

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



Document Prepared By LGAI Technological Center, S.A.

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Summary:

LGAI Technological Center, S.A. (hereafter referred to as “Applus+ Certification”) has been commissioned by Beijing Ruifang Information Technology Co., Ltd to perform the verification of greenhouse gas emission reductions of the project activity “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” (UNFCCC Ref. No. 3664, VCS Ref. No. 1824, hereafter referred to as “the project activity”) reported in the monitoring report /1/ during monitoring period 10/09/2009 to 23/09/2017.

The project activity was registered as a CDM project activity on 24/09/2010 which is available at <http://cdm.unfccc.int/Projects/DB/JC11272000505.51/view>. The project activity has been validated by Applus+ Certification based on the PD /3/ version 2.0 dated 15/10/2018 and reported in the validation report No. A+SH_SYST_00818 /4/, version 01.1, completed on 31/10/2018 for gap validation.

The project activity is a biomass generation project located at Liucheng County, Guangxi Zhuang Autonomous, People's Republic of China which is to use biomass resource for electricity generation. The installed capacity of the project activity is 30 MW, consisting of 2 sets of steam turbines and generators with unit capacity of 15 MW. The total quantity of biomass residues used by the proposed project will be 178,198 tons. The average annual power delivered to the grid by the project is expected to be 180,000 MWh. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants South China Power Grid (SCPG) also by avoiding natural decay or uncontrolled burning of anthropogenic sources of biomass residues. It's estimated that the proposed project could achieve GHG emission reductions of 123,324 tCO₂e annually.

The purpose and scope of this verification is to ensure that reported emission reductions are complete and accurate in accordance with applicable VCS standards and relevant UNFCCC requirements in order to be certified. A desk review and a site visit have been conducted to verify the data submitted in the monitoring report /1/. Applus+ Certification confirms the following has been reviewed:

- Monitoring plan included in the registered PD /3/;
- Validation report No. A+SH_SYST_00818 /4/, version 01.1, completed on 31/10/2018;
- Approved methodology, ACM0006 /6/, version 09.0, dated 31/07/2009;
- VCS standards and guidance version 3.7, as well as relevant UNFCCC requirements;
- All information and references relevant to the project activity's resulting in emission reductions.

During this verification, no finding was identified related to the monitoring, implementation or operations of the project activity in relation to relevant VCS standards, guidance and UNFCCC requirements and relevant host party criteria and the applied baseline and monitoring methodology etc.

- Applus+ Certification confirms that the project is implemented in accordance with the registered VCS PD /3/. The monitoring plan complies with the applied methodology ACM0006 /6/ version

09.0 and the monitoring has been carried out in accordance with the monitoring plan in the registered VCS PD /3/. The monitoring system is in place and the emission reductions are calculated without material misstatements. The level of assurance of the verification is reasonable. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information reviewed and evaluated Applus+ Certification confirms that the implementation of the project has resulted in 1,069,816 tCO₂e emission reductions during period 10/09/2009 to 23/09/2017.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center, S.A. has been commissioned by Beijing Ruifang Information Technology Co., Ltd to perform the verification¹ of greenhouse gas emission reductions of the project activity “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” (UNFCCC Ref. No. 3664, VCS Ref. No. 1824) reported in the Monitoring Report /1/ during monitoring period 10/09/2009 to 23/09/2017.

LGAI Technological Center, S.A. as the verification body of the project activity has been accredited as a DOE by UNFCCC and also meets the competence requirements as set out in ISO 14065:2007.

The objective of verification is to have an independent review and ex post determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the pre-registered CDM project activity during the monitoring period from the date when the project started to operate until the date when the project was actually registered as a CDM project activity by the CDM-EB. Certification is the written assurance by the DOE that, during a specific time period, a proposed VCS project activity achieved the reductions in anthropogenic emissions by sources of GHGs as verified.

The objective of this verification/certification is to verify and certify emission reductions, reported for the “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” in China for the period 10/09/2009 to 23/09/2017.

1.2 Scope and Criteria

The verification scope is defined as an independent and objective review of the registered CDM PDD, the Project's baseline study and Monitoring Report (MR) and other relevant documents. The information in these documents is reviewed against VCS Version 3 requirements, UNFCCC rules and associated interpretations.

The verification is not meant to provide any consulting towards the client. However, stated requests for forward actions and/or corrective actions may provide input for improvement of the Project monitoring towards reductions in the GHG emissions.

1.3 Level of Assurance

The verification report is based on the CDM-PDD, the VCS Monitoring Report (MR), supporting evidences made available to the verifier and information collected through performing interviews and during the on-site assessment.

¹ According to 5.3.12 of VCS Standard Version 3.7: Validation (including project crediting period renewal validation) and the first verification of a project (in a given project crediting period) may be undertaken by the same validation/verification body. However, the subsequent verification shall be undertaken by a different validation/verification body. The gap validation of a project registered under an approved GHG program may be disregarded when assessing adherence to these requirements. Therefore, it is in line with the requirement of the standard that Applus+ Certification is able to undertake the this VCS verification.

The verification conclusion is assured a reasonable level of assurance.

1.4 Summary Description of the Project

Project title	Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China
UNFCCC reference number	3664
VCS reference number	1824
Project Participants	Liuzhou City Xin'neng Biomass Power Generation Co., Ltd. (Project Owner, host country, P. R. China) Mitsubishi Corporation (CERs Buyer, Japan) (for CDM) Demeter Venture UK Limited (VERs Buyer, United Kingdom of Great Britain and Northern Ireland)
Location of the project	Liucheng County, Guangxi Zhuang Autonomous, People's Republic of China Geographic coordinates: east longitude of 109°11'35" and north latitude of 24°39'27"
Project start date	Construction start date: 24/02/2009 Operation start date: 10/09/2009
Date of registration as CDM project	24/09/2010
Version of registered CDM PDD and VCS PD	Version 05, dated 29/03/2010 (CDM PDD) Version 2.0 dated 15/10/2018 (VCS PD and basis for verification)
Monitoring period	10/09/2009 to 23/09/2017
First monitoring report	Version 1.0, dated 03/12/2018
Final monitoring report	Version 2.1, dated 06/01/2019
Applied Methodology/Version	ACM0006, version 09.0, dated 31/07/2009
Scope/Technical Area	1/1.1

The project activity is a biomass generation project located at Liucheng County, Guangxi Zhuang Autonomous, People's Republic of China which is to use biomass resource for electricity generation. The installed capacity of the project activity is 30 MW, consisting of 2 sets of steam turbines and generators with unit capacity of 15 MW. The total quantity of biomass residues used by the proposed project will be 178,198 tons. The average annual power delivered to the grid by the project is expected to be 180,000 MWh. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants South China Power Grid (SCPG) also by avoiding natural decay or uncontrolled burning of anthropogenic sources of biomass residues. It's estimated that the proposed project could achieve GHG emission reductions of 123,324 tCO₂e annually.

The project activity was registered as a CDM project activity on 24/09/2010 which is available at <http://cdm.unfccc.int/Projects/DB/JCI1272000505.51/view>. The project activity has been validated by Applus+ Certification based on the PD /3/ version 2.0 dated 15/10/2018 and reported in the validation report No. A+SH_SYST_00818 /4/, version 01.1, completed on 31/10/2018 for gap validation.

2 VERIFICATION PROCESS

2.1 Method and Criteria

Verification was conducted using Applus+ Certification's procedures in line with the requirements specified in the VCS Standard version 3, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant UNFCCC requirements and applying standard auditing techniques.

Applus+ Certification completed a strategic review and risk assessment of the projects activities and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage if relevant;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;
- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the monitoring report.

Applus+ Certification verified the implementation of the monitoring plan and the data presented in the Monitoring Report /1/ for the period in question. This involved a site visit and a desk review of the Monitoring Report. This Verification Report describes the findings of this assessment.

The information of the assessment team is included below:

Assessment team

According to the sectoral scopes / technical area and experiences in the sectoral or national business environment, Applus+ Certification has composed a project assessment team in accordance with the appointment rules in Applus+ Certification. The composition of assessment team has to be approved by the Applus+ Certification ensuring that the required skills are covered by the team. The four qualification levels for team members that are assigned by formal appointment rules as below:

- Leader Auditor (LA)
- Auditor (A)/ Auditor Trainee (AiT)
- Technical Reviewer (TR)
- Technical Experts (TE)

Name	Qualification	Coverage of scope	Coverage of Technical Area	Host country experience
<i>Hanshen (Denny) Xue</i>	<i>LA/TE</i>	<i>Y (1.1)</i>	<i>Y</i>	<i>Y</i>
<i>Meng (Simon) Shen</i>	<i>TR</i>	<i>Y (1.1)</i>	<i>Y</i>	<i>Y</i>

Hanshen (Denny) Xue (Master Degree in Environmental Engineering, Bachelor Degree in Thermal Engineering) is a lead auditor appointed by Applus+ Certification for the GHG project assessment. He is based on Shanghai. He has 1.5 years of work experiences in CDM project development. Before he joined Applus+ Certification, he has been worked for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development.

Meng (Simon) Shen (Master Degree in Thermal Energy Engineering, Bachelor Degree in Environmental Engineering) is a Lead Auditor appointed by Applus+ Certification for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ Certification, he had been worked for TÜV SÜD as a GHG Validator/Assessment team and ISO 9001/14001 Lead Auditor for 3.5 years.

2.2 Document Review

The VCS monitoring report /0/ version 1.0 dated 03/12/2018, version 2.1 dated 06/01/2019 and the emission reduction calculations spreadsheet /2/, were assessed as part of the verification. In addition, registered VCS PD /2/ version 2.0, dated 15/10/2018 in particular the baseline estimations and the monitoring plan, and the gap validation report version 01.1 dated 31/10/2018, as well as relevant documents, were reviewed. A detailed documents reviewed are listed in Annex 1 of the report.

2.3 Interviews

The key personnel interviewed are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Zhang Huang	Chief	Liuzhou City Xin'neng Biomass Power Generation Co., Ltd.	Operation of the project activity; Implementation of the monitor plan of the project activity;
Mr. Li Wei	Operator	Liuzhou City Xin'neng Biomass Power Generation Co., Ltd.	Data collection and data achievement;
Ms. Sun Mingxia	Operator	Liuzhou City Xin'neng Biomass Power Generation	Calibration of meters and equipment maintenance

		Co., Ltd.	
Mr. Teng Haipeng	Project Manager	Demeter Venture UK Limited	Data collection and ER calculation

2.4 Site Inspections

The assessment team performed the on-site verification (Liucheng County, Guangxi Zhuang Autonomous, People's Republic of China) on 27-28/09/2018. The interviewed personnel and objective are listed in above table.

2.5 Resolution of Findings

As an outcome of the verification process, the team can raise different types of findings.

Where a non-conformance arises the assessment team shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

The assessment team shall raise a Clarification Request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

All CARs and CLs raised during verification shall be resolved prior to submitting a request for issuance.

There are no CARs and CLs raised for this monitoring period for the project.

2.5.1 Forward Action Requests

None FAR was raised during the verification process. Also there are no remaining from former verification and validation.

2.6 Eligibility for Validation Activities

Not applicable as LGAI Technological Center, S.A. holds the accreditation for the validation and verification for projects under scope 1.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

Through reviewing the registered PD /3/, validation report /4/ and UNFCCC website <http://cdm.unfccc.int/Projects/DB/JC11272000505.51/view>, it was validated that the project has been registered as a CDM project on 24/09/2010 with reference No. 3664. Also, after checking http://www.vcsprojectdatabase.org/#!/project_details/1824, it is confirmed that the project has also been registered as a VCS project. The project does not participate in the other emissions trading program by checking public information on Internet and interviewing with project owner.

During the period from 10/09/2009 to 09/09/2019 as the crediting period, the project would claim for other CERs or VCUs, however CERs and VCUs would not been claimed together in the same period.

Therefore, Applus+ Certification consider the project is eligible to participate under the VCS Program as there is (or would be) no risk for double counting for the emission reduction during any period as the information is (and will be) publicly available and controlled.

3.2 Methodology Deviations

Not applicable as not deviation for methodology.

3.3 Project Description Deviations

Not applicable as not deviation for project description.

3.4 Grouped Project

Not applicable as not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

By means of on-site visit, the assessment team confirms that all physical features of the proposed CDM project activity proposed in the registered VCS PD /3/ are in place and the PP has operated the project as per registered VCS PD /3/. The installed capacity of the project is 30 MW, consisting of 2 sets of steam turbines and generators with unit capacity of 15 MW. The total quantity of biomass residues used by the proposed project will be 178,198 tons. The average annual power delivered to the grid by the project is expected to be 180,000 MWh. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants South China Power Grid (SCPG) also by avoiding natural decay or uncontrolled burning of anthropogenic sources of biomass residues. It's estimated that the proposed project could achieve GHG emission reductions of 123,324 tCO₂e annually.

The construction of the project started on 24/02/2009, the project started commission since 10/09/2009 verified by checking operation log /7/. There are no changes on the key equipment and technology since the validation of the project. No special event which would affect the monitoring of the project has been observed during the monitoring period.

The emission reduction resulted from the project during this monitoring period would apply for VCU. The project only applies CERs and VCUs under CDM and VCS (no other form of environmental credit) and no rejection from CDM and VCS has occurred. The project would contribute to sustainable development in Job creation, Reduction in GHG emissions, Reduction of fossil fuel use and increase of power supply aspects confirmed during site visit.

The technical parameters have been verified with the nameplates /8/ as below:

Item	Quantity	Manufacturer	Model	Main technical parameter
Boilers	2	Nantong Wanda Boiler Manufacture Co., Ltd.	Medium temperature Medium pressure biomass cycle fluidized bed boiler	Boiler rated evaporating capacity: 75 t/h Steam pressure: 3.82 MPa(g) Steam Temperature: 450 °C Boiler feed-water temperature: 150 °C Boiler efficiency: not lower than 89%
Steam turbines	2	China Changjiang Power Corporation (Group)	Medium pressure, single cylinder, actuation,	Rated put-in steam pressure: 3.43 MPa(a) Rated put-in steam

			impulse, condensed gas, N15- 3.43/435	temperature: 435 °C Rated put-in steam capacity: 65t/h Total efficiency: 81.5%
Generators	2	China Changjiang Power Corporation (Group)	QA-15-2	Rated capacity: 15 MW Most run capacity: 18 MW Rated frequency: 50 Hz Rated voltage: 10.5 KV Capacity factor: 0.80 Rated efficiency: 97.6%

By comparing the actual ER claimed in this monitoring period with the estimate in the registered PD, the actual emission reductions (1,069,816 tCO₂e) are 7.84% higher than what is stated in the registered PD (i.e. 991,998 tCO₂e, equals to annual emission reductions, 123,324 tCO₂e multiplied by the actual operational days 2,936 days then divided by 365 days) which are consider in the reasonable due to the stable supply of biomass and stable operation of the project activity, the GWP_{CH₄} change from 21 to 25 since 2013. Moreover, when considering actual annual electricity generation in this monitoring period in the financial analysis, the IRR of the project is still under the benchmark. Therefore, the assessment team confirm the increasing of actual annual electricity generation will not lead to the overestimation of VERs.

The assessment team confirmed that there is no proposed or actual change to the project design during this monitoring period.

All required equipments and procedures are available and implemented in an appropriate manner.

All necessary monitoring instruments are installed. All required instruments including standby and operating procedures for the same have been implemented in an appropriate manner.

The project is completely operational and the same has been confirmed on-site. Neither mistakes nor malfunction on main meters have been observed during this monitoring period.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

The monitoring has been carried out in accordance with the monitoring plan contained in the registered VCS PD /3/. All parameters were monitored and determined as per the monitoring plan which is listed in below table:

Data / Parameter:	BF _{k,y}
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Data unit:	tons of dry matter																																				
Description:	Quantity of biomass residue type k combusted in the project plant during the year y																																				
Purpose of the data:	Calculation of baseline emissions Calculation of project emissions																																				
Parameter value:	<table><tr><th>Period</th><th>Sugarcane leaf (t)</th><th>Mulberry leaf (t)</th></tr><tr><td>10/09/2009-31/12/2009</td><td>35,015</td><td>7,229</td></tr><tr><td>01/01/2010-31/12/2010</td><td>119,793</td><td>25,219</td></tr><tr><td>01/01/2011-31/12/2011</td><td>128,328</td><td>28,269</td></tr><tr><td>01/01/2012-31/12/2012</td><td>128,844</td><td>25,390</td></tr><tr><td>01/01/2013-31/12/2013</td><td>128,604</td><td>26,785</td></tr><tr><td>01/01/2014-31/12/2014</td><td>121,824</td><td>27,132</td></tr><tr><td>01/01/2015-31/12/2015</td><td>122,306</td><td>26,737</td></tr><tr><td>01/01/2016-31/12/2016</td><td>131,613</td><td>27,241</td></tr><tr><td>01/01/2017-23/09/2017</td><td>89,342</td><td>20,671</td></tr><tr><td>Total</td><td>1,005,670</td><td>214,673</td></tr></table>				Period	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
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01/01/2017-23/09/2017	89,342	20,671																																			
Total	1,005,670	214,673																																			
Source of data used:	Quantity of biomass residue type k combusted in the project plant during the year y are sourced from Monthly Report for fuel /9/, as the direct measure result of the quantity of biomass residues is on wet-basis, the moisture of biomass residues is also considered (included in the Moisture of biomass residues report /22/).																																				
Information flow:	For Quantity of biomass residue type k combusted in the project plant during the year y: 1 belt meter was used to monitor Quantity (tonnes on wet-basis) of biomass residues continuously, aggregated monthly, and prepare annually. For each batch of biomass, the quantity (wet-basis) would be measured and recorded in Monthly Report for fuel /9/. Also, for each batch of biomass, the moisture content of the biomass residues would be monitored continuously by using drying oven and electric balance and recorded in the Moisture of biomass residues report /22/. Then Quantity (tonnes on dry-basis) of biomass residues were calculated based on Quantity (tonnes on wet-basis) of biomass residues and the moisture content of the biomass residues accordingly and recorded in the Monthly Report for fuel /9/. The data for Monthly Report for fuel /9/ have been sent to the CDM consulting company for reporting of GHG emission reduction.																																				
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 1 belt meter, drying oven and electric balance during the monitoring period verified by site visit. See below for the information of 1 belt meter, constant temperature drying oven and electric balance verified by site visit and checking calibration certificates /11/: <table><tr><th>Equipment</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr><tr><td>Belt meter</td><td>ICS-17</td><td>07050327</td><td>1</td></tr></table>				Equipment	Type	Serial Number	Accuracy	Belt meter	ICS-17	07050327	1																									
Equipment	Type	Serial Number	Accuracy																																		
Belt meter	ICS-17	07050327	1																																		

	Drying oven	101-1ES	13779	±1.0°C	
	Electric balance	FA2004	93380	0.01 mg	
The type, serial number and accuracy have been confirmed by site visit.					
Calibration:	The calibration information is shown as below /11/:				
	Belt meter	Equipment	Calibration date	Valid until	
		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			
	Drying oven	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		
	Electric balance	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		
	17/06/2009	16/06/2010			
	The calibration was conducted by accredited third party which is Guangxi Institute of Metrology & Measurement was accredited by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China /13/.				
	QA/QC procedure:	Monthly Balance for fuel covering the monitoring period /14/ are crosschecked and presented in the ER and confirmed to be correct by the assessment team. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.			
	Means of verification:	Data of the parameter was verified by checking Monthly Report for fuel /9/. All data is in line with Monthly Report for fuel /9/; Information flow was verified by checking Monthly Report for fuel /9/, and all			

	information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PDD; Calibration was verified by checking calibration certificate and Accreditation certificate, all calibration of monitoring equipment meets the requirement indicated in the PDD.
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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																																			
Purpose of the data:	Calculation of baseline emissions Calculation of project emissions																																			
Parameter value:	<table><tr><th>Period</th><th>Sugarcane leaf (t)</th><th>Mulberry leaf (t)</th></tr><tr><td>10/09/2009-31/12/2009</td><td>35,590</td><td>7,338</td></tr><tr><td>01/01/2010-31/12/2010</td><td>120,136</td><td>25,184</td></tr><tr><td>01/01/2011-31/12/2011</td><td>127,993</td><td>28,340</td></tr><tr><td>01/01/2012-31/12/2012</td><td>128,948</td><td>25,368</td></tr><tr><td>01/01/2013-31/12/2013</td><td>128,792</td><td>26,813</td></tr><tr><td>01/01/2014-31/12/2014</td><td>121,554</td><td>27,083</td></tr><tr><td>01/01/2015-31/12/2015</td><td>122,493</td><td>26,685</td></tr><tr><td>01/01/2016-31/12/2016</td><td>131,550</td><td>27,251</td></tr><tr><td>01/01/2017-23/09/2017</td><td>89,481</td><td>20,654</td></tr><tr><td>Total</td><td>1,006,537</td><td>214,716</td></tr></table>	Period	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		
Period	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																																		
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01/01/2017-23/09/2017	89,481	20,654																																		
Total	1,006,537	214,716																																		
Source of data used:	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 are sourced from Monthly Report for fuel /9/, as the direct measure result of the quantity of biomass residues is on wet-basis, the moisture of biomass residues is also considered (included in the Moisture of biomass residues report /22/).																																			
Information flow:	For 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: 2 scale meters were used to monitor Quantity (tonnes on wet-basis) of biomass residues continuously, aggregated monthly, and prepare annually. For each batch of biomass, the quantity (wet-basis) would be measured and recorded in Monthly Report for fuel /9/. Also, for each batch of biomass, the moisture content of the biomass residues would be monitored continuously by using drying oven and electric balance and recorded in the Moisture of biomass residues report /22/. Then Quantity (tonnes on dry-basis) of biomass residues were calculated based on Quantity (tonnes on wet-basis) of biomass residues and the moisture content of the biomass residues accordingly and																																			

	recorded in the Monthly Report for fuel /9/.			
	The data for Monthly Report for fuel /9/ have been sent to the CDM consulting company for reporting of GHG emission reduction.			
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 2 scale meters, drying oven and electric balance during the monitoring period verified by site visit. See below for the information of 2 scale meters, drying oven and electric balance verified by site visit and checking calibration certificates /11/:			
	Equipment	Type	Serial Number	Accuracy
	Scale Meters	SCS/ZCS-30	101017611	0.5
		SCS/ZCS-60	20071007	0.5
	Drying oven	101-1ES	13779	±1.0°C
	Electric balance	FA2004	93380	0.01 mg
	The type, serial number and accuracy have been confirmed by site visit.			
Calibration:	The calibration information is shown as below /11/:			
	Equipment	Calibration date	Valid until	
	Scale Meters (2 meters)	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	
	Drying oven	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	
	Electric balance	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		

	The calibration was conducted by accredited third party which is Guangxi Institute of Metrology & Measurement was accredited by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China /13/.
QA/QC procedure:	Monthly Balance for fuel covering the monitoring period /14/ are crosschecked and presented in the ER and confirmed to be correct by the assessment team. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking Monthly Report for fuel /9/. All data is in line with Monthly Report for fuel /9/; Information flow was verified by checking Monthly Report for fuel /9/, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PDD; Calibration was verified by checking calibration certificate and Accreditation certificate, all calibration of monitoring equipment meets the requirement indicated in the PDD.

Data / Parameter:	Moisture content of the biomass residues																																
Data unit:	%																																
Description:	Moisture content of each biomass residue type k																																
Purpose of the data:	Calculation of project emissions																																
Parameter value:	<table><tr><th>Period</th><th>Sugarcane leaf (%)</th><th>Mulberry leaf (%)</th></tr><tr><td>10/09/2009-31/12/2009</td><td>14.08</td><td>26.74</td></tr><tr><td>01/01/2010-31/12/2010</td><td>14.14</td><td>26.63</td></tr><tr><td>01/01/2011-31/12/2011</td><td>14.34</td><td>26.94</td></tr><tr><td>01/01/2012-31/12/2012</td><td>14.12</td><td>26.65</td></tr><tr><td>01/01/2013-31/12/2013</td><td>14.36</td><td>26.85</td></tr><tr><td>01/01/2014-31/12/2014</td><td>14.27</td><td>26.76</td></tr><tr><td>01/01/2015-31/12/2015</td><td>14.50</td><td>26.97</td></tr><tr><td>01/01/2016-31/12/2016</td><td>14.03</td><td>26.75</td></tr><tr><td>01/01/2017-23/09/2017</td><td>14.46</td><td>27.19</td></tr></table>	Period	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		
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01/01/2017-23/09/2017	14.46	27.19																															
Source of data used:	Moisture content of each biomass residue type k are sourced from Moisture of biomass residues report /22/.																																
Information flow:	For Moisture content of each biomass residue type k: For each batch of biomass, the moisture content of the biomass residues would be monitored continuously by using constant temperature drying oven and electric balance and recorded in the Moisture of biomass residues report /22/. The data for Moisture of biomass residues report /22/ have been sent to the																																

	CDM consulting company for reporting of GHG emission reduction.																																									
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by drying oven and electric balance during the monitoring period verified by site visit. See below for the information of drying oven and electric balance verified by site visit and checking calibration certificates /11/: <table><tr><th>Equipment</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr><tr><td>Drying oven</td><td>101-1ES</td><td>13779</td><td>±1.0°C</td></tr><tr><td>Electric balance</td><td>FA2004</td><td>93380</td><td>0.01 mg</td></tr></table> The type, serial number and accuracy have been confirmed by site visit.	Equipment	Type	Serial Number	Accuracy	Drying oven	101-1ES	13779	±1.0°C	Electric balance	FA2004	93380	0.01 mg																													
Equipment	Type	Serial Number	Accuracy																																							
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Calibration:	The calibration information is shown as below /11/: <table><tr><th>Equipment</th><th>Calibration date</th><th>Valid until</th></tr><tr><td rowspan="9">Drying oven</td><td>17/06/2009</td><td>16/06/2010</td></tr><tr><td>09/12/2009</td><td>08/12/2010</td></tr><tr><td>29/11/2010</td><td>28/11/2011</td></tr><tr><td>20/11/2011</td><td>19/11/2012</td></tr><tr><td>10/11/2012</td><td>09/11/2013</td></tr><tr><td>05/11/2013</td><td>04/11/2014</td></tr><tr><td>20/10/2014</td><td>19/10/2015</td></tr><tr><td>10/10/2015</td><td>09/10/2016</td></tr><tr><td>27/09/2016</td><td>26/09/2017</td></tr><tr><td rowspan="8">Electric balance</td><td>17/06/2009</td><td>16/06/2010</td></tr><tr><td>09/12/2009</td><td>08/12/2010</td></tr><tr><td>29/11/2010</td><td>28/11/2011</td></tr><tr><td>20/11/2011</td><td>19/11/2012</td></tr><tr><td>10/11/2012</td><td>09/11/2013</td></tr><tr><td>05/11/2013</td><td>04/11/2014</td></tr><tr><td>20/10/2014</td><td>19/10/2015</td></tr><tr><td>10/10/2015</td><td>09/10/2016</td></tr><tr><td>27/09/2016</td><td>26/09/2017</td></tr></table> The calibration was conducted by accredited third party which is Guangxi Institute of Metrology & Measurement was accredited by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China /13/.	Equipment	Calibration date	Valid until	Drying oven	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	Electric balance	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
Equipment	Calibration date	Valid until																																								
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	20/10/2014	19/10/2015																																								
	10/10/2015	09/10/2016																																								
27/09/2016	26/09/2017																																									
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.																																									
Means of verification:	Data of the parameter was verified by checking Moisture of biomass residues report /22/. All data is in line with Moisture of biomass residues report /22/; Information flow was verified by checking Moisture of biomass residues report /22/, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PDD; Calibration was verified by checking calibration certificate and Accreditation																																									

	certificate, all calibration of monitoring equipment meets the requirement indicated in the PDD.
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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
Purpose of the data:	Calculation of project emissions
Parameter value:	30
Source of data used:	Default values, as provided in Table 4 in the ACM0006
Information flow:	The value of this parameter is the default value sourced from Table 4 in the ACM0006.
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Not applicable

Data / Parameter:	AVD _y
Data unit:	km
Description:	Average round trip distance (from and to) between biomass residues supply sites and the project site
Purpose of the data:	Calculation of project emissions
Parameter value:	100
Source of data used:	Estimation based on assumption, as according to the Chinese Law, the collecting radius of biomass residues should not exceed 50 kilometres, so it is acceptable and conservative to apply 100 kilometres for this parameter.
Information flow:	Not applicable
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable

QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Not applicable

Data / Parameter:	N _y	
Data unit:	-	
Description:	Number of truck trips for the transportation of biomass residues	
Purpose of the data:	Calculation of project emissions	
Parameter value:	Period	Data
	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
	01/01/2017-22/09/2017	27,532
Source of data used:	Number of truck trips for the transportation of biomass residues are sourced from Truck Transportation Record /23/.	
Information flow:	For Number of truck trips for the transportation of biomass residues, For each transportation, the distance as well as the numbers of times would be recorded as Truck Transportation Record /23/. The data for Truck Transportation Record /23/ have been sent to the CDM consulting company for reporting of GHG emission reduction.	
Monitoring method, frequency and equipments:	Not applicable	
Calibration:	Not applicable	
QA/QC procedure:	The consistency of the number of truck trips with the quantity of biomass residues combusted has been made in the ER and confirmed to be considered as consistent. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.	
Means of verification:	Data of the parameter was verified by checking Truck Transportation Record /23/. All data is in line with Truck Transportation Record /23/;	

	Information flow was verified by checking Truck Transportation Record /23/, and all information are consistent.
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Data / Parameter:	EF _{km,CO2,y}
Data unit:	tCO ₂ /km
Description:	Average CO ₂ emission factor for the trucks during the year y
Purpose of the data:	Calculation of project emissions
Parameter value:	1.011×10 ⁻³
Source of data used:	Default values
Information flow:	The value of this parameter is the default value
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Not applicable

Data / Parameter:	EF _{CO2,diesel,y}
Data unit:	tCO ₂ /GJ
Description:	CO ₂ emission factor for diesel
Purpose of the data:	Calculation of project emissions
Parameter value:	0.07406667(= 20.2×44/12/1,000)
Source of data used:	Default values from IPCC
Information flow:	The value of this parameter is the default value from IPCC
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Not applicable

Data / Parameter:	FF _{project plant,diesel,y}	
Data unit:	ton/year	
Description:	Quantity of diesel combusted in the project plant during the year y	
Purpose of the data:	Calculation of project emissions	
Parameter value:	Period	Data
	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
	01/01/2017-22/09/2017	0
	Total	0
Source of data used:	Quantity of diesel combusted in the project plant during the year y is sourced from Diesel Consumption Record /17/ in which is zero.	
Information flow:	Not applicable as no diesel was used.	
Monitoring method, frequency and equipments:	Not applicable as no diesel was used.	
Calibration:	Not applicable as no diesel was used.	
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain. Crosscheck is not applicable as no diesel was used or purchased.	
Means of verification:	Not applicable	

Data / Parameter:	EG _{project plant,y}
Data unit:	MWh/yr
Description:	Net quantity of electricity supplied to the grid by the project plant during the year y

Purpose of the data:	Calculation of baseline emissions			
Parameter value:	Period		Data	
	10/09/2009-31/12/2009		47,267.00	
	01/01/2010-31/12/2010		157,064.30	
	01/01/2011-31/12/2011		142,911.70	
	01/01/2012-31/12/2012		146,210.60	
	01/01/2013-31/12/2013		163,017.50	
	01/01/2014-31/12/2014		185,020.70	
	01/01/2015-31/12/2015		180,990.90	
	01/01/2016-31/12/2016		186,153.90	
	01/01/2017-23/09/2017		145,385.50	
	Total		1,197,078.20	
Source of data used:	Net quantity of electricity supplied to the grid by the project plant during the year y is sourced from Meter Reading Record (MRRs) /15/ issued by the project owner, Electricity Transaction Notes (ETNs) /16/ issued by power grid company covering monitoring period.			
Information flow:	For Net quantity of electricity supplied to the grid by the project plant during the year y: 1 bidirectional electricity meters installed at the project site was measured continuously, recorded monthly and archived electronically. At 24:00 hr of last day of each month, the staff from project owner and power grid company will record electricity meter's readings and form Meter Reading Records (MRRs). The staff from power grid company will then transcribes the data into Electricity Transaction Notes (ETNs), then after the confirmation of the project owner for the ETNs, the project owner will issue the invoice. The data for MRRs, ETNs have been sent to the CDM consulting company for reporting of GHG emission reduction. The conservative one would be used for ER calculation.			
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 1 bi-direction electricity meters. See below for the information of 1 bi-direction electricity meters verified by site visit and checking calibration certificates /12/:			
	Meter	Type	Serial Number	Accuracy
	Old meter*	DSZY566-G	011212320117004774	0.5s
	New meter	DSZY566-G	011212320117004779	0.5s
*By checking Meter change record /24/, it is confirmed on 23/09/2010, old				

	meter (011212320117004774) has been replaced by new meter (011212320117004779). The type, serial number and accuracy have been confirmed by site visit.		
Calibration:	The calibration information is shown as below /12/:		
	Meter	Calibration date	Valid until
	Old meter	17/06/2009	16/06/2010
		09/12/2009	08/12/2010
	New Meter	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	
The calibration was conducted by accredited third party which is Guangxi Institute of Metrology & Measurement was accredited by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China /13/.			
QA/QC procedure:	Readings taken from the meters and recorded in the monthly monitoring report are cross checked with electricity sales receipts. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.		
Means of verification:	Data of the parameter was verified by checking MRRs and ETNs. All data is in line with MRRs and ETNs; Information flow was verified by checking MRRs and ETNs, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PDD; Calibration was verified by checking calibration certificate and Accreditation certificate, all calibration of monitoring equipment meets the requirement indicated in the PDD.		

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	
Purpose of the data:	Calculation of project emissions	
Parameter value:	Period	Data

	10/09/2009-31/12/2009	420.70													
	01/01/2010-31/12/2010	842.90													
	01/01/2011-31/12/2011	536.70													
	01/01/2012-31/12/2012	489.40													
	01/01/2013-31/12/2013	512.40													
	01/01/2014-31/12/2014	535.10													
	01/01/2015-31/12/2015	565.80													
	01/01/2016-31/12/2016	592.10													
	01/01/2017-23/09/2017	406.90													
	Total	3,945.50													
Source of data used:	On-site electricity consumption attributable to the project activity imported from SCPG during the year y is sourced from Meter Reading Record (MRRs) /15/ issued by the project owner, Electricity Transaction Notes (ETNs) /16/ issued by power grid company covering monitoring period.														
Information flow:	For On-site electricity consumption attributable to the project activity imported from SCPG during the year y: 1 bidirectional electricity meters installed at the project site was measured continuously, recorded monthly and archived electronically. At 24:00 hr of last day of each month, the staff from project owner and power grid company will record electricity meter's readings and form Meter Reading Records (MRRs). The staff from power grid company will then transcribes the data into Electricity Transaction Notes (ETNs), then after the confirmation of the project owner for the ETNs, the power grid company will issue the invoice. The data for MRRs, ETNs have been sent to the CDM consulting company for reporting of GHG emission reduction. The conservative one would be used for ER calculation.														
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 1 bi-direction electricity meters. See below for the information of 1 bi-direction electricity meters verified by site visit and checking calibration certificates /12/: <table><tr><th>Meter</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr><tr><td>Old meter*</td><td>DSZY566-G</td><td>011212320117004774</td><td>0.5s</td></tr><tr><td>New meter</td><td>DSZY566-G</td><td>011212320117004779</td><td>0.5s</td></tr></table> *By checking Meter change record /24/, it is confirmed on 23/09/2010, old meter (011212320117004774) has been replaced by new meter (011212320117004779). The type, serial number and accuracy have been confirmed by site visit.			Meter	Type	Serial Number	Accuracy	Old meter*	DSZY566-G	011212320117004774	0.5s	New meter	DSZY566-G	011212320117004779	0.5s
Meter	Type	Serial Number	Accuracy												
Old meter*	DSZY566-G	011212320117004774	0.5s												
New meter	DSZY566-G	011212320117004779	0.5s												

Calibration:	The calibration information is shown as below /12/:		
	Meter	Calibration date	Valid until
	Old meter	17/06/2009	16/06/2010
		09/12/2009	08/12/2010
	New Meter	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
The calibration was conducted by accredited third party which is Guangxi Institute of Metrology & Measurement was accredited by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China /13/.			
QA/QC procedure:	Readings taken from the meters and recorded in the monthly monitoring report are cross checked with electricity sales receipts. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.		
Means of verification:	Data of the parameter was verified by checking MRRs and ETNs. All data is in line with MRRs and ETNs; Information flow was verified by checking MRRs and ETNs, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PDD; Calibration was verified by checking calibration certificate and Accreditation certificate, all calibration of monitoring equipment meets the requirement indicated in the PDD.		

Data / Parameter:	TDL _y
Data unit:	%
Description:	The average technical distribution losses rate from power transmission site to power consumption site
Purpose of the data:	Calculation of project emissions
Parameter value:	20
Source of data used:	The average technical distribution losses rate from power transmission site to power consumption site is sourced from the default value in the "Tool to calculate baseline, project and/or leakage emissions from electricity

	consumption"
Information flow:	Not applicable
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Not applicable

Data / Parameter:	NCV _i
Data unit:	GJ/t
Description:	Net calorific value of the fossil fuel type i (i: diesel)
Purpose of the data:	Calculation of project emissions
Parameter value:	42.652
Source of data used:	Net calorific value of the fossil fuel type i is sourced from China Energy Statistical Yearbook 2017 /25/ and crosscheck with IPCC
Information flow:	Not applicable
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	By checking China Energy Statistical Yearbook 2017 and IPCC, it is confirmed that conservative value has been used for ER calculation. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Not applicable

Data / Parameter:	NCV _k		
Data unit:	GJ/t		
Description:	Net calorific value of biomass residue type k		
Purpose of the data:	Calculation of project emissions		
Parameter value:	Period	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	15.70	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
Source of data used:	Net calorific value of biomass residue type k is sourced from NCV Report for fuel /19/.		
Information flow:	For at least every 6 months, 3 samples of each kind of fuel would be taken for the test of NCV by a reputed laboratory according to relevant international standards. The NCV measurement is based on dry matters. The laboratory would issue a NCV Report for fuel /19/ accordingly. The data for NCV Report for fuel /19/ have been sent to the CDM consulting company for reporting of GHG emission reduction.		
Monitoring method, frequency and equipments:	Not applicable		
Calibration:	Not applicable		
QA/QC procedure:	By checking pervious measurement report, relevant data sources and IPCC, it is confirmed that the value applied in the monitoring report is reasonable. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.		
Means of verification:	Data of the parameter was verified by checking NCV Report for fuel /19/. All data is in line with NCV Report for fuel /19/; Information flow was verified by checking NCV Report for fuel /19/, and all information are consistent.		

Data / Parameter:	EF _{burning,CH4,k,y}
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Data unit:	tCH ₄ /GJ
Description:	CH ₄ emission factor for uncontrolled burning of the biomass residue type k during the year y
Purpose of the data:	Calculation of project emissions
Parameter value:	0.0027
Source of data used:	CH ₄ emission factor for uncontrolled burning of the biomass residue type k during the year y is sourced from IPCC
Information flow:	Not applicable
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Not applicable

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			
Purpose of the data:	Calculation of leakages			
Parameter value:	Sugarcane leaf:			
	Year	Annual available amount (10 ⁴ tonnes)	Amount used out of the project	Amount used by the Project (10 ⁴ tonnes)
	2009*	327	48	4.08
	2010	341	49	13.95
	2011	320	46	14.98
	2012	324	48	15.00
	2013	345	53	15.02
	2014	340	45	14.20
	2015	349	50	14.30
	2016	343	52	15.32
	2017**	332	51	10.44
	* 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	Amount used	Amount used by the	

		available amount (10⁴ tonnes)	out of the project	Project (10⁴ tonnes)
	2009*	64	31	0.99
	2010	63	32	3.44
	2011	58	30	3.87
	2012	55	27	3.46
	2013	50	24	3.66
	2014	52	21	3.70
	2015	55	22	3.66
	2016	64	31	0.99
	2017**	63	32	3.44
	* 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			
Source of data used:	Quantity of biomass residues of type k available in the region is sourced from Biomass Survey report 2010, 2011, 2012, 2013, 2014, 2015, 2016 and 2017.			
Information flow:	Not applicable			
Monitoring method, frequency and equipments:	Not applicable			
Calibration:	Not applicable			
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.			
Means of verification:	Not applicable			

Data / Parameter:	BF _{available,k,y}		
Data unit:	Tones		
Description:	Quantity of biomass residues of type k available in the region		
Purpose of the data:	Calculation of leakages		
Parameter value:	Sugarcane leaf:		
	Year	Annual available amount (10⁴ tonnes)	Amount used out of the project
	2009*	327	48
	2010	341	49
	2011	320	46
	2012	324	48
	2013	345	53
	2014	340	45
	2015	349	50
	2016	343	52
	2017**	332	51

	* 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: <table><tr><th>Year</th><th>Annual available amount (10⁴ tonnes)</th><th>Amount used out of the project</th><th>Amount used by the Project (10⁴ tonnes)</th></tr><tr><td>2009*</td><td>64</td><td>31</td><td>0.99</td></tr><tr><td>2010</td><td>63</td><td>32</td><td>3.44</td></tr><tr><td>2011</td><td>58</td><td>30</td><td>3.87</td></tr><tr><td>2012</td><td>55</td><td>27</td><td>3.46</td></tr><tr><td>2013</td><td>50</td><td>24</td><td>3.66</td></tr><tr><td>2014</td><td>52</td><td>21</td><td>3.70</td></tr><tr><td>2015</td><td>55</td><td>22</td><td>3.66</td></tr><tr><td>2016</td><td>64</td><td>31</td><td>0.99</td></tr><tr><td>2017**</td><td>63</td><td>32</td><td>3.44</td></tr></table> * 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	Year	Annual available amount (10 ⁴ tonnes)	Amount used out of the project	Amount used by the Project (10 ⁴ tonnes)	2009*	64	31	0.99	2010	63	32	3.44	2011	58	30	3.87	2012	55	27	3.46	2013	50	24	3.66	2014	52	21	3.70	2015	55	22	3.66	2016	64	31	0.99	2017**	63	32	3.44
Year	Annual available amount (10 ⁴ tonnes)	Amount used out of the project	Amount used by the Project (10 ⁴ tonnes)																																						
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2016	64	31	0.99																																						
2017**	63	32	3.44																																						
Source of data used:	Quantity of biomass residues of type k available in the region is sourced from Biomass Survey report 2010, 2011, 2012, 2013, 2014, 2015, 2016 and 2017.																																								
Information flow:	Not applicable																																								
Monitoring method, frequency and equipments:	Not applicable																																								
Calibration:	Not applicable																																								
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.																																								
Means of verification:	Not applicable																																								

Parameters available at validation stage:

Below data has been verified against the data sources and the PDD.

Parameter title	Description	Data	Source
EF _{grid,CM,y*}	Baseline emission factor: the combined emission factor of the project grid system in year y	0.78795	Notification on 2009 baseline emission factors for regional power grids in China, issued by China on 06/07/2009 /20/.
GWP _{CH4}	The warm current of CH ₄	21 (before 2013) 25 (after 2013)	IPCC

* $EF_{grid,CM,y}$ are not directly available at validation but calculated based on other parameter in the PDD available at validation, therefore in this monitoring period, only $EF_{grid,CM,y}$ are included and rest of parameter are either used to calculate $EF_{grid,CM,y}$ or not used in the MR.

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

The monitoring has been carried out in accordance with the monitoring plan contained in the register VCS PD /4/ version 2.0 dated 15/10/2018.

As a result of verification of the ER calculation process, the assessment team confirmed that all the parameters required for the determination of the emission reductions have been included in the MR Report and ER Calculation Spreadsheet /¡Error! No se encuentra el origen de la referencia./ and are consistent with the applied methodology ACM0006 version 09.0 and the monitoring plan contained in the registered VCS PD. The parameters are complete in this monitoring period.

Especially for calculation of leakage, after checking Biomass Survey report /21/, it is confirmed that the quantity of available biomass residue in the region is at least 25% larger than the quantity of biomass residues that are utilized, therefore, the leakage is considered as zero.

After verifying the reported figures with the raw data sources, it's confirmed that the values of the parameters from the raw data sources are consistent with those quoted in the ER Calculation Spreadsheet and the MR Report. The verification process for the same has been clearly described above in section 4.2 of the report.

4.4 Non-Permanence Risk Analysis

Not applicable as a renewable project.

5 SAFEGUARDS

5.1 No Net Harm

By checking the EIA summary and conclusion provided in the registered PD or PDD, it is confirmed that biomass power is green power and the impact caused by biomass power on the surrounding ecosystem and residents, water, and atmosphere etc. is very little, there would be no net harm caused due to the project activity. Also the EIA of the project are approved by the government.

Also no potential environment or social economic matter was found during the site visit. The project is renewable energy project and thus no net harm observed in Air or water quality on-site.

5.2 Local Stakeholder Consultation

The local stakeholder's meeting was held in Liucheng City in July and September 2007. 211 participants (totally in twice stakeholder meetings) attended the meeting including local residents, builders and members of the local authorities. The project owner introduced the proposed project, and then a survey was arranged through a one-page questionnaire, which was designed to be easily filled in. The opinions expressed by the stakeholders were recorded and are available on request.

The stakeholder meeting and the survey showed that the proposed project receives strong support from the local community. They all believe the proposed project will promote local economic development and agree with the project development and construction.

Communications with Local stakeholders was being carried out at periodic intervals. There are no negative comments received for the project.

All such conclusion has been verified through site visit and check registered VCS PD.

6 VERIFICATION CONCLUSION

Applus+ Certification has been commissioned by Beijing Ruifang Information Technology Co., Ltd to perform the verification of greenhouse gas emission reductions of the project activity "Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China" (UNFCCC Ref. No. 3664, VCS Ref. No. 1824).

The management of Liuzhou City Xin'neng Biomass Power Generation Co., Ltd. is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring Plan in the registered VCS PD /3/, version 2.0 dated 15/10/2018.

Our verification approach was based on the requirements as defined under the applicable VCS standards and relevant UNFCCC requirements. Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is implemented and operated as per the registered CDM PDD and VCS PD;
- the monitoring plan in CDM PDD and VCS PD is as per the applied methodology;
- the monitoring complies with the monitoring plan in the registered CDM PDD and VCS PD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS and CDM requirements;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

In our opinion, the GHG emission reductions for "Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China" during the monitoring period 10/09/2009 to 23/09/2017 as reported in Monitoring Report, prepared on the basis of the project's Monitoring Plan are fairly stated. Based on the information we have seen and evaluated, we confirm the following statement:

Verification period: From 10/09/2009 to 23/09/2017 (divided into 9 vintage periods).

Verified GHG emission reductions or removals in the above reporting period:

Year	Baseline emissions removals (tCO ₂ e) or	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
Year 2009	38,992	1,996	0	36,996
Year 2010	129,761	6,482	0	123,279
Year 2011	119,088	6,528	0	112,560
Year 2012	121,590	6,282	0	115,307
Year 2013	136,106	6,820	0	129,286
Year 2014	153,126	6,536	0	146,590
Year 2015	149,955	6,708	0	143,247
Year 2016	154,507	7,033	0	147,474
Year 2017	119,977	4,900	0	115,077
Total	1,123,102	53,286	0	1,069,816

APPENDIX 1: REFERENCE LIST

1. Monitoring report, version 1.0, dated 03/12/2018; version 2.1, dated 06/01/2019
2. ER calculation spreadsheet version 1.0 and version 3.0
3. Registered VCS PD, version 2.0, dated 15/10/2018; Registered CDM PDD, version 05, dated 29/03/2010
4. Validation report, No. A+SH_SYST_00818, version 01.1, completed by Applus+ Certification
5. VCS standard version 3.7, dated on 21/06/2017
6. Approved methodology ACM0006, version 09.0, dated 31/07/2009
7. Operation Log
8. Nameplate of the equipment
9. Monthly Report for fuel covering the monitoring period
10. CDM Monitoring procedure
11. Calibration Certificates for scale meters, belt meters, drying oven and electric balance covering the monitoring period
12. Calibration Certificates for electricity meters covering the monitoring period
13. Accreditation Certification for Guangxi Institute of Metrology & Measurement was accredited by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China
14. Monthly Balance for fuel covering the monitoring period
15. Meter Reading Record (MRRs) for Meters covering the monitoring period
16. Electricity Transaction Notes (ETNs) for Meters covering the monitoring period
17. Diesel Consumption Record covering the monitoring period
18. Purchase Invoice for diesel covering the monitoring period
19. NCV Report for fuel covering the monitoring period
20. Notification on 2009 baseline emission factors for regional power grids in China, issued by China on 06/07/2009
21. Biomass Survey report 2010, 2011, 2012, 2013, 2014, 2015, 2016 and 2017

- 22 Moisture of biomass residues report
- 23 Truck Transportation Record
- 24 Meter change record
- 25 China Energy Statistical Yearbook 2017
- 26 IPCC