HENAN XINXIANG 24MW BIOMASS BASED COGENERATION PROJECT

Document Prepared by Climate Bridge (Shanghai) Ltd.

Tel: +86 21 6246 2036; Fax: +86 21 2301 9950

Project Title	Henan Xinxiang 24MW Biomass based Cogeneration Project
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Prepared By	Yumei Peng
Contact	Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, P.R. of China Telephone: 2162462036; Email: projects@climatebridge.com http://www.climatebridge.com

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Henan Xinxiang 24MW Biomass based Cogeneration Project (hereafter, the project) is located in Huixian County of Xinxiang City, Henan Province, China, and was implemented by Xinxiang Tianjie Bio-Power Generation Co., Ltd.

The project scenario is: the installation of 2*12MW cogeneration plants based on biomass residues; the generation of electricity with 126,709 MWh/yr supplied into Central China Power Grid (hereinafter as CCPG); the generation of heat with 909,200GJ/yr; and the utilization of biomass residues for cogeneration of power and heat. The project doesn't claim the emission reductions due to displacement of heat, therefore, this project will achieve GHG emissions reduction by displacing the equivalent electricity generated by CCPG with biomass residues fired cogeneration plant which has lower CO_2 emission. In addition, CH_4 emissions will be reduced by avoiding dumping of biomass residues. As a result, the project is estimated to achieve 55,874 tCO_2e emission reductions annually during the second crediting period from 28-Oct-2019 to 27-Oct-2029. And the first crediting period is from 28-Oct-2009 to 27-Oct-2019.

The project started construction in June of 2008, the operation of the first turbine-generator was started on 28-Oct-2009 and the operation of the second turbine-generator was started on 17-Jan-2011.

The scenario existing prior to the start of the implementation of the project activity is CCPG providing the same electricity service as the project;

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

1.2 Sectoral Scope and Project Type

Sectoral scope: 1. Energy (renewable/non-renewable);

Project type: Biomass power generation project;

The project is not a grouped project.

1.3 Project Eligibility

The scope of the VCS Program includes:

1) The six Kyoto Protocol greenhouse gases

The emissions reduction of the project sources from CO_2 emissions from the production of the equivalent amount of electricity replaced by the project that would otherwise have been purchased from the fossil fuel fired power plants of CCPG. Thus, the project applicable to this scope.

2) Ozone-depleting substances

NA.

3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process

NA.

4) Project activities supported by a methodology approved under a VCS approved GHG program, unless explicitly excluded under the terms of Verra approval

The approved consolidated baseline and monitoring methodology ACM0006 (Version 15.0) of the project utilized is a methodology approved under CDM Program, that is a VCS approved GHG program.

5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements

NA.

And the project was registered on 11-Sep-2013 under VCS standard Version 3.3. Thus, the project is eligible under the scope of VCS program.

1.4 Project Design

The project has been designed to be a single installation of an activity, not a grouped project.

1.5 Project Proponent

Organization name	Xinxiang Tianjie Bio-Power Generation Co., Ltd.
Contact person	Qingjie Wang
Title	Project manager
Address	Huangli Village, Wucun Town, Huixian City, Henan Province, China
Telephone	+86 21 2301 9950
Email	3542346576@qq.com

1.6 Other Entities Involved in the Project

Organization name	Climate Bridge (Shanghai) Ltd.
Role in the project	Consultancy
Contact person	Zhiwen Gao
Title	General Manager
Address	Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, China 200120
Telephone	+86-2162462036
Email	gao.zhiwen@climatebridge.com ; projects@climatebridge.com

1.7 Ownership

The project proponent is Xinxiang Tianjie Bio-Power Generation Co., Ltd., who has the full ownership of the project. The approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), and Letter of Approval for the Project as a CDM Project issued by China National Development and Reform Commission, and the business license of the project owner are evidences for legislative right. Besides, the equipment purchasing contract and the purchasing power agreement are the evidences for the ownership of the plant, equipment and power generating.

1.8 Project Start Date

The project started on 28-Oct-2009 (Project operation date).

1.9 Project Crediting Period

The project crediting period is ten years, twice renewable for a total of 30 years. However, the project is also registered as a CDM project (UNFCCC Ref. 3054) and the crediting period under CDM is 21 years (7*3 renewable), therefore the total length of VCS crediting period should be no more than 21 years which is from 28-Oct-2009 to 27-Oct-2030 and the project is not eligible for VCU issuance beyond 27-Oct-2030. This is the second crediting period from 28-Oct-2019 to 27-Oct-2029.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	✓

Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
28-Oct-2019~27-Oct-2020	55,874
28-Oct-2020~27-Oct-2021	55,874
28-Oct-2021~27-Oct-2022	55,874
28-Oct-2022~27-Oct-2023	55,874
28-Oct-2023~27-Oct-2024	55,874
28-Oct-2024~27-Oct-2025	55,874
28-Oct-2025~27-Oct-2026	55,874
28-Oct-2026~27-Oct-2027	55,874
28-Oct-2027~27-Oct-2028	55,874
28-Oct-2028~27-Oct-2029	55,874
Total estimated ERs	558,740
Total number of crediting years	10
Average annual ERs	55,874

1.11 Description of the Project Activity

The project is located in Huixian County of Xinxiang City, Henan Province, China, and was implemented by Xinxiang Tianjie Bio-Power Generation Co., Ltd.. The purpose of the project is to utilize the biomass residues resource to generate electricity.

The existing scenario prior to the start of the implementation of the project activity is: the electricity estimated to be generated was obtained from CCPG; the heat was generated by coal-fired boilers with low efficiency; and the biomass residues was dumped or left to decay without utilizing for energy purpose.

Purpose of this project is to generate electricity and heat by utilizing surplus stalks and waste wood in the project region. Installed capacity of this project is 24MW (2*12MW) and electricity generated will be supplied to the CCPG dominated by fossil fuel fired power plants (64.2% of installed capacity in 2006) to displace equivalent electricity from the grid, and the heat will be supplied into factories near the project site which will generate the equivalent heat by coal-fired boilers in the absence of this project.

The project scenario is: the installation of 2*12MW cogeneration plants based on biomass residues; the generation of electricity with 126,709 MWh/yr supplied into CCPG; the generation of heat with 909,200GJ/yr; and the utilization of biomass residues for cogeneration of power and heat.

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

As the scenario of this project mentioned above, the emission sources and gases of the project activity includes CO_2 emissions from on-site fossil fuel and electricity consumption that is attributable to the project activity; CO_2 emissions from off-site transportation of biomass residues that are combusted in the project plant; and CH_4 emissions from combustion of biomass residues for electricity and heat generation.

The emission sources and gases of the baseline scenario includes CO_2 emissions from fossil fuel fired power plants connected to CCPG; CO_2 emissions from fossil fuel based heat generation that is displaced through the project activity; and CH_4 emissions from decay of surplus biomass residues.

The project will not claim the emission reductions due to displacement of heat that would be generated by coal-fired boilers, therefore, this project will achieve GHG emissions reduction by displacing the equivalent electricity generated by CCPG with biomass residues fired cogeneration plant which has lower CO_2 emission. In addition, CH_4 emissions will be reduced by avoiding dumping of biomass residues. As a result, 55,874 tCO_2e emission reductions will be generated annually.

Technologies applied on the project activity

The project consists of one site only and the implementation is not phased. This project installs two biomass fired boilers of medium temperature and medium pressure with a capacity of 2×75t/h, and the system also includes the 2*12MW medium temperature and medium pressure turbines and generators for power generation resulting in a total Installed capacity of 24MW (2*12MW).

Please see Table 1 below for parameters of the main equipment of the Project.

Table 1 Parameters of the main equipment of the Project[1]

Boiler	
Manufacture: Jinan Boiler Group Co., Ltd.	
Type	YG-75/3.82-T
Quantity	2

[1] Equipment Purchase Agreements of Xinxiang Tianjie Bio-Power Generation Project.

Rated evaporative capacity	75t/h
Steam-gas pressure	3.821MPa
Water temperature	150°C
Efficiency	83%
Turbine	
Manufacture: China Changjiang Energy Corp (Group)	
Type	C12-3.43/0.98
Quantity	2
Rated installed capacity	12MW
Inlet pressure	3.43MPa
Inlet temperature	435°C
Rated steam flow	75t/h
Rated revolution	3000r/min
Generator	
Manufacture: China Changjiang Energy Corp (Group)	
Type	QF-15-2
Quantity	2
Rated power	15MW
Rated voltage	6300V
Rated power factor	0.8
Rated revolution	3000r/min

Environmentally safe technology

The technology employed in the Project, which has been employed in worldwide, is safe on environment and will not bring negative damages to the ecosystem.

Technology transfer

The main equipment, such as the turbines and electricity generators, are made in the host country. No technology is transferred from other countries to this Project activity.

1.12 Project Location

The proposed project activity is located in Huangli Village, Wucun Town, Huixian County, Xinxiang City, Henan Province of China. The center of the plant has geographical coordinates of 113° 30′40″ east longitude and 35° 19′50″ north latitude.

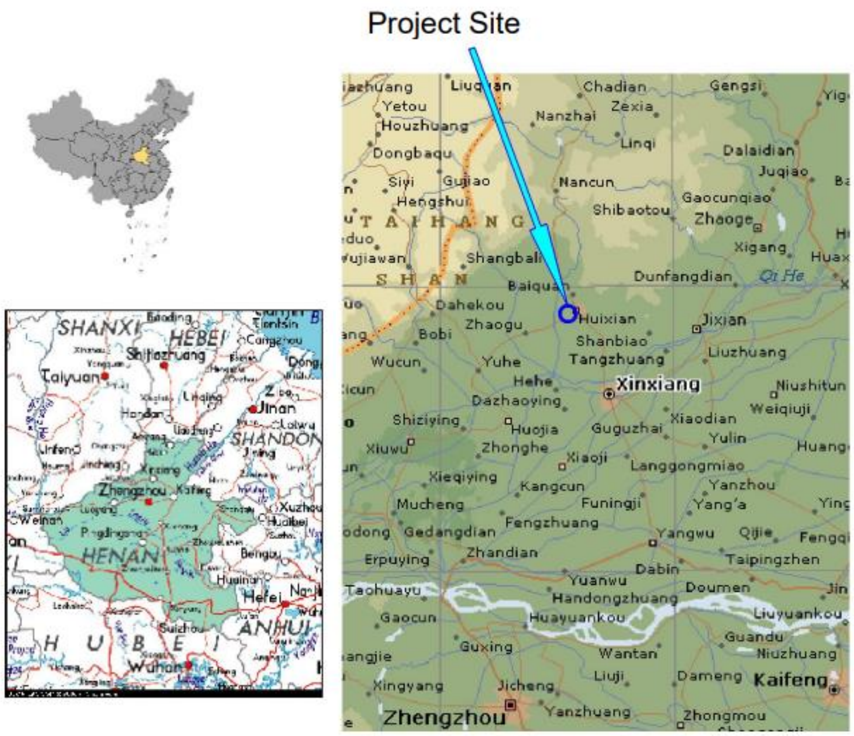

Figure 1 Location of the project

1.13 Conditions Prior to Project Initiation

The existing scenario prior to the start of the implementation of the project activity is: the electricity estimated to be generated was obtained from CCPG; the heat was generated by coal-fired boilers with low efficiency; and the biomass residues was dumped or left to decay without utilizing for energy purpose.

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is biomass residues generation power project and meets the relevant provisions of the Law of the People's Republic of China on the Prevention and Control of Environmental Pollution. The project activity will meet the requirement of national laws and regulations, also financially viable.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has been registered as a Clean Development Mechanism (CDM) project in UNFCCC on 11-Jul-2011 (UNFCCC Ref. 3054), with the renewable 7 years crediting period started from 11-Jul-2011. Total GHG emission reductions of 186,473 tCO_2 generated from 11-Jul-2011 to 31-Dec-2012 (both first and last days included) by the project has been issued as CER under CDM program. Please refer to the following link for details.

https://cdm.unfccc.int/Projects/DB/RWTUV1256116990.83/view

1.15.2 Projects Rejected by Other GHG Programs

NA.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

China has a national emissions trading scheme only cover the high-emission industries, such as thermal power generation, petrochemical, chemical, building materials, iron and steel, non-ferrous, paper, aviation and other key emission industries that emitted at least 26,000 tons of CO_2e/year, not including renewable project[2]. And the project activity is not included the mandatory emission control scheme and there is no emission cap enforced for the project owner according to the enforced company list[3] in public information. Hence, it is confirmed that the emission reductions will not be double counted.

The project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

1.17 Additional Information Relevant to the Project

Leakage Management

NA.

Commercially Sensitive Information

[2] http://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html

[3] http://mee.gov.cn/xxgk2018/xxgk/xxgk03/202012/W020201230736907682380.pdf

No commercially sensitive information has been excluded from the public version of the project description.

Sustainable Development

The Project will contribute to sustainable development in the following ways:

126,709 MWh/yr of electricity from renewable sources will be supplied to the power grid. Thus, the project will achieve SDG 7 Affordable and Clean Energy[4].

The project will achieve a GHG emission reduction of 55,874 tCO_2e/yr during second crediting period. Thus, the project will achieve SDG 13 Climate Action[5].

This project will increase income of local farmers and accelerate economy development in rural areas through purchase of agricultural stalks. It also will reduce environmental pollution from dumping of biomass residues; During second crediting period, direct and indirect employment opportunities will be generated. Thus, the project will achieve SDG 8 Decent Work and Economic Growth[6].

Further Information

NA.

2 SAFEGUARDS

[4] https://sdgs.un.org/goals/goal7

[5] https://sdgs.un.org/goals/goal13

[6] https://sdgs.un.org/goals/goal8

2.1 No Net Harm

There are no negative environmental and/or socio-economic impacts due to the project. During the second crediting period, the project as a clean renewable energy project can reduce greenhouse gas emissions and the environmental pollution caused by fossil fuels consumption. Meanwhile, the implementation of the project will improve local socio-economic development through creating career opportunities and paying taxes.

2.2 Local Stakeholder Consultation

Local Stakeholder Consultation during the project design stage:

A stakeholders meeting was held by the project owner on 03-Mar-2008 in order to collect the attitude and comments of the stakeholders in local area towards the construction and operation of this project. Before the meeting, the project owner informed the local government about the time and content of the meeting and asked the government to invite representatives of the stakeholders to attend this meeting. `

Totally 51 stakeholder representatives participated the meeting, respectively from the local government, surrounding villages (Huangli Village, Xiedian Village, Guandian Village), Huangli Secondary School, and Yanguang Hongtai Bio-product Co., Ltd. (the primary heat consumer). The representatives were selected from different ages, different occupations and different education levels. At this meet, the project owner described this project activity to allow the local stakeholders to understand the project activity

Questionnaire survey: During the survey of stakeholders, the comments from the relevant stakeholders were collected. 51 copies questionnaires were distributed and all of them were collected. The recovery rate is 100%.

In summary, all stakeholders supported the project design and some of the stakeholders pointed out in the questionnaire that the project owner should strengthen the control about smoke, water and noise after this project activity put into production. The project owner has carried out measures in the EIA to reduce impact on the environment and pay attention to the follow-up solution control according to the comment of stakeholders, which solved possible noise pollution the stakeholders considered.

Thus, there is no negative comments received during the project preparation stage.

The mechanism for on-going communication with local stakeholders

Communications with Local stakeholders will be carried out at periodic intervals. The project owner will carry out questionnaire survey for the local stakeholder to collect the relevant comments and suggestions. In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.

2.3 Environmental Impact

Based on China Environmental Protection Law, the Environmental Impact Assessment (EIA) must be completed before the development and construction of the Project. Thus, the project owner authorized a third party to carry out the EIA report. And an expert-group was invited to attend a verification meeting hold by the Environmental Protection Bureau to verify the EIA report of the Project, and finally the Environmental Protection Bureau approved the EIA report on 12-Jun-2008, indicating that the Project meets all the national environmental protection regulations. The analysis and measures to be taken to mitigate the impacts are demonstrated in the following:

1. Air environment

When a gas-contamination happens, the maximum concentration of SO_2 and NO_2 is at the distance of 1993m; from the influence of the concern point, Yangqi battalion is about 2070m far from the chimney. Gas-contamination severely affected the battalion, but not exceeds the second class standard of Environmental Air Quality Standard, and the impact of concern point is still acceptable. The concentration of SO_2, NO_2 and PM10 can still meet the standard. The daily average concentrations of SO_2, NO_2, PM10 in all the concern points are not beyond the standard. It shows that this project has a very small impact on the quality of the local environment. The annual maximum concentrations of SO_2, NO_2 and PM10 in the project are in the position of the chimney WSW 3231m; annual average concentrations in each concern points of SO_2, NO_2 and PM10 can meet the evaluation criteria requirements, and have a smaller proportion. The project will replace the coal-fire boilers in 7 companies including Yanguang hongtai biological Co.,Ltd., Huixian zhongzhou textile Co., Ltd., and Huixian Hengtai Building Material Co., Ltd. and etc. After the implementation of this project, the contamination concentration of each concern points showed a downward trend, and this project clearly demonstrated the positive effects of the environment.

2. Water environment

The emission of wastewater in this project is 30t/h (21t/h in winter), which is mainly concentrated wastewater produced by the chemical water treatment station, sewage water in recycling systems and boiler sewage water etc. Wastewater of this project is discharged by sewage pipe network into Dasha River.

The mine underground drainage water in Chengcun village was used as cooling water, which could mitigate the impact of mine drainage for surface water, and also saved the water resources. And it is a better use of wastewater.

The amount of wastewater emitted is small, and the drainage water is clean, which would not cause negative impact on Dasha River.

3. Noise environment

The status quo added by the contribution to this project of sound environment around plant boundary without the steam discharge of boilers will reach 48.7-61.5dB (A), and the noise around plant boundary can meet the requirement of type II in Urban Regional Environmental Noise Standards (GB3096-93) with the prevention measures.

In the situation with steam discharge of boilers, the noise of steam discharge will increase noise assessment by 5 dB (A) in the region around 50m after setting muffler, which had a greater impact on a wider scope. However, steam discharge of boilers is sporadic, small probability (less than 6 times per year), and the time is short (under normal circumstances not more than one minute), thus the external environmental impact is acceptable.

4. Solid waste

The solid waste of this plant is mainly slag and flying ash whose amount is about 6480t/a, including ash with 4560 t/a and slag with 1920t/a. Ash residues are rich in potassium carbonate and the SSP, which can be used for fertilizer directly or as deep processing of compound fertilizers. The ash residue positions can be use for temporary storage of fly ash and bottom ash. Remove ash by dry-method to keep activity of the ash. The scrappy ash under the bag filter ash bucket will be delivered into ash storeroom after pump gasification, and the ash exported from the ash storeroom will be returned to farmers for fertilizer by direct bagging. Ash bagging transport will not cause many dust, and the air will not have an impact on the environment along the way.

The project of the solid waste can be utilized, solid waste in the storage and transportation process will not have an impact on the surrounding environment.

According to the results of EIA and the reply from the Environmental Protection Bureau, the impacts on the environment are not significant.

2.4 Public Comments

Some of the stakeholders pointed out in the questionnaire that the project owner should strengthen the control about smoke, water and noise after this project activity put into production. The project owner has carried out measures in the EIA to reduce impact on the environment and pay attention to the follow-up solution control according to the comment of stakeholders, which solved possible noise pollution the stakeholders considered. Thus, there is no negative comments received during the project preparation stage.

And in the public comment period from 20-Sep-2008 to 19-Oct-2008 under CDM program, there is no comments received.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Following approved baseline & monitoring methodology and tools are applied:

Methodology:

Approved consolidated baseline and monitoring methodology ACM0006: Electricity and heat generation from biomass, Version 15.0;

Reference:

https://cdm.unfccc.int/filestorage/B/C/W/BCW83JE6VY0IO1U47GNDL29SZRHQFK/EB108_repan06_ACM0006.pdf?t=TWR8cXlxc3VofDCVfod3yr24pvTaId5TWgpr

The applied tools:

Combined tool to identify the baseline scenario and demonstrate additionality, Version 07.0;

Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, Version 03.0;

Tool to calculate the emission factor for an electricity system, Version 07.0;

Project and leakage emissions from transportation of freight, Version 01.1.0;

Project and leakage emissions from biomass, Version 04.0;

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.

For more information regarding the methodology, please refer to the link:

https://cdm.unfccc.int/methodologies/DB/VMJVDQP3A9KKUEE1B57OVHBDEPO7R0

3.2 Applicability of Methodology

The approved methodology ACM0006. (version 15.0) is applicable to the project activity and the project meets the applicability of the applied methodology as follows:

Clauses	Requirements of the ACM0006	Scenario of the project	Conclusion
1	This methodology is applicable to project activities that operate biomass (co-)fired power and-heat plants. The CDM project activity may include the following activities or, where applicable, combinations of these activities: (a) The installation of new plants at a site where currently no power or heat generation occurs (Greenfield projects); (b) The installation of new plants at a site where currently power or heat generation occurs. The new plant	The project is new-build project, and which is to generate electricity and heat by utilizing surplus stalks and waste wood in the project region.	Applicable

Clauses	Requirements of the ACM0006	Scenario of the project	Conclusion
	replaces or is operated next to existing plants (capacity expansion projects); (c) The improvement of energy efficiency of existing biomass-based power-and-heat plants (energy efficiency improvement projects), which can also lead to a capacity expansion, e.g. by retrofitting the existing plant; (d) The total or partial replacement of fossil fuels by biomass in existing power-and-heat plants or in new power-and-heat plants that would have been built in the absence of the project (fuel switch projects), e.g. by increasing the share of biomass use as compared to the baseline, by retrofitting an existing plant to use biomass.		
2	Biomass used by the project plant is limited to biomass residues, biogas, RDF and/or biomass from dedicated plantations;	Fuel fired in this project plants is agricultural stalks and waste wood, no other biomass residues types are used.	Applicable
3	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;	Not applicable. The project does not co-fire fossil fuels.	NA
4	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;	Not applicable. The biomass residues used in this project are not from a production process.	NA
5	The biomass used by the project plant is not stored for more than one year;	Not applicable. As the biomass residues used for this project are agricultural stalks and waste wood, and the storage period is 4-6 months, less than one year.	NA

Clauses	Requirements of the ACM0006	Scenario of the project	Conclusion
6	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.	The project only involves drying and shredding.	Applicable
7	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 supply chain of biomass 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.	Not applicable. The project is new-build biomass residues generation power project by utilizing surplus stalks and waste wood in the project region.	NA
8	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.	Not applicable. The project does not involve utilization of biogas for power or heat generation.	NA
9	In the case biomass from dedicated plantations is used, the applicability conditions of the “TOOL16: Project and leakage emissions from biomass” apply.	Not applicable. The biomass residues used in this project plants are from the project region.	NA

In addition, the project meets the applicability conditions of the applied tools applied in the section 3.1 of this VCS PD as follows:

Applicability		Conclusion
Tool to calculate the Emission Factor for an Electricity System (version 07.0):		
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The Project is the installation of a biomass residues generation power plant supplying electricity to the Grid.	Applicable
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option II a and option IIb. If option II a is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	The Project is the installation of a biomass residues generation power plant supplying electricity to the CCPG.	Applicable
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project electricity system located in a non-Annex I country.	Applicable

Applicability		Conclusion
Under this tool, the value applied to the CO_2 emission factor of biofuels is zero	Not applicable. The project does not involve this situation.	NA
Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)		
The tool is applicable to all types of proposed project activities. However, in some cases, methodologies referring to this tool may require adjustments or additional explanations as per the guidance in the respective methodologies. This could include, inter alia, a listing of relevant alternative scenarios that should be considered in Step 1, any relevant types of barriers other than those presented in this tool and guidance on how common practice should be established.	The project is new-build biomass residues generation power project, and the baseline scenario of the project is, B1: The biomass residues are dumped or left to decay mainly under aerobic conditions. P7: The generation of power in the power grid. The project has demonstrated its additionality in the first crediting period and no changes affect the additionality of the project since its registration.	Applicable
Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (Version 03.0)		
This tool provides procedures to calculate project and/or leakage CO2 emissions from the combustion of fossil fuels. It can be used in cases where CO_2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties. Methodologies using this tool should specify to which combustion process j this tool is being applied.	The tool is used to calculate project CO_2 emissions from the combustion of fossil fuels. **Option B**, the CO_2 emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO_2 emission factor of the fuel type i, is chose by the project.	Applicable
Project and leakage emissions from transportation of freight (Version 01.1.0)		
This tool is applicable to project activities which involve freight transportation by road and where transportation is not the main project activity. This tool is not applicable to project activities where transportation is the main source of greenhouse gases emissions. This tool does not provide procedures to estimate baseline emissions from road transportation of freight. The tool only provides to determine CO_2 emissions. CH4 and N2O emissions are excluded	The tool is used to calculate project CO_2 emissions from the freight transportation which is not the main project activity. **Option B:** Using conservative default values is chose by the project.	Applicable

Applicability		Conclusion
for simplification as they are small compared to CO_2 emissions.		
In addition, the tool is applicable for the determination of project or leakage emissions from freight transportation by rail in project activities where transportation is not the main project activity	The project does not involve this situation.	NA
Project and leakage emissions from biomass (Version 04.0)		
For project activities which include biomass cultivation: (a) The land in which biomass is cultivated: (i) Does not contain wetlands; (ii) Does not contain organic soils as defined in paragraph 12(c); (iii) Is not subjected to flood irrigation. (b) The land in which biomass is cultivated: (i) Does not contain forest nor contained forest since 31 December 1989; or (ii) Contains a forest plantation that before the start of the project will be harvested and the land would be neither reforested nor will regenerate on its own into a forest in the absence of the project activity. (c) Desalination is not a substantial source of water in the host country	Not applicable. The project only utilizes biomass residues, not including biomass cultivation.	NA
In case the land contains a forest plantation, the project proponent shall demonstrate and document transparently in the CDM-PDD that before the start of the project activity the plantation will be finally harvested and regeneration to forestland (according to the respective national definition) will not take place. In doing so, the project proponent shall: (a) Identify realistic and credible alternatives with regard to the possible land use scenarios that would occur in	Not applicable. The project only utilizes biomass residues, not including forest plantation.	NA

Applicability		Conclusion
the absence of the project activity, including but not limited to: (i) The forest plantation continues under the current management practice; (ii) The forest plantation is harvested and the land is replanted; (iii) The forest plantation is harvested and the land is abandoned. (b) Assess the economic attractiveness of the existing forest plantation by applying Step 2 of the latest approved version of the "Tool for the demonstration and assessment of additionality"; (c) Confirm, based on the plantation management practices in the region for the considered species, that the situation referred to in paragraph 6 (b) (ii) is the common practice; and (d) Use relevant credible evidence, including but not limited to official land use maps, satellite images/aerial photographs, cadastral information, official land use records.		
The tool is also applicable if biomass residues are consumed in a CDM project activity. These could be: (a) Procured by the project proponents; or (b) The result of an agro-industrial process under the control of the project proponents.	The project utilizes biomass residues purchased in the project region to generate electricity.	Applicable
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.)		
This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism.	The tool is used to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period. As per section 3.4 of this VCS PD, the current baseline does not need to be updated.	Applicable

Applicability		Conclusion
The tool consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.		

3.3 Project Boundary

According to methodology ACM0006 (15.0), the spatial extent of the project boundary encompasses:

(a) All plants generating power and/or heat located at the project site, whether fired with biomass, fossil fuels or a combination of both;

(b) All power plants connected physically to the electricity system (grid) that the project plant is connected to;

(c) If applicable, all off-site heat sources that supply heat to the site where the CDM project activity is located (either directly or via a district heating system);

(d) The means of transportation of biomass to the project site;

(e) If the feedstock is biomass residues, the site where the biomass residues would have been left for decay or dumped;

(f) If the feedstock is biomass produced in dedicated plantations the geographic boundaries of the dedicated plantations;

(g) The wastewater treatment facilities used to treat the wastewater produced from the treatment of biomass;

(h) If biogas is included, the site of the anaerobic digester.

The project is to utilize the biomass residues resource to generate electricity and heat. The site where the biomass residues would have been left for decay or dumped. Electricity generated by the Project was delivered to CCPG. According to *2019 Baseline Emission Factors for Regional Power Grids in China issued by China's DNA* which provides the delineation of grid boundaries, CCPG is the grid boundary of the Project. CCPG is composed of includes Jiangxi, Henan, Hubei, Hunan, Chongqing, Sichuan. And the project doesn't claim the emission reductions due to displacement of heat from coalfired boilers.

The greenhouse gases and emission sources included in or excluded from the above-identified project boundary are shown as below:

Source		Gas	Included?	Justification/Explanation
Baseline	Electricity generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
	Heat generation	CO_2	No	
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
	Uncontrolled burning or Decay of surplus biomass residues	CO_2	No	Minor emission source
		CH_4	Yes	This emission source is chosen to be included in the baseline
		N_2O	No	Excluded for simplification. This is conservative.
Project	On-site fossil fuel consumption	CO_2	No	Main emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Off-site transportation of biomass	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	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 residues do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Yes	This emission source must be included if CH_4

Source		Gas	Included?	Justification/Explanation
				emissions from uncontrolled burning or decay of biomass residues in the baseline scenario are included
		N_2O	No	Excluded for simplification. This emission source is assumed to be small
	Wastewater from the treatment of biomass	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	No	This emission source shall be included in cases where the waste water is treated (partly) under anaerobic conditions
		N_2O	No	Excluded for simplification. This emission source is assumed to be small
	Cultivation of land to produce biomass feedstock	CO_2	No	This emission source shall be included in cases biomass from dedicated plantation is used
		CH_4	No	This emission source shall be included in cases biomass from dedicated plantation is used
		N_2O	No	This emission source shall be included in cases biomass from dedicated plantation is used

Figure 2 presents a flow diagram within the project boundary which physically delineates the project activity and its relevant information. Please refer to the section 5.3 for details of monitoring equipment.

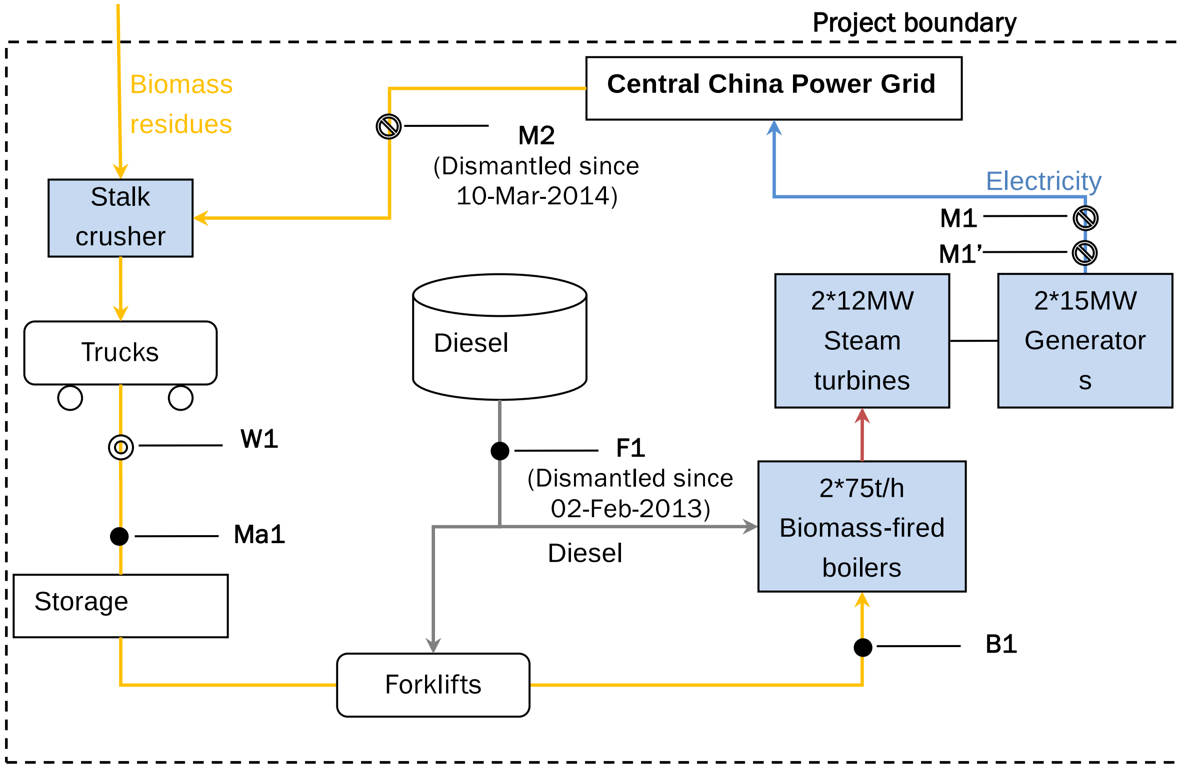

Figure 2 Flow diagram of the project boundary

3.4 Baseline Scenario

According to the description in the approved baseline methodology ACM0006 (version 15.0), "TOOL16: Project and leakage emissions from biomass" and "TOOL02: Combined tool to identify the baseline scenario and demonstrate additionality, Version 07.0", the baseline scenario of the project is,

B1: The biomass residues are dumped or left to decay mainly under aerobic conditions.

P7: The generation of power in the power grid.

H6: The generation of heat in specific off-site plants;

The project doesn't claim the emission reductions due to displacement of heat, therefore, the baseline scenario of the project is **B1** and **P7**.

In accordance with "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), the validity of the current baseline is assessed using the following sub-steps:

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

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

There are no new national and/or sectoral policies that could affect the baseline scenario during the renewal of the crediting period. Although national policies favour the development of renewable energy sources, CCPG is still dominated by the thermal power plants. For total electricity generation produced by fossil fuel power plants, the annual share of fossil fuel resource based total power generation is 60.87% in 2014, 54.93% in 2015, 52.99% in 2016, 50.95% in 2017, 50.92% in 2018, respectively, the average share of the five most recent years is more than 50% of total electricity generation in CCPG[7]. Hence in the absence of the project activity, electricity would still have been generated in the existing grid-connected power plants or by the addition of new generation sources from CCPG. It is a common practice to generate heat in boilers using fossil fuel in China. The biomass residues are dumped or left to decay under mainly aerobic conditions is also in compliance with all laws and regulations. Thus, the current baseline still complies with all relevant mandatory national and sectoral policies which have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period. Go to step 1.2.

Step 1.2: Assess the impact of circumstances

The baseline scenario identified at the validation of the project activity was the provision of an equivalent amount of annual electricity generation by CCPG and heat by coalfired boilers, and the equivalent biomass residues are dumped or left to decay mainly under aerobic conditions. The biomass residues used in this project are surplus, and the demand for these biomass residues is not expected to increase significantly by other sources in foreseeable future, so it is credible these biomass residues will be left unused (dumped or left to decay) around the project site without this project. Please refer to the section 4.3 for details.

The investment environment or market characteristics especially the feed-in tariff and biomass residue price, the policy in terms of market access permit, these circumstances continue during the second crediting period and therefore, do not have an impact on the current baseline emissions. Hence the current baseline does not need to be updated. Go to step 1.3.

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 project is a new-build biomass residues generation power project with no baseline equipment(s) or an investment for the crediting period for which renewal is requested, this step is not applicable. Go to step 1.4.

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

[7] China Electric Power Yearbook

Assess whether data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid or whether they should be updated. Updates should be undertaken in the following cases:

- Where IPCC default values are used, the values should be updated if any new default values have been adopted and published by the IPCC, for example, in guidelines for national GHG inventories, IPCC assessment report or special reports by the IPCC;
- Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity.

If any of the data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, the current baseline needs to be updated for the subsequent crediting period.

In accordance with the methodology, the grid emission factor and all the values in its calculation are updated in section 4.1. IPCC default value the weighted average CO_2 emission factor of diesel 0.0748 tCO_2/GJ has been updated from IPCC 2006. Please refer to section 5 for details.

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

Step 2.1: Update the current baseline

As per the analysis in step 1 above, the current baseline does not need to be updated.

Step 2.2: Update the data and parameters

The updated baseline emission factor for the project ($EF_{grid,CM,y}$) is calculated in line with the "Tool to calculate the emission factor for an electricity system (version 07.0)", the data is calculated as 0.4287 tCO_2e/MWh, refer to section 4.1 for details. IPCC default value the weighted average CO_2 emission factor of diesel 0.0748 tCO_2/GJ and Global warming potential of CH_4 28 tCO_2e/tCH_4 have been updated from 2006 IPCC Guideline and IPCC Fifth Assessment Report (AR5), respectively. Please refer to section 5 for details.

3.5 Additionality

The project has demonstrated its additionality in the first crediting period and no changes affect the additionality of the project since its registration.

3.6 Methodology Deviations

In this second crediting period, the Build Margin CO_2 emission factor ($EF_{grid,BM,y}$) sources directly from the *2019 Baseline Emission Factors for Regional Power Grids*[8] issued by China DNA. And there is a deviation for the calculation method of $EF_{grid,BM,y}$ since the relevant Build Margin data is important business data and not published under the current circumstances in China, however, which follows the conservative principle and not impact the application of the methodology. Please refer to section 4.1 for details.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to the methodology ACM0006 (version 15.0), the baseline emissions are to be calculated as follows:

$$BE_y = EL_{BL,GR,y} \times EF_{EG,GR,y} + \sum_f FF_{BL,HG,y,f} \times EF_{FF,y,f} + EL_{BL,FF/GR,y} \times min\left(EF_{EG,GR,y}, EF_{EG,FF,y}\right) + BE_{BR,y} \quad (1)$$

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2)
$EL_{BL,GR,y}$	=	Baseline electricity sourced from the grid in year *y* (MWh)
$EF_{EG,GR,y}$	=	Grid emission factor in year *y* (t CO_2/MWh)
$FF_{BL,HG,y,f}$	=	Baseline fossil fuel demand for process heat in year *y* (GJ)
$EF_{FF,y,f}$	=	CO_2 emission factor for fossil fuel type *f* in year *y* (t CO_2/GJ)
$EL_{BL,FF/GR,y}$	=	Baseline uncertain electricity generation in the grid or on-site or off-site power-only units in year *y* (MWh)
$EF_{EG,FF,y}$	=	CO_2 emission factor for electricity generation at the project site or off-site plants in the baseline in year *y* (t CO_2/MWh)
$BE_{BR,y}$	=	Baseline emissions due to disposal of biomass residues in year *y* (t CO2e)
f	=	Fossil fuel type

The procedure to determine baseline emissions can be summarized as follows:

Step 1: Determine the total baseline process heat generation, electricity generation and capacity constraints, and efficiencies;

[8] https://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/202012/W020201229610353340851.pdf

Step 2: Determine the baseline electricity sourced from the grid and emission factors;

Step 3: Determine the baseline biomass-based heat and power generation;

Step 4: Determine the baseline demand for fossil fuels to meet the balance of process heat and the corresponding electricity generation;

Step 5: Determine the baseline emissions due to uncontrolled burning or decay of biomass residues.

Step 1: Determine the total baseline process heat generation, electricity generation and capacity constraints, and efficiencies;

Step 1.1: Determine the total baseline process heat generation

The project doesn't claim the emission reductions due to displacement of heat, therefore, this step is not applicable.

Step 1.2: Determine the baseline capacity of electricity generation ($CAP_{EG,total,y}$)

The total capacity of electricity generation available in the baseline is calculated as follows:

$$CAP_{EG,total,y} = LOC_y \times \left[\sum_i \left(CAP_{EG,CG,i} \times LFC_{EG,CG,i}\right) + \sum_j \left(CAP_{EG,PO,j} \times LFC_{EG,PO,j}\right)\right] \quad (2)$$

Where:

$CAP_{EG,total,y}$	=	Baseline electricity generation capacity in on-site and off-site plants in year y (MWh)
$CAP_{EG,CG,i}$	=	Baseline electricity generation capacity of cogeneration-type heat engine *i* (MW)
$CAP_{EG,PO,j}$	=	Baseline electricity generation capacity of power-only-type heat engine *j* (MW)
$LFC_{EG,CG,i}$	=	Baseline load factor of cogeneration-type heat engine *i* (ratio)
$LFC_{EG,PO,j}$	=	Baseline load factor of power-only-type heat engine *j* (ratio)
LOC_y	=	Operation of the industrial facility using the process heat in year *y* (hour)
i	=	Cogeneration-type heat engine in the baseline scenario
j	=	Power-only-type heat engine in the baseline scenario

As the project is a green-field project, there is no heat engines employed in the baseline scenario. Therefore, the baseline capacity of electricity generation is set to be zero to further consider the minimum baseline electricity generation in the grid in step 2.

Step 1.3: Determine the efficiencies of heat generators, and efficiencies and heat-to-power ratio of heat engines

The project doesn't claim the emission reductions due to displacement of heat, therefore, this step is not applicable.

Step 2: Determine the baseline electricity sourced from the grid and emission factors;

Step 2.1: Determine the baseline electricity generation ($EL_{BL,y}$)

The amount of electricity that would be generated in the baseline in year *y* equals the amount of electricity generated in the project scenario as follows:

$$EL_{BL,y} = EL_{PJ,gross,y} + EL_{PJ,imp,y} - EL_{PJ,aux,y} \quad (3)$$

Where:

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

Since there is no off-site electricity consumption in the project, $EL_{PJ,aux,y}$ sources from $EL_{PJ,gross,y}$ and $EL_{PJ,imp,y}$. And $EL_{PJ,exp,y}$ is that the project electricity exports to grid in year y (MWh). Therefore, the difference between $EL_{PJ,gross,y}$ and $EL_{PJ,aux,y}$ equals the $EL_{PJ,exp,y}$ minus $EL_{PJ,imp,y}$, $EL_{PJ,gross,y}$ - $EL_{PJ,aux,y}$ = $EL_{PJ,exp,y}$ - $EL_{PJ,imp,y}$.

Thus, $EL_{BL,y} = EL_{PJ,gross,y} + EL_{PJ,imp,y} - EL_{PJ,aux,y} = EL_{PJ,exp,y}$.

And the total electrical generation of the project is estimated to be 142,370 MWh with an auxiliary consumption rate of 11%. Thus, the net electrical generation of the project $EL_{BL,y}$ ($EL_{PJ,exp,y}$) is estimated to be 126,709 MWh.

Step 2.2: Determine the baseline electricity sourced from the grid ($EG_{BL,GR,y}$)

The amount of electricity that would be sourced from the grid in the baseline is calculated assuming that the amount of electricity generated on-site and off-site in the baseline shall be limited by the installed capacity of power generation available in the baseline scenario (on-site and off-site):

$$EL_{BL,GR,y} = max\left(0, EL_{BL,y} - CAP_{EG,total,y}\right) \quad (4)$$

Where:

$EL_{BL,GR,y}$	=	Baseline electricity sourced from the grid in year *y* (MWh)
$EL_{BL,y}$	=	Baseline electricity generation in year *y* (MWh)

$CAP_{EG,total,y}$ = Baseline electricity generation capacity in on-site and off-site plants in year *y* (MWh)

According to the step 1.3 and 2.1, $EL_{BL,GR,y} = EL_{BL,y} - CAP_{EG,total,y}$ =126,079MWh-0MWh=126,079MWh

Step 2.3: Determine the emission factor of grid electricity generation ($EF_{EG,GR,y}$)

The baseline emission factor $EF_{EG,GR,y}/EF_{grid,CM,y}$ is calculated as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0). The $EF_{grid,CM,y}$ is calculated ex ante and fixed for the second crediting period. Detailed as follows:

Step 2.3.1. Identify the relevant electricity system

For determining the electricity emission factors, identify the relevant project electricity system. Similarly, identify any connected electricity system. If a connected electricity system is located partially or totally in Annex-I countries, then the emission factor of that connected electricity system should be considered zero. If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used.

The Chinese DNA has published a delineation of the project electricity system and connected electricity systems, Option 1 is applied for the project. According to the delineations, the Central China Power Grid (CCPG) is identified as the relevant electric power system of the project, which includes Henan Province, Hubei Province, Hunan Province, Jiangxi Province, Sichuan Province and Chongqing City Power Grids.

Step 2.3.2. Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

Based on China's real situation, only grid power plants are included in the calculation.

Step 2.3.3. Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on the following methods:

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch Data Analysis OM, or

(d) Average OM.

Detailed information to carry out a dispatch data analysis is not publicly available; therefore, method (b) and method (c) is not suitable for the project.

The Simple OM method (a) can only be applied when low-cost/must run resources[9] constitute less than 50% of total grid generation in average of the five most recent years. According to the data from China Electric Power Yearbook 2014-2018, from year 2013 to year 2017, for the CCPG the project activity connected to, the average low-cost/must-run electric power resources generation accounts for the total grid total in recent five years is lower than 50%, which satisfied the applicability of the method (a), therefore, the simple OM method is chosen for the calculation of the OM emission factor $EF_{grid,OM,y}$.

As per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0), one of the following methods should be chosen to calculate the simple OM emission factor:

- Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the VCS-PD to the VVB for validation, or
- Ex post option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

Here ex-ante vintage is chosen, and the $EF_{grid,OM,y}$ is fixed during the second crediting period.

Step 2.3.4. Calculate the operating margin emission factor according to the selected method

The Simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. The simple OM may be calculated:

(a) **Option A**: Based on the net electricity generation and a CO_2 emission factor of each power unit, or

[9] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

(b) **Option B**: 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.

For the project activity, the required data for the exercise of Option A is not available and those of Option B can be obtained from official sources, and off-grid power plants are not included in the calculation, therefore, Option B is chosen to calculate the operating margin emission factor:

For Option B, the Simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{m} EG_{y}} \quad (5)$$

Where:

$EF_{grid,OM,simple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	Amount of fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fuel type i in year y (GJ/mass or volume unit)
$EF_{CO_2,i,y}$	CO_2 emission factor of fuel type i in year y (tCO_2/GJ)
EG_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y (MWh)
i	All fuel types combusted in power sources in the project electricity system in year y
y	The relevant year as per the data vintage chosen in Step 3

Regarding parameter selection, local values of $NCV_{i,y}$ and $EF_{CO_2,i,y}$ should be used where available. If no such values are available, IPCC world-wide default values are preferable. In this VCS PD, the Net Calorific Value ($NCV_{i,y}$) of each type of fossil fuel used in the calculation comes from China Energy Statistic Yearbook 2016-2018. Emission factors ($EF_{CO_2,i,y}$) of each type of fossil fuel come from IPCC 2006 default values.

The Simple OM Emission Factor ($EF_{grid,OM,simple,y}$) of the project is calculated on the basis of the fuel consumption data for electricity generation of the CCPG, not including those of low-operating cost and must-run power plants, such as wind power, hydropower and nuclear etc. These data are obtained from the China Electric Power Yearbook (2016~2018, published annually) and China Energy Statistical Yearbook (2016~2018). Based on these data, the Simple OM Emission Factor ($EF_{grid,OM,simple,y}$) of the CCPG is calculated as 0.8587 tCO_2e/MWh.

Step 2.3.5. Calculate the build margin emission factor

In terms of vintages of data, project participants can choose between one of the following two options:

Option 1 For the first crediting period, calculate the build margin emission factor, ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the second crediting period should be used. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2 For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The VCS PD chooses **Option 1**, which requires the project participant to calculate the Build Margin Emission Factor $EF_{grid,BM,y}$, ex-ante based on the most recent information available on units already built for sample group m at the time of PD submission.

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20 percent of AEG_{total} (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\ percent}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\ percent}$, in MWh);

(c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\ percent}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Otherwise:

(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20 percent of the annual electricity generation of the project electricity system (if 20 percent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);

If the annual electricity generation of that set is comprises at least 20 percent of the annual electricity generation of the project electricity system (i.e. $AEG_{SET\text{-}sample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore steps (e) and (f).

(e) Include in the sample group $SET_{sample\text{-}CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20 percent of the annual electricity generation of the project electricity system (if 20 percent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample\text{-}CDM\text{-}>10yrs}$).

Under the current circumstances in China, the power plants consider the Build Margin data as important business data and will not have them published. Therefore, it is difficult to obtain the data of five power plants that have been put into operation most recently or the newly installed power plant capacity additions in the electricity system that comprise 20% of the system generation.

According to the instructions of China DNA, for the determination of the set of samples, a sample merging processing in some degree has been adopted due to that the power generation data, energy consumption data or thermal efficiency data of each plant cannot be consulted in the public statistical data. In this calculation, the newly-installed power units in the past years are classified by year, province and power generation technology, and the same type of newly-installed power units in the same province and in the same year are bundled as a "newly-installed power units".

The power generation of each “newly-installed power units” in the most recent year y is estimated based on its installed capacity and the number of power generation utilization hours in year y. The formula is as follows:

$$EG_{m,y} = CAP_m \times H_{m,y} \tag{6}$$

Where:

$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

CAP_m	Installed capacity of electricity generated and delivered to the grid by power unit *m* in year *y* (MW)
$H_{m,y}$	The number of power utilization hours (h) of electricity generated and delivered to the grid by power unit *m* in year y. And it selects the average utilization hours of similar units in the province in which it is located in year *y*;
y	Most recent year for which data is available.
m	The sample group of power units.

The power unit m is selected from the "newly-installed power plants" in the most recent year y (For the calculation of the grid BM in 2019, the y is equal to 2017) to the "newly-installed power plants" in the earlier year, until the cumulative power generation reaches 20% of the total power generation in the year y (y=2017).

Since the newly-installed power units of the same type (k) in the same province (A) and the same year (t) are bundled into the "newly-installed power units", the CAP_m is equal to the statistical data of recent installed capacity of a given unit type(k) in a given year(t) in a given province (A).

$$CAP_m = CAP_m|_{m=(A,t,k)} = CAP_{A,t,k} \quad (7)$$

Where:

CAP_m	Installed capacity of electricity generated and delivered to the grid by power unit m in year y (MW), and m is equivalent to an established combination of (A, t, k);
$CAP_{A,t,k}$	Capacity of newly-installed power units of a given province (A), given year (t), and given unit type (k) (MW)
A	It is the various provincial regions covered by the regional power grid
t	It is the sampling year of the "newly-installed power units". For the calculation of the grid BM in 2019, t is equal to 2017, 2016, ..., until the units that comprise at least 20 percent of the system generation in 2017.
k	It is the power generation technology classification of "newly-installed power units", which is divided into: hydro-power, coal-thermal power, gas-thermal power, oil-thermal power, Waste-thermal power plant, other thermal power[10], nuclear power, wind power, solar power, and others[11].

As per tool, the CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the tool in Step 4 section 6.4.1 for the simple OM, using Options A1, A2 or A3, using for y the most recent historical year for which electricity generation data is available, and using form the power units included in the build margin.

[10] refers to waste heat and pressure, straw, bagasse, forest wood power generation.

[11] refers to power generation such as geothermal energy and ocean energy.

Because current statistics data cannot separate each power plant, for a power unit m, only data on electricity generation and the fuel types used is available. So, the option A2 is selected, the emission factor should be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit, as follows

$$EF_{EL.m.y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad (8)$$

Where:

$EF_{EL.m.y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{CO2,m,i,y}$	Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO_2/GJ)
$\eta_{m,y}$	Average net energy conversion efficiency of power unit *m* in year y (ratio)
3.6	Conversion coefficient of thermal work equivalent of eletricity (GJ/MWh)

According to formula, the unit electricity emission factor of the hydro-power, nuclear power, wind power, solar power, other thermal power[12], and others power generation technology[13]in the "newly-installed power units" samples are is zero. The emission factor per unit of electricity for power generation from coal, gas, oil and waste power is calculated based on the formula. Since the average net energy conversion efficiency of each sample($\eta_{m,y}$) cannot be obtained, the power supply thermal efficiency of the best commercialized technology of coal, gas, oil and waste power ($\eta_{Best,m,y}$) is better than $\eta_{m,y}$. It is conservative to use $\eta_{Best,m,y}$ for the calculation of $EF_{EL,m,y}$.

The Build Margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (9)$$

Where

$EF_{grid,BM,y}$	Build Margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year *y* (tCO_2/MWh)
m	Power units included in the Build Margin

[12] Other thermal power mainly refers to waste heat and pressure, straw, bagasse and forest power generation.

[13] Others power generation technology mainly refers to geothermal energy, ocean energy and other power generation.

y	The most recent year for which data is available

Based on these data, the $EF_{grid,BM,y}$ of the CCPG is calculated as 0.2854 tCO_2e/MWh.

Step 2.3.6. Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or

(b) Simplified CM.

The weighted average CM method (**option A**) should be used as the preferred option. And the PD choose option A.

The combined margin emissions factor ($EF_{grid,CM,y}$) is calculated as follows:

$$EF_{grid,CM,y} = \omega_{OM} \times EF_{grid,OM,y} + \omega_{BM} \times EF_{grid,BM,y} \quad (10)$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission for the project electricity system factor in year *y* (tCO_2e /MWh)
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor for the project electricity system in year *y* (tCO_2e /MWh)
ω_{OM}	Weighting of operating margin emissions factor (%)
ω_{BM}	Weighting of build margin emissions factor (%)

The Combined Margin emissions factor $EF_{grid,CM,y}$ should be calculated as the weighted average of the Operating Margin emission factor $EF_{grid,OM,y}$ and the Build Margin emission factor $EF_{grid,BM,y}$, where ω_{OM}= 0.25 and ω_{BM} = 0.75 for all other project excluded wind and solar project for the second and third crediting period. The $EF_{grid,OM,y}$and $EF_{grid,BM,y}$ are calculated as described in Step 2.3.4 and 2.3.5.

Therefore,

$EF_{grid,CM,y}$= 0.8587 tCO_2e/MWh*0.25+0.2854 tCO_2e/MWh*0.75 = 0.4287 tCO_2e/MWh

Step 2.4: Determine the emission factor of on-site electricity generation with fossil fuels ($EF_{EG,FF,y}$)

For the project, no fossil fuel based power generation was identified as part of the baseline scenario, so according to the methodology, make $EF_{EG,FF,y}$ = $EF_{EG,GR,y}$= $EF_{grid,CM,y}$.

Step 3: Determine the baseline biomass-based heat and power generation

As per section 3.4, the baseline scenario of the project is **B1** and **P7**, the project doesn't claim the emission reductions due to displacement of heat, therefore, this step is not applicable.

Step 4: Determine the baseline demand for fossil fuels to meet the balance of process heat and the corresponding electricity generation;

As per section 3.4, the baseline scenario of the project is **B1** and **P7**, the project doesn't claim the emission reductions due to displacement of heat, therefore, this step is not applicable.

Step 5: Determine the baseline emissions due to uncontrolled burning or decay of biomass residues

Step 5.1: Determine $BE_{BR,B1/B3,y}$

As per section 3.4, for the project, the baseline scenario of the project is **B1** and **P7**, the emissions are determined separately for biomass residues categories for which scenarios B1 (aerobic decay) apply:

$$BE_{BR,y} = BE_{BR,B1,y} = GWP_{CH4} \times \sum_{n} BR_{B1,n,y} \times NCV_{BR,n,y} \times EF_{BR,n,y} \quad (11)$$

Where:

$BE_{BR,y}$	=	Baseline emissions due to disposal of biomass residues in year *y* (t CO_2e)
$BE_{BR,B1,y}$	=	Baseline emissions due to aerobic decay of biomass residues in year *y* (t CO_2)
GWP_{CH4}	=	Global Warming Potential of methane valid for the commitment period (t CO_2/t CH_4)
$BR_{B1,n,y}$	=	Quantity of biomass residues of category *n* used in the CDM project activity in year *y* for which the baseline scenario is B1 (tonnes on dry-basis)
$NCV_{BR,n,y}$	=	Net calorific value of biomass residue of category *n* in year *y* (GJ/tonne on dry-basis)
$EF_{BR,n,y}$	=	CH_4 emission factor for uncontrolled burning of the biomass residues category *n* during the year *y* (tCH_4/GJ)
n	=	Biomass residue category

For the project, in the second crediting period, GWP_{CH4} is 28 tCO_2e/ tCH_4 from IPCC Fifth Assessment Report (AR5). Shall be updated according to any future VERRA decisions. According to the ACM0006 (Version 15.0), in the absence of more accurate information for $NCV_{BR,n,y}$ and $EF_{BR,n,y}$, a default value of 0.0027 t CH_4/ t biomass residues 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 residues should be used. And the quantity of the dry matter of maize stalk $BF_{maize\ stalk\ y}$ is 88,080t, and $BF_{waste\ wood\ y}$ is 88,080t.

Hence, in summary,

$$BE_y = EL_{BL,GR,y} \times EF_{EG,GR,y} + BE_{BR,y}$$

$$= EL_{PJ,exp,y} \times EF_{grid,CM,y} + GWP_{CH4} \times \sum_n BR_{B1,n,y} \times NCV_{BR,n,y} \times EF_{BR,n,y}$$

=126,709MWh*0.4287tCO_2e/MWh+28tCO_2e/tCH_4*(88,080t+88,080t) * 0.001971tCH_4/t

= 54,320 tCO_2e + 9,722 tCO_2e= 64,042 tCO_2e

4.2 Project Emissions

According to the methodology ACM0006 (version 15.0), the project emissions are calculated as follows:

$$PE_y = PE_{FF,y} + PE_{GR1,y} + PE_{GR2,y} + PE_{TR,y} + PE_{BR,y} + PE_{WW,y} + PE_{BG2,y} + PE_{BC,y} \quad (12)$$

Where:

PE_y	=	Project emissions in year *y* (t CO_2)
$PE_{FF,y}$	=	Emissions during the year *y* due to fossil fuel consumption at the project site (t CO_2)
$PE_{GR1,y}$	=	Emissions during the year *y* due to grid electricity imports to the project site (t CO_2)
$PE_{GR2,y}$	=	Emissions due to a reduction in electricity generation at the project site in year *y* (t CO_2)
$PE_{TR,y}$	=	Emissions during the year *y* due to incremental transport of biomass to the project plant (t CO_2)
$PE_{BR,y}$	=	Emissions from the combustion of biomass during the year *y* (t CO_2e)
$PE_{WW,y}$	=	Emissions from wastewater generated from the treatment of biomass in year *y* (t CO_2e)
$PE_{BG2,y}$	=	Emissions from the production of biogas in year *y* (t CO_2e)
$PE_{BC,y}$	=	Project emissions associated with the cultivation of land to produce biomass in year *y* (t CO_2)

1. Determination of PE_{FFy}

According to "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 03.0), **Option B,** the CO_2 emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO_2 emission factor of the fuel type i, is chose, the formula is:

$$PE_{FFy} = \sum_i FC_{projectsite,i,y} \cdot NCV_{i,y} \cdot EF_{CO_2,i,y} \quad (13)$$

Where:

PE_{FFy}	=	Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO2/yr)
$FC_{projectsite,i,y}$	=	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr), i=diesel.

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

During the actual operation of the project, no diesel is needed for the ignition as the biomass residues used in the project are easy to be burnt in the boiler. Therefore, the flow meter F1 has been dismantled on 02-Feb-2013 by the project owner in order to improve efficiency and save the maintenance expense. And for the diesel used in forklifts, the consumption was determined by the records of diesel purchase and remained, and the measurements were crosschecked by diesel purchase invoice.

During the second crediting period, It is estimated that the consumption rate of diesel for each forklift is 1.5L/hr and the density of diesel (#0) is about 0.84 kg/L. For totally 4 forklifts at all collecting stations, each of them works 8 hours per day, and 365 days per year, which conservatively gives the annual diesel consumption of about 15t. The weighted average net calorific value of the diesel is 42.652GJ/t based on China Energy Statistical Yearbook 2018; the weighted average CO_2 emission factor of diesel is 0.0748 tCO_2/GJ soured from 2006 IPCC default value at the upper limit of the uncertainty at a 95% confidence interval. Hence,

PE_{FFFy}= 15t*42.652GJ/t*0.0748 tCO_2/GJ=48 tCO_2

2. Determination of $PE_{GR1,ye}$

If electricity is imported from the grid to the project site during year *y*, corresponding emissions should be accounted for as project emissions, as follows:

$$PE_{GR1,y} = EF_{EG,GR,y} \times EL_{PJ,imp,y} \quad (14)$$

Where:

$PE_{GR1,y}$	=	Emissions during the year *y* due to grid electricity imports to the project site (t CO_2)
$EL_{PJ,imp,y}$	=	Project electricity imports from the grid in year *y* (MWh)
$EF_{EG,GR,y}$	=	Grid emission factor in year *y* (t CO_2/MWh)

Only one stalk collection site was built to collect stalks since the start of the project. Since 10-March-2014, this stalk collection site has been closed and all biomass residues are transported directly to the project site. Therefore, M2 installed at the stalk collection sites by power grid company with an accuracy of 1.0s has been dismantled and the electricity consumed by the project activity is 0 from 10-March-2014 onward.

In the second crediting period, the project electricity imports from the grid are estimated to be 0 MWh, thus, $EL_{PJ,imp,y}$= 0 MWh. Grid emission factor $EF_{EG,GR,y}$/$EF_{grid,CM,y}$ is calculated as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0). The $EF_{grid,CM,y}$ =0.4287 tCO_2e/MWh, is calculated ex ante and fixed for the second crediting period. Hence,

$PE_{GR1,y}$=0 tCO_2

3. Determination of $PE_{TR,y}$

According to the "TOOL12: Project and leakage emissions from transportation of freight", **Option B:** Using conservative default values is chose. $PE_{TR,m}$ in the tool corresponds to the parameter $PE_{TR,y}$ in this methodology ACM0006 (Version 15.0) is calculated as followings,

$$PE_{TR,y} = PE_{TR,m} = \sum D_{f,m} \times FR_{f,m} \times EF_{CO2,f} \times 10^{-6} \quad (15)$$

Where:

$PE_{TR,m}$	=	Project emissions from transportation of freight monitoring period m (t CO_2)
$D_{f,m}$	=	Return trip distance between the origin and destination of freight transportation activity f in monitoring period m (km)
$FR_{f,m}$	=	Total mass of freight transported in freight transportation activity f in monitoring period m (t)
$EF_{CO2,f}$	=	Default CO_2 emission factor for freight transportation activity f (g CO_2/t km)
f	=	Freight transportation activities conducted in the project activity in monitoring period m

All the biomass residues supply sites are within 50 kilometers away around the site of the project. Therefore, the 100 kilometers ($D_{f,m}$) is conservative for project emission calculation.

The default value of emission factors for Light vehicles and Heavy vehicles are 245 g CO_2e/t km and 129 g CO_2e/t km, respectively. For conservativeness, project proponents use 245 g CO_2e/t km ($EF_{CO2,f}$) for $PE_{TR,m}$ calculations, no matter the freights are transported by Light vehicles or Heavy vehicles.

Total mass of freight transported in freight transportation activity is 193,091t ($FR_{f,m}$) included 93,902t of maize stalks and 99,189t of waste wood. Hence,

$PE_{TR,y}$=100km*(93,902t+99,189t)* 245 g CO_2e/t km*10^{-6}= 4,731 CO_2e

4. Determination of $PE_{BR,y}$

The project proponents chose to include emissions due to uncontrolled burning or decay of biomass residues ($BE_{BR,y}$) in the calculation of baseline emissions, then emissions from the combustion of this category of biomass residues have also to be included in the project scenario. Corresponding emissions are calculated as follows:

$$PE_{BR,y} = GWP_{CH4} \times EF_{CH4,BR} \times \sum_{n} BR_{PJ,n,y} \times NCV_{BR,n,y} \quad (16)$$

Where:

$PE_{BR,y}$	=	Emissions from the combustion of biomass residues during the year *y* (tCO_2e)
GWP_{CH4}	=	Global Warming Potential of methane valid for the commitment period (tCO_2/tCH_4)
$EF_{CH4,BR}$	=	CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ)
$BR_{PJ,n,y}$	=	Quantity of biomass residues of category *n* used in the CDM project activity in year *y* (tonnes on dry-basis)
$NCV_{BR,n,y}$	=	Net calorific value of biomass residue of category *n* in year *y* (GJ/tonne on dry-basis)

According to methodology ACM0006 (Version 15.0), the default CH_4 emission factor of 30 kg CH_4/TJ is used for this project, and the uncertainty is estimated to be 300%, thus a conservativeness factor of 1.37 is applied to the CH4 emission factor. The net calorific value of the maize stalk combusted in this project $NCV_{maize\ stalk}$ is 17.79 GJ/t, and $NCV_{waste\ wood}$ is 15.64 GJ/t. Global Warming Potential of methane GWP_{CH4} is 28 tCO_2/tCH_4. The quantity of dry matter $BR_{BL,maize\ stalk,y}$ is 88,080t, and $BR_{BL,waste\ wood,y}$ is 88,080t, so

$\boldsymbol{PE_{BR,y}}$**=28 tCO_2/tCH_4*1.37*30kg CH_4/TJ *10^{-6}* (88,080t*17. 79GJ/t+88,080t*15.64 GJ/t)**

= 3,389 tCO_2

5. Determination of $PE_{WW,y}$

The project does not involve waste water originating from treatment of the biomass residues under anaerobic conditions, therefore, **$PE_{WW,y}$=0.**

6. Determination of $PE_{BG2,y}$

The project does not involve biogas, therefore, **$PE_{BG2,y}$=0.**

7. Determination of $PE_{BC,y}$

The biomass residues used by the project is surplus stalks and waste wood in the project region, not includes biomass from dedicated plantations, therefore, **$PE_{BC,y}$=0.**

In summary,

$\boldsymbol{PE_y = PE_{FF,y} + PE_{GR1,y} + PE_{TR,y} + PE_{BR,y}}$**=48 tCO_2+0+4,731 tCO_2+3,389 tCO_2=8,168 tCO_2**

4.3 Leakage

According to the methodology ACM0006 (version 15.0), leakage emissions due to diversion of biomass residues from other applications shall be calculated according to the "TOOL16: Project and leakage emissions from biomass" (version 04.0).

The tool 16 is also applicable if biomass residues are consumed in project activity. These could be: (a) Procured by the project proponents; or (b) The result of an agro-industrial process under the control of the project proponents. The tool 16 is applicable for the project since the types of biomass residues used by the project are surplus maize stalk and waste wood purchased by project owner in the project region. And the baseline scenario of the project due to biomass residues is **B1:** The biomass residues are dumped or left to decay mainly under aerobic conditions.

For biomass residues categories for scenario B1 are deemed a plausible alternative scenario, the following procedures should be applied for the combined amount of biomass identified:

(i) Demonstrate that there is an abundant surplus of the biomass residue in the project region which is not utilized. For this purpose, demonstrate that the total quantity of that type of biomass residues annually available in the project region is at least 25 per cent larger than the quantity of biomass residues which is utilized annually in the project region (e.g. for energy generation or as feedstock), including the project facility;

(ii) Demonstrate for the sites from where biomass residues are sourced that the biomass residues have not been collected or utilized (e.g. as fuel, fertilizer or feedstock) but have been dumped and left to decay, land-filled, left in the field to decay after harvest or burnt without energy generation (e.g. field burning). This approach is only applicable to biomass residues categories for which project participants can clearly identify the site from where the biomass residues are sourced;

(iii) In case surplus of biomass residues in the project region cannot be demonstrated, the alternative use of the biomass shall be considered unknown (B4) and result in leakage emissions.

For the project, the biomass residues used include maize stalks and waste wood which both come from the nearby area purchasing from local farmers in project region, and have the same using way in the absence of the project activity. Based on the analysis below, we can find out that the quantity of available biomass residues in the defined geographical boundary in 2018[14] are far larger than 25% the quantity of biomass residues utilized in the project. Thus, the utilization of the biomass residues by the project plant is considered to have no influence on the biomass

[14] Since 2018 special Report of Biomass Fuel in Huixian City is latest and available data for biomass residues in project region before the start date of the second crediting period which is 28-Oct-2019. The second crediting period is from 28-Oct-2019 to 27-Oct-2029.

residues usage, and therefore the leakage of proposed project is considered to be 0. Therefore, Leakage emission LE_y = 0.

Biomass residues	Quantity of available (t/yr)	Quantity of utilized (t/yr)						Larger percentage than utilized
		Feedstuff	Compost	Returning field	Feedstock	For the project	Total	
Maize stalk	381,300	3,839	73,246	97,115	0	93,902	268,102	42.22%
Waste wood	322,000	0	0	0	110,200	99,189	209,389	53.78%
Total	703,300	3,839	73,246	97,115	110,200	193,091	477,491	47.29%

Data source: Feasibility Study Report and Special Report of Biomass Fuel in Huixian City (2018).

4.4 Net GHG Emission Reductions and Removals

The annual emission reductions ER_y for the project activity are calculated as the baseline emissions minus the project emissions and minus the leakage emissions. The final GHG emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (17)$$

Where:

ER_y Emission reductions in year y (tCO_2)

BE_y Baseline Emissions in year y (tCO_2)

PE_y Project emissions in year y (tCO_2)

LE_y Leakage emissions in year y (tCO_2)

The summary of ex ante estimates of emission reductions is shown as follows:

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
28-Oct-2019~27-Oct-2020	64,042	8,168	0	55,874
28-Oct-2020~27-Oct-2021	64,042	8,168	0	55,874
28-Oct-2021~27-Oct-2022	64,042	8,168	0	55,874
28-Oct-2022~27-Oct-2023	64,042	8,168	0	55,874
28-Oct-2023~27-Oct-2024	64,042	8,168	0	55,874
28-Oct-2024~27-Oct-2025	64,042	8,168	0	55,874
28-Oct-2025~27-Oct-2026	64,042	8,168	0	55,874
28-Oct-2026~27-Oct-2027	64,042	8,168	0	55,874
28-Oct-2027~27-Oct-2028	64,042	8,168	0	55,874
28-Oct-2028~27-Oct-2029	64,042	8,168	0	55,874
Total	640,420	81,680	0	558,740

5 MONITORING

5.1 Data and Parameters Available at Validation

The baseline gird emission factor $EF_{grid,CM,y}$ is obtained directly from the official source *Notification on Determining Baseline Emission Factor of China's Grid* by China's DNA. Thus, the relevant basis parameters for calculation of $EF_{grid,CM,y}$ are not described in detail here. With consideration of the fact of the Project, data and parameters that are available at validation are summarized in below tables.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2e/MWh
Description	The baseline grid emission factor
Source of data	2019 Baseline Emission Factors for Regional Power Grids
Value applied	0.4287
Justification of choice of data or description of measurement methods and procedures applied	As per the requirements in "Tool to calculate the emission factor for an electricity system version 07.0"
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	GWP_{CH4}
Data unit	$t CO_2e/t CH_4$
Description	Global warming potential of CH_4
Source of data	IPCC
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Default value of 28 from IPCC Fifth Assessment Report (AR5). Shall be updated according to any future VERRA decisions.
Purpose of Data	Calculation of baseline emissions

Comments	-

Data / Parameter	$EF_{CO2,f}$
Data unit	g CO_2e/t km
Description	Default CO_2 emission factor for freight transportation activity f
Source of data	"TOOL12: Project and leakage emissions from transportation of freight version 1.1.0"
Value applied	245
Justification of choice of data or description of measurement methods and procedures applied	In "TOOL12: Project and leakage emissions from transportation of freight version 1.1.0", the default value of emission factors for Light vehicles and Heavy vehicles are 245 (g CO_2e/t km) and 129 (g CO_2e/t km), respectively. For conservativeness, project proponents use 245 (g CO_2e/t km) for $PE_{TR,y}$ calculations, no matter the freights are transported by Light vehicles or Heavy vehicles.
Purpose of Data	Calculation of project emissions
Comments	-

Data / Parameter	$NCV_{BR,n,y} \cdot EF_{BR,n,y}$
Data unit	tCH_4/t
Description	The CH_4 emission factor for the combustion of biomass residues in the project plant in year y
Source of data	ACM0006 (Version 15.0)
Value applied	0.001971
Justification of choice of data or description of measurement methods and procedures applied	Default values
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EF_{CH4,BR}$
Data unit	$kgCH_4$/TJ
Description	CH_4 emission factor for the combustion of biomass residues in the project plant

Source of data	ACM0006 (Version 15.0)
Value applied	41.1
Justification of choice of data or description of measurement methods and procedures applied	The default CH_4 emission factor of 30 kg CH4/TJ from 2006 IPCC Guidelines, Volume 2, Chapter 2, Tables 2.2 to 2.6 is used for the project, and the uncertainty is estimated to be 300%, thus a conservativeness factor of 1.37 is applied to the CH_4 emission factor.
Purpose of Data	Calculation of project emissions
Comments	-

Data / Parameter	$NCV_{diesel,y}$
Data unit	GJ/t
Description	The net calorific value (energy content) of diesel
Source of data	China Energy Statistical Yearbook 2018
Value applied	42.652
Justification of choice of data or description of measurement methods and procedures applied	Country-specific value
Purpose of Data	Calculation of project emissions
Comments	-

Data / Parameter	$EF_{CO2,diesel,y}$
Data unit	tCO_2/GJ
Description	The CO_2 emission factor of diesel in year y
Source of data	IPCC default values
Value applied	0.0748
Justification of choice of data or description of measurement methods and procedures applied	2006 IPCC Guidelines, Volume 2, Chapter 1, Table 1.4, default value at the upper limit of the uncertainty at a 95% confidence interval
Purpose of Data	Calculation of project emissions
Comments	-

5.2 Data and Parameters Monitored

Data / Parameter	$EL_{PJ,exp,y}$
Data unit	MWh
Description	The project electricity exports to grid in year y
Source of data	On-site measurement
Description of measurement methods and procedures to be applied	The measure meter is to measure the project electricity exports to grid in year y As per section 4.1 of this VCS PD, $EL_{BL,y} = EL_{PJ,exp,y}$, the monitored parameter $EL_{PJ,exp,y}$ is directly measured by measure meter and in line with the actual situation of the project and Electricity Purchase and Sale Agreement, which also does not influence the baseline emission calculation. Therefore, in second crediting period, $EL_{PJ,exp,y}$ will be monitored directly instead of the monitored parameters $EL_{PJ,aux,y}$ and $EL_{PJ,gross,y}$. Data type: Measured Archiving procedure: Paper and Electronic Responsibility: The monitoring team is responsible for monitoring including monitoring, aggregating and processing original data, crosscheck and archiving of monitoring data, and the calibration and maintenance of the measuring equipment. Calibration Frequency: Once in one year
Frequency of monitoring/recording	Continuously measured by meter and monthly recorded
Value monitored	126,709
Monitoring equipment	Bi-directional electric meter
QA/QC procedures to be applied	The consistency of metered electricity generation will be cross-checked with receipts from electricity sales (if available) and the quantity of fuels fired. The precision degree of the meter is 0.2S according to the national standard Technical Administrative Code of Electric Energy Metering (DL/T 448-2016).
Purpose of the data	Calculation of baseline emissions

Calculation method	-
Comments	-

Data / Parameter	$EL_{PJ,imp,y}$
Data unit	MWh
Description	The project electricity imports from the grid in year y
Source of data	On-site measurement
Description of measurement methods and procedures to be applied	The measure meter is to measure the quantity of electricity consumed by the project activity plant from the grid. Data type: Measured Archiving procedure: Electronic Responsibility: The monitoring team is responsible for monitoring including monitoring, aggregating and processing original data, crosscheck and archiving of monitoring data, and the calibration and maintenance of the measuring equipment. Calibration Frequency: Once in one year
Frequency of monitoring/recording	Continuously measured by meter and monthly recorded
Value monitored	0
Monitoring equipment	Bi-directional electric meter
QA/QC procedures to be applied	The consistency of metered electricity generation will be cross-checked with receipts from electricity purchase. The precision degree of the meter is 0.2S according to the national standard Technical Administrative Code of Electric Energy Metering (DL/T 448-2016).
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	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
Data unit	Tonnes

Description	-Quantity of available biomass residues of category n in the region -Quantity of biomass residues of category n that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region -Availability of a surplus of biomass residues category n (which cannot be sold or utilized) at the ultimate supplier to the project and a representative sample of other suppliers in the defined geographical region
Source of data	The local statistical data
Description of measurement methods and procedures to be applied	Along the crediting period, new categories of biomass (i.e. new types, new sources, with different fate) can be used in the CDM project activity. In this case, a new line should be added to the table. If those new categories are of the type B1, B2 or B3, the baseline scenario for those categories of biomass residues should be assessed using the procedures outlined in the guidance provided in the procedure for the selection of the baseline scenario and demonstration of additionality
Frequency of monitoring/recording	Annually
Value applied	(see table below)
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Calculation of baseline and leakage emissions
Calculation method	-
Comments	-

Biomass residues type	Quantity of available biomass residues	Quantity of biomass residues utilized	Larger percentage than utilized
Maize stalk	381,300	268,102	42.22%
Waste wood	322,000	209,389	53.78%

Data / Parameter	$BR_{B1,n,y}$
Data unit	tonnes on dry-basis
Description	Quantity of biomass residues of category n used in the project activity in year y.

<table>
<tr><td>Source of data</td><td>On-site measurements</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Use electronic belt weight installed at the feeding inlet of the boiler to measure continuously the quantity of biomass residues combusted in the project plant.
Data aggregated monthly is recorded in the monthly consumption statistics spreadsheet.
Adjust for the moisture content in order to determine the quantity of dry biomass. And please refer to below parameter Moisture content of the biomass residues for relevant moisture content.
Data type: Measured
Archiving procedure: Electronic
Responsibility: The monitoring team is responsible for monitoring including monitoring, aggregating and processing original data, crosscheck and archiving of monitoring data, and the calibration and maintenance of the measuring equipment.
Calibration Frequency: once in one year</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Data monitored continuously and aggregated as appropriate, to calculate emissions reductions</td></tr>
<tr><td>Value monitored</td><td>
<table>
<tr><td>Biomass residues type</td><td>Biomass residues source</td><td>Biomass residues fate in the absence of the project activity</td><td>Biomass residues use in project scenario</td><td>Biomass residues quantity (tonnes)</td></tr>
<tr><td>Maize stalk</td><td>Off-site from the nearby area</td><td>Dumped or burnt in an uncontrolled manner(B1)</td><td>Electricity generation on-site</td><td>88,080</td></tr>
<tr><td>Waste wood</td><td>Off-site from the nearby area</td><td>Dumped or burnt in an uncontrolled manner(B1)</td><td>Electricity generation on-site</td><td>88,080</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>Electronic belt weight & drying oven & balance</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes</td></tr>
<tr><td>Purpose of the data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Calculation method</td><td>-</td></tr>
</table>

Comments	-

Data / Parameter	Moisture content of the biomass residues
Data unit	% Water content
Description	Moisture content of the biomass residues type k
Source of data	On-site measurements
Description of measurement methods and procedures to be applied	Use drying oven & balance installed in laboratory of the project site to determine once for the water content of the biomass residues of each freight transported. Then, the relevant staff records the water content of the biomass residues of each freight transported in the monthly fuel statistics spreadsheet. Adjust for the moisture content in order to determine the quantity of dry biomass residues. Data type: Measured Archiving procedure: Electronic Responsibility: The monitoring team is responsible for monitoring including monitoring, aggregating and processing original data, crosscheck and archiving of monitoring data, and the calibration and maintenance of the measuring equipment. Calibration Frequency: Once in one year
Frequency of monitoring/recording	Continuously, monthly mean values are calculated based on the water content of the biomass residues of each freight transported.
Value applied	Biomass residues type: Water content Maize stalk: 6.2% Waste wood: 11.2%
Monitoring equipment	Drying oven & balance
QA/QC procedures to be applied	-
Purpose of data	Calculation of baseline and project emissions
Calculation method	-

Value applied:

Biomass residues type	Water content
Maize stalk	6.2%
Waste wood	11.2%

Comments	-

Data / Parameter	$FC_{projectsite,i,,y}$
Data unit	t
Description	Quantity of diesel combusted in the project activity during the year y
Source of data	On-site measurement by the records of diesel purchase and remained
Description of measurement methods and procedures to be applied	The fuel consumption quantity will be from available purchase invoice from the financial records which is conservative for project calculation.
Frequency of monitoring/recording	Continuously
Value applied	15
Monitoring equipment	-
QA/QC procedures to be applied	Cross-check the measurements with diesel purchase invoice.
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	For the diesel used in forklifts, the consumption is determined by the records of diesel purchase and remained, and the measurements will be crosschecked by diesel purchase invoice.

Data / Parameter	$FR_{f,m}$
Data unit	Tonnes
Description	Total mass of freight transported in freight transportation activity f in monitoring period m
Source of data	On-site measurement
Description of measurement methods and procedures to be applied	Use weight meter installed in the gate of the project site to determine once for the mass of each freight transported. Then, the relevant staff records the type and mass of the biomass residues of each freight transported in the monthly fuel statistics spreadsheet.

<table>
<tr><td></td><td>Adjust for the moisture content in order to determine the quantity of dry biomass residues.
Data type: Measured
Archiving procedure: Electronic
Responsibility: The monitoring team is responsible for monitoring including monitoring, aggregating and processing original data, crosscheck and archiving of monitoring data, and the calibration and maintenance of the measuring equipment.
Calibration Frequency: once in one year</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Records by project participants or records by truck operators</td></tr>
<tr><td>Value applied</td><td><table><tr><td>Biomass residues type</td><td>Value</td></tr><tr><td>Maize stalk</td><td>93,906</td></tr><tr><td>Waste wood</td><td>99,189</td></tr></table></td></tr>
<tr><td>Monitoring equipment</td><td>Weight meter</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of project emissions</td></tr>
<tr><td>Calculation method</td><td>-</td></tr>
<tr><td>Comments</td><td>Applicable to Option B</td></tr>
</table>

Data / Parameter	$D_{f,m}$
Data unit	Kilometer
Description	Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m
Source of data	On-site measurement
Description of measurement methods and procedures to be applied	Determined once for each freight transportation activity f for a reference trip using the vehicle odometer or any other appropriate sources (e.g. on-line sources)
Frequency of monitoring/recording	-

Value applied	50*2
Monitoring equipment	-
QA/QC procedures to be applied	Check consistency of the distance records provided by the truckers by comparing recorded distances with other information from other sources (e.g. maps); All the biomass residues supply sites are within 50 kilometers away around the site of the Project. Therefore, the 100 kilometers (AVD_y) is conservative for project emission calculation.
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	-

Data / Parameter	NCV_k
Data unit	GJ/ton of dry matter
Description	Net calorific value of biomass residue of category n in year y
Source of data	Sample measurement
Description of measurement methods and procedures to be applied	Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV on dry-basis
Frequency of monitoring/recording	Measured every six months, taking at least three samples for each measurement
Value monitored	<table><tr><td>Biomass residues type</td><td>Value</td></tr><tr><td>Maize stalk</td><td>17.79</td></tr><tr><td>Waste wood</td><td>15.64</td></tr></table>
Monitoring equipment	-
QA/QC procedures to be applied	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant

	data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass residues.
Purpose of the data	Calculation of project emissions
Calculation method	-
Comments	-

5.3 Monitoring Plan

1. Organizational structure, responsibilities and competencies

The project owner has set up a specific VCS department for monitoring decisions and operation of the monitoring plan.

There is a VCS director as a leader of the VCS department, a monitoring manager for overall implementation and management of the monitoring plan, and a monitoring team for practical operation of the monitoring.

The management structure of the monitoring team is shown in Figure 3.

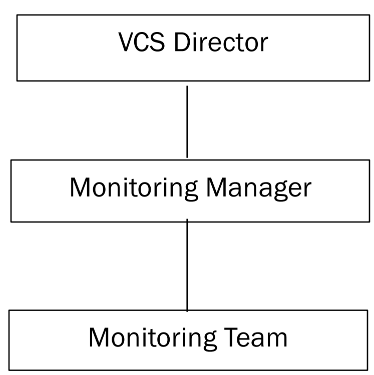

Figure 2 Monitoring structure of the Project

The VCS director is responsible for the general management of the VCS project, and takes charge of the communication and coordination with VCS related departments (DNA, stakeholders, VCUs buyer and VVB, etc.).

The monitoring manager is responsible for the overall implementation and management of the monitoring plan for this project, including data collection, ERs calculation, preparing monitoring reports and cooperating with VVB for verification.

The monitoring team is responsible for the practical operation of the monitoring work, including monitoring, aggregating and processing original data, crosscheck and archiving of monitoring data, and the calibration and maintenance of the measuring equipment.

2. Monitoring system and procedures

Monitoring of biomass residues data

The biomass residues data of this project includes quantity, moisture content and net calorific value of used biomass residues.

In the second crediting period, quantity of utilized biomass residues is measured by electronic belt weight installed at the feeding inlet of the boiler, and these data shall be crosschecked with the quantity of electricity and heat generated or any fuel purchase receipts (if available).

And in the second crediting period, the moisture content of biomass residues is measured by drying oven & balance installed in laboratory of the project site for the random sample when they are transported into the project site each time, and the mean values calculated annually. To ensure the authenticity of the value, the project owner will invite the technician of local Quality Testing Bureau to calibrate the moisture analyzer used for monitoring annually.

In the second crediting period, net calorific value of biomass residues is measured by sending the random sample to local Quality Testing Bureau for analysis every six months, taking at least three samples for each measurement and the mean values calculated annually. The consistency of the measurements will be checked by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements.

Monitoring of transport data

The transport data of this project includes quantity of biomass residues transported to the project site and average round trip distance.

In the second crediting period, quantity of biomass residues transported to the project site is measured by weighing the trucks twice when it goes in and out of the project site with electronic weight meter installed in the gate of the project site, and these data shall be crosschecked with the quantity of electricity and heat generated and any fuel purchase receipts (if available).

The average round trip distance will be obtained from the records by project participants on the origin of the biomass residues which is measured continuously, and the consistency of distance records provided by the truckers will be checked by comparing recorded distances with other information from other sources (e. g. maps).

Monitoring of fossil fuel data

And in the second crediting period, the diesel consumption for operation of forklifts at the project site is determined by the quantity of diesel purchase and remained, and the measurements will be crosschecked by diesel purchase invoice.

Monitoring of electricity data

The electricity data of this project includes on-site electricity consumption and net electricity generation.

In this second crediting period, the two new bi-directional electricity meters M1 (measure meter) and M1' (check meter) with an accuracy of 0.2s are used to monitor the export ($EL_{PJ,exp,y}$) and import electricity ($EL_{PJ,imp,y}$), from December 2019 onwards, bidirectional electricity meter reading record date is changed from 24:00 hr of the 23rd day to 24:00 hr of last day of each month.

Before 10-March-2014, only one stalk collecting site was built to collect stalks, and the on-site electricity consumption at the stalk collection site was measured by an electricity mete (M2) installed on this collecting site. The monitoring team records the M2 electricity meter's readings and complete Meter Reading Records at 24:00 hr of the last day of each month. Since 10-March-2014, this stalk collection site has been closed and all biomass residues are transported directly to the project site. Therefore, M2 has been dismantled and the electricity consumed by the project activity is 0 from 10-March-2014 onward. And in this second crediting period, the electricity consumed by the project activity will be 0.

If in the future, other stalk collecting sites will be built, the electricity meters will be installed as per the related standards and rules in China to measure the on-site electricity consumption at the stalk collection sites.

Monitoring of availability of biomass residues

The quantity of available and utilized biomass residues in the defined geographical region will be monitored to check the leakage effect. These data will be obtained from official statistical information on a yearly basis.

The detailed structure of the monitoring system can be found in Figure 4 and Table 2.

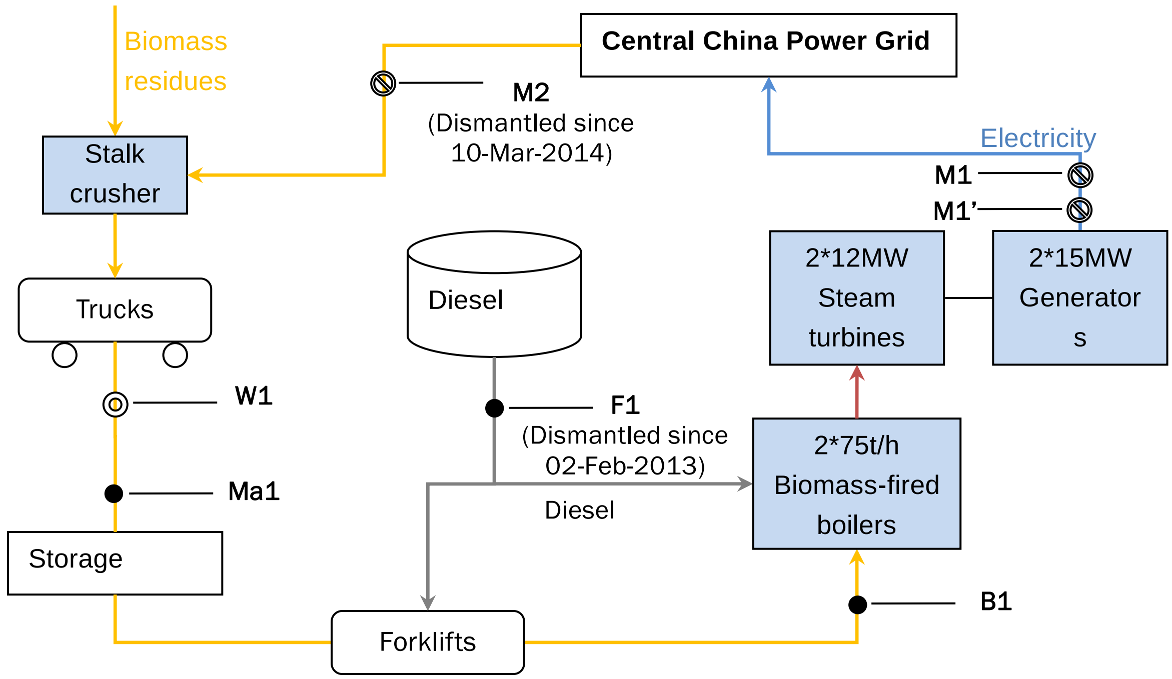

Figure 3: the monitoring diagram of the project

Table 2: Details of the monitoring equipment

Monitoring equipment	Description	Location
M1	Measure meter, measuring the net electricity generated by the project	The meter is installed on supply side of the project site
M1'	Check meter, measuring the net electricity generated by the project	The meter is installed on supply side of the project site
W1	Weight meter, measuring the quantity of the biomass residues that has been transported to the project site	Gate of the project site
B1	Electronic belt weight, measuring the quantity of biomass residues combusted in the project plant	Feeding inlet of the boiler
Ma1	Drying oven & balance, measuring the moisture content of the biomass residues	Laboratory of the project site

4. QA/QC

Training program

Before the operation of this project, monitoring personnel was trained for basic conception and management of the project activity, monitoring and archiving procedures of relevant data, and the requirement for data quality assurance etc.

Calibration of measuring equipment

In order to assure precision, the project owner invited the technician of local Quality Testing Bureau to calibrate all the monitoring equipment every year. The calibration of the equipment is implemented according to the relevant national standard. The calibration records are saved for verification, and the data inspectors of VCS monitoring team are in charge of daily maintenance of the equipment.

5. Emergency procedure

Electricity meters

If reading of measure meter is not precision allowed error range at any month, electricity connected to grid should be confirmed as follow:

(1) Firstly, reading data from check meter, calculating electricity connected to grid of the project according to historical line lose rate, except anyone think that check ammeter is not precision after check;

(2) If check meter has not accepted precision or operation is not criterion, the project owner and power grid company should design a reasonable conservative method to estimate reading together, and explain that it's reasonable and conservative at verification of VVB.

(3) If the project owner and power grid company can't compass consistent idea about the method to estimate reading, it should be arbitrated according to conventional process to confirm consistency of reading estimated.

Electronic belt weight

When the electronic belt weight is broken, the biomass residues consumption data could be calculated by energy balance based on purchased quantities and stock changes, the most conservative approach will be applied in ER calculation.

Weight meter

When malfunction of weight meter appears, the relevant monitoring data could be calculated by combusted quantities and stock changes, the most conservative approach will be applied in ER calculation.

Drying oven & balance

When malfunction of Drying oven & balance appears, the historical data would be used by choosing the most conservative data.

If the failure of whole power generation system occurs, no VCUs should be claimed until it has been recovered.