LIUCHENG BIOMASS POWER GENERATION PROJECT IN GUANGXI ZHUANG AUTONOMOUS REGION, CHINA

Document Prepared By Beijing Cronus Technology Consultancy Centre

Project Title	Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China
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Monitoring Period	10/09/2009 to 23/09/2017
Prepared By	Beijing Cronus Technology Consultancy Centre
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China (hereafter referred to "the proposed project") is sited in Liucheng County Guangxi Zhuang Autonomous Region, and it was constructed and operated by Liuzhou City Xin'neng Biomass Power Generation Co., Ltd. (hereafter referred to "the project owner").

The proposed project constructed a biomass residues power generation plant with the biomass residues from mulberry leaf and sugarcane leaf discarded by local farmers in Liucheng County. The main systems of the proposed project involve heat system, fuel supply system, ash removal system, water disposal system, water supply system, electrical system, thermal control system, auxiliary production system etc. There are abundant biomass resources in Liucheng County as follows: within the 50 kilometers radius range of the project site, the annual available quantities of sugarcane leaf is 375,000 tons and the annual available quantities of mulberry leaf is 315,000 tons, therefore, the total annual available quantities are 690,000 tons. The total quantity of biomass residues used by the proposed project are 178,198 tons. Before the implementation of the proposed project, there were no equipments and systems of biomass residues power generation in the nearby of the project site.

According to the following analysis, in absence of the proposed project, the most viable baseline scenario was "The SCPG providing the same annual power generation" and the same amount of biomass residues "dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner". The project emission sources are CO_2 emissions by on site fossil fuels, CO_2 emissions by on site electricity consume and CO_2 emissions by mulberry leaf and sugarcane leaf transportation and CH_4 emissions by mulberry leaf and sugarcane leaf burning. The proposed project installed two 75 t/h biomass residues direct-burning boilers and two 15 MW steam turbines and generators. The total installed capacity is 30 MW, with annual operation hours of 6,000, thus the annual generated electricity is 180,000 MWh and the annual grid-connected electricity is 157,860 MWh. The electricity is delivered to Guangxi grid, and finally delivered to South China Power Grid (SCPG). The estimated annual GHG emission reductions are 123,324 tCO_2.

The generators and turbines purchase agreement was signed on 28/08/2008. The project started construction on 05/02/2009 and started to operation on 10/09/2009. During the monitoring period (from 10/09/2009 to 23/09/2017), the emission reduction achieved by the project is 1,069,816 tCO_2e.

1.2 Sectoral Scope and Project Type

The Project falls in the sectoral scope 1: energy industries (renewable-/non-renewable sources).

The Project is not a grouped project.

1.3 Project Proponent

Provide contact information for the project proponent(s). Copy and paste the table as needed.

Organization name	Liuzhou City Xin'neng Biomass Power Generation Co., Ltd.
Contact person	Sun Yuping
Title	Project Owner
Address	Minzu Road, No. 119, Nanning City Guangxi Zhuang Autonomous Region P. R. China，530000
/Telephone	+86-772-761 8211
Email	LZXN0772@163.com

1.4 Other Entities Involved in the Project

Organization name	DEMETER VENTURE UK LIMITED
Role in the project	Project Buyer
Contact person	Tao Ren
Title	General Manager
Address	145-157,St John Street, London,Uk
Telephone	+44 274 732 33
Email	Teng_hp@demeterventureuk.com

1.5 Project Start Date

10/09/2009

(The project started to operation on 10/09/2009)

1.6 Project Crediting Period

The VCS crediting period of the Project is from 10/09/2009 to 09/09/2019, totally 10 years.

1.7 Project Location

The proposed project is located in Liucheng County, Guangxi Zhuang Autonomous,

People's Republic of China. Region, 3.5 km west away from Liucheng county, 58 km north away from Liuzhou city. The site's coordinates are east longitude of 109°11'35" and north latitude of 24°39'27".

1.8 Title and Reference of Methodology

The approved baseline and monitoring methodology applied in the proposed project activity is ACM0006 "Consolidated methodology for electricity generation from biomass residues" (Version 09, EB48).

In line with the application of the ACM0006, the project refers to the following tools and /methodology:

_ ACM0002: "Consolidated baseline and monitoring methodology for grid-connected electricity

generation from renewable sources" (Version 10, EB47);

_ "Tool to calculate the emission factor for an electricity system" (version 02);

_ "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 02.2);

_ "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (version 02);

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

1.9 Other Programs

Emission Trading Programs and Other Binding Limits:

The project has been registered as a CDM project on 24/09/2010, for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program. The project proponent confirmed that, once emission reductions generated from 10/09/2009 to 23/09/2017 are issued under VCS rules, those credits will not be claimed as CERs and will be claimed as zero in the possible future CER monitoring report. And issued VCUs will be sold only once to one particular buyer.

Once the project proponent are included in an emissions trading program or any other mechanism that includes GHG allowance trading, the VCU issuance under VCS rules will be stop immediately since the date of included in an emissions trading program or any other mechanism that includes GHG allowance trading.

Other Forms of Environmental Credit:

The Project is a renewable energy generation project, which discharges no emission during operation period. Thus, the project doesn't fall into categories that creating GHG emissions primarily for the purpose of its subsequent removal or destruction.

The Project has not created another form of environmental credit, which will be verified by DOE. And the Project will not create other environmental credit in the future.

Participation under Other GHG Programs:

The Project has been registered as a VCS project with registration number 1824.

The Project has been registered as a CDM project with registration number 3664.

1.10 Sustainable Development

The proposed project will contribute to sustainable development in the region in following aspects:

- Use biomass residues resources effectively, promote recycle economy; control the burning of mulberry leaf and sugarcane leaf safely, protect the environment;
- To increase local power supply, accelerate local economic development; displace part of the electricity generated by SCPG, which is dominated by fossil fuel fired power plants, and reduce air pollutant emissions such as CO_2, SO_2 and NO_X.
- The proposed project will facilitate the local employment and create a lot of opportunities in construction period and 111 employees in operation period.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The proposed project will install two 75 t/h biomass residues direct-burning boilers and two 15 MW steam turbines and generators. The total installed capacity is 30 MW, with annual operation hours of 6,000, thus the annual generated electricity is 180,000 MWh and the annual grid-connected electricity is 157,860 MWh.

The Project was put into operation on 10/09/2009 The electricity generated by the Project is delivered to SCPG.

During this monitoring period, the Project is operated and implemented in accordance with the validated and revised PDD version 05 dated 29/03/2010, which was approved by EB on 24/09/2010. Neither emergencies (including of overhaul times, downtimes of equipment, exchange of equipment, etc.) happened to the monitoring system in this monitoring period, nor events or situations occurred during the monitoring period, which may impact the applicability of the methodology.

The key technology parameter of the boilers, steam turbines and generators can be found at Table1.

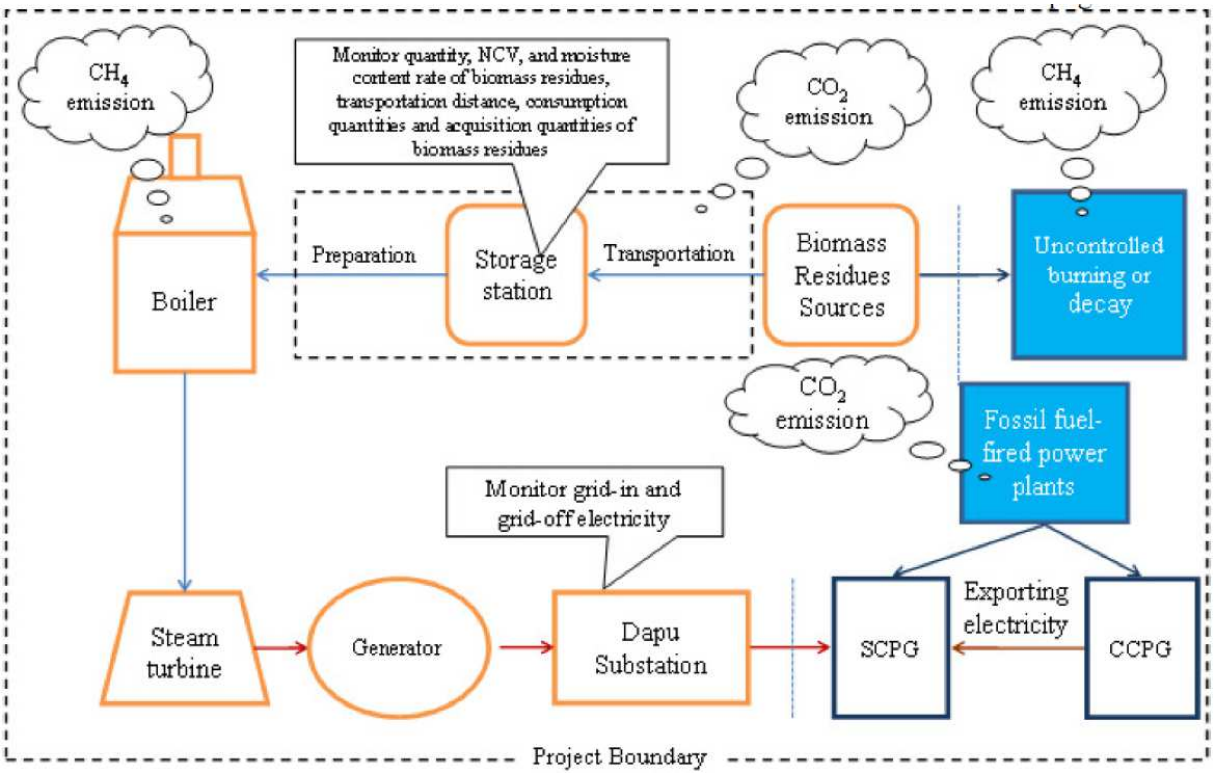
Table1 key technical parameters of boilers, steam turbines and generators

Item	Quantity	Manufacturer	Model	Main technical parameter
Boilers	2	Nantong Wanda Boiler	Medium temperature	Boiler rated evaporating capacity: 75t/h

		Manufacture Co., Ltd.	Medium pressure biomass cycle fuidized bed boiler	Steam pressure: 3.82MPa(g) Steam Temperature: 450 ℃ Boiler feed-water temperature: 150 ℃ Boiler efficiency: not lower than 89%
Steam turbines	2	China Changjiang Power Corporation (Group)	Medium pressure, single cylinder, actuation, impulse, condensed gas, N15-3.43/435	Rated put-in steam pressure: 3.43 MPa(a) Rated put-in steam temperature: 435 ℃ Rated put-in steam capacity: 65t/h Total efficiency: 81.5%
Generators	2	China Changjiang Power Corporation (Group)	QA-15-2	Rated capacity: 15MW Most run capacity: 18MW Rated frequency: 50Hz Rated voltage: 10.5KV Capacity factor: 0.80 Rated efficiency: 97.6%

The electricity generated by the Project will be delivered to Guangxi grid and finally delivered to South China Power Grid (SCPG).

The technical process in the Project can be shown as following diagram:



2.2 Deviations

2.2.1 Methodology Deviations

There is no deviation applied to this monitoring period.

2.2.2 Project Description Deviations

There is no deviation applied to this monitoring period.

2.3 Grouped Project

The Project is not a grouped project.

2.4 Safeguards

2.4.1 No Net Harm

The Environmental Impact Assessment (EIA) Report for the proposed project was compiled by Environmental Sciences Research Institute in Guangxi Zhuang Autonomous Region. The EIA Report for the proposed project has been approved by the Environmental Protection Bureau of Guangxi Zhuang Autonomous Region on 29/12/2007, with approval No. “Guihuanguanzi [2007] No.586”. According to the approval comments of the EIA Report by the Environmental Protection

Bureau of Guangxi Zhuang Autonomous Region, the environmental impacts likely to be caused by the proposed project are analyzed as APPENDIX: < CDM PDD> SECTION D.1.

2.4.2 Local Stakeholder Consultation

Local Stakeholder Consultation during the project preparation stage:

To let the public realize the objective of the proposed project, support and cooperate with construction of the project, and heighten the environmental benefits and social benefits of the proposed project, the project proponent developed a stakeholders' survey of the proposed project in July and September 2007, to collect comments and requirement of public in the related region.

The first stage

The public participation was organized in July 2007 for collecting stakeholder's views and opinions mainly focused on the environmental impacts through releasing questionnaire and public announcement, partly by interview one by one:

Medium bulletin: make medium bulletin in the local residential area near the location site and release bulletin survey of stakeholders in the residential area near the project construction site. The bulletin contents include general description of the proposed project, public participation load table and contact method.

Questionnaire survey: The survey objects include local government and related departments of Liucheng county, the local villagers living nearby Liucheng biomass power project. During the survey of stakeholders, 150 questionnaires were released, and 145 questionnaires were got back, the return ratio is 96.7%. In addition, 40 people is interviewed and consulted.

The second stage

To know the public's suggestions and advices mainly on the issues of CDM application of the proposed project, the project owner did the stakeholders' survey in September 2007. The survey range was in Liucheng County, 66 questionnaires were released, and all were got back.

Local Stakeholder Consultation during the project implementation stage:

Communications with Local stakeholders are being carried out at periodic intervals. There are no negative comments received for the project. In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation[1]

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2e/MWh
Description	Baseline emission factor: the combined emission factor of the project grid system in year y. $EF_{grid,CM,y}$ was not directly available at validation but calculated based on other parameters in the PDD available at validation, therefore in the MR, only $EF_{grid,CM,y}$ is included and the rest of the parameters are either used to calculate EF_{CM} or not used in the MR.
Source of data	Registered PDD
Value applied:	0.78795
Justification of choice of data or description of measurement methods and procedures applied	Notification on 2009 baseline emission factors for regional power grids in China, issued by China on July 6, 2009 and the registered PDD.
Purpose of the data	Baseline emissions calculations.
Comments	The emission factor of the Project was ex-ante determined and is fixed during the first crediting period. All data and parameters had been determined at registration.

Data / Parameter	GWP_{CH4}
Data unit	
Description	The warm current of CH_4
Source of data	IPCC default value
Value applied:	21 (for years before 2013), 25 (for years since 2013)
Justification of choice of data or description of measurement methods and procedures applied	According to the regulation of ACM0006, IPCC defaults can be used;

[1] According to the PDD, the project participants of the proposed project adopted to monitor the number of truck trips (N_y) instead of the average truck load (TL_y) to calculate the emissions of fossil fuel consumed for transportation, therefore TL_y is not included in this section.

Purpose of the data	Project emissions calculations
Comments	-

3.2 Data and Parameters Monitored

Data / Parameter	$BF_{k,y}$
Data unit	tons of dry matter
Description	Quantity of biomass residue type *k* combusted in the project plant during the year *y*
Source of data	On-site measurements
Description of measurement methods and procedures to be applied	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass residues. The quantity should be crosschecked with the quantity of electricity generated. Continuously, prepare annually an energy balance.
Frequency of monitoring/recording	-
Value monitored	

	Sugarcane leaf (t)	Mulberry leaf (t)
10/09/2009-31/12/2009	35,015	7,229
01/01/2010-31/12/2010	119,793	25,219
01/01/2011-31/12/2011	128,328	28,269
01/01/2012-31/12/2012	128,844	25,390
01/01/2013-31/12/2013	128,604	26,785
01/01/2014-31/12/2014	121,824	27,132
01/01/2015-31/12/2015	122,306	26,737
01/01/2016-31/12/2016	131,613	27,241
01/01/2017-23/09/2017	89,342	20,671
Total	1,005,670	214,673

Monitoring equipment: Electronic belt weight meter

Type	Serial number	Accuracy class	Date of calibration	Validity
ICS-17	07050327	1	17/06/2009	16/06/2010
			09/12/2009	08/12/2010
			29/11/2010	28/11/2011
			20/11/2011	19/11/2012
			10/11/2012	09/11/2013
			05/11/2013	04/11/2014
			20/10/2014	19/10/2015
			10/10/2015	09/10/2016
			27/09/2016	26/09/2017

QA/QC procedures to be applied	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes

Purpose of the data	Baseline emissions and project emissions calculation
Calculation method	-
Comments	-

Data / Parameter	$BF_{T,k,y}$
Data 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*
Source of data	On-site measurements
Description of measurement methods and procedures to be applied	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass residues. The quantity should be crosschecked with the quantity of electricity generated. Continuously, prepare annually an energy balance.
Frequency of monitoring/recording	-
Value monitored	

	Sugarcane leaf (t)	Mulberry leaf (t)
10/09/2009-31/12/2009	35,590	7,338
01/01/2010-31/12/2010	120,136	25,184
01/01/2011-31/12/2011	127,993	28,340
01/01/2012-31/12/2012	128,948	25,368
01/01/2013-31/12/2013	128,792	26,813
01/01/2014-31/12/2014	121,554	27,083
01/01/2015-31/12/2015	122,493	26,685
01/01/2016-31/12/2016	131,550	27,251
01/01/2017-23/09/2017	89,481	20,654
Total	1,006,537	214,716

Monitoring equipment: Electronic scales

Type	Serial number	Accuracy class	Date of calibration	Validity
SCS/ZCS-30	101017611	0.5	17/06/2009	16/06/2010
			09/12/2009	08/12/2010
			29/11/2010	28/11/2011
			20/11/2011	19/11/2012
			10/11/2012	09/11/2013
			05/11/2013	04/11/2014
			20/10/2014	19/10/2015

				10/10/2015 27/09/2016	09/10/2016 26/09/2017
	SCS/ZCS-60	20071007	0.5	17/06/2009 09/12/2009 29/11/2010 20/11/2011 10/11/2012 05/11/2013 20/10/2014 10/10/2015 27/09/2016	16/06/2010 08/12/2010 28/11/2011 19/11/2012 09/11/2013 04/11/2014 19/10/2015 09/10/2016 26/09/2017

QA/QC procedures to be applied	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Purpose of the data	Baseline emissions and project emissions calculation
Calculation method	-
Comments	-

Data / Parameter	Moisture content of the biomass residues
Data unit	% Water content
Description	Moisture content of each biomass residue type *k*
Source of data	On-site measurements
Description of measurement methods and procedures to be applied	Continuously, mean values calculated at least annually
Frequency of monitoring/recording	-
Value monitored	

	Sugarcane leaf (%)	Mulberry leaf (%)
10/09/2009-31/12/2009	14.08	26.74
01/01/2010-31/12/2010	14.14	26.63
01/01/2011-31/12/2011	14.34	26.94
01/01/2012-31/12/2012	14.12	26.65
01/01/2013-31/12/2013	14.36	26.85
01/01/2014-31/12/2014	14.27	26.76
01/01/2015-31/12/2015	14.50	26.97
01/01/2016-31/12/2016	14.03	26.75
01/01/2017-23/09/2017	14.46	27.19

<table>
<tr><td>Monitoring equipment</td><td>Drying oven
<table>
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<tr><td>101-1ES</td><td>13779</td><td>±1℃</td><td>17/06/2009
09/12/2009
29/11/2010
20/11/2011
10/11/2012
05/11/2013
20/10/2014
10/10/2015
27/09/2016</td><td>16/06/2010
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28/11/2011
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09/11/2013
04/11/2014
19/10/2015
09/10/2016
26/09/2017</td></tr>
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Electronic balance
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<tr><td>FA2004</td><td>93380</td><td>0.01mg</td><td>17/06/2009
09/12/2009
29/11/2010
20/11/2011
10/11/2012
05/11/2013
20/10/2014
10/10/2015
27/09/2016</td><td>16/06/2010
08/12/2010
28/11/2011
19/11/2012
09/11/2013
04/11/2014
19/10/2015
09/10/2016
26/09/2017</td></tr>
</table></td></tr>
<tr><td>QA/QC procedures to be applied</td><td>-</td></tr>
<tr><td>Purpose of the data</td><td>Baseline emissions and project emissions calculation</td></tr>
<tr><td>Calculation method</td><td></td></tr>
<tr><td>Comments</td><td>In case of dry biomass residues, monitoring of this parameter is not necessary.</td></tr>
</table>

Data / Parameter	$EF_{CH4,BF}$
Data unit	$kgCH_4/TJ$
Description	CH_4 emission factor for the combustion of biomass residues in the project plant
Source of data	default values, as provided in Table 4 in the ACM0006
Description of measurement methods and procedures to be	Default values, as provided in Table 4 in the ACM0006; The uncertainty level is 300%.

applied	
Frequency of monitoring/recording	-
Value monitored	30
Monitoring equipment	
QA/QC procedures to be applied	Default values, as provided in Table 4 in the ACM0006; The uncertainty level is 300%.
Purpose of the data	Project emissions calculation
Calculation method	
Comments	CH4 emissions from biomass residues combustion have been included in the project boundary, so monitoring this parameter is required.

Data / Parameter	AVD_y
Data unit	km
Description	Average round trip distance (from and to) between biomass residues supply sites and the project site
Source of data	Records by project participants on the origin of the biomass residues
Description of measurement methods and procedures to be applied	Continuously
Frequency of monitoring/recording	-
Value monitored	10/09/2009-31/12/2009: 100 01/01/2010-31/12/2010: 100 01/01/2011-31/12/2011: 100 01/01/2012-31/12/2012: 100 01/01/2013-31/12/2013: 100 01/01/2014-31/12/2014: 100 01/01/2015-31/12/2015: 100 01/01/2016-31/12/2016: 100 01/01/2017-23/09/2017: 100
Monitoring equipment	-
QA/QC procedures to be applied	Check consistency of distance records provided by the truckers by comparing recorded distances with information from other sources (e.g. maps).

Purpose of the data	Project emissions calculation
Calculation method	
Comments	Option 1 is chosen to estimate CO_2 emissions from transportation by the proposed project, so this parameter should be monitored like this. If biomass residues are supplied from different sites, this parameter should correspond to the mean value of km traveled by trucks that supply the biomass residues to the plant.

Data / Parameter	N_y
Data unit	-
Description	Number of truck trips for the transportation of biomass residues
Source of data	On-site measurements
Description of measurement methods and procedures to be applied	Continuously
Frequency of monitoring/recording	-
Value monitored	10/09/2009-31/12/2009: 10,259 01/01/2010-31/12/2010: 37,251 01/01/2011-31/12/2011: 39,049 01/01/2012-31/12/2012: 37,224 01/01/2013-31/12/2013: 38,573 01/01/2014-31/12/2014: 36,496 01/01/2015-31/12/2015: 37,607 01/01/2016-31/12/2016: 38,983 01/01/2017-23/09/2017: 27,532
Monitoring equipment	
QA/QC procedures to be applied	Check consistency of the number of truck trips with the quantity of biomass residues combusted, e.g. by comparison with previous years
Purpose of the data	Project emissions calculation
Calculation method	
Comments	Option 1 is chosen to estimate CO_2 emissions from transportation by the proposed project, so this parameter should be monitored like this. The project participants of the proposed project adopted to monitor this parameter not the average truck load TL_y

Data / Parameter	$EF_{km,CO2,y}$
Data unit	tCO_2/km
Description	Average CO_2 emission factor for the trucks during the year y
Source of data	Choose emission factors applicable for the truck types used from the literature in a conservative manner (i.e. the higher end within a plausible range)
Description of measurement methods and procedures to be applied	Cross check with the values from literature at least annually
Frequency of monitoring/recording	-
Value monitored	1.011×10^{-3}
Monitoring equipment	
QA/QC procedures to be applied	Cross check with the values from literature at least annually
Purpose of the data	Project emissions calculation
Calculation method	
Comments	Option 1 is chosen to estimate CO_2 emissions from transportation by the proposed project, so this parameter should be monitored like this.

Data / Parameter	$EF_{CO2,diesel,y}$
Data unit	tCO_2/GJ
Description	CO_2 emission factor for diesel
Source of data	Use IPCC default emission factors
Description of measurement methods and procedures to be applied	Review the appropriateness of the data annually
Frequency of monitoring/recording	-
Value monitored	0.07406667(= 20.2×44/12000)
Monitoring equipment	
QA/QC procedures to be applied	Check the default values of IPCC
Purpose of the data	Project emissions calculation

Calculation method	
Comments	-

Data / Parameter	$FF_{project\ plant,diesel,y}$
Data unit	ton/year
Description	Quantity of diesel combusted in the project plant during the year y; The proposed project only uses the biomass residues as fuels and won't use any other fossil fuels. But in order to be more conservative, 0 tons of diesel is considered to be consumed ex-ante and the amount of diesel will be monitored ex-post:
Source of data	On-site measurements
Description of measurement methods and procedures to be applied	Use weight. Continuously
Frequency of monitoring/recording	-
Value monitored	
Monitoring equipment	
QA/QC procedures to be applied	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Purpose of the data	Project emissions calculation
Calculation method	
Comments	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

10/09/2009-31/12/2009	0
01/01/2010-31/12/2010	0
01/01/2011-31/12/2011	0
01/01/2012-31/12/2012	0
01/01/2013-31/12/2013	0
01/01/2014-31/12/2014	0
01/01/2015-31/12/2015	0
01/01/2016-31/12/2016	0
01/01/2017-23/09/2017	0

Data / Parameter	$EG_{project\ plant,y}$

<table>
<tr><td>Data unit</td><td>MWh/yr</td></tr>
<tr><td>Description</td><td>Net quantity of electricity supplied to the grid by the project plant during the year y</td></tr>
<tr><td>Source of data</td><td>On-site measurements</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Continuously</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>-</td></tr>
<tr><td>Value monitored</td><td>
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<tr><td>10/09/2009-31/12/2009</td><td>47,267.0</td></tr>
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<tr><td>01/01/2011-31/12/2011</td><td>142,911.7</td></tr>
<tr><td>01/01/2012-31/12/2012</td><td>146,210.6</td></tr>
<tr><td>01/01/2013-31/12/2013</td><td>163,017.5</td></tr>
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<tr><td>01/01/2016-31/12/2016</td><td>186,153.9</td></tr>
<tr><td>01/01/2017-23/09/2017</td><td>145,385.5</td></tr>
<tr><td>Total</td><td>1,197,078.2</td></tr>
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</td></tr>
<tr><td>Monitoring equipment</td><td>Electric meter*
<table>
<tr><th>Type</th><th>Serial number</th><th>Accuracy class</th><th>Date of calibration</th><th>Validity</th></tr>
<tr><td>DSZY566-G</td><td>011212320117004774</td><td>0.5S</td><td>17/06/2009
09/12/2009</td><td>16/06/2010
08/12/2010</td></tr>
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09/12/2009
29/11/2010
20/11/2011
10/11/2012
05/11/2013
20/10/2014
10/10/2015
27/09/2016</td><td>16/06/2010
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28/11/2011
19/11/2012
09/11/2013
04/11/2014
19/10/2015
09/10/2016
26/09/2017</td></tr>
</table>
*Meter was changed from 011212320117004774 to 011212320117004779 at 11:30AM on 23/09/2010.</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>The consistency of metered net electricity generation should be crosschecked with receipts from electricity sales and the quantity</td></tr>
</table>

	of biomass residues fired.
Purpose of the data	Baseline emissions calculation
Calculation method	
Comments	-

Data / Parameter	$EC_{PJ,y}$
Data unit	MWh
Description	On-site electricity consumption attributable to the project activity imported from SCPG during the year *y*
Source of data	On-site measurements
Description of measurement methods and procedures to be applied	Use electricity meters. The quantity shall be cross-checked with electricity purchase receipts. Continuously, aggregated at least annually.
Frequency of monitoring/recording	-
Value monitored	

10/09/2009-31/12/2009	420.7
01/01/2010-31/12/2010	842.9
01/01/2011-31/12/2011	536.7
01/01/2012-31/12/2012	489.4
01/01/2013-31/12/2013	512.4
01/01/2014-31/12/2014	535.1
01/01/2015-31/12/2015	565.8
01/01/2016-31/12/2016	592.1
01/01/2017-23/09/2017	406.9
Total	3,945.5

Monitoring equipment

Electric meter*

Type	Serial number	Accuracy class	Date of calibration	Validity
DSZY566-G	011212320117004774	0.5S	17/06/2009 09/12/2009	16/06/2010 08/12/2010
DSZY566-G	011212320117004779	0.5S	17/06/2009 09/12/2009 29/11/2010 20/11/2011 10/11/2012	16/06/2010 08/12/2010 28/11/2011 19/11/2012 09/11/2013

	<table><tr><td></td><td></td><td></td><td>05/11/2013 20/10/2014 10/10/2015 27/09/2016</td><td>04/11/2014 19/10/2015 09/10/2016 26/09/2017</td></tr></table> *Meter was changed from 011212320117004774 to 011212320117004779 at 11:30AM on 23/09/2010.
QA/QC procedures to be applied	Cross-check measurement results with invoices for purchased electricity
Purpose of the data	Project emissions calculation
Calculation method	
Comments	-

Data / Parameter	TDL_y
Data unit	%
Description	The average technical distribution losses rate from power transmission site to power consumption site
Source of data	According to “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, adopt the default value.
Description of measurement methods and procedures to be applied	The distribution losses can be based on references from utilities, network operators or other official documentation. Here the default value is used.
Frequency of monitoring/recording	-
Value monitored	20
Monitoring equipment	
QA/QC procedures to be applied	-
Purpose of the data	Project emissions calculation
Calculation method	
Comments	-

Data / Parameter	NCV_i
Data unit	GJ/t
Description	Net calorific value of the fossil fuel type i (i: diesel)

Source of data	As for the proposed project, it comes from "China Energy Statistical Yearbook (2017)"
Description of measurement methods and procedures to be applied	Review the appropriateness of the data annually
Frequency of monitoring/recording	-
Value monitored	42.652GJ/ton (refer to Annex 3 of PDD)
Monitoring equipment	
QA/QC procedures to be applied	Check the local / national data.
Purpose of the data	Project emissions calculation
Calculation method	
Comments	-

Data / Parameter	NCV_k
Data unit	GJ/t
Description	Net calorific value of biomass residue type k
Source of data	Measurements
Description of measurement methods and procedures to be applied	1. 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, referenced default values are used. In the absence of more accurate information, it is recommended to use 0.0027t CH_4 per ton of biomass residues as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$. 2. As for calculation of methane emissions from combustion of biomass residues, measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV based on dry biomass residues. 3. Monitoring frequency: at least every six months, taking at least three samples for each measurement.
Frequency of monitoring/recording	-
Value monitored	Report from a reputed laboratory and according to relevant international standards.

Date of Measurement	Sugarcane leaf	Mulberry leaf
19/08/2009	15.84	13.29
09/10/2009	15.67	13.85

	02/04/2010	15.73	13.48	
	16/09/2010	15.67	13.57	
	10/03/2011	15.82	13.73	
	08/09/2011	15.49	13.82	
	05/03/2012	15.93	13.64	
	30/08/2012	15.78	13.28	
	26/02/2013	15.69	13.34	
	19/08/2013	15.55	13.38	
	12/02/2014	15.61	13.5	
	07/08/2014	15.7	13.97	
	29/01/2015	16.03	13.46	
	13/07/2015	15.84	13.48	
	12/01/2016	15.67	13.76	
	06/07/2016	16.04	13.88	
	05/01/2017	15.79	13.45	
	22/06/2017	15.67	13.39	

Monitoring equipment	
QA/QC procedures to be applied	Check the consistency of the measurements by comparing the measurement results with measurements in previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass residues.
Purpose of the data	Baseline emissions and project emissions calculation
Calculation method	
Comments	-

Data / Parameter	$EF_{burning,CH4,k,y}$
Data unit	tCH_4/GJ
Description	CH_4 emission factor for uncontrolled burning of the biomass residue type k during the year y
Source of data	Use IPCC default values
Description of measurement methods and procedures to be applied	To determine the CH_4 emission factor, the referenced default values are used. In the absence of more accurate information, it is recommended to use 0.0027t CH_4 per ton of biomass residues as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$. Monitoring frequency: annually
Frequency of monitoring/recording	-

Value monitored	To use 0.0027 tCH_4 per ton of biomass residues as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$.
Monitoring equipment	
QA/QC procedures to be applied	Review of default values
Purpose of the data	Baseline emissions calculation
Calculation method	
Comments	The CH_4 emissions from biomass residues combustion are included in the project boundary for the proposed project, so this parameter must be monitored like this.

Data / Parameter	$BF_{utilized,k,y}$
Data unit	Tones
Description	Quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region
Source of data	Local statistical data from governmental department in year of 2009-2017.
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	Annually
Value monitored	Please refer to section 4.3
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Leakage calculations
Calculation method	-
Comments	The proposed project adopts L2 for considering leakage.

Data / Parameter	$BF_{available,k,y}$
Data unit	Tones
Description	Quantity of biomass residues of type k available in the region
Source of data	Local statistical data from governmental department in year 2009-2017.
Description of	-

measurement methods and procedures to be applied	
Frequency of monitoring/recording	Annually
Value monitored	Please refer to section 4.3
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Leakage calculations
Calculation method	-
Comments	The proposed project adopts L2 for considering leakage.

3.3 Monitoring Plan

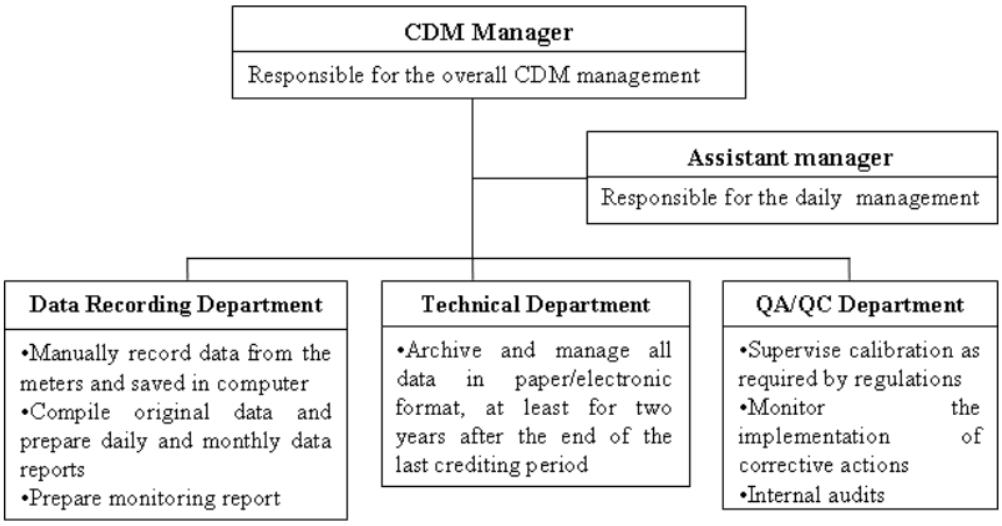
This monitoring plan will set out a number of monitoring tasks in order to ensure that all aspects of greenhouse gas (GHG) emission reductions for the proposed project are controlled and reported. This requires an on going monitoring of the project to ensure performance according to its design and that the claimed Certified Emission Reductions (CERs) are actually achieved. The following monitoring plan is set out according to the monitoring requirement in ACM0006.

1. The requirement of the monitoring plan

The monitoring plan of the proposed project is a guidance document that provides the set of procedures for preparing key project indicators, tracking and monitoring the impacts of the proposed project. The monitoring plan will be used throughout the defined crediting period for the project to determine and provide documentation of GHG emission impacts from the proposed project. This monitoring plan fulfils the requirement set out by the Kyoto Protocol that emission reductions projects under the CDM have real, measurable and long-term benefits and that the reductions in emissions are additional to any that would occur in the absence of the certified project activity.

2. The monitoring organization

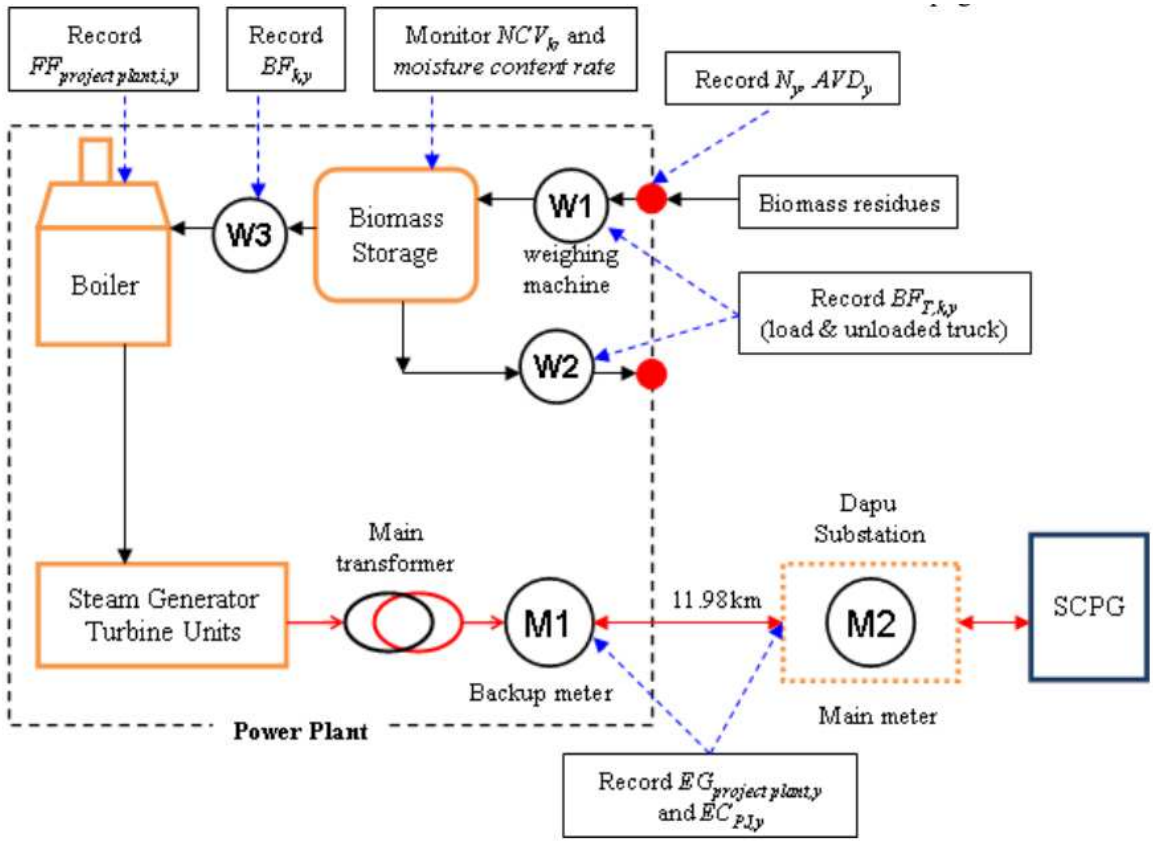
The monitoring management structure will be established for implementation of the monitoring plan, and the roles and responsibilities of monitoring management structure are shown as below:



According to the arrangement of the project owner, the general manager of Liuzhou City Xin'neng Biomass Power Generation Co., Ltd will be the CDM manager.

3. Parameters to be monitored

According to ACM0006 "Consolidated methodology for electricity generation from biomass residues", parameters need to be monitored in the proposed project include:
1) The electricity connected to SCPG ($EG_{project\ plant,y}$) and delivered from SCPG ($EC_{PJ,y}$);
2) The quantities combusted in the project plant ($BF_{k,y}$) and transported to the project site ($BF_{T,k,y}$), moisture content rate, and NCV of biomass residues (NCV_k);
3) The round trip (from and to) of biomass residues transportation (AVD_y) and the number of truck trips for the transportation of biomass residues (N_y);
4) The diesel consumption by project activity ($FF_{project\ plant,i,y}$);
5) Quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region ($BF_{utilized,k,y)}$ and quantity of biomass residues of type k available in the region ($BF_{available,k,y}$);
The measurement points of the above parameters can be simply shown as follows:



6) Furthermore, besides the direct measurement for the above parameters, the following parameters are from the IPCC or other default values and they also need to be cross checked ex-post through the renew of the IPCC or other default values according to the requirement of the methodology:

• CH4 emission factor for the combustion of biomass residues in the project plant ($EF_{CH4,BF}$);
• Average CO2 emission factor for the trucks during the year y ($EF_{km,CO2,y}$);
• CO2 emission factor for diesel ($EF_{CO2,diesel,y}$);
• The average technical distribution losses rate from power transmission site to power consumption site (TDL_y)
• Net calorific value of the fossil fuel type i (i: diesel) (NCV_i)
• CH4 emission factor for uncontrolled burning of the biomass residue type k during the year y ($EF_{burning,CH4,k,y}$)

To monitor these parameters, project owner will build up a system to measure and collect reliable data, ensure to receive all the emission reduction information.

4. Monitoring facilities, installation and data collection for the monitored parameters

The above parameters needed to be monitored can be typed as the following according to the different monitoring facilities, installation and data collection:

1) $EG_{project\ plant,y}$ and $EC_{PJ,y}$:

The electric energy metering should be equipped according the requirements of the *Technical Administrative Code of Electric Energy Metering* (DL/T448-2000, China). Before putting into operation, the project owner and the power grid corporation should examine the electric energy metering according to the *Technical Administrative Code of Electric Energy Metering* (DL/T448-2000).
According to the approval letter of "Grid Connection System of Liucheng Biomass Residues Power Generation Project" by Guangxi Power Grid Corporation, both the main meter (0.2s, bidirectional) and back-up meter (0.2s, bidirectional) will be installed in Dapu substation. Grid-connected electricity will be recorded in the positive direction and the electricity provided by the grid to the plant will be recorded in the opposite direction by both main meter and back-up meter. The backup meter is the back-ups of the main meters. According to the national technology regulation, the measure meters should be calibrated once a year.
The detailed process is as follows:
a. The project owner and the grid company will read and record the data from the main meter and backup meter in the last day of every month.
b. The grid company and the project owner provide the electricity purchase/sales invoices, respectively.
c. The project owner provides the records of the meters and copies of invoices to the verifying DOE.
If the imprecision of readings from the main meter falls outside the range of acceptable error in specific months, or the main meter's function is abnormal, the amount of the electricity should be confirmed according to the following measures.
a. Conduct calibration on the main meter and backup meter by a qualified party to evaluate where there exists a fault.
b. If the project owner and the grid company cannot reach an agreement on the conservative method to estimate a reading, arbitration should be conducted according to the power purchase agreement to confirm the consistency of the estimating method applied.

2) $BF_{k,y}$, $BF_{T,k,y}$ and NCV_k:
The quantities combusted in the project plant and transported to the project site will be recorded, and the moisture content and NCV of the biomass residues will be measured by project owner every day.

3) AVD_y and N_y:
The round trip (from and to) of biomass residues transportation and the number of truck trips for the transportation of biomass residues will be recorded by project owner every day.

4) $FF_{project\ plant,i,y}$:
The diesel consumption and reservation quantities will be recorded by project owner, which can be cross checked by the sales invoices.

5) The consumption quantities of biomass residues k in year y in project site, the acquisition quantities of biomass residues k in year y in project site:
The relevant statistical reports will be collected from the local agriculture department.

6) $EF_{CH4,BF}$, $EF_{km,CO2,y}$, $EF_{CO2,diesel,y}$, TDL_y, NCV_i and $EF_{burning,CH4,k,y}$:
The above parameters will be cross checked ex-post through the latest IPCC or other default

values according to the requirement of the methodology, and the relevant work will be done by the project owner.
All the data mentioned above will be collected by the data recording department.

5. Quality Assurance and Quality Control (QA/QC)

QA/QC is to ensure the accuracy of data collected through measures including periodic calibration of monitoring meters, corrective actions, and internal audits.

5.1 Calibration
According to *the Technical Administrative Code of Electric Energy Metering* (DL/T448-2000*)*, the electric meters will be calibrated periodically. The electric meters will be calibrated by an accredited calibration agency. Calibration certificates of the accredited calibration agency and the relevant calibration documents will be collected by the QA/QC department and transferred to technical department for archiving.
5.2 Corrective actions
If problems which can affect the quality of data occur, the QA/QC department will initiate and supervise the implementation of corrective actions.
5.3. Internal audit
Internal audit is independent.
Internal audit procedure will be initiated under any of the following circumstances:
• modification of the monitoring system
• prior to verification
Firstly, the monitoring system will be checked on whether the monitoring system runs properly and whether the monitored results are correct. Secondly, spot check of daily/monthly data report will be undertaken.
Internal audit report will be submitted upon completion of the procedure.
5.4 Management review
The CDM manager will organize the management review periodically in order to let the monitoring process running smoothly. Through the management review, the related problems can be found out and the corrections can be done.

6. Data management

The monitoring record of the meters will be transferred from data recording department to technical department, and the calibration reports of the meters should be also archived by technical department.

7. Training

Monitoring training is critical to ensure that all members of the CDM Monitoring Team have a thorough understanding of the monitoring procedure and are able to carry out the monitoring tasks strictly in line with the CDM requirements. Only qualified staff can work on duty. The training will include:
• Training on operation and monitoring system of the biomass residues power generation station
This is the type of training which are routinely carried out by the biomass residues power generation station itself for new staff.
• Training on CDM basics with focus on CDM monitoring

It will be carried out by the CDM consultancy company before the project is implemented. The CDM monitoring manual which including the content of the function of organization and data management system will be used as the primary training materials. The training includes the following contents:

√ CDM project cycle and the significance of monitoring
√ Management structure and work scope of each team member
√ Components of the monitoring plan
√ QA/QC procedure
√ Monitoring report template
√ Preparation for verification
√ Questions and answers

8. Monitoring Report

After the proposed project is registered and begins its operation, the monitoring reports should be prepared by the data recording department and reviewed by the CDM Manager prior to the verification of DOE. The report should cover the monitoring of grid-in power generation, grid-off power to the plant, check report, report on calculation of the emission reductions and records of monitoring instrument repair and calibration, etc.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

1. Emission reductions due to displacement of electricity

$ER_{electricity,y}=EG_y * EF_{electricity,y} = EG_{project\ plant,\ y} * EF_{grid,CM,y}$

Where:

$ER_{electricity,y}$	Emission reductions due to displacement of electricity during the year *y* (tCO_2/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)
$EF_{electricity,y}$	CO_2 emission factor for the electricity displaced due to the project activity during the year *y* (tCO_2/MWh)
$EG_{project\ plant,\ y}$	Net quantity of electricity supplied to the grid by the project plant during the year *y* (MWh)
$EF_{grid,CM,y}$	The combined emission factor of the project grid system (SCPG) in year y (tCO_2/MWh)

Parameter	Unit	Amount								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
$EG_{project\ plant,\ y}$	MWh	47267	157064	142912	146211	163018	185021	180991	186154	145386
$EF_{grid,CM,y}$	tCO_2/MWh	0.78795								
$ER_{electricity,\ y}$	tCO_2	37244	123759	112607	115207	128450	145787	142612	146680	114557

2. Baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues

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

Where:

$BE_{biomass,y}$	Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year *y* (tCO_2/yr)
GWP_{CH4}	Global Warming Potential of methane valid for the commitment period (tCO_2/tCH_4)
$BE_{PJ,k,y}$	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 or liter)
NCV_k	Net calorific value of the biomass residue type *k* (GJ/ton of dry matter or GJ/liter)
$EF_{burning,CH4,k,y}$	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

Parameter	Unit	Amount								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
GWP_{CH4}	tCO_2/tCH_4	21	21	21	21	25	25	25	25	25
$BE_{PJ,k,y}$	ton	42244	145012	156596	154234	155390	148956	149043	158855	110014
NCV_k	GJ/ton	It is recommended in methodology ACM0006 to use 0.0027 tCH_4/t of biomass as 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.								
$EF_{burning,CH4,k,y}$	tCH_4/GJ									
$BE_{biomass,y}$	tCO_2	1794	6002	6482	6384	7657	7340	7344	7828	5421

3. Total baseline emissions or removals (BE_y)

Parameter	Unit	Amount								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
$ER_{electricity,y}$	tCO_2	37244	123759	112607	115207	128450	145787	142612	146680	114557
$BE_{biomass,y}$	tCO_2	1749	6002	6482	6384	7657	7340	7344	7828	5421
BE_y	tCO_2	38992	129761	119088	121590	136106	153126	149955	154507	119977

4.2 Project Emissions

1. CO_2 emissions from transportation of biomass residues (PE_{Ty})

$$PE_{Ty} = N_y * AVD_y * EF_{km,CO2,y}$$

Where:

PE_{Ty}	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)

Parameter	Unit	Amount								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
N_y		10259	37251	39049	37224	38573	36496	37607	38983	27532
AVD_y	km	100	100	100	100	100	100	100	100	100
$EF_{km,CO2,y}$	ton/km	0.001011								
PE_{Ty}	tCO_2	1037	3766	3948	3763	3900	3690	3802	3941	2783

2. CO_2 emissions from on-site consumption of fossil fuels (PE_{FFy})

$$PE_{FFy} = FF_{project\ plant,\ diesel,\ y} \times NCV_{diesel,y} \times EF_{diesel,y}$$

Where:

PE_{FFy}	CO_2 emissions during year y from on-site consumption of fossil fuels (tCO_2/yr)
$FF_{project\ plant,\ diesel,\ y}$	Quantity of diesel combusted in the biomass residue fired power plant during the year *y* (mass or volume unit per year)
$NCV_{diesel,y}$	The net calorific value of diesel in year y (GJ/mass or volume unit)
$EF_{diesel,y}$	The CO_2 emission factor of diesel in year y (tCO_2/GJ)

$$PEFF_y = FF_{project\ plant,\ diesel,\ y} \times NCV_{diesel,y} \times EF_{diesel,y} = 0.$$

Parameter	Unit	Amount								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
$FF_{project\ plant,\ diesel,\ y}$	ton	0	0	0	0	0	0	0	0	0
$NCV_{diesel,y}$	GJ/ton	42.652								
$EF_{diesel,y}$	tCO_2/GJ	0.07406667								
PE_{FFy}	tCO_2	0	0	0	0	0	0	0	0	0

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

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

Where:

$PE_{EC,y}$	Project emissions from electricity consumption in year *y* (tCO_2/yr)

$EC_{PJ,y}$	On-site electricity consumption attributable to the project activity imported from SCPG in year *y* (MWh)
$EF_{grid,CM,y}$	The CM in SCPG CM (tCO_2/MWh)
TDL_y	The average technical distribution losses rate from power transmission site to power consumption site in year *y* (%)

Parameter	Unit	Amount								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
$EC_{PJ,y}$	MWh	421	843	537	489	512	535	566	592	407
$EF_{grid,CM,y}$	tCO_2/MWh	0.78795								
TDL_y	%	20								
$PE_{EC,y}$	tCO_2	398	797	507	463	484	506	535	560	385

4. 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:

$PE_{biomass,CH4,y}$	Methane emissions from combustion of biomass residues in year *y* (tCH_4/yr)
$EF_{CH4,BF}$	CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ)
$BF_{k,y}$	Quantity of biomass residue type *k* combusted in the project plant during the year *y* (tons of dry matter or liter)
NCV_k	Net calorific value of the biomass residue type *k* (GJ/ton of dry matter or GJ/liter)

Parameter	Unit	Amount								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
$EF_{CH4,BF}$	$kgCH_4$/TJ	41								
$BF_{sugarcane\ leaf,y}$	ton	35015	119793	128328	128844	128604	121824	122306	131613	89342
$NCV_{sugarcane\ leaf}$	GJ/ton	15.70	15.70	15.68	15.81	15.65	15.64	15.91	15.86	15.75
$BF_{mulberry\ leaf,y}$	ton	7229	25219	28269	25390	26785	27132	26737	27241	20671
$NCV_{mulberry\ leaf}$	GJ/ton	13.76	13.59	13.73	13.57	13.35	13.69	13.52	13.82	13.43
$PE_{biomass,CH4,y}$	tCH_4	26.68	91.36	98.67	97.90	97.43	93.59	94.82	101.24	69.25

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

No waste water treatment is involved in the proposed project activity. As a result, the emissions are zero.

6. Total project emissions or removals (PE_y)

$PE_y=PET_y+FF_{project\ plant,\ diesel,\ y}+PE_{EC,y}+PE_{biomass,CH4,y}*GWP_{CH4}$

Parameter	Unit	Amount								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
PET_y	tCO_2	1037	3766	3948	3763	3900	3690	3802	3941	2783
$FF_{project\ plant,\ diesel,\ y}$	ton	0	0	0	0	0	0	0	0	0
$PE_{EC,y}$	tCO_2	398	797	507	463	484	506	535	560	385
$PE_{biomass,CH4,y}$	tCH_4	26.68	91.36	98.67	97.90	97.43	93.59	94.82	101.24	69.25
GWP_{CH4}	tCO_2/tCH_4	21	21	21	21	25	25	25	25	25
PE_y	tCO2eq	1996	6482	6528	6283	6820	6536	6708	7033	4900

4.3 Leakage

In the monitoring period, the biomass supply is far more than 25% larger than the quantity of available biomass that is utilized including the project activity. The conclusion is the biomass supply to the proposed project is sufficient and will not lead to displacement of current use of biomass as a fuel. No significant leakage is anticipated for the proposed project activity.

Therefore the leakage for the proposed project activity is zero.

Sugarcane leaf

Year	Annual available amount (10^4 tonnes)	Amount used out of the project	Amount used by the Project (10^4 tonnes)	Annual available amount/Total annual use
2009*	327	48	4.08	628%
2010	341	49	13.95	542%
2011	320	46	14.98	525%
2012	324	48	15.00	514%
2013	345	53	15.02	507%
2014	340	45	14.20	574%
2015	349	50	14.30	543%
2016	343	52	15.32	510%
2017**	332	51	10.44	540%

* It is 113 days of 2009 in the monitoring period: 10/09/2009-31/12/2009

**It is 266 days of 2017 in the monitoring period: 01/01/2017-23/09/2017

Mulberry leaf

Year	Annual available amount (10^4 tonnes)	Amount used out of the project	Amount used by the Project (10^4 tonnes)	Annual available amount/Total annual use
2009*	64	31	0.99	200%
2010*	63	32	3.44	178%
2011	58	30	3.87	171%
2012	55	27	3.46	181%
2013	50	24	3.66	181%
2014	52	21	3.70	210%
2015	55	22	3.66	214%
2016	52	20	3.72	219%
2017**	45	25	2.84	162%

* It is 113 days of 2009 in the monitoring period: 10/09/2009-31/12/2009

**It is 266 days of 2017 in the monitoring period: 01/01/2017-23/09/2017

4.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
From 10/09/2009 to 31/21/2009	38,992	1,996	0	36,996
2010	129,761	6,482	0	123,279
2011	119,088	6,528	0	112,560
2012	121,590	6,282	0	115,307
2013	136,106	6,820	0	129,286
2014	153,126	6,536	0	146,590
2015	149,955	6,708	0	143,247
2016	154,507	7,033	0	147,474
From 01/01/0217 to 23/09/2017	119,977	4,900	0	115,077
Total	1,123,102	53,286	0	1,069,816

The emission reductions estimated in the PDD were 991,998 tCO_2e (123,324 tCO_2e/365d*2936d) during this monitoring period. The actual emission reductions in this monitoring period (2936 days) were 1,069,816 tCO_2e, the actual emission reductions in this monitoring period are 7.84 % more than the estimation in the registered PDD. The main reason is that the electricity exported to the grid was about 7.2 % higher than the ex-ante estimation in registered CDM PDD. The higher

electricity exported has no impact on the additionally of the project activity as the sensitivity analysis of the project activity shows that the IRR will not exceeds benchmark until a 14.80% increase in Grid-connected electricity.

APPENDIX X: <TITLE OF APPENDIX>

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.