



**Verified Carbon
Standard**

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



Document Prepared by LGAI Technological Center, S.A. (Applus+ Certification)

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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 a validation of the renewal of crediting period of “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” (Ref. No. 1824) (hereinafter referred to as the project activity) in P. R. China.

The scope of the validation of the renewal of crediting period is defined as an independent and objective review of the updated sections of the PD relating to the baseline, estimated emission reductions and the monitoring plan using the most recent version of baseline and monitoring methodology applicable for the project activity. The validation opinion is finalized based on the assessment of the project description through applying standard auditing techniques including but not limited to document reviews, follow up actions (e.g. site visit, telephone or e-mail interviews) and also the review of the applicable approved methodology and underlying formulae and calculations.

The assessment was performed in accordance with the VCS standards version 4.1, VCS guidance version 4.0 and UNFCCC requirement including an assessment of:

- The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period of the registered VCS project activity at the time of requesting renewal of crediting period of the project activity;
- The correctness of the application of the approved methodology and, where applicable, the approved standardized baseline for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period of the registered VCS project activity.

The project activity was registered as a CDM project activity on 24/09/2010 which is available at <https://cdm.unfccc.int/Projects/DB/JC11272000505.51/view>. After the registration of CDM, the project has been registered as a VCS project which is available at <https://registry.terra.org/app/projectDetail/VCS/1824>.

The purpose of “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” (hereafter referred to as the Project) developed by Liuzhou City Xin’neng Biomass Power Generation Co., Ltd. is to generate renewable electricity by utilizing biomass resource. 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 proposed project is located at Liucheng County, Guangxi Zhuang Autonomous, People’s Republic of China. The coordinate of the project is east longitude of 109° 11’35” and north latitude of 24° 39’27”. The project activity will achieve greenhouse gases (GHGs) emission reductions by avoiding CO₂ emissions from the business-as-usual scenario electricity generation of those fossil fuel-fired power plants connected to the SCPG also by avoiding natural decay or uncontrolled burning of anthropogenic sources of biomass residues. The project activity contributes to sustainable development of the local community, the host country and the world.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

During this validation, no finding was identified in relation to relevant VCS standards, guidance and UNFCCC requirements and relevant host party criteria and the applied baseline and monitoring methodology etc.

In summary, it is Applus+ Certification’s opinion that the project activity “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” (Ref. No. 1824) in P. R. China, as described in the PD, version 02 dated 17/08/2021, meets all relevant VCS and UNFCCC requirements for the renewal of the crediting period.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center, S.A. (hereafter referred to as Applus+ Certification) has been commissioned by Beijing Ruifang Information Technology Co., Ltd to perform a validation of the renewal of crediting period of “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” (Ref. No. 1824) (hereinafter referred to as the project activity) in P. R. China.

LGAI Technological Center, S.A. as the validation 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 this validation is to ensure that reported information in the Project Description of “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” is complete and accurate in accordance with applicable VCS standards and relevant UNFCCC requirements.

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the project description (PD). The PD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0006 version 15.0. The validation was based on the requirements in the CDM Validation and Verification standard for project activities version 02.0 and VCS guideline version 4.0 and standard version 4.1.

The validation 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 validation report is based on the VCS-PD and supporting evidences made available to the validator and information collected through performing interviews and during the on-site assessment.

The validation 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)
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 date: 24/02/2009 Operation start date: 10/09/2009
First Project Description (PD)	Version 01, dated 20/07/2021
Final Project Description (PD)	Version 02, dated 17/08/2021
Applied Methodology/Version	ACM0006, version 15.0, dated 14/12/2020
Scope/Technical Area	1/1.1

The project activity was registered as a CDM project activity on 24/09/2010 which is available at <https://cdm.unfccc.int/Projects/DB/JCI1272000505.51/view>. After the registration of CDM, the project has been registered as a VCS project which is available at <https://registry.terra.org/app/projectDetail/VCS/1824>.

The purpose of “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” (hereafter referred to as the Project) developed by Liuzhou City Xin’eng Biomass Power Generation Co., Ltd. is to generate renewable electricity by utilizing biomass resource. 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 proposed project is located at Liucheng County, Guangxi Zhuang Autonomous, People’s Republic of China. The coordinate of the project is east longitude of 109°11’35” and north latitude of 24°39’27”. The project activity will achieve greenhouse gases (GHGs) emission reductions by avoiding CO₂ emissions from the business-as-usual scenario electricity generation of those fossil fuel-fired power plants connected to the SCPG also by avoiding natural decay or uncontrolled burning of anthropogenic sources of biomass residues. The project activity contributes to sustainable development of the local community, the host country and the world.

2 VALIDATION PROCESS

2.1 Method and Criteria

Validation was conducted using Applus+ Certification's procedures in line with the requirements specified in the VCS Standard version 4.1, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant UNFCCC requirements and applying standard auditing techniques. No sampling was utilized during the site visit as well as validation for project activity.

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

- Project Details;
- Application of Methodology;
- Estimated GHG Emission Reduction and Removals;
- Monitoring;
- Safeguards etc.

Applus+ Certification validate that the reported information in the Project Description are complete and accurate in question. This involved a site visit and a desk review of the Project Design. This Validation Report describes the findings of this assessment.

The information of the assessment team is included in below of this report.

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 (AT)
- Technical Reviewer (TR)

- Technical Experts (TE)

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

Denny Xue (Master's Degree in Environmental Engineering, Bachelor's Degree in Thermal Engineering) is an Auditor appointed by Applus+ LGAI for the GHG project assessment, auditing and technical review. He has more than 6 years of work experience in CDM/GS4GG/VCS project assessment and review with Applus+. Before he joined Applus+ LGAI, he has been working for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development.

Simon Shen (Master's Degree in Thermal Energy Engineering, Bachelor's Degree in Environmental Engineering) is an Auditor appointed by Applus+ LGAI for the GHG project assessment, auditing and technical review. He has more than 6 years of work experience in CDM/GS4GG/VCS project assessment and review with Applus+, apart from the years of experience working as GHG Auditor and ISO 9001/14001 in TUV SUD before he joined Applus+ for 3.5 years. Mr. Simon Shen has extensive experience also as former Applus+ Shanghai CDM Technical Manager.

2.2 Document Review

The VCS project design version 01 dated 20/07/2021, version 02 dated 17/08/2021 were assessed as part of the validation. In addition, the registered VCS PD 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 as well as relevant documents, were reviewed. A detailed documents reviewed are listed in Appendix 1 of the report.

2.3 Interviews

The key personnel interviewed are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Li Jingdong	Project Manager	Liuzhou City Xin'neng Biomass Power Generation Co., Ltd.	Basic information, technology of the project, etc.; Monitor Data: meter readings, control and maintenance, QA&QC systems Status of the project activity and any modifications with respect to the registered PD. Applicability to the latest methodology.
Mr. Li Yong	Project Manager	Liuzhou City Xin'neng Biomass Power Generation Co., Ltd.	National and local policies and changes Baseline of the project and its updates The lifetime of the project activity Emission Factors and their updates Monitoring plan and changes.

2.4 Site Inspections

The assessment team performed the on-site validation (Liucheng County, Guangxi Zhuang Autonomous, People's Republic of China.) on 16/08/2021. The interviewed personnel and objective are listed in above table.

2.5 Resolution of Findings

As an outcome of the validation 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 reported information is not in line with the applicable CDM/VCS requirements.

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

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

There are no CARs and CLs raised for the project.

2.5.1 Forward Action Requests

As this is the validation for the project for renewal of crediting period, there are no FARs raised in the previous validation and verification process.

3 VALIDATION FINDINGS

3.1 Project Details

The following description of the project as per PD was verified during the on-site visit:

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 information of equipment has been confirmed by checking nameplate of the equipment. The total quantity of biomass residues (mulberry leaf and sugarcane leaf) 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 58,277 tCO₂e annually.

The project activity was invested and operated by Liuzhou City Xin'neng Biomass Power Generation Co., Ltd. which is the project proponent of project by checking the business license of the project.

By site visit checking the nameplate of the project, following technical parameter of project activity are confirmed:

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,	Rated put-in steam pressure: 3.43 MPa(a)

			actuation, impulse, condensed gas, N15- 3.43/435	Rated put-in steam 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 checking the registered VCS PD and site visit interview with project owner, it is confirmed that the project started operation on 10/09/2009 which is the project start date according to the requirement of VCS. Also, the start date of the first VCS crediting period of the project has been set started from 10/09/2009 to 09/09/2019 last for 10 years and second VCS crediting period of the project would start from 10/09/2019 to 09/09/2029 last for 10 years in line with the requirement of VCS.

As the installed capacity of the project is 30 MW which falls under large scale project according to the requirement of CDM. However, due the annually estimated emission reductions are less than 300,000 tCO₂, the project falls under project under VCS standard.

The project is located at Liucheng County, Guangxi Zhuang Autonomous, People's Republic of China. The geographical coordinators of project are east longitude of 109°11'35" and north latitude of 24°39'27" verified by the site visit.

Before the implementation of the project activity, the electricity generated by the project would be supplied by SCPG in the baseline scenario.

By checking laws and regulation, it is confirmed that the project activity is in complicate with all laws and regulations in China.

By checking information on the Internet, it is confirmed that the project activity has been validated by JCI based on the CDM PDD version 05 dated 29/03/2010 and reported in the validation report No. JCI-VAL 09/027, version 02, completed on 30/03/2010. The project activity was registered as a CDM project activity on 24/09/2010. All above information is available at <https://cdm.unfccc.int/Projects/DB/JCI1272000505.51/view>. By checking statement issued by the project proponent, it is confirmed that in this crediting period, the project would only been issued under VCS. Until now, there are no CERs issuance of request under CDM scheme.

The project does not participate in the other emissions trading program by checking public information on Internet and interviewing with project owner. Of course, no rejection from other GHG programs.

As the project is not a grouped project, the eligibility criteria for grouped project is not applicable; No leakage management as not an AFOLU project; No commercially sensitive information confirmed through site visit.

The project activity would contribute sustainable development in the region in following aspects confirmed by site visit:

- 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 CO₂, SO₂ 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.

Overall, it is confirmed that the PD is accurate, complete, and provides an understanding of the nature of the project.

3.2 Safeguards

3.2.1 No Net Harm

By checking the EIA summary and conclusion provided in the registered PDD, it is confirmed that biomass is green power and the impact caused by biomass 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.

3.2.2 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 PDD.

3.2.3 Environmental Impact

By checking the EIA summary and conclusion provided in the registered PD, it is confirmed that biomass power is green power and the impact caused by biomass 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.

3.2.4 Public Comments

There are no public comments received.

3.2.5 AFOLU-Specific Safeguards

Not applicable as non-AFOLU project.

3.3 Application of Methodology

3.3.1 Title and Reference

The approved methodology applied in the project activity is ACM0006 – “Electricity and heat generation from biomass” (version 15.0)

Related tools are:

Tool to calculate the emission factor for an electricity system (version 07.0)

Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (version 03.0.1)

Project and leakage emissions from transportation of freight (version 01.1.0)

Project and leakage emissions from biomass (version 04.0)

Tool to calculate project or leakage CO₂ emission from fossil fuel combustion (version 03.0).

3.3.2 Applicability

The criteria and assessment of ACM0006 (version 15.0) are in the following table:

Criteria	Analysis	Assessment team's opinion
The methodology is applicable under the following conditions: (a) Biomass used by the project plant is limited to biomass residues, biogas, RDF and/or biomass from dedicated plantations;	This project uses biomass residues.	By site visit and checking FSR, it is confirmed that the project uses biomass residues.
(b) Fossil fuels may be co-fired in the project plant. However, the amount of fossil fuels co-fired does not exceed 80% of the total fuel fired on energy basis;	This project does not use fossil fuel.	By site visit and checking FSR, it is confirmed that the project does not use fossil fuel. This is not applicable.

(c) For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project does not result in an increase of the processing capacity of (the industrial facility generating the residues) raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;	This waste biomass used by this project is not from dedicated production process. Therefore, it is not applicable to this project.	By site visit and checking FSR, it is confirmed that the waste biomass used by this project is not from dedicated production process. This is not applicable.
(d) The biomass used by the project plant is not stored for more than one year;	According to the biomass residues collection and disposal conditions of the proposed project, the storage period of the biomass is much less than one year.	By site visit and checking FSR, it is confirmed that the storage period of the biomass is less than one year.
(e) The biomass used by the project plant is not processed chemically or biologically (e.g. through esterification, fermentation, hydrolysis, pyrolysis, bio- or chemical-degradation, etc.) prior to combustion. Drying and mechanical processing, such as shredding and pelletisation, are allowed.	According to the FSR, the biomass residues used by the proposed project are not obtained from chemically processed biomass (e.g. through esterification, fermentation, hydrolysis, pyrolysis, bio- or chemical degradation, etc.) prior to combustion. Only shredding system is included in the proposed project.	By site visit and checking FSR, it is confirmed that the project only involved in shredding, no other chemically or biologically process are involved.

In the case of fuel switch project activities, the use of biomass or the increase in the use of biomass as compared to the baseline scenario is technically not possible at the project site without a capital investment in: (a) The retrofit or replacement of existing heat generators/boilers; or (b) The installation of new heat generators/boilers; or (c) A new dedicated biomass supply chain established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes); or (d) Equipment for preparation and feeding of biomass.	This project is not fuel switch project.	By site visit and checking FSR, it is confirmed that the project is not fuel switch project. This is not applicable.
If biogas is used for power and heat generation, the biogas must be generated by anaerobic digestion of wastewater, and: (a) If the wastewater generation source is registered as a CDM project activity, the details of the wastewater project shall be included in the PDD, and emission reductions from biogas energy generation are claimed using this methodology; (b) If the wastewater source is not a CDM project, the amount of biogas does not exceed 50% of the total fuel fired on energy basis.	This project does not use biogas.	By site visit and checking FSR, it is confirmed that the project does not use biogas. This is not applicable.

In the case biomass from dedicated plantations are used, the applicability conditions of the methodological tool “project and leakage emissions from biomass” apply.	The biomass used in this project are not from dedicated plantations.	By site visit and checking FSR, it is confirmed that biomass used in this project are not from dedicated plantations. This is not applicable
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Finally, the methodology is only applicable if the baseline scenario, as identified per the “Selection of the baseline scenario and demonstration of additionality” section hereunder, is: (a) For power generation: scenarios P2 to P7, or a combination of any of those scenarios; and (b) For heat generation: scenarios H2 to H7, or a combination of any of those scenarios; (c) If some of the heat generated by the CDM project activity is converted to mechanical power through steam turbines, for mechanical power generation: scenarios M2 to M5: (i) In cases M2 and M3, if the steam turbine(s) are used for mechanical power in the project, the turbine(s) used in the baseline shall be at least as efficient as the steam turbine(s) used for mechanical power in the project; (ii) In cases M4 and M5, steam turbine(s) generating mechanical power to be used for the same purpose as in the baseline are not allowed; (d) For the use of biomass residues: scenarios B1 to B5, or a combination of any of those scenarios; (e) For the use of biogas: scenarios BG1 to BG3, or a combination of any of those scenarios.	The most feasible baseline scenario of the proposed project is as follows: -For power generation: P7, the generation of power in the power grid; -For the use of biomass residues: B1, the biomass residues are dumped or left to decay mainly under aerobic conditions.	By site visit and checking FSR, it is confirmed the most feasible baseline scenario of the proposed project is as follows: -For power generation: P7, the generation of power in the power grid; -For the use of biomass residues: B1, the biomass residues are dumped or left to decay mainly under aerobic conditions.
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The methodology is not applicable if the baseline scenario involves the cultivation of biomass in dedicated plantations.	The biomass used in this project are not from dedicated plantations.	By site visit and checking FSR, it is confirmed that biomass used in this project are not from dedicated plantations. This is not applicable
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According to the table above, the assessment team confirm the project meets all the applicable criteria of ACM0006 version 15.0

Also, for related tools, the assessment team confirm all applicable criteria have been met confirmed by site visit and checking FSR.

3.3.3 Project Boundary

Project boundary has been ascertained and confirmed during the site visit using ACM0006 version 15.0 – “the spatial extent of the proposed project boundary include, all power plants connected with SCPG, biomass transportation means from outside of project site to project site, the site where the biomass residues would have been left for decay or dumped.”

Hence the project boundary includes all power plants connected with SCPG, biomass transportation means from outside of project site to project site, the site where the biomass residues would have been left for decay or dumped.

The calculation of net electricity supplied to grid is under purview of state electricity board and project activity Owner or project activity Implementer does not have any control on it. Thus, for project activity, net electricity supplied to grid is the monitoring parameter which is used for ER calculations.

The sources and GHG gases involved for proposed Project activity are as below:

Source		Gas	Included	Justification/Explanation
Baseline	Electricity and heat generation	CO ₂	Yes	Main emission source
		CH ₄	No	Excluded for simplification. This is conservative
		N ₂ O	No	Excluded for simplification. This is conservative

Source		Gas	Included	Justification/Explanation
	Uncontrolled burning or decay of surplus biomass residues	CO ₂	No	It is assumed that CO ₂ emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH ₄	Yes	The project participants of the proposed project finally decided to include this emission source, since B1 and B3 have been identified as the most likely baseline scenarios for the proposed project
		N ₂ O	No	Excluded for simplification. This is conservative. Note also that emissions from natural decay of biomass are not included in GHG inventories as anthropogenic sources
Project activity	On-site fossil fuel consumption	CO ₂	Yes	May be an important emission source
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small
	Off-site transportation of biomass	CO ₂	Yes	May be an important emission source
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small
	Combustion of biomass for electricity and heat	CO ₂	No	It is assumed that CO ₂ emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH ₄	Yes	Because the CH ₄ emissions from uncontrolled burning or decay of biomass residues in the baseline scenario have been included, this emission source must be included
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be small

Source		Gas	Included	Justification/Explanation
	Wastewater from the treatment of biomass	CO ₂	No	It is assumed that CO ₂ emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH ₄	No	Excluded because waste water is not treated (partly) under anaerobic conditions
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be small
	Cultivation of land to produce biomass feedstock	CO ₂	No	This project does not use dedicated plantation. Therefore, this emission source shall not be included.
		CH ₄	No	This project does not use dedicated plantation. Therefore, this emission source shall not be included.
		N ₂ O	No	This project does not use dedicated plantation. Therefore, this emission source shall not be included.

3.3.4 Baseline Scenario

The baseline scenario of the project activity is confirmed as below:

For power generation: P7, the generation of power in the power grid;

For the use of biomass residues: B1, the biomass residues are dumped or left to decay mainly under aerobic conditions.

According to the methodology ACM0006 version 15.0, the baseline emissions are the electricity produced by the project activity multiplied by the emission factor of SCPG plus avoiding natural decay or uncontrolled burning of anthropogenic sources of biomass residues.

For the second crediting period, the continued validity of the original baseline has been assessed in the updated PD. Applus+ Certification confirms that there have been no changes in the relevant national and/or sectoral regulations on building a biomass project for exporting electricity to power grid since the previous crediting period. On the other hand, the baseline scenario for building a biomass project for exporting electricity to power grid was still valid according to methodology ACM0006 version 15.0.

The information presented in the updated PD has been validated by an initial document review of all data. Further confirmation has been made based on the review of information from similar projects and/or technologies. The sources referenced in the PD have been quoted correctly. The information was verified against credible sources, such as the following:

- China Energy Statistical Yearbook 2013;
- China Energy Statistical Yearbook 2014;
- China Energy Statistical Yearbook 2015;
- China Energy Statistical Yearbook 2016;
- China Energy Statistical Yearbook 2017;
- China Energy Statistical Yearbook 2018.
- China Energy Statistical Yearbook 2019.

The steps from the Methodological Tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” version 03.0.1 as per VCS standard version 4.1 were applied to assess the continued validity of the baseline and/or to update the baseline at the renewal of a crediting period:

Step 1: Assess the validity of the current baseline for the next crediting period

VCS standard version 4.1 requires assessing the impact of new relevant national and/or sectoral policies and circumstances on the baseline. The validity of the current baseline is assessed using the following Sub-steps:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

In China, the Renewable Energy Law has been put into effect since 2006, which encourages the development of renewable energy projects. However, although renewable energy projects have been developed rapidly in recently years, grid connected power generation in China is still dominated by fossil-fuel power plants. There are no new relevant national and/or sectoral policies and/or circumstances in the electricity generation sector applicable to the project activity, in comparison to the time of the submission of the project activity for validation, which would affect the compliance of the current baseline scenario. Hence in the absence of the project activity electricity would still have been generated in the existing fossil fuel power plants or by the addition of new fossil fuel power plants connected to the SCPG.

Moreover, there are no regulation forbidding dumping biomass residues, this is still the common practice in China based on the professional knowledge of the assessment team.

Applus+ Certification confirms that no relevant mandatory national and/or sectoral policies applicable to the project activity came into effect after the submission of the project activity for validation.

Step 1.2: Assess the impact of circumstances

For the project activity, the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment. The main investment environment or market characteristics especially the feed-in tariff, the policy in terms of market access permit have no significant change. The current practice for the baseline emissions is still the GHG emitted by SCPG: the equivalent electricity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources within the SCPG.

By verifying China Energy Statistical Yearbook 2013, China Energy Statistical Yearbook 2014, China Energy Statistical Yearbook 2015, China Energy Statistical Yearbook 2016, China Energy Statistical Yearbook 2017, China Energy Statistical Yearbook 2018 and China Energy Statistical Yearbook 2019. It is confirmed that thermal power (which coal is the fuel) still domain the power supply in SCPG which is the same situation when project activity was under validation. Therefore, the main market characteristics have no change.

As the project is under normal operation which is in line with the original design thereby the condition used to determine baseline emissions in the previous crediting is still valid.

The conditions used to determine the baseline emissions in the previous crediting period are not valid: the emission factor calculation of SCPG in the first crediting period is basing on the data of 2004-2006. Before the time of requesting renewal of the crediting period, the China DNA have issued the latest “2019 Baseline Emission Factors for Regional Power Grids in China” on 29/12/2020, so the emission factor of SCPG and all values need to be updated for the second crediting period.

The local biomass residues are dumped by simple piling up, therefore B1 is still a realistic alternative scenario for the use of biomass residues.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

The current baseline scenario is the continuation of the current practice. In the absence of the project, the electricity would have been supplied by SCPG, the baseline scenario for the biomass residues utilization is that the biomass residues are dumped or left to decay under mainly aerobic conditions and all these will not request an investment by the project proponent or third party. So, this step is not applicable.

Step 1.4: Assessment of the validity of the data and parameters

The SCPG emission factor calculated ex-ante for the 1st crediting period needs to be updated, as per the “Tool to calculate the emission factor for an electricity system” version 07.0.

Also the GWP_{CH4} has been updated according to latest requirement.

This parameter is properly described in the 3.3.6 of following report.

Conclusion on step 1:

Applus+ Certification confirms that the current baseline is still valid as per methodology ACM0006 version 15.0. However, the grid emission factor and other parameter needs to be updated for the subsequent crediting period.

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

As the baseline scenario of the project activity is still sustained in this crediting period, no update would be required.

Step 2.2: Update the data and parameters

The SCPG emission factor and other parameter will be updated as described in 3.3.6 of this report.

3.3.5 Additionality

Not applicable for the renewal of crediting period.

3.3.6 Quantification of GHG Emission Reductions and Removals

The calculation of the emissions reductions exactly follows the procedures described in the methodology ACM0006 version 15.0 and relevant tool, e.g. the “Tool to calculate the emission factor for an electricity system” version 07.0.

Applus+ Certification has assessed the calculation of project emissions, baseline emissions, leakage emissions and emission reductions. Corresponding calculations have been carried out based on calculation spreadsheet. The consistency of the parameters and equations presented in PD, as well as calculation spreadsheet etc., has been compared with the information and requirements presented in the methodology and respective tools.

The assumptions and data used to determine the emission reductions are listed in the PD and all the sources have been checked. Based on the information reviewed it is confirmed that the sources used are correctly quoted and interpreted in the PD. The values presented in the PD are considered reasonably based on the documentation and references reviewed and the results of the interviews.

The estimation of the emission reductions are considered correct as the calculations have been reproduced by the assessment team with the attainment of the same results.

Applus+ Certification confirms methodology ACM0006 version 15.0 and relevant tool, e.g. the “Tool to calculate the emission factor for an electricity system” version 07.0 have been correctly applied to calculate baseline emissions, project emissions, leakage and net GHG emission reductions and removals.

Detailed information on the verification of the parameters used in the equations is found below. The algorithms for the determination of the baseline and project are discussed in the following sections.

The emission reductions are calculated by the difference between baseline emissions (BE_y), project emissions (PE_y) and leakage (LE_y).

(1) Baseline emissions

The project involved in using biomass residues as fuel for the power generation. As per the methodology ACM0006 version 15.0 that the baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity also by avoiding natural decay or uncontrolled burning of anthropogenic sources of biomass residues. Then baseline emissions are calculated by baseline electricity generation emissions and baseline emissions due to uncontrolled burning or decay of biomass residues in this project case.

For the calculation of baseline electricity generation emissions, considering the project situation, it could be simplified by considering Baseline electricity generation in year y ($EL_{BL,y}$) and Grid emission factor in year y ($EF_{EG,GR,y}$).

Baseline electricity generation in year y ($EL_{BL,y}$) is determined by Gross quantity of electricity generated in all power plants included in the project boundary in year y ($EL_{PJ,gross,y}$), Project electricity imports from the grid in year y ($EL_{PJ,imp,y}$) and Total auxiliary electricity consumption required for the operation of the power plants in year y ($EL_{PJ,aux,y}$).

The grid emission factor ($EF_{EG,GR,y}$) shall be determined using the latest approved version of “Tool to calculate the emission factor for an electricity system” which equal to the Combined margin CO₂ emission factor for grid connected power generation in year y ($EF_{grid,CM,y}$).

The Combined margin CO₂ emission factor for grid connected power generation in year y ($EF_{grid,CM,y}$) is calculated in a transparent and conservative manner as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the steps prescribed in the “Tool to calculate the emission factor for an electricity system”, version 07.0.

The PD version 02 completed on 17/08/2021 using the data for calculation of the grid emission factor at the time the PD was received for validation. The latest data available was from China Electric Power Yearbook 2016-2018, China Energy Statistical Yearbook 2016-2018. The calculation is in accordance with the calculation process of the combined margin emission factor published by the Chinese DNA: 2019 Baseline Emission Factors for Regional Power Grids in China published by the DNA of China on 29/12/2020.

The SCPG is selected as the electricity system of the project activity. Simple OM method (method a) is applied for calculating OM emission factor because according to the data from China Electric Power Yearbook 2014-2018, the low-cost/must-run resources in the latest five years (2013-2017) constitute less than 50% of the total grid generation. Ex-ante option with a 3-year generation-weighted average is chosen to account for $EF_{grid,OMsimple,y}$. Option B of simple OM is selected for the calculation based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option A was denied because necessary data for Option A is not available). As a result, $EF_{grid,OMsimple,y}$ is calculated to be 0.8042 tCO₂e/MWh as a generation weighted average for the year 2015-2017.

Based on the most recent years energy balance of the SCPG, calculating the proportions of CO₂ emissions from the coal-fired, oil-fired and gas-fired power plants in total CO₂ emissions of thermal power plants and taking them as weight of each type of plant in the calculations;

Based on the most advanced commercialized technologies which applied by the coal-fired, oil-fired and gas-fired power plants, calculating the emission factor of thermal power plants in SCPG. This approach is more conservative as it assumes all recently built plants have the fuel efficiency as that of the most advanced commercialized technologies;

Calculating the $EF_{grid,BM,y}$ through multiplying the emission factor of thermal power plants by the percentage share of thermal power plants installed capacity addition within all recently built installed capacity. The proper year is selected so that it is the closest time when the last 20% of installed capacity was built.

As a result, the $EF_{grid,BM,y}$ is calculated to be 0.2135 tCO₂e/MWh.

Based on the weight w_{OM} and w_{BM} of 0.25:0.75 by default for the second crediting period, the combined margin emission factor is calculated to be 0.361175 tCO₂e/MWh.

The annual net electricity supplied to the grid is 157,860 MWh which is in line with the original design of the project. It's confirmed that the estimation of the figure is reasonable. Thereby, the baseline emissions could be calculated to be $157,860 \text{ MWh} \times 0.361175 \text{ tCO}_2\text{e/MWh} = 57,015 \text{ tCO}_2\text{e}$. The assessment team confirmed that the emission reductions calculation for electricity is corrected in the PD.

The values of the main parameters for calculating combined emission factor ($EF_{\text{grid,CM},y}$) are crosschecked by the assessment team and the data sources are listed in below table:

Data and Parameters	Description	Data source
$EF_{\text{grid,OM},y}$	Simple operating margin CO ₂ emission factor in year y	2019 Baseline Emission Factors for Regional Power Grids in China
$EF_{\text{grid,BM},y}$	Build margin CO ₂ emission factor in year y	2019 Baseline Emission Factors for Regional Power Grids in China
WOM	Weighting of operating margin emissions factor	Tool to calculate the emission factor for an electricity system, version 07.0
WBM	Weighting of build margin emissions factor	Tool to calculate the emission factor for an electricity system, version 07.0

For the calculation of baseline emissions due to uncontrolled burning or decay of biomass residues, considering the baseline of the project is B1, it is then equal to baseline emissions due to aerobic decay or uncontrolled burning of biomass residues in year y ($BE_{BR,B1/B3,y}$).

Baseline emissions due to aerobic decay or uncontrolled burning of biomass residues in year y ($BE_{BR,B1/B3,y}$) is determined by Global Warming Potential of methane valid for the commitment period (GWP_{CH_4}), Quantity of biomass residues of category n used in the CDM project activity in year y for which the baseline scenario is B1 or B3 (tonnes on dry-basis) ($BR_{BR,B1/B3,y}$), Net calorific value of biomass residue of category n in year y (GJ/tonne on dry-basis) ($NCV_{BR,n,y}$) and CH_4 emission factor for uncontrolled burning of the biomass residues category n during the year y ($EF_{BR,n,y}$).

For $NCV_{BR,n,y}$ and $EF_{BR,n,y}$, a default value of 0.0027 t CH_4 /t biomass is recommended, adjusted by a conservativeness factor (i.e. 0.73) to address the high level of uncertainty. In this case, an emission factor of 0.001971 t CH_4 /t biomass should be used.

For GWP_{CH_4} , according to latest requirement of VCS standard, 28 t CO_2 /t CH_4 would be applied.

$BR_{BR,B1/B3,y}$ is determined based on project design information which is 178,198 ton (wet-basis) and 149,294.28 ton (dry-basis) considering the percentage and moisture of different biomass residues used as fuel for the project.

Therefore, $BE_{BR,B1/B3,y}$ was calculated as $28 \text{ tCO}_2/\text{tCH}_4 * 149,294.28 \text{ ton} * 0.001971 \text{ tCH}_4/\text{t biomass} = 8,239 \text{ tCO}_2\text{e}$

The baseline emission is then determined as $57,015 \text{ tCO}_2\text{e} + 8,239 \text{ tCO}_2\text{e} = 65,254 \text{ tCO}_2\text{e}$

Applus+ Certification confirms that all data sources and assumptions are appropriate, and calculations are correct, applicable to the proposed VCS project activity and will result in a conservative estimate of the emission reductions.

(2) Project emissions

According to ACM0006 and the project situation, the project emissions of the project activity involved in Emissions during the year y due to fossil fuel consumption at the project site, Emissions during the year y due to grid electricity imports to the project site, Emissions during the year y due to incremental transport of biomass to the project plant and Emissions from the combustion of biomass during the year y.

For Emissions during the year y due to fossil fuel consumption at the project site, according to Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, it is determined by Quantity of fuel type i combusted in process j during the year y ($\text{FC}_{i,y}$), CO_2 emission coefficient of fuel type i in year y ($\text{COEF}_{i,y}$), considering the only possible fuel other biomass residues may be used is diesel, then the Emissions during the year y due to fossil fuel consumption at the project site is determined as Quantity of the diesel oil combusted during the year y ($\text{FC}_{\text{diesel oil},y}$), Net calorific value of the diesel oil in year y ($\text{NCV}_{\text{diesel oil},y}$) and CO_2 emission factor of the diesel oil in year y ($\text{EF}_{\text{CO}_2,\text{diesel oil},y}$).

Based on the FSR, the $\text{FC}_{\text{diesel oil},y}$ was considered as zero. And for $\text{NCV}_{\text{diesel oil},y}$ and $\text{EF}_{\text{CO}_2,\text{diesel oil},y}$, data from IPCC and China Energy Statistical Yearbook would be used and continuously updated during the verification stage.

Emissions during the year y due to fossil fuel consumption at the project site is then considered as 0 t CO_2e in the ex-ante stage.

For Emissions during the year y due to grid electricity imports to the project site, it is determined by Project electricity imports from the grid in year y ($\text{EL}_{\text{PJ},\text{imp},y}$) and grid emission factor ($\text{EF}_{\text{EG},\text{GR},y}$).

According to the FSR, $\text{EL}_{\text{PJ},\text{imp}}$, was considered as zero, and $\text{EF}_{\text{EG},\text{GR},y}$ has been determined and justified in above report.

For Emissions during the year y due to incremental transport of biomass to the project plant, according to Project and leakage emissions from transportation of freight, it is determined by using conservative default values (option B) considering Return trip distance between the origin and destination of freight transportation activity f in monitoring period m ($\text{D}_{f,m}$), Total mass of freight transported in freight transportation activity f in monitoring period m ($\text{FR}_{f,m}$) and Default CO_2 emission factor for freight transportation activity f ($\text{EF}_{\text{CO}_2,f}$).

For $\text{D}_{f,m}$, the most conservative value which is 100 km base on FSR would be used.

For $\text{FR}_{f,m}$, which the same as wet-basis of $\text{BR}_{\text{BR},\text{B1}/\text{B3},y}$ as 178,198 tonnes sourced from FSR.

For $\text{EF}_{\text{CO}_2,f}$ is determined by Project and leakage emissions from road transportation of freight, in which default value of 245 g CO_2 /tkm was used.

Then Emissions during the year y due to incremental transport of biomass to the project plant was calculated as $178,198 \text{ tonnes} * 100 \text{ km} * 245 \text{ gCO}_2/\text{tkm} = 4,366 \text{ tCO}_2\text{e}$

For Emissions from the combustion of biomass during the year y , it is determined by Global Warming Potential of methane valid for the commitment period (GWP_{CH_4}), CH_4 emission factor for the combustion of biomass residues in the project plant ($\text{EF}_{\text{CH}_4,\text{BR}}$), Quantity of biomass residues of category n used in the CDM project activity in year y ($\text{BR}_{\text{PJ},n,y}$) and Net calorific value of biomass residue of category n in year y ($\text{NCV}_{\text{PJ},n,y}$).

GWP_{CH_4} has been determined in the above report.

As per methodology ACM0006, the default CH_4 emission factor for wood waste and other solid biomass residues utilized in the proposed project activity is $30 \text{ kgCH}_4/\text{TJ}$. The uncertainty is estimated to be 300%, and a conservativeness factor of 1.37 is applied.

$BR_{PJ,n,y}$ is the same as $BR_{BR,B1/B3,y}$, please refer to the above report for detail.

$NCV_{PJ,n,y}$ are sourced from FSR which is 15,560 MJ/t for sugarcane leaf and 13,480 MJ/t for mulberry leaf

Emissions from the combustion of biomass during the year y is then determined as $28 \text{ tCO}_2/\text{tCH}_4 * 178,198 * 80\% * (1 - 13.6\%) * 15,560 \text{ MJ/t} + 178,198 * 20\% * (1 - 26.7\%) * 13,480 \text{ MJ/t} * 30 \text{ kgCH}_4/\text{TJ} * 1.37 = 2,611 \text{ tCO}_2\text{e}$

Therefore, the project emissions was determined as $0 \text{ tCO}_2\text{e} + 0 \text{ tCO}_2\text{e} + 4,366 \text{ tCO}_2\text{e} + 2,611 \text{ tCO}_2\text{e} = 6,977 \text{ tCO}_2\text{e}$

(3) Leakage

According to the methodology, leakage emissions due to diversion of biomass residues from other applications shall be calculated according to the “Project and leakage emissions from biomass”.

The biomass consumed by this project would be dumped or left to decay under mainly aerobic conditions in absence of the project. According to local available biomass survey conducted by third party in 2020, the available amount of sugarcane leaf and mulberry leaf for this project is larger than 125% of the project consumption shown as below table:

Biomass Type	Mulberry leaf	Sugarcane leaf
Total available amount in local area (10,000 tons)	60	339
Amount for other applications outside of the project (10,000 tons)	34	55
Available amount for this project (10,000 tons)	26	284
Consumption by this project (10,000 tons)	3.564	14.2558

Therefore, leakage are considered as zero.

$$LE_y = 0 \text{ tCO}_2\text{e}$$

(4) Emission reductions

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average ex-ante estimation of emission reduction conservatively calculated to be 58,277 tCO₂e per year for the selected 10 years crediting period. Total emission reductions during the second crediting period are estimated to be 582,770 tCO₂e.

3.3.7 Methodology Deviations

Not applicable

3.3.8 Monitoring Plan

The project applies methodology ACM0006 version 15.0. The original monitoring plan was updated based on ACM0006 version 15.0 requirements.

Parameters	Description	Measurement method and QA/QC procedures	Assessment conclusion
Biomass categories and quantities used in the CDM project activity	Biomass categories and quantities used in the CDM project activity	Type, source and quantity of biomass would be determined by using weight meter(s). Adjust for the moisture content in order to determine the quantity of dry biomass. Fate in the absence of the project activity is determined as B1 while use in the project scenario are determined as P7.	Consistent with methodology
For biomass residues categories for which scenarios B1, B2 or B3 is deemed a plausible baseline alternative, project participants shall	For biomass residues categories for which scenarios B1, B2 or B3 is deemed a plausible baseline alternative, project participants shall demonstrate that this is a realistic and credible alternative scenario	For quantity of available biomass residues of category n in the region, quantity of biomass residues of category n that are utilized and availability of a surplus of biomass residues category n will be determined by surveys or statistics.	Consistent with methodology

demonstrate that this is a realistic and credible alternative scenario			
$FC_{\text{diesel oil},y}$	Quantity of the diesel oil combusted during the year y	Quantity of the diesel oil combusted during the year y would be monitored by either mass or volume meters.	Consistent with methodology
$EF_{CO_2,\text{diesel oil},y}$	CO_2 emission factor of the diesel oil in year y	Data from IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories would be used and update in case of new data available.	Consistent with methodology
$NCV_{\text{diesel oil},y}$	Net calorific value of the diesel oil in year y	Data from China Energy Statistical Yearbook would be used and update in case of new data available.	Consistent with methodology
$D_{f,m}$	Return trip distance between the origin and destination of freight transportation activity f in monitoring period m	Most conservative value as 100 km would be used for calculation.	Consistent with methodology
$FR_{f,m}$	Total mass of freight transported in freight transportation activity f in monitoring period m	Weight meter(s) would be used to monitor the parameter continuously and record monthly.	Consistent with methodology
$BR_{PJ,n,y}$	Quantity of biomass of category n used in the CDM project activity in year y (tonnes on dry-basis)	Weight meter(s) would be used to monitor the parameter continuously and record monthly. Adjust for the moisture content in order to determine the quantity of dry biomass. The parameter would be crosschecked with an annual energy balance that is based on purchased quantities and stock changes.	Consistent with methodology
$NCV_{BR,n,y}$	Net calorific value of biomass residue of	Measurements are carried out at reputed laboratories and according to	Consistent with methodology

	category n in year y (GJ/tonne on dry-basis)	relevant international standards. Measure the NCV on dry-basis. At least every six months, taking at least three samples for each measurement.	
EL _{PJ,gross,y}	Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y	For gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y (EL _{PJ,gross,y}), 1 meters with accuracy of no less than 0.5 would be used to monitor the parameter. The meter readings will be continuous measurement and monthly recorded. The measurement/ monitoring equipments should adopt the colligated automation system according with national standard and technology. The qualified entity will check out these electricity meters every year.	Consistent with methodology
EL _{PJ,imp,y}	Project electricity imports from the grid in year y	For project electricity imports from the grid in year y (EL _{PJ,imp,y}), 1 meters with accuracy of no less than 0.5 would be used to monitor the parameter. The meter readings will be continuous measurement and monthly recorded. The measurement/ monitoring equipments should adopt the colligated automation system according with national standard and technology. The qualified entity will check out these electricity meters every year.	Consistent with methodology
EL _{PJ,aux,y}	Total auxiliary electricity consumption required for the operation of the proposed project site in year y	For total auxiliary electricity consumption required for the operation of the proposed project site in year y (EL _{PJ,aux,y}), 1 meters with accuracy of no less than 0.5 would be used to monitor the parameter. The meter readings will be continuous measurement and monthly recorded.	Consistent with methodology

		The measurement/ monitoring equipments should adopt the colligated automation system according with national standard and technology. The qualified entity will check out these electricity meters every year.	
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3 electricity meters installed at project site with accuracy of no less than 0.5 are used to measure gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y ($EL_{PJ,gross,y}$), project electricity imports from the grid in year y ($EL_{PJ,imp,y}$) and total auxiliary electricity consumption required for the operation of the proposed project site in year y ($EL_{PJ,aux,y}$).

Weight meter(s) installed at project site are used to monitor quantity of biomass of category n used in the CDM project activity in year y (tonnes on dry-basis) ($BR_{PJ,n,y}$), type, source and quantity of biomass and total mass of freight transported in freight transportation activity f in monitoring period m ($FR_{f,m}$).

Quantity of the diesel oil combusted during the year y ($FC_{diesel\ oil,y}$) would be monitored by either mass or volume meters.

The calibration of meters would be conducted by qualified third party based on the requirement of local and national standard.

For biomass residues categories for which scenarios B1, B2 or B3 is deemed a plausible baseline alternative, project participants shall demonstrate that this is a realistic and credible alternative scenario will be monitored sourced from surveys or statistics.

Net calorific value of biomass residue of category n in year y (GJ/tonne on dry-basis) ($NCV_{BR,n,y}$) are measured at reputed laboratories and according to relevant international standards on dry-basis at least every six months, taking at least three samples for each measurement.

CO₂ emission factor of the diesel oil in year y ($EF_{CO2,diesel\ oil,y}$), net calorific value of the diesel oil in year y ($NCV_{diesel\ oil,y}$) are sourced from IPCC default values and China Energy Statistical Yearbook respectively and update when new data are available.

Most conservative value as 100 km are applied for return trip distance between the origin and destination of freight transportation activity f in monitoring period m ($D_{f,m}$) confirmed by FSR.

Applus+ Certification confirms that the monitoring plan contains all necessary parameters which have been clearly described in PD and that the means of monitoring described in the plan complies with the requirements of the methodology.

An organizational structure is provided in PD. The functions such as data collection, aggregation, verification, calculation, archiving, as well as the maintenance of equipment etc. have been defined. Quality assurance and quality control procedures for recording, maintaining and data archiving etc. will be ensured according to VCS and CDM EB rules. The calibration of the meter will be implemented as per national standard. An emergency treatment process has been defined in PD when the meter is in malfunction. Data management and quality control system are quoted in PD. The monitoring staffs will be trained based on the training program described in PD.

3.4 Non-Permanence Risk Analysis

Not applicable for the present project activity.

4 VALIDATION CONCLUSION

Applus+ Certification has performed a validation of renewal of crediting period of the “Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China” (Ref. No. 1824). The validation was performed on the basis of the updated sections of the PD relating to the baseline, estimated emission reductions and the monitoring plan using the most recent version of baseline and monitoring methodology applicable for the project activity. The final validation opinion was finalized in accordance with the VCS standard version 4.1, CDM VVS for project activities version 02.0 and the CDM PS for project activities version 02.0 including the assessment of:

- (a) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period of the registered VCS project activity at the time of requesting renewal of crediting period of the project activity;
- (b) The correctness of the application of the approved methodology and, where applicable, the approved standardized baseline for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period of the registered VCS project activity.

The review of the project design documentation and the subsequent follow-up interviews have provided Applus+ Certification with sufficient evidence to determine the validity of the original baseline. The project correctly applies the latest baseline and monitoring methodology ACM0006, “Electricity and heat generation from biomass” version 15.0. Applus+ Certification is able to confirm:

- (a) The updated PD complies with the valid version of the applicable PD form and instructions therein for filling out the PD;
- (b) Information transferred to the later valid version of the PD form is materially the same as that in the registered PD;
- (c) The baseline and monitoring methodology was applied in accordance with the applicable requirements in the VCS standard and Project Standard;
- (d) The baseline, the estimated GHG emission reductions, and the monitoring plan in the updated PD comply with the applicable requirements in the VCS standard and Project Standard, and the valid version of the methodology that is applicable to the registered VCS project activity;
- (e) The next crediting period of the registered VCS project activity commences on the day immediately after the expiration of the current crediting period;

- (f) The names of project participants in the updated PD are consistent with the names of the project participants in the registered PD.

Applus+ Certification also confirms that there have been a methodology deviation for the second crediting period when submitting this report.

Given that the project is implemented as designed and the underlying assumptions do not change, the project is likely to achieve the estimated amount of annual emission reductions of 58,277 tCO₂e and a total estimated emission reduction of 582,770 tCO₂e over the 2nd renewable crediting period as specified within the final PD.

In summary, it is Applus+ Certification's opinion that the project activity "Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China" (Ref. No. 1824) in P. R. China, as described in the PD, version 02 dated 17/08/2021, meets all relevant VCS and UNFCCC requirements for the renewal of the crediting period.

APPENDIX 1: REFERENCE LIST

1. VCS PD, version 01, dated 20/07/2021; version 02, dated 17/08/2021
2. ER calculation spreadsheet
3. CDM PDD, version 05, dated 29/03/2010
4. CDM Validation Report, version 02, dated 30/03/2010
5. VCS PD, version 2.0, dated 15/10/2018
6. VCS Gap Validation Report, version 01.1 dated 31/10/2018
7. VCS standard version 4.1, dated on 22/04/2021
8. Approved methodology ACM0006, version 15.0, dated 14/12/2020
9. Tool to calculate the emission factor for an electricity system, version 07.0
10. Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0
11. Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period, version 03.0.1
12. Project and leakage emissions from transportation of freight, version 01.1.0
13. Project and leakage emissions from biomass version 04.0
14. Tool to calculate project or leakage CO₂ emission from fossil fuel combustion version 03.0
15. CDM Validation and Verification Standard for project activities version 02.0
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17. CDM project cycle procedure for project activities version 02.0
18. Business license
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20. Nameplate of the equipment
21. FSR
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