of fossil fuels due to the project activity (PEFFy), CO_2 emissions from consumption of electricity ($PE_{EC,y}$), CH_4 emissions from the combustion of biomass residues ($PE_{Biomass,CH4,y}$), Calculate as below:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \times (PE_{Biomass,CH4,y} + PE_{WW,CH4,y})$$

Where:

PETy CO_2 emissions during the year y due to transportation of biomass residues to the project plant (tCO_2)

PEFFy 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)

$PE_{EC,y}$ CO_2 emissions during the year y due to electricity consumption at the project site that is attributable to the project activity (tCO_2)

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)

$PE_{WW,CH4,y}$ CH_4 emissions from waste water generated from the treatment of biomass residues in the year y (tCH_4)

(1) CO_2 emissions from transportation of biomass residues (PETy)

Transporting biomass to the project site is normally done by trucks, which results in direct GHG emissions. Project participants choose the Option 1 listed in the ACM0006 to determine emissions: an approach based on distance and vehicle type.

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

Where:

PETy CO2 emissions during the year y due to transport of the biomass residues to the project plant (tCO2)

Ny Number of truck trips during the year y

AVDy 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 CO2 emission factor for the trucks measured during the year y (tCO2/km)

During the monitoring period, emissions from transportation of biomass residues are described as follows:

Period	N_y	AD_y	$EF_{km,\ CO2,\ y}$	PET_y
2013	28,144	100	0.001011	2,845.36
2014	28,673	100	0.001011	2,898.84
2015	27,581	100	0.001011	2,815.74
2016	28,044	100	0.001011	2,835.25
2017	26,799	100	0.001011	2,709.38
Total	**139,511**	**100**	**0.001011**	**14,104.56**

Note: 1) For the year of 2017,only until to 29/11/2017;

2) Ny is recorded continuously by project owner; the original records and the calculation process have been submitted to DOE. The value is also checked with the number of truck trips with the quantity of biomass combusted. The transported quantity (wet) of biomass residues during this monitoring period is 1,245,883 t, so the calculated average truck load is around 8.93 t. There are several suppliers with several kinds of transportation vehicles, and the supplied quantity of each time varies a lot, the actual range is around 3t to 13t, so the value is within normal range.

(2) CO_2 emissions from on-site consumption of fossil fuels ($PEFF_y$)

(2.1) As for $FF_{project\ plan,i,y}$

As stated in the registered PDD, according to the Explanation and Clarification for the Start-up way of the boiler provided by China City Environment Protection Engineering Limited Company and by the boiler manufacturer, the project will use the dry biomass to start up the boiler and the fossil fuels such as the diesel or natural gas won't be used.

Furthermore, it is stated in the registered PDD that "This ($FF_{project\ plant,i,y}$) should include fossil fuels co-fired in the project plant but not any other fuel consumption at the project site that is attributable to the project activity (e.g. for mechanical preparation of the biomass residues)".

In this monitoring period, according to the monitoring data, the project indeed hasn't used the diesel to start up. So, $FF_{project\ plant,i,y}$ in this monitoring period is zero.

(2.2) As for $FF_{project\ site,i,y}$

As per methodology ACM0006 (version 10), CO_2 emissions from on-site combustion of fossil fuels ($PEFF_y$) should be calculated using the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 02). The CO_2 emissions from on-site consumption of fossil fuels (diesel) are calculated as follows:

$PEFFy = FF_{project,diesel,y} \times NCV_{diesel,y} \times COEF_{diesel,y}$

Where:

$PEFF_y$ 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 (tCO2e/yr)

$FF_{project\ site,diesel,y}$ Quantity of diesel combusted at the project site for other purposes that are attributable to the project activity during the year y (mass unit per year)

$COEF_{diesel}$ the CO_2 emission factor for diesel (tCO_2/GJ) , which is calculated based on net calorific value and CO_2 emission factor of diesel, as follows:

$$COEF_{diesel,\ y} = NCV_{diesel,\ y} \times EF_{diesel,\ y} \times 44/12$$

Where:

$NCV_{diesel,y}$ the net calorific value of diesel in year y (GJ/ton)

$EF_{diesel,y}$ the CO_2 emission factor of diesel in year y (tC/GJ)

During the monitoring period, the NCV of diesel(GJ/t) is 42.652, and the emission factor of diesel（ tC/TJ） is 20.20, so PEEFy is calculated as follows:

Period	$FF_{project\ site,diesel,y}$	$NCV_{diesel,y}$	$EF_{diesel,y}$	$PEFF_y$
	t	GJ/t	tC/GJ	tCO_2
2013	183.01	42.652	0.0202	578.15
2014	165.95	42.652	0.0202	524.25
2015	176.63	42.652	0.0202	557.99
2016	172.43	42.652	0.0202	544.72
2017	162.2	42.652	0.0202	512.40
Total	**860.22**			**2,717.51**

Note: 1) For the year of 2017,only until to 29/11/2017;

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

According to regulation by methodology ACM0006, the calculation of the project emission due to electricity consumption should adopt the latest version of “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (Version 01, EB39). It can be calculated as follows:

$$PE_{EC,y}=EC_{2,PJ,y}\times EF_{grid,CM,y}\times(1+TDLy)$$

Where:

PEEC,y CO_2 emissions from on-site electricity consumption attributable to the project activity. (tCO2e/yr)

$EC_{2,PJ,y}$ On-site electricity consumption attributable to the project activity during the year y (MWh)

EFgrid,CM,y CO_2 emission factor for grid electricity during the year y (tCO_2/MWh)

TDLy The average technical transmission and distribution losses in the CCPG in year y for the voltage level at which electricity is obtained from the CCPG at the project site

According to regulation by methodology ACM0006, the on-site electricity consumption attributable to the project activity (EC2,PJ,y) should include all electricity consumption that is consumed by the project activity (e.g. for mechanical treatment of the biomass), except for auxiliary electricity consumption by the project plant (e.g. for pumps, vans, etc)($EC_{1,PJ,y}$).The auxiliary electricity consumption by the project plant ($EC1_{,PJ,y}$) should be considered in the calculation of the net quantity of electricity generation in the project plant ($EG_{project\ plant,y}$).

As for the proposed project, there is none of electricity consumption that is consumed by the project activity (e.g. for mechanical treatment of the biomass), so $EC_{2,PJ,y}$ here is zero. The auxiliary electricity consumption by the project plant (e.g. for pumps, vans, etc)($EC_{1,PJ,y}$) has been considered in the calculation of the net quantity of electricity generation in the project plant ($EG_{project\ plant,y}$).

Therefore, during the monitoring period, $PE_{EC,y}$=0 CO_2e

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

The emissions can be calculated as follows:

$PE_{Biomass,CH4,\ y} = EF_{CH\ 4,BF} \times \sum BF_{k\ ,\ y} \times NCV_k$

Where:

$PE_{Biomass,CH4,y}$ CH_4 emissions from the combustion of biomass residues during the year y (tCH_4/yr)

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

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

$EF_{CH4,BF}$ CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ)

As per methodology ACM0006, the default CH_4 emission factor for all biomass utilized in the project activity is 30 kg CH_4/TJ, the uncertainty is then estimated to be 300%, resulting in a conservativeness factor of 1.37. So the $EF_{CH4,BF}$ is equal to 41.1kg CH_4/TJ

During the monitoring period, emissions from combustion of biomass residues are described as follows:

Period	$EF_{CH\ 4,BF}$	BF1	NCV1	BF2	NCV2	BF3	NCV3	$PE_{Biomass,CH4,\ y}$
	CH_4/TJ	(dry,t)	(MJ/t)	(dry,ton)	(MJ/t)	(dry,ton)	(MJ/t)	tCH_4
2013	41.1	170781.8	13,488	27,287.07	13,691	7728.95	13,742	114.39
2014	41.1	169,951	13,005	26,119	13,861	7,769.06	13,796	110.12
2015	41.1	69,236.9	12,904	28,044.4	13,726	6,578.67	13,181	109.14
2016	41.1	171,749.7	13,139	28,686.27	13,947	5121.87	13,429	112.02
2017	41.1	151,373.9	12,978	25729.97	13,610	6631.11	13,274	98.75
Total		**833,093**		**135,867**		**33,830**		**114.39**

Note: 1) For the year of 2017,only until to 29/11/2017;

2) The biomass residue type in “BF1”is rice straw, the biomass residue type in “BF2”is rape stalk and the biomass residue type in “BF3”is cotton stalk.

(5) Methane emissions from waste water treatment ($PE_{WW,CH4,y}$)

According to the analysis in B.6.1 in the registered PDD, no waste water treatment is involved in the project activity. As a result, the emissions are zero.

(6) Total project emissions

Project emissions include CO_2 emissions from transportation of biomass residues to the project site (PETy), CO_2 emissions from on-site consumption of fossil fuels due to the project activity (PEFFy), CO_2 emissions from consumption of electricity ($PE_{EC,y}$), and CH_4 emissions from the combustion of biomass residues ($PE_{WW,CH4,y}$):

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \times (PE_{Biomass,CH4,y} + PE_{WW,CH4,y})$$

Where:

PET_y CO_2 emissions during the year y due to transportation of biomass residues to the project plant (tCO_2)

$PEFF_y$ 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)

$PE_{EC,y}$ CO_2 emissions during the year y due to electricity consumption at the project site that is attributable to the project activity (tCO_2)

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)

$PE_{WW,CH4,y}$ CH_4 emissions from waste water generated from the treatment of biomass residues in the year y (tCH_4)

During the monitoring period, the total project emissions are described as follows:

Period	PET_y	$PEFF_y$	$PE_{EC,y}$	$PE_{Biomass,CH4,y}$	$PE_{WW,CH4,y}$	PE_y
	tCO_2	tCO_2	tCO_2	tCH_4	tCH_4	tCO_2e
2013	2,845.36	578.15	0	114.39	0	5,825.79
2014	2,898.84	524.25	0	110.12	0	5,735.70
2015	2,815.74	557.99	0	109.14	0	5,665.62
2016	2,835.25	544.72	0	112.02	0	5,732.31
2017	2,709.38	512.40	0	98.75	0	5,295.61
Total	**14,104.56**	**2,717.51**	**0**	**114.39**	**0**	**28,255.04**

Note: 1) For the year of 2017,only until to 29/11/2017;

E.3. Calculation of leakage emissions

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According to the i Survey of Available and Usable Biomass Residue Quantity of Yicheng City from 2013 to 2017, issued by Agricultural Bureau of Yicheng City/78/, the availability and utilization of biomass residues types used in the project activity are shown as follows:

Type of biomass residues	Rice straw	Rape stalk	Cotton stalk	Total
1. Available quantity (10000 t)	397.30	28.25	9.71	435.26
2.Quantity utilized (10000t)	155.25	21.36	6.48	183.09
2.1 Quantity to be utilized at the project plant in this monitoring period(10000t)	103.02	17.33	4.22	124.57
2.2 Quantity utilized for other purposes (10000 t)	52.23	4.03	2.26	58.52
3. Ratio of available quantity vs.quantity utilized	2.56	1.32	1.50	

As shown above, for each of the biomass residues types used in the project activity, its available quantity in the defined geographical region is at least 25% larger than the quantity utilized. Hence, there is an abundant surplus of the biomass residues in the region of the project activity which is not utilized, and thus there is no leakage caused by the project activity during the monitoring period.

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)			
				Before 01/01/ 2013	From 01/01/ 2013 until 31/12/ 2020	From 01/01/ 2021	Total amount
Total	766,948	28,255	0	0	738,693	0	738,693

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante for this monitoring period in the PDD (t CO_2e)
738,693	703,017

E.5.1. Explanation of calculation of "amount estimated ex ante for this monitoring period in the PDD"

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During this monitoring period, the estimated emission reductions in the approved revised PDD during this monitoring period can be calculated as: (1794days/365days)*143,033 tCO_2e =703,017 tCO_2e. Therefore, the emission reductions estimated in the PDD for this monitoring period should be 703,017 tCO2e.

E.6. Remarks on increase in achieved emission reductions

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The emission reductions during current monitoring period are 5.07% higher than the estimated in the registered PDD. The reason for the increase in emission reductions is that the net electricity supplied to the grid is 4.29% higher than the amount estimated ex ante for this monitoring period in the registed PDD.

Net electricity supplied to the grid during this monitoring period (MWh)	Amount estimated ex ante for this monitoring period in the PDD (MWh)
727,660.919	697,743.123 Calculated as (1794days/365days)*141,960

According to registered PDD when the annual grid-in electricity increase more than 5.23%, the IRR can reach 8%, so even the net electricity supplied to the grid is 4.29% higher than the amount estimated ex ante in the PDD, the additionality of the proposed project could not be effected.

E.7. Remarks on scale of small-scale project activity

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Not applicable.

Document information

Version	*Date*	*Description*
09.0	8 October 2021	Revision to: • Ensure consistency with version 03.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN).
08.0	6 April 2021	Revision to: • Reflect the "Clarification: Regulatory requirements under temporary measures for post-2020 cases" (CDM-EB109-A01-CLAR).
07.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.

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 GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.