ANHUI GUZHEN BIOMASS GENERATION PROJECT

Document Prepared by **Beijing Ruifang Information Technology Co., Ltd.**

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Prepared By	Beijing Ruifang Information Technology Co., Ltd.
Contact	Haidian District, Beijing, 100082, P.R.China. Teng_hp@126.com

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Anhui Guzhen Biomass Generation Project (hereafter referred to as the Project) is sited within Guzhen County, Anhui Province, P.R.China. The Project is invested, constructed and operated by the National Guzhen Bio Energy Co., Ltd.

The Project installs one 130t/h boiler and one 30MW steam turbine generator. Rice straw, maize straw, peanut straw and wood residues are used as fuel for power generation. The annual electricity supply of the Project is expected to be 186,900 MWh, which is delivered to East China Power Grid (ECPG). This project does not include heat supply.

Prior to the Project, the biomass residues used in the Project are dumped or left to decay under mainly aerobic conditions. The electricity supplied by the Project is supplied by East China Power Grid, which generates CO_2 emissions as it is mainly composed of traditional fossil fuel fired power plants. These are also the baseline scenarios of the Project.

The Project will achieve emission reductions via avoiding CO_2 emissions from the same amount of electricity generation from East China Power Grid, which is mainly composed of traditional fossil fuel fired power plants. In the first crediting period, it is estimated that the project activity will generate emission reductions of 132,072 tCO_2e per year. In the second crediting period, it is estimated that the project activity will generate emission reductions of 83,258 tCO_2e per year.

The project started construction on 28/03/2010 and started operation on 03/01/2011. The first crediting period is from 03/01/2011 - 02/01/2021 (10 years). The project operated normally in the first crediting period. The project is applying for the crediting period renewal and the second crediting period is from 03/01/2021 to 02/01/2031 (10 years).

1.2 Sectoral Scope and Project Type

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

The Project is not a grouped project.

1.3 Project Eligibility

The project is a biomass power project, which reduces CO_2 by replacing electricity from fossil fuel power plants. This complies with the scope of VCS program.

1.4 Project Design

This project is designed to include a single location only. It is not designed to include multiple project activity instances, or as a grouped project.

The project involves the installation of one 130 t/h biomass residues direct-burning boilers and one 30 MW steam turbine and generator.

Eligibility Criteria

N/A as this is not grouped project.

1.5 Project Proponent

Organization name	National Guzhen Bio Energy Co., Ltd.
Contact person	Wang jundi
Title	Manager
Address	Old Administration Building, No. 1 Beishatan, Chaoyang District, Beijing, China
Telephone	+86-10-58611519
Email	wjd@nbe.com

1.6 Other Entities Involved in the Project

Organization name	Beijing Ruifang Information Technology Co., Ltd.
Role in the project	Consultancy
Contact person	Teng haipeng
Title	Manager
Address	Haidian District, Beijing, P.R.China, Beijing, China.
Telephone	+86-10-86291231
Email	Teng_hp@126.com

1.7 Ownership

The approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), established the project ownership of Anhui Guzhen Biomass Generation Project. The purchasing contract of boiler, generator, and the purchasing power agreement are the evidences for the property and contractual right in the plant, equipment and electricity.

1.8 Project Start Date

03/01/2011 (the commissioning date which means that the project started to generate GHG emission reductions, which is also the start date of operation)

1.9 Project Crediting Period

The first crediting period under VCS is from 03/01/2011 - 02/01/2021 (totally 10 years, renewable). The total VCS crediting period would have been from 03/01/2011 - 02/01/2041 (30 years). However, this project has been registered in CDM with ID of 8008, and the total crediting period is from 01/01/2013 - 31/12/2033 (21 years). According to VCS regulations, the total crediting period of VCS is from 03/01/2011 - 31/12/2033.

The project is applying for the second crediting period, which is from 03/01/2021 to 02/01/2031. The the same has been described in the MR (version 2.0 dated 28/03/2020) and approved by VERRA.

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)
03/01/2021 -31/12/2021 (363days)	82,802
01/01/2022-31/12/2022	83,258
01/01/2023-31/12/2023	83,258
01/01/2024-31/12/2024	83,258
01/01/2025-31/12/2025	83,258
01/01/2026-31/12/2026	83,258
01/01/2027-31/12/2027	83,258
01/01/2028-31/12/2028	83,258
01/01/2029-31/12/2029	83,258
01/01/2030-31/12/2030	83,258

01/01/2031-02/01/2031 (2days)	456
Total estimated ERs	832,580
Total number of crediting years	10
Average annual ERs	83,258

1.11 Description of the Project Activity

The purpose of the project is to generate electricity from biomass power and deliver it to the ECPG. For the project,

The scenario existing prior to the start of the implementation of the project activity is “The ECPG providing the same annual power generation” and the same amount of biomass residues “dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner";

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

The biomass residues will be mechanically processed and stored at the Project plant site. The Project will install one 130t/h boiler and one 30MW steam turbine generator. The boiler combusts biomass residues to generate steam, which drives the steam turbine generator to generate power. Figure 3 below shows the technical process of the project, and table 1 below shows the key technical specifications of the boiler, turbine and generator. The annual operating hours of the Project are 7,000 hours, and the annual consumption of biomass residues is 310,000 tonnes. The annual net electricity supply of the Project is expected to be 186,900 MWh which will be supplied to East China Power Grid via a 35 kV outlet circuit.

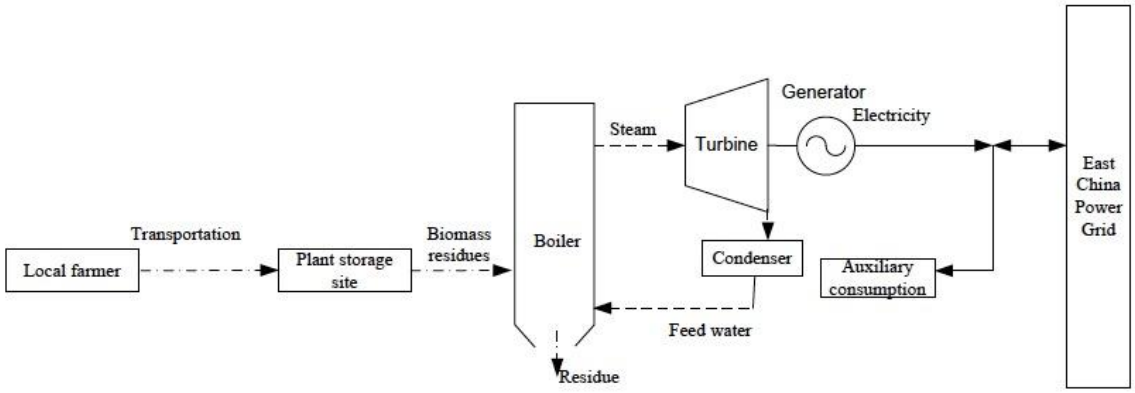


Figure 1. Technical process of the Project

Table 1. key technical parameters of boilers, steam turbines and generators

Item	Quantity	Key technical specifications
Boiler	1	Type: high temperature and high pressure natural circulation；

		Rated steam output: 130t/h; Rated steam pressure: 9.2 MPa(a); Rated steam temperature: 540℃; Life time: 20 years
Steam turbine	1	Rated output: 30MW; Rated pressure of main steam: 8.83 MPa(a); Rated temperature of main steam: 535℃; Rated flux of main steam: 130t/h; Life time: 20 years
Generator	1	Rated output: 30MW; Rated voltage: 10.5kV; Rated rotating speed: 3,000r/min; Life time: 20 years

1.12 Project Location

The Project is sited on the Economic Development Zone, 8 km to the downtown of Guzhen County, Anhui Province. The Project has geographical coordinates with east longitude of 117° 20'13" (i.e. 117.3369°) and north latitude of 33°13'08" (i.e. 33.2189°). Figure 2 shows the location of Guzhen County, Figure 3 shows the location of the Project.

Figure 2. Location of Guzhen County

Picture 3. Location of the project

1.13 Conditions Prior to Project Initiation

The project is a green-field biomass power plant and there is none of existing biomass residue fired power plants on-site or nearby the project site. The purpose of the project is to generate renewable power by biomass energy to replace power from ECPG which is dominated by fossil-fuel fired power plant.

In absence of this project, the biomass residues used in the Project are dumped or left to decay under mainly aerobic conditions. Equivalent electricity generated by the project activity would otherwise be provided from the ECPG which is dominated by fossil-fuel fired power plant.

The scenario prior to the project is the same as the baseline scenario.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is in the field of renewable energy. The Feasibility Study Report of the project was approved by Anhui Energy Bureau on 17/03/2010, and the Environment Influence Assessment was approved by Anhui Environment Protection Bureau on 11/12/2009. And the project has got LOA from NDRC. These approvals demonstrate that the project meets the requirement of national laws and regulations, including Renewable Energy Law of the People's Republic of China and Environmental Protection Regulation for biomass energy Project, etc.

This project is also in line with current laws and regulations.

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 CDM project in UNFCCC on 07/11/2012 (UNFCCC Ref. 8008). The first 7-year renewable crediting period is from 01/01/2013 to 31/12/2019.

1.15.2 Projects Rejected by Other GHG Programs

The project is not rejected by other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The Project has been registered as a CDM project in UNFCCC on 07/11/2012 (UNFCCC Ref. 8008). The first 7-year renewable crediting period is from 01/01/2013 to 31/12/2019.

The project has not been counted or used under GS project or under any other voluntary carbon crediting scheme (including China ETS). In the future, the emission reductions that apply for issuance under VCS will not be issued under CDM or GS project or under any other voluntary carbon crediting scheme (including China ETS).

1.16.2 Other Forms of Environmental Credit

The Project has been registered as a CDM project in UNFCCC on 07/11/2012 (UNFCCC Ref. 8008). The first 7-year renewable crediting period is from 01/01/2013 to 31/12/2019.

The project does not apply for other kinds of environmental credit.

1.17 Sustainable Development Contributions

The project provides many benefits that will help achieve China's Sustainable Development Goals (SDG)[1], a set of 17 universal goals covering the thematic areas of environmental, economic and social development.

[1] https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/W020161014332600482185.pdf

Provide clean energy. This project uses waste biomass to generate electricity. The annual electricity supply of the Project is 186,900 MWh. This contributes to one of the China's actions for promoting the sustainable developing, "By 2030, increase the share of non-fossil fuels in primary energy consumption to about 20 percent"; (SDG 7).

Provide decent work. The project provides 75 job opportunities for the project operation, which meets one of the China's action plans "by 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value." (SDG 8).

Reduce CO_2 emissions. This project uses biomass to generate electricity and deliver to ECPG to replace the equivalent electricity that would otherwise have been from fossil fuel power plants. This project would avoid the fossil fuel consumption and could reduce GHG emissions. The project reduces emission reductions of 83,258tCO_2/year. This contributes to achieving one of China's stated sustainable development priorities "Actively adapt to climate change and strengthen resistance capacity to climate risks in agriculture, forestry, water resources and other key fields, as well as cities, coastal regions and ecologically vulnerable areas"; (SDG 13).

1.18 Additional Information Relevant to the Project

Leakage Management

N/A

Commercially Sensitive Information

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

Further Information

N/A

2 SAFEGUARDS

2.1 No Net Harm

As justified in Section 1.17 and Section 2.3, the project does not bring negative environmental and socio-economic impacts.

2.2 Local Stakeholder Consultation

Stakeholders of the Project are identified as the local residents of Shouxian County and around the project site. The survey was conducted on 14/12/2009 through distributing and collecting responses to a questionnaire.

For the total 50 questionnaires distributed to the stakeholders, 50 returned with a response rate of 100%. The basic structure of the respondents is illustrated in Table 2.

Table 2. Structure of the respondents

Structure of gender		
Gender	No.	Percentage (%)
Male	48	96
Female	2	4

Structure of education level		
Education level	No.	Percentage (%)
Undergraduate or higher	0	0
Senior middle school	26	52
Junior middle school or lower	24	48

Structure of age		
Age	No.	Percentage (%)
18~35	11	22
36~50	33	66

50 and above	6	12

The questionnaires mainly focus on the following issues:

· What is the attitude of the environmental protection of Project?

· What is the understand level of the Project?

· What is the impact of the Project on the local economic growth?

· What is the impact of the Project on the life standard of stakeholders?

· What is the most concern of environmental impact of the Project?

· What is the attitude of the stakeholders on the construction of the Project?

Survey results:

The summary of questionnaire survey is listed as the following:

- 58% of them very concern about the environmental protection of the Project, 40% of them concern about the Project, and 2% of them don't concern.

- 64% of them know the Project well, 34% of them know the Project, 2% of them do not know the project;

- 96% think the Project will promote the local economic growth, 4% think the Project has no impact on the local economic growth;

- 100% of them think the Project will bring positive influence on living quality of local people;

- 36% of them worried about the noise issue, 24% of them worried about the wastewater issue, 40% of them worried about the air pollution issue.

- 100% of them support the construction of the Project.

Regarding the issues worried about by the stakeholders, such as noise, water pollution, air pollution, it has been analyzed and provided corresponding measures to prevent and handle these issues by project owner, ensuring these issues will not impact the local environment and residents.

According to the results of the survey, local residents fully support the proposed project. It is not necessary to modify the Project in the aspect of design, construction and operation.

The continuous input/grievance mechanism is introduced into the project. The mechanism is as below:

	Method	Justification
Continuous input/ grievance book	A grievance book is put at the project site	a grievance book is put at the gate office of project plant. Anyone who has comment on the project can put down his opinion or suggestion on the project.

Telephone access	+86-10-58611519	Mr. Wang jundi, National Guzhen Bio Energy Co., Ltd.
	+86-10-86291231	Mr. Teng Haipeng, Beijing Ruifang Information Technology Co., Ltd.
Email access	wjd@nbe.com	Wang jundi, National Guzhen Bio Energy Co., Ltd.
	Teng_hp@126.com	Mr. Teng Haipeng, Beijing Ruifang Information Technology Co., Ltd.

2.3 Environmental Impact

The Environmental Impact Statement Form was completed by Anhui Institute of Environmental Science in Oct, 2009. And it was approved by the Anhui Environment Protection Bureau on 11 Dec, 2009 (Document No. [2009]523). According to the Environmental Impact Statement Form, environmental impacts possibly caused by the Project and corresponding measures employed by the project owner are analyzed as follows:

1. Environmental Impact Analysis During Construction Period

(1) Atmosphere Environment

The major pollutant is flying-dust, and is mainly caused by transportation and construction. The influence area of fling-dust is within 100m. The influence area of transportation dust can be effectively reduced by sprinkling the road. The construction dust has no impact on all the environmental sensitive points, which are all 300m away from the project plant.

(2) Wastewater

The wasterwater is mainly concrete maintenance water, road sprinkling water and some domestic wastewater. Temporary sedimentation tank and septic tank will be installed to treat the waste water. The concrete maintenance water can be reused after treatment in the temporary sedimentation tank, and the domestic wastewater can be discharged into the irrigation channel nearby after treated in the septic tank. Thus, the wastewater will not impact the environment.

(3) Noise

Noises generated by the Project include primarily from the operation of construction machines and equipments. According to the on-site measurement, the noise value of 60m away doesn't beyond the construction noise standard on daytime, and the noise value of 300m away doesn't beyond the construction noise standard on night time. The construction noise has no impact on all the environmental sensitive points, which are all 300m away from the project plant.

(4) Solid waste

The solid wastes during construction are mainly discarded earth, waste construction materials, waste decorating materials and living garbage. The discarded earth, waste construction materials, and some waste decorating materials will be backfilled. The packaging boxes and bags will be selected and sold. The living solid waste will be collected and stored at specific site, and delivered to environmental sanitation administrative department. Thus the solid waste generated during the construction period will not impact the surroundings.

2. **Environmental Impact Analysis During Operation Period**

(1) Atmosphere Environment

Biomass residues with low ash and sulphur content are used as fuel in the Project. The concentration of SO2 and dust will be much lower comparing with traditional coal power plant. The Project adopts clean combustion technology and is equipped with highly efficient bag-type dust collector and will release the flue gas through high stake, ensuring that the flue gas from the Project will not impact the atmosphere.

(2) Wastewater

The wastewater is mainly from water purification station and circulating cooling water process. The quality of the wastewater can meet the requirement of Integrated wastewater discharge standard, and thus can be discharged into river and will not poison the water environment.

(3) Noise

The transportation attributed to the Project is much smaller than the present transportation condition, and thus will not increase any noise influence.

The noise of boiler venting is temporary. After taking the measures of venting on daytime and installing noise muffler, this noise will not impact the surroundings.

(4) Solid waste

The ash from the Project will be transported in sealed vehicles by specific companies, and will be recycled as raw material for fertilizer, thus the storage, transportation and treatment of ash will not impact the environment.

In summary, by means of pollution avoidance and control, the Project will not have significant impact on the regional environment.

2.4 Public Comments

No public comments were received.

2.5 AFOLU-Specific Safeguards.

N/A

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The approved methodology applied in the project activity is

ACM0018 Electricity generation from biomass in power-only plants (v6.0)

Project and leakage emissions from transportation of freight (v1.1.0)

Tool to calculate emission factor for an electricity system (v7.0)

Tool to calculate project or leakage CO_2 emission from fossil fuel combustion (v03.0);

Project and leakage emissions from biomass (v05.0);

Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (v3.0.1).

3.2 Applicability of Methodology

The project constructs a new power station with fuel of surplus biomass residues, and the baseline scenario is combination of "The ECPG providing the same annual power generation" and biomass residues dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner. It complies with the applicability of methodology ACM0018.

Table 3. Application conditions and analysis of ACM0018

Applicable conditions in ACM0018	The specific conditions for the proposed project	Applicable to the proposed project or not?
Scope This methodology applies to project activities that generate power using biomass as fuel, optionally combining with solar thermal power generation. The project may be a Greenfield, capacity expansion or fuel switch project.	This project uses biomass residues as fuel to generate electricity. This project does not combing with solar thermal. This is a greenfield project.	Applicable

Applicability This methodology is applicable to project activities that generate electricity in biomass (co-)fired power-only plants, optionally combining with electricity generation using solar thermal technology. The project activity may include the following activities or, where applicable, combinations of these activities: (a) The installation of new biomass (co-)fired power-only plants at a site where currently no power generation occurs (Greenfield power project activities);	This is a greenfield project. No other power plants are existed in the project site. This project only uses waste biomass to generate electricity. Scenario (a) is applicable for this project.	Applicable
(b) The installation of new biomass (co-)fired power-only plants, which replace or are operated next to existing power-only plants fired with fossil fuels and/or biomass (power capacity expansion project activities);	This is a greenfield project. Therefore, this is not applicable.	N/A
(c) The improvement of energy efficiency of existing biomass (co-)fired power-only plants (energy efficiency improvement project activities), which can also lead to a capacity expansion, for example by retrofitting the existing plant;	This is not energy efficiency project. Therefore, this is not applicable.	N/A
(d) The total or partial replacement of fossil fuels by biomass in an existing power-only plant or in a new power-only plant that would have been built in the absence of the project (fuel switch project activities), for example by increasing the share of biomass use as compared to the baseline, by retrofitting an existing plant to use biomass, etc.;	This is a new project, not replacement or retrofitting project. Therefore, this is not applicable.	N/A
(e) The installation of biomass (co-)fired power-only plants which include solar thermal power generation by sharing the power generation equipment between the biomass and solar components at a site where currently no power generation using solar thermal technology occurs (either as Greenfield or power capacity expansion project).	This project does not include solar thermal. Therefore, this is not applicable.	N/A
4. The methodology is applicable under the following conditions: (a) Biomass used by the project plant is limited to biomass residues, biogas, RDF1 and/or biomass from dedicated plantations;	This project uses biomass residues. Therefore, this is applicable.	Applicable
(b) Fossil fuels may be co-fired in the project plant. However, the amount of fossil fuels co-fired shall not exceed 80 per cent of the total fuel fired (i.e. fossil fuels and biomass) on an	This project does not use fossil fuel.	N/A

energy basis;		
(c) For project activities that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar cane, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;	This project does not use biomass from production process.	N/A
(d) The biomass used by the project plant should not be stored for more than one year;	The biomass used by this project is stored for no more than one year.	Applicable
(e) The biomass used by the project plant is not processed chemically or biologically (e.g. through esterification, fermentation, hydrolysis, pyrolysis, bio- or chemical-degradation, etc.) prior to combustion. Drying and mechanical processing, such as shredding and pelletisation, are allowed;	The biomass used by the project plant is not processed chemically or biologically.	Applicable
(f) No power and heat plant operates at the project site during the crediting period;	No power and heat plant is operated at the project site during the crediting period	Applicable
(g) If any heat is generated for purposes other than power generation (e.g. heat which is produced in boilers or extracted from the header to feed thermal loads in the process) during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site, the following conditions should apply: (i) The implementation of the project activity does not influence directly or indirectly the operation of the heat generation equipment, i.e. the heat generation equipment would operate in the same manner in the absence of the project activity; (ii) The heat generation equipment does not influence directly or indirectly the operation of the project plant (e.g. no fuels are diverted from the heat generation equipment to the project plant); and (iii) The amount of fuel used in the heat generation equipment can be monitored and clearly differentiated from any fuel used in the project activity;	No heat is generated for purposes other than power generation during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site.	N/A

(h) 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 significant capital investment in: (i) The retrofit or replacement of existing heat generators/boilers; or (ii) The installation of new heat generators/boilers; or (iii) A new dedicated biomass supply chain established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass that could otherwise not be used for energy purposes); (iv) Equipment for preparation and feeding of biomass.	This project is not fuel switch project. Therefore, this scenario is not applicable.	N/A
5. If biogas is used for power 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 is lower than 50% of the total fuel fired on energy basis.	This project does not include biogas. Therefore, this scenario is not applicable.	N/A
In the case the project activities utilize biomass, the "TOOL16: Project and leakage emissions from biomass" shall be applied to determine the relevant project emissions from the cultivation of biomass and the utilization of biomass or biomass residues.	Tool 16 is used in this project.	Applicable
Finally, the methodology is only applicable if the baseline scenario, as identified per the "Procedure for the selection of the baseline scenario and demonstration of additionality" section hereunder, is: a. For power generation: Scenarios P2 to P8, or a combination of any of those scenarios.	For power generation of this project, P5 is the baseline scenario.	Applicable
Application of sectoral scopes: 1) For validation and verification of CDM project activities and programme of activities by a designated operational entity (DOE) using this methodology application of sectoral scope 01 is mandatory.	Sectoral scope 1 is applied for this project The baseline of biomass is	Applicable

2)	If emission reductions are claimed for preventing disposal and/or preventing uncontrolled burning of biomass residues in the baseline, then sectoral scope 13 shall apply.	decay or abandoned, not including burning. Therefore, 13 is not included in this project.	N/A

Table 4. Application condition analysis of 'Project and leakage emissions from biomass (version 05.0)'

Applicable conditions	The specific conditions for the proposed project	Applicable to the proposed project or not?
Scope: The tool provides methods for estimating emissions along the value chain of biomass and biomass residues. The methodology that refers to this tool shall indicate which of the emission sources listed in Table 1 are to be included or omitted in the calculation of project emissions.	This project uses biomass residues. The biomass residues are transported from the biomass residues generation site to the biomass residues end-user (power plant)	Applicable
In the case the project activities utilize biomass, the "TOOL16: Project and leakage emissions from biomass" shall be applied to determine the relevant project emissions from the cultivation of biomass and the utilization of biomass or biomass residues.	This project uses biomass residues. Therefore, 'tool 16 TOOL16: Project and leakage emissions from biomass' is applied to determine the relevant project emissions from the utilization of biomass or biomass residues.	Applicable

Table 5. Application condition analysis of 'Project and leakage emissions from transportation of freight (v1.1.0)'

Applicable conditions	The specific conditions for the proposed project	Applicable to the proposed project or not?
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	This project contains freight transportation by road and transportation is not the main project activity.	Applicable

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. CH_4 and N_2O emissions are excluded 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.	This project does not transport biomass residue by rail. The biomass residue consumed by this project is transported by road.	NA

Table 6. Application condition analysis of 'Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (version03.0)'

Applicable conditions	The specific conditions for the proposed project	Applicable to the proposed project or not?
This tool provides procedures to calculate project and/or leakage CO_2 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.	This project would consume fossil fuel in the project activity. Therefore, this tool is applicable.	Applicable

Table 7. Application condition analysis of '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)'

Applicable conditions	The specific conditions for the proposed project	Applicable to the proposed project or not?
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	This project is applying the credit period renewal. Therefore, this tool is applicable.	Applicable

Table 8. Application condition analysis of 'Tool to calculate the emission factor for an electricity system (version 07.0)'

Applicable conditions	The specific conditions for the proposed project	Applicable to the proposed project or not?
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).	This project supply electricity to national grid to substitute grid electricity. Therefore, this tool is applicable.	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 IIa and option IIb. If option IIa 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.	Only grid power plants are included for the emission factor calculation.	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 is not located in annex I country	Applicable
Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The value of biofuel is not included in the CO_2 emission factor calculation	Applicable

3.3 Project Boundary

According to ACM0018, the possible baseline emission source includes:

1) CO_2 emissions from electricity generation of fossil fuel power plants of ECPG,

2) CH_4 emissions from uncontrolled burning or decay of surplus biomass residues.

For simplification and conservativeness, this project decides to exclude the CH_4 emissions from uncontrolled burning or decay of surplus biomass residues.

Therefore, the baseline emission source includes CO_2 emissions from electricity generation of fossil fuel power plants of ECPG,

The possible project emission sources includes

1) CO_2 emission from on-site fossil fuel consumption,
2) CO_2 emission from on-site and off-site transportation and processing of biomass,
3) CH_4 emission from Combustion of biomass for electricity
4) CO_2 and CH_4 emission from Cultivation of land to produce biomass feedstock
5) CH_4 emission from Waste water treatment of biomass.

This project decides to exclude the CH_4 emissions from uncontrolled burning or decay of surplus biomass residues. Therefore, CH_4 emission from combustion of biomass for electricity can be excluded.

This project does not include cultivation of land to produce biomass feedstock, therefore, CO_2 and CH_4 emission from Cultivation of land to produce biomass feedstock is excluded in this project.

This project does not include Waste water treatment of biomass. Therefore, CH_4 emission from Waste water treatment of biomass is excluded.

Therefore, the project emission source include:

6) CO_2 emission from on-site fossil fuel consumption,
7) CO_2 emission from on-site and off-site transportation and processing of biomass,

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
	Decay of surplus biomass residues	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH_4	No	PP decide to exclude the calculation of baseline emissions due to decay of biomass residues for simplification and conservativeness.
		N_2O	No	Excluded for simplification. This is conservative.
Project	On-site fossil fuel consumption	CO_2	Yes	An important 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

Source		Gas	Included?	Justification/Explanation
	On-site and off-site transportation and processing of biomass	CO_2	Yes	An important 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	CO_2	No	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH_4	No	The calculation of baseline emissions due to decay of biomass residues are not included for simplification and conservativeness.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small
	Cultivation of land to produce biomass feedstock	CO_2	No	The biomass consumed in this project is not from dedicated plantation.
		CH_4	No	The biomass consumed in this project is not from dedicated plantation.
		N_2O	No	The biomass consumed in this project is not from dedicated plantation.
	Waste water 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	There is no waste water treated under anaerobic condition.
		N_2O	No	Excluded for simplification. This emission source is assumed to be small

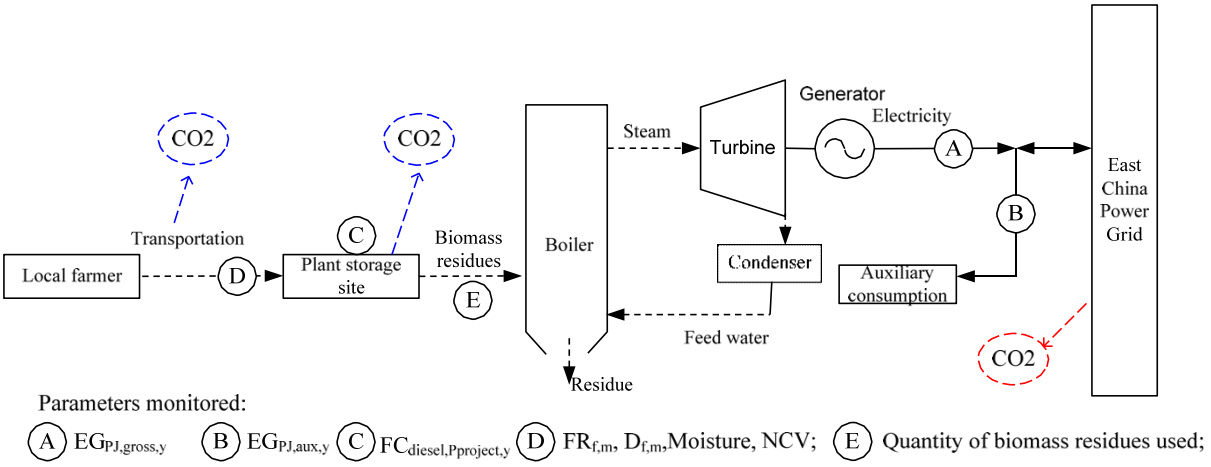


Figure 3 Flow diagram of the project

3.4 Baseline Scenario

The baseline scenario of the Project is Biomass residues are left to decay (B1). The same amount of electricity supplied by this project is provided by ECPG (P5).

For the second crediting period, the continued validity of the original baseline should be assessed.

According to the Methodological Tool "Assessment of the validity of the original/current baseline and update the baseline at the renewal of the crediting period" (v03.0.1), the stepwise procedure as follows should be adopted to assess the continued validity of the baseline and to update the baseline:

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 relevant national and/or sectoral policies and/or circumstances in the biomass-based electricity generation sector and no new policy on biomass' compulsory utilization, in comparison to the time of the submission of the project activity for validation, which would affect the compliance of the current baseline scenario.

Step 1.2: Assess the impact of circumstances

Assess the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario.

In the situation where the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, an assessment of the changes in market characteristics is required for the renewal of the crediting period.

The baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment. The baseline scenario for the electricity is to import equivalent electricity from ECPG. The situation for ECPG was the electricity generation dominated by thermal plant in the previous crediting period and in this renewed crediting period.

Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid. Assess the availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions.

(i) The conditions used to determine the baseline emissions in the previous crediting period are still valid.

The availability of new fuels or raw materials or the level of fuel prices has no impact on the identification of the current practice for the baseline emissions. Presently the ECPG is dominated by the fossil fuel power plants. The availability of new fuels or raw materials or the level of fuel prices has no impact on the baseline emissions.

(ii) The local biomass residues are dumped by simple piling up or left to decay under mainly aerobic conditions, therefore B1 is still realistic alternative scenario for the use of biomass residues.

(iii) The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes, this alternative is not in compliance with legal and regulatory requirements at present. Therefore, B3 is not the realistic and credible alternative.

If the new circumstances make a continued validity of the current baseline not plausible, then the current baseline needs to be updated for the subsequent crediting period.

As there are no new circumstances that make a continued validity of the current baseline not plausible, the current baseline does not need to be updated for the second crediting period.

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

In the absence of the CDM project activity, the project owner would not have constructed the plant and the electricity requirement will be satisfied by ECPG.

The baseline scenario for electricity generation in the Project is that the electricity requirement will be satisfied by ECPG. (P5)

The baseline scenario for the biomass residues utilization is that the biomass residues are dumped or left to decay under mainly aerobic conditions (B1).

The baseline scenario does not involve continued use of existing equipment, therefore, this sub-step is not applicable.

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

Since there are some parameters, which were determined at the start of the first crediting period, are not valid anymore, therefore, the current baseline emissions needs to be updated for the second crediting period according to this tool.

Before the time of requesting renewal of the crediting period, the China DNA has issued the latest Notice “2019 Baseline Emission Factors for Regional Power Grids in China” on 29/12/2020, so the emission factor of ECPG is updated for the second crediting period according to this Notice.

In summary, the emission factor of ECPG and all values have been updated to the latest data for the second crediting period according to this Notice.

Application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline is valid for the second crediting period but data and parameters needs to be updated. Therefore step 2 is used.

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

Step 2.1: Update the current baseline

The baseline emissions for the second crediting period have been updated, without reassessing the baseline scenario, based on the latest approved version of the methodology ACM0018. More details for the updated baseline emissions for the second crediting period can be seen in section 4.

Step 2.2: Update the data and parameters

As mentioned in step 1.4 above, all parameters regarding the grid emission factor calculation have been updated for this second crediting period. More details can be seen in section 4.

3.5 Additionality

According to VCS standard 4.2, a full reassessment of additionality is not required.

There is no new regulation that would impact the project's baseline and additionality. The validity of the original baseline scenario is demonstrated in Section 3.4, and it was concluded that the current baseline is still valid for next crediting period. Only EF related parameters should be updated for the second crediting period.

Project has no change compared with the original status. Therefore, the project description is the same as in the first crediting period.

3.6 Methodology Deviations

There are no methodology deviations for this project.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to ACM0018, baseline emissions are calculated as follows

$BE_y = BE_{EL,y} + BE_{BR,y}$

where

BE_y = Baseline emissions during year y (t CO_2)

$BE_{EL,y}$ =Baseline emissions due to generation of electricity in year y (t CO_2)

$BE_{BR,y}$ =Baseline emissions due to uncontrolled burning or decay of biomass residues in year y (t CO_2e)

Step 1: Determination of $BE_{EL,y}$

Baseline emissions from electricity generation are calculated based on the net quantity of electricity generated at the project site under the project scenario ($EG_{PJ,y}$) and a baseline emission factor ($EF_{BL,EL,y}$) which expresses the weighted average CO_2 intensity of electricity generation in the baseline, as follows:

$BE_{EL,y}=EG_{PJ,y}*EF_{BL,EL,y}$

Where

$EG_{PJ,y}$= Net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y (MWh)

$EF_{BL,EL,y}$= Emission factor for electricity generation in the baseline in year y (tCO_2/MWh)

Step: 1.1 Determination of $EG_{PJ,y}$

The net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary ($EG_{PJ,y}$) is determined as the difference between the gross electricity generation at the project site ($EG_{PJ,gross,y}$) and the total auxiliary electricity consumption required for the operation of the power plants at the project site ($EG_{PJ,aux,y}$), as follows:

$EG_{PJ,y} = EG_{PJ,Gross,y} - EG_{PJ,aux,y}$

Where:

$EG_{PJ,y}$ =Net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y (MWh)

$EG_{PJ,gross,y}$ =Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y (MWh)

$EG_{PJ,aux,y}$ =Total auxiliary electricity consumption required for the operated of the power plants the project site (MWh)

Step: 1.2 Determination of $EF_{BL,EL,y}$

The electricity generated under the project activity could be generated in the baseline in three different ways, depending on the baseline scenario and the particular situation of the project activity:

(a) Use of biomass residues at the project site.

(b) Use of fossil fuels at the project site

(c) Power generation in the electricity grid

For the project activity, the project activity exports all electricity to the grid and no electricity would be produced at the project site in the baseline.

ACM0018 gives an approach to calculate $EF_{BL,EL,y}$ as follows:

$$EF_{BL,EL,y} = \frac{EG_{BL,FF,y} \times EF_{BL,FF,y} + EG_{BL,grid,y} \times EF_{grid,CM,y} + EG_{BL,FF/grid,y} \times \text{MIN}\left(EF_{BL,FF,y}, EF_{grid,CM,y}\right)}{EG_{BL,BR,y} + EG_{BL,FF,y} + EG_{BL,grid,y} + EG_{BL,FF/grid,y}}$$

Where:

$EF_{BL,EL,y}$ =Emission factor for electricity generation in the baseline in year y (tCO_2/MWh)

$EG_{BL,BR,y}$ =Amount of electricity that would be generated with biomass residues in power-only Plants operated at the project site in the baseline in year y (MWh)

$EG_{BL,FF,y}$ =Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year y (MWh)

$EG_{BL,grid,y}$ =Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year y (MWh)

$EG_{BL,FF/grid,y}$= Amount of electricity that would be generated in the baseline either by power plants in the electricity grid or by power plants at the project site using fossil fuels in year y(MWh)

$EF_{grid,CM,y}$ =Combined margin CO_2 emission factor for grid-connected electricity generation in year y (tCO_2/MWh)

$EF_{BL,FF,y}$ =CO_2 emission factor for electricity generation with fossil fuels in power plant(s) at the project site in the baseline in year y(tCO_2/MWh)

In the following, first amounts of electricity generated from the various sources in the baseline ($EG_{BL,BR,y}$, $EG_{BL,grid,y}$, $EG_{BL,FF,y}$ and $EG_{BL,FF/grid,y}$) are determined, taking into account the project configuration the baseline scenario. Therefore, different cases have to be considered. Then the emission factors ($EF_{grid,CM,y}$ and $EF_{BL,FF,y}$) are determined.

Step 1.3: Determination of $EG_{BL,BR,y}$

In the baseline scenario for the project activity, there is no electricity that would be generated with biomass residues in power-only plants operated at the project site, therefore, according to ACM0018, $EG_{BL,BRy}$=0.

Step 1.4: Determination of $EG_{BL,FF,y}$

In the baseline scenario for the project activity, there is no electricity that would be generated with fossil fuels at the project site, therefore, according to ACM0018, $EG_{BL,FF,y}$=0.

Step 1.5: Determination of $EG_{BL,grid,y}$

In the baseline scenario for the project activity, the electricity supplied by the project will replace equivalent amount of electricity in the power grid, therefore, according to ACM0018, $EG_{BL,grid,y}=EG_{PJ,y.}$

Step 1.6 : Determination of $EG_{BL,FF/grid,y}$

$EG_{BL,FF,grid,y}$ represents the amount of electricity that could be generated in the baseline in the grid or at the project site using fossil fuels. $EG_{BL,FF/grid,y}$ corresponds to the remainder of electricity generation,i.e.the amount that exceeds the minimum electricity that would be generated by power plants in electricity grid ($EG_{BL,grid,y}$), the minimum amount of electricity that could be generated with fossil fuels at the project site ($EG_{BL,FF,y}$), and the amount of electricity that would be generated with biomass residues at the project site ($EG_{BL,BR,y}$). Accordingly, $EG_{BL,FF/grid,y}$ is calculated as follows:

$EG_{BL,\ FF/\ grid,y} = EG_{PJ,\ y} - EG_{BL,BR,y} - EG_{BL,FF,y} - EG_{BL,grid,y}$

Where:

$EG_{BL,FF/grid,y}$ =Amount of electricity that could be generated in the baseline either by power plants in the electricity grid or by power plants at the project site using fossil fuels in year y (MWh)

$EG_{PJ,y}$ =Electricity generated in power plants included in the project boundary in year y (MWh)
$EG_{BL,BR,y}$ =Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in baseline in year y (MWh)

$EG_{BL,FF,y}$ =Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year y(MWh)

$EG_{BL,grid,y}$ =Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year y (MWh)

According to the analysis from Step 1.3 to step 1.5, the above function about be calculated as below:

$EG_{BL,\ FF/grid,y} = EG_{PJ,\ y} - EG_{BL,BR,y} - EG_{BL,FF,y} - EG_{BL,grid,y} = EG_{PJ,y}-0-0-EG_{PJ,y}=0$

Step 1.7: Determination of $EF_{BL,FF,y}$

$EF_{BL,FF,y}$ should be determined using Option A or Option B below. If fossil fuel power plants were operated at the project site prior to the implementation of the project activity, either Option A or Option B can be used to determine $EF_{BL,FF,y}$. For new power plants that would be constructed at the project site in the baseline scenario, Option B should be used.

According to the analysis of baseline scenario in section B.4, the project is a newly built power-only project and no power plants were or would be operated at the project site prior to the implementation of the project in the baseline scenario, then it is not applicable.

Step 1.8: Determination of $EF_{grid,CM,y}$

$EF_{grid,CM,y}$ should be determined as the combined margin CO_2 emission factor for grid connected power generation in year y, calculated using the latest approved version of the "Tool to calculate the emission factor for an electricity system". The Tool was applied in the following steps:

Sub-step 1. Identify the relevant electric power system

In accordance with the Tool to Calculate the Emission Factor for an Electricity System, the project electricity system of the Project is identified according to the delineation of the project electricity system and connected electricity systems published by China's DNA.

Electricity generated by the Project will be delivered to the Anhui Province. According to the China's 2019 Baseline Emission Factors for Regional Power Grid in China issued by China's DNA which provides the delineation of relevant electric power systems, the East China Power Grid is the relevant electric power system of the Project.

Sub-STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Option I (only grid power plants are included in the calculation) provided in Tool to Calculate the Emission Factor for an Electricity System is chosen to calculate the operating margin and build margin emission factor.

Sub-STEP 3. Select an operating margin (OM) method

Four methods are provided in the Tool to calculate the emission factor for an electricity system for the calculation of Operating Margin Emission Factor(s) ($EF_{grid,OM,y}$), they are

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM.

As per the Tool to calculate the emission factor for an electricity system, with reference to the 2019 Baseline Emission Factors for Regional Power Grid in China, method (a) simple OM is employed for calculation of the operating margin emission factor(s) ($EF_{grid,OM,y}$) of the Project.

As per the Tool to calculate the emission factor for an electricity system, the simple OM method only can be used when low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Among the total electricity generation of the East China Power Grid which the Project is connected to, the amount of low-cost/must run resources are all less than 50%. Thus, the method (a) simple OM can be used to calculate the baseline emission factor of operating margin ($EF_{grid,OM,y}$) for the Project.

The emission factors were determined ex ante (A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation) and will not be updated during the first crediting period.

Sub-STEP 4. Calculate the operating margin emission factor ($EF_{grid,OMsimple,y}$) according to the selected method

Three options are provided in the Tool to Calculate the Emission Factor for an Electricity System for the determination of the simple OM emission factor ($EF_{grid,OMsimple,y}$). Since the data on fuel consumption, net electricity generation, the average efficiency and the fuel type(s) used in each power unit in the East China Power Grid are not available, Option A and B can't be used. According to 2019 Baseline Emission Factors for Regional Power Grid in China, nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known as stated in step 2 above, Option C (based on data 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) is adopted to calculate the simple OM emission factor ($EF_{grid,OMsimple,y}$). The formula of $EF_{grid,OMsimple,y}$ calculation is

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y}$$

where:

$EF_{grid,OMsimple,y}$ is the simple operating margin CO_2 emission factor in year y (tCO_2e /MWh);

$FC_{i,y}$ is the amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit);

$NCV_{i,y}$ is the net calorific value (energy content) of fossil fuel type i in year y (GJ/ mass or volume unit);

$EF_{CO2,i,y}$ is the CO_2 emission factor of fossil fuel type i in year y (tCO_2e /GJ);

EG_y is the 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 are all fossil fuel types combusted in power sources in the project electricity system in year y;

y is the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation.

According to 2019 Baseline Emission Factors for Regional Power Grid in China,

$EF_{grid,OMsimple,y}$=0.7921tCO_2/MWh

Sub-step 5 Calculate the build margin emission factor

Considering data availability, CDM EB accepts the following deviation in application of methodology2:
1) Use of capacity additions during the last 1~3 years for estimating the build margin emission factor for grid electricity.

2) Use of weights estimated using installed capacity in place of annual electricity generation.

And it is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

Therefore for the Project: First, calculate the share of different power generation technology in recent capacity additions. Second, calculate the weight for capacity additions of each power generation technology. And finally calculate the emission factor using the efficiency level of the best technology commercially available in China.

According to the Tool to calculate the emission factor for an electricity system, project participants shall choose between one of the following two options to calculate the Build Margin Emission Factor ($EF_{grid,BM,y}$).

Option 1. Calculate the Build Margin emission factor ($EF_{grid,BM,y}$) ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission.

Option 2. For the first crediting period, the Build Margin emission factor ($EF_{grid,BM,y}$) must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, the Build Margin emission factor ($EF_{grid,BM,y}$) should be calculated ex- ante, as described in option 1 above.

Option 1 is employed by the Project.

According to the Tool to calculate the emission factor for an electricity system, calculate the Build Margin Emission Factor ($EF_{grid,BM,y}$) to the using the following equation:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

where:

$EF_{grid,BM,y}$ is the build margin CO_2 emission factor in year y (tCO_2/MWh);

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

[2] Http://cdm.unfccc.int/Projects/Deviations.

$EF_{EL,m,y}$ is the CO_2 emission factor of power unit m in year y (tCO_2/MWh);

m is the power units included in the build margin;

y is the most recent historical year for which power generation data is available.

Since the data of installed capacity can not be separated into coal fired, oil fired and gas fired currently, BM is calculated by the following steps and formula:

Step a. Calculate the power generation emissions of solid fuel, liquid fuel and gas fuel and each share in the total emissions based on the Energy Balance Table of the most recent year.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}$$

Where

$FC_{i,j,y}$ is the amount of fuel i (in a mass or volume unit) consumed by power plant j in year(s) y;

$NCV_{i,y}$ is the net calorific value (energy content) of fossil fuel type i in year y (GJ/ mass or volume unit);

$EF_{CO2,i,y}$ is the CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ);

COAL, OIL and GAS are footnote group for solid fuels, liquid fuels and gas fuels.

Step b. Calculate the emission factor for thermal power of the grid based on the result of Step a and the efficiency level of the best technology commercially available in China.

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$$

Where $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are emission factor proxies of efficiency level of the best coal fired, oil fired and gas fired power generation technology commercially available in China.

Step c. Calculate BM of the grid based on the result of Step b and the share of thermal power of recent 20% capacity additions.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal}$$

Where CAP_{Total} is total capacity additions while $CAP_{Thermal}$ is capacity additions of thermal power.

The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the China Energy Statistical Yearbook. The emission factors and oxidation factors of the fuels employed are obtained from Table 1.3 and Table 1.4 on page 1.21-1.24 of volume 2 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

With reference to the 2019 Baseline Emission Factors for Regional Power Grid in China, the Build Margin emission factor ($EF_{grid,BM,y}$) of the East China Power Grid is 0.3870 tCO_2e/MWh.

Step 6. Calculate the combined margin emissions factor

Based on the Tool to calculate the emission factor for an electricity system, the baseline emission factor ($EF_{grid,CM,y}$) is calculated as the weighted average of the operating margin emission factor ($EF_{grid,OM,y}$) and the build margin emission factor ($EF_{grid,BM,y}$), as

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times \omega_{OM} + EF_{grid,BM,y} \times \omega_{BM}$$

According to the Tool to calculate the emission factor for an electricity system, the weight w_{OM} is 0.5 and the weight w_{BM} is 0.5 for biomass power projects. Therefore the combined baseline emission factor

$EF_{grid,CM,y}$ =0. 25×0.7921+0.75×0.3870 =0.48828 (tCO_2e/MWh).

According to above analysis, $EF_{BEL,EL,y}$= $EF_{grid,CM,y}$=0.48828 (tCO_2e/MWh).

Step 2: Determination of $BE_{BR,y}$

PP decides to exclude the calculation of baseline emissions due to decay of biomass residues. Therefore, **$BE_{BR,y}$=0**

4.2 Project Emissions

According to ACM0018_v6.0,

$PE_y=PE_{Biomass,y}+PE_{FF,y}+PE_{CBR,y}+PE_{BG2,y}$

Where,

PE_y= Project emissions during year y (tCO_2e)

$PE_{Biomass,y}$= Project emissions associated with the biomass and biomass residues in year y ($t\ CO_2$)

$PE_{FF,y}$= Emissions during the year y due to fossil fuel consumption (tCO_2)

$PE_{CBR,y}$= Emissions from the combustion of biomass residues during the year y (tCO_2e)

$PE_{BG2,y}$= Emissions from the production of biogas in year y (tCO_2e)

The project activity will not claim the baseline emission reductions from decay of biomass residues, therefore, $PE_{CBR,y}$ is excluded.

The project does not include biogas, therefore, $PE_{BG2,y}$ is not included.

Therefore,

$PE_y = PE_{Biomass,y} + PE_{FF,y}$

Where,

$PE_{Biomass,y}$= Project emissions associated with the biomass and biomass residues in year y ($t CO_2$)

$PE_{FF,y}$= Emissions during the year y due to fossil fuel consumption (tCO_2)

Determination of $PE_{Biomass,y}$

The biomass residue is not processed outside of the project site. The biomass will be transported directly to the plant storage site, so there will be no electricity use off- site. $PE_{BRP}=0$

$PE_{Biomass,y}$ shall be determined by applying the provisions form the 'TOOL16 Project and leakage emissions from biomass(version 05.0)' and involve the following emission sources:

a) Project emissions resulting from the cultivation of biomass in a dedicated plantation of a CDM project activity that uses biomass (PE_{BC});

This project does not involve biomass from dedicated plantation. Therefore, PE_{BC} is not involved in the project emissions.

b) Project emissions resulting from the transportation of biomass (PE_{BT});

This project consumes biomass residue, not biomass. Therefore, PE_{BT} is not involved in the project emissions.

c) Project emissions resulting from the processing of biomass (PE_{BP});

This project does not involve biomass. Therefore, PE_{BP} is not involved in the project emissions.

d) Project emissions resulting from the transportation of biomass residues (PE_{BRT}) if the project consumes biomass residues;

This project includes the transportation of biomass residues, therefore, PE_{BRT} in included in this project. In tool 16, $PE_{BRT,y}$ is used.

e) Project emissions resulting from the processing of biomass residues (PEBRP) if the project consumes biomass residues.

This project does not involve biomass residues processing outside of the project site. Therefore, PE_{BRP} is not involved in the project emissions. The onsite electricity consumption are included in the $EG_{PJ,aux,y}$. The fossil fuel consumed are included in $PE_{FF,y}$

From above analysis, **$PE_{Biomass,y} = PE_{BRT,y}$**

Determination of $PE_{BRT,y}$

$PE_{BRT,y}$ are determined by the 'TOOL12 Project and leakage emissions from transportation of Freight (version 01.1.0)'.

$PE_{BRT,y}$ in ACM0018 and TOOL16 equals with $PE_{TR,m}$ in 'TOOL12 Project and leakage emissions from transportation of Freight (version 01.1.0)'.

For the Project, transportation is undertaken by vehicles. According to "Project and leakage emissions from road transportation of freight", project participants may choose between two different approaches to determine emissions: monitoring fuel consumption (Option A) or using conservative default values (Option B). Option B is adopted by the project, and, $PE_{TR,y}$ are determined as follows:

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

Where:

$PE_{TR,m}$ = Project emission from road transportation of freight in monitoring period m (tCO_2)

$D_{f,m}$ = Return trip road 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) . 310,000 ton is used for ex-ante calculation.

$EF_{CO2,f}$ = Default CO_2 emission factor for freight transportation activity f (gCO_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 around the site of the Project, and all the values of Df,m is chosen to be 100km for conservativeness.

According to "Project and leakage emissions from road transportation of freight", the default value of emission factors for Light vehicles and Heavy vehicles are 245 (gCO_2 /t km) and 129 (gCO2/t km), respectively. For conservativeness, the value of 245 (gCO_2/t km) is adopted for PETR,m calculations no matter the freights are transported by Light vehicles or Heavy vehicles.

$$PE_{biomass,y} = PE_{BRT,y} = PE_{TR,m} = PE_{TR,m}$$

$$= \sum D_{f,m} \times FR_{f,m} \times EF_{CO2,f} \times 10^{-6} = 31 \times 10^{4} \times 100 \times 245 \times 10^{-6} = 7{,}595\ tCO_2e$$

Determination of $PE_{FF,y}$

According to ACM0018, the following emission sources shall be included in determining $PE_{FF,y}$:

(a) Emissions from on-site fossil fuel consumption for the generation of electric power. This includes all fossil fuels used at the project site in heat generators (e.g. boilers) for the generation of electric power;

(b) Emissions from on-site fossil fuel consumption of auxiliary equipment and systems related to the generation of electric power. This includes fossil fuels required for the operation of auxiliary equipment related to the power plants (e.g. for pumps, fans, cooling towers, instrumentation and control, etc.) which are not accounted in (a) above;

(c) If any fossilized or non-biodegradable materials are used in the processing of biomass and incorporated in the processed biomass (e.g. binders) then emissions arising from those materials shall be accounted for when the processed biomass are combusted. For that purpose those materials shall be deemed as fossil fuels. If net calorific values, carbon content and/or emission factors of those materials are available they should be used, otherwise the net calorific values, carbon content and/or emission factors of the most carbon intensive fossil fuel available in the country should be used.

The latest approved version TOOL03 shall be used to calculate $PE_{FF,y}$. All combustion processes j as described in the bullets above shall be included.

$PE_{FF,y}$ in ACM0018 equals with $PE_{FC,j,y}$ in TOOL03 'Tool to calculate project or leakage CO2 emissions from fossil fuel combustion(version 03.0)'

$$PE_{FC,j,y} = \sum_{i} FC_{i,j,y} \times COEF_{i,y}$$

Where

$FC_{i,j,y}$ = Is the quantity of fuel type *i* combusted in process *j* during the year *y* (mass or volume unit/yr) . 125 ton diesel is used for ex-ante calculation.

$COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type *i* in year *y* (tCO_2/mass or volume unit)

I = Are the fuel types combusted in process *j* during the year *y*

TOOL 03 gvies two options to calculate $COEF_{i,y.}$ This project chooses option B.

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*, as follows:

$$COEF_{i,y} = \_NCV_{i,\_y} \times EF_{CO2,i,y} \_$$

Where

NCV_i = Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit) . 43.3GJ/t as per IPCC default value.

$EF_{CO2,i}$ = Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ) . 0.0748tCO_2e/GJ as per IPCC default value.

$PE_{FF,y}$= $FC_{i,j,y}$*$NCV_{diesel,y}$*$EF_{CO2e,diesel,y}$=125t*43.3GJ/t*0.0748 tCO_2e/GJ =405t

Through above analysis, the project emissions include emissions from road transportation of freight and fossil fuel consumption emissions.

PE_y=$PE_{biomass,y}$+ $PE_{FF,y=}$ $PE_{TR,m+}$ $PE_{FF,y=}$7,595t +405t=8,000t

4.3 Leakage

The leakage estimation is analyzed according to tool 16.

1) Leakage due to shift of pre-project activities resulting from cultivation of biomass in a dedicated plantation in year y ($LE_{BC,y}$)

This project does not include biomass from dedicated plantation. Therefore this leakage is excluded.

2) Leakage due to diversion of biomass residues from other applications in year y ($LE_{BR,Div,y}$)

The biomass consumed in this project is waste biomass. The biomass would have been dumped in absence of the project. According to the local survey conducted by Agriculture bureau of Guzhen county in 2020, there is abundant biomass with radium of 50km around the project site. The available biomass is 25% larger than the project consumption amount.

Biomass residue	Annual available amount (10^4 tonnes)	Other use,excluding the Project (10^4 tonnes)	The Project use (10^4 tonnes)	Annual Available amount/Total annual use
Rice straw	57.010	16.8	6.4	628%
Peanut straw	36.04	13.10	3.2	717%
Maize straw	56.07	16.90	5.3	739%
Wood residue	93.17	21.00	16.1	448%

3) Leakage due to the transportation of biomass residues outside of the project boundary in year y ($LE_{BRT,y}$)

The biomass is transported within 50km, and the emissions due to the transportation has been included in project emissions. $LE_{BRT,y}=0$

4) Leakage due to processing of biomass residues outside the project boundary in year y ($LE_{BRP,y}$)

This project does not include processing of biomass residues outside the project boundary. Therefore, $LE_{BRP,y}=0$

4.4 Net GHG Emission Reductions and Removals

Baseline emission

As stated in section 4.3,

$$BE_y = BE_{EL,y} = (EG_{PJ,gross,y} - EG_{PJ,aux,y}) \times EF_{grid,CM,y}$$

According to the FSR of the Project, the electricity generation is estimated to be 210,000 MWh, and the auxiliary consumption is 23,100 MWh. According to the 2019 Baseline Emission Factors for Regional Power Grid in China, the baseline emission factor of the Project is 0.48828 tCO2e/MWh.

The baseline emissions are calculated as

$BE_y = BE_{EL,y} = (EG_{PJ,gross,y} - EG_{PJ,aux,y}) \times EF_{grid,CM,y} = (210{,}000-23{,}100) \times 0.48828 = 91{,}258 tCO_2e.$

Project emissions

1. Carbon dioxide emissions from combustion of fossil fuels for transportation of biomass residues to the project plant $PE_{BRT,y}$

All the biomass residues supply sites are within 50 kilometers away around the site of the Project, therefore all the values of $D_{f,m}$ is chosen to be 100km for conservativeness.

According to the registered PDD, the value of $FR_{f,m}$ is 310000ton. This value is used for ex-ante calculation and the actual value will be monitored during the monitoring period.

According to "Project and leakage emissions from road transportation of freight", the default value of emission factors for Light vehicles and Heavy vehicles are 245 (gCO_2 /t km) and 129 (gCO_2/t km), respectively. For conservativeness, the value of 245 (gCO_2/t km) is adopted for $PE_{TR,m}$ calculations no matter the freights are transported by Light vehicles or Heavy vehicles.

Therefore:

$PE_{BRT,y} = PE_{TR,m} = PE_{TR,m} = \sum D_{f,m} \times FR_{f,m} \times EF_{CO2,f} \times 10^{-6} = 31 \times 10^4 \times 100 \times 245 \times 10^{-6} = 7{,}595\ tCO_2e.$

2. Carbon dioxide emissions from on-site consumption of fossil fuel ($PE_{FF,y}$)

The Project is estimated to consume 125t diesel a year. The diesel is consumed by the on-site vehicle that are used to transport or treat the biomass within the plant. The $NCV_{diesel,y}$ is 43.3 GJ/t and $EF_{CO2,diesel,y}$ is 0.0748tCO_2e/GJ as IPCC default value.

$PE_{FF,y} = FC_{diesel,project,y} * NCV_{diesel,y} * EF_{CO2e,diesel,y} = 125 \times 43.3 \times 0.0748 = 405 tCO_2e.$

$PE_y = PE_{BRT,y} + PE_{FF,y} = 7{,}595\ tCO_2e + 405 tCO_2e = 8{,}000\ tCO_2e$

Leakage emission

As analysis of Section B 6.1 above, there is no leakage caused by the project activity.

Estimated emission reductions

$ERy = BEy - PEy - LE_y = 91{,}258 - 8000 - 0 = 83{,}258\ tCO_2e/yr$

Year	Estimated baseline	Estimated project	Estimated leakage	Estimated net GHG emission

	emissions or removals (tCO_2e)	emissions or removals (tCO_2e)	emissions (tCO_2e)	reductions or removals (tCO_2e)
03/01/2021-31/12/2021	90,758	7,956	0	82,802
01/01/2022-31/12/2022	91,258	8,000	0	83,258
01/01/2023-31/12/2023	91,258	8,000	0	83,258
01/01/2024-31/12/2024	91,258	8,000	0	83,258
01/01/2025-31/12/2025	91,258	8,000	0	83,258
01/01/2026-31/12/2026	91,258	8,000	0	83,258
01/01/2027-31/12/2027	91,258	8,000	0	83,258
01/01/2028-31/12/2028	91,258	8,000	0	83,258
01/01/2029-31/12/2029	91,258	8,000	0	83,258
01/01/2030-31/12/2030	91,258	8,000	0	83,258
01/01/2031-02/01/2031	500	44	0	456
Total	912,580	80,000	0	832,580

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/MWh
Description	Simple operating margin CO_2 emission factor in year y
Source of data	"2019 Baseline Emission Factors for Regional Power Grids in China" issued by China DNA[3]
Value applied	0.7921
Justification of choice of data or description of measurement methods and procedures applied	Official public data from NDRC

[3] http://www.mee.gov.cn

Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/MWh
Description	Build margin CO_2 emission factor in year y
Source of data	"2019 Baseline Emission Factors for Regional Power Grids in China" issued by China DNA[4]
Value applied	0.3870
Justification of choice of data or description of measurement methods and procedures applied	Official public data from NDRC
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	w_{OM}
Data unit	%
Description	Weighting of operating margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (v07.0)
Value applied	25
Justification of choice of data or description of measurement methods and procedures applied	Based on the requirements of "Tool to calculate the emission factor for an electricity system" (v07.0)
Purpose of Data	Calculation of baseline emissions
Comments	/

[4] http://www.mee.gov.cn

Data / Parameter	w_{BM}
Data unit	%
Description	Weighting of build margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (v 07.0)
Value applied	75
Justification of choice of data or description of measurement methods and procedures applied	Based on the requirements of "Tool to calculate the emission factor for an electricity system" (v07.0)
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	Biomass residues categories and quantities used for the selection of the baseline scenario selection and assessment of additionality
Data unit	- Type; - Source; - Fate in the absence of the project activity (scenarios B1); - Use in the project scenario (scenarios P5); - Quantity (tonnes on dry-basis)
Description	Refer to Table B.3 in section B.4
Source of data	Feasibility Study Report
Value applied	

No.	Biomass residue type	Biomass residues source	Biomass residues fate in the absence of the project activity	Biomass residues use inproject scenario	Biomass residues quantity (1000 tonnes on dry-basis)
1	Rice straw	Offsite from local farmer	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	4.80
2	Peanut straw	Offsite from local farmer	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	2.56
3	Maize straw	Offsite from local farmer	Dumped (B1)	Electricity generation on-site	3.45

					(biomass-only boiler)	
	4	Wood residues	Offsite from local farmer	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	8.86
Justification of choice of data or description of measurement methods and procedures applied	Feasibility Study Report was finished by a qualified institute and approved by government. It is a reliable source.					
Purpose of Data	Calculation of project emissions					
Comments	/					

Data / Parameter	$EF_{CO2,f}$
Data unit	gCO_2/tkm
Description	Default CO_2 emission factor for freight transportation activity f
Source of data	"Project and leakage emissions from transportation of freight" (v01.1.0)
Value applied	245
Justification of choice of data or description of measurement methods and procedures applied	In "Project and leakage emissions from transportation of freight" (v01.0.0), the default value of emission factors for Light vehicles and Heavy vehicles are 245 (gCO_2/tkm) and 129 (gCO_2/tkm) respectively. For conservativeness, project participants will use 245 (gCO_2/tkm) for $PE_{TR,m}$ calculations, no matter the freights are transported by Light vehicles or Heavy vehicles.
Purpose of Data	Calculation of project emissions
Comments	/

5.2 Data and Parameters Monitored

Data / Parameter	Biomass categories and quantities used in the project activity
Data unit	- Type (i.e. rice straw, peanut straw, maize straw, wood residues); - Source (obtained from identified biomass residues producers, etc.); - Fate in the absence of the project activity (scenarios B1); - Use in the project scenario (scenarios P5);

<table>
<tr><td></td><td>- Quantity (tonnes on dry-basis)</td></tr>
<tr><td>Description</td><td>These quantities should be updated every year of the crediting period as part of the monitoring plan so as to reflect the actual use of biomass in the project scenario.

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 types 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.</td></tr>
<tr><td>Source of data</td><td>On-site measurements</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Use calibrated weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Data monitored continuously and aggregated as appropriate</td></tr>
<tr><td>Value applied</td><td>
<table>
<tr><th>No.</th><th>Biomass residue type</th><th>Biomass residues source</th><th>Biomass residues fate in the absence of the project activity</th><th>Biomass residues use in project scenario</th><th>Biomass residues quantity (10000 tonnes on dry- basis)</th></tr>
<tr><td>1</td><td>Rice straw</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>4.80</td></tr>
<tr><td>2</td><td>Peanut straw</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>2.56</td></tr>
<tr><td>3</td><td>Maize straw</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>3.45</td></tr>
<tr><td>4</td><td>Wood residues</td><td>Offsite from local farmer</td><td>Dumped (B1)</td><td>Electricity generation on-site (biomass-only boiler)</td><td>8.86</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>Belt scale, with accuracy of 1.0.</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>
</table>

Purpose of data	This parameter is related to the procedure for the selection of the baseline scenario selection and assessment of additionality.
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 type n in the region - Quantity of biomass residues of type n that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region - Availability of a surplus of biomass residues type 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	Surveys or statistics
Description of measurement methods and procedures to be applied	At the validation stage for biomass residues categories identified ex ante, and always that new biomass residues categories are included during the crediting period
Frequency of monitoring/recording	/
Value applied	According to the biomass survey conducted by Agriculture bureau of Guzhen county in 2020
Monitoring equipment	/
QA/QC procedures to be	/

Biomass Type	Rice straw	Peanut straw	Maize straw	Wood residues
Total available amount in local area (10,000 tons)	57.010	36.040	56.070	93.170
Amount for other applications outside of the project (10,000 tons)	16.800	13.100	16.900	21.000
Biomass utilized by the project (10,000 tons)	6.400	3.200	5.300	16.100
Available Biomass/Total biomass utilized including this project	628%	717%	739%	448%

applied	
Purpose of data	Calculation of leakage
Calculation method	/
Comments	/

Data / Parameter	Moisture content of the biomass residues
Data unit	% Water content
Description	Moisture content of each biomass residue type *k*
Source of data	On-site measurements
Description of measurement methods and procedures to be applied	The moisture content should be monitored for each batch of biomass of homogeneous quality. The weighted average should be calculated for each monitoring period and used in the calculations.
Frequency of monitoring/recording	Continuously measurement and record at least annually.
Value applied	Rice straw: 25% Maize straw: 35% Peanut straw: 20% Wood residues: 45%
Monitoring equipment	Moisture analyzer, with accuracy of ±0.1mg
QA/QC procedures to be applied	/
Purpose of data	To determine the biomass weight on dry basis
Calculation method	/
Comments	/

Data / Parameter	$NCV_{n,y}$
Data unit	GJ/tonnes of dry-basis
Description	Net calorific value of biomass residues of category n in year y
Source of data	Default value from public literature or on-site measurement
Description of	From public literature or on-site measurement

measurement methods and procedures to be applied	
Frequency of monitoring/recording	If monitoring data is used, the data is monitored at least every six months, taking at least three samples for each measurement
Value applied	/
Monitoring equipment	/
QA/QC procedures to be applied	/
Purpose of data	This parameter is not included in the ER calculation. It is only used for crosscheck of energy balance
Calculation method	/
Comments	/

Data / Parameter	$FC_{diesel\ oil,y}$
Data unit	t/yr
Description	Quantity of the diesel oil combusted during the year y
Source of data	On-site measurements
Description of measurement methods and procedures to be applied	Use flow meter, and the volume will be converted into weight using a conservative 0.85 g/ml specific gravity value (as per automobile diesel fuels standard)
Frequency of monitoring/recording	Continuously measurement and record at least annually.
Value applied	125 for ex-ante and the actual value will be monitored.
Monitoring equipment	Volume meter
QA/QC procedures to be applied	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Purpose of data	Calculation of project emissions
Calculation method	/
Comments	/

Data / Parameter	$EF_{CO2,diesel\ oil,y}$
Data unit	tCO_2/GJ
Description	CO_2 emission factor of the diesel oil in year y
Source of data	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Description of measurement methods and procedures to be applied	/
Frequency of monitoring/recording	/
Value applied	0.0748 for diesel oil
Monitoring equipment	/
QA/QC procedures to be applied	Default value for diesel oil.
Purpose of data	Calculation of project emissions
Calculation method	/
Comments	/

Data / Parameter	$NCV_{diesel\ oil,y}$
Data unit	GJ/t
Description	Net calorific value of the diesel oil in year y
Source of data	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Description of measurement methods and procedures to be applied	Default value for diesel oil. Any future revision of the IPCC Guidelines should be taken into account

Frequency of monitoring/recording	/
Value applied	43.3
Monitoring equipment	/
QA/QC procedures to be applied	Default value for diesel oil.
Purpose of data	Calculation of project emissions
Calculation method	/
Comments	/

Data / Parameter	$D_{f,m}$
Data unit	Km
Description	Return trip distance between the origin and destination of freight transportation activity f in monitoring period m.
Source of data	Default value
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.
Frequency of monitoring/recording	Each verification
Value applied	100
Monitoring equipment	/
QA/QC procedures to be applied	Default value
Purpose of data	Calculation of project emissions
Calculation method	/
Comments	The biomass collection radius is 50km from the Project site. For ex-ante and for conservative estimation, 50*2=100km is used as the return trip distance from biomass supply site to the project site

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	Records of project participant
Description of measurement methods and procedures to be applied	Use weighbridge. The data is recorded in the log book.
Frequency of monitoring/recording	Continuous on-site measurements and monthly recording by the proposed project owner.
Value applied	310,000
Monitoring equipment	Weighbridge, with accuracy of class III.
QA/QC procedures to be applied	The weighbridge will be calibrated according to national standard. Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Purpose of data	Calculation of project emissions
Calculation method	/
Comments	/

Data / Parameter	$EG_{PJ,gross,y}$
Data unit	MWh
Description	Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y (MWh)
Source of data	Measured by electricity meter
Description of measurement methods and procedures to be applied	The electricity is monitored continuously by electricity meter, and the cumulative data is recorded.
Frequency of monitoring/recording	Data monitored continuously and aggregated annually.

Value applied	210,000 for ex-ante estimation and the actual value will be monitored and recorded.
Monitoring equipment	Electricity meter, with accuracy of 0.5S
QA/QC procedures to be applied	The electricity meter will be calibrated according to national standard.
Purpose of data	Calculation of baseline emissions
Calculation method	/
Comments	/

Data / Parameter	$EG_{PJ,aux,y}$
Data unit	MWh
Description	Total auxiliary electricity consumption required for the operation of the proposed project site in year y
Source of data	Measured by electricity meter
Description of measurement methods and procedures to be applied	The electricity is monitored continuously by electricity meter, and the cumulative data is recorded.
Frequency of monitoring/recording	Data monitored continuously and aggregated annually.
Value applied	23,100
Monitoring equipment	The electricity is monitored by electricity meter with national standard. The accuracy of the electricity meter is 0.5S.
QA/QC procedures to be applied	The electricity meter will be calibrated according to national standard.
Purpose of data	Calculation of baseline emissions
Calculation method	/
Comments	/

Data / Parameter	$EG_{PJ,imp,y}$
Data unit	MWh

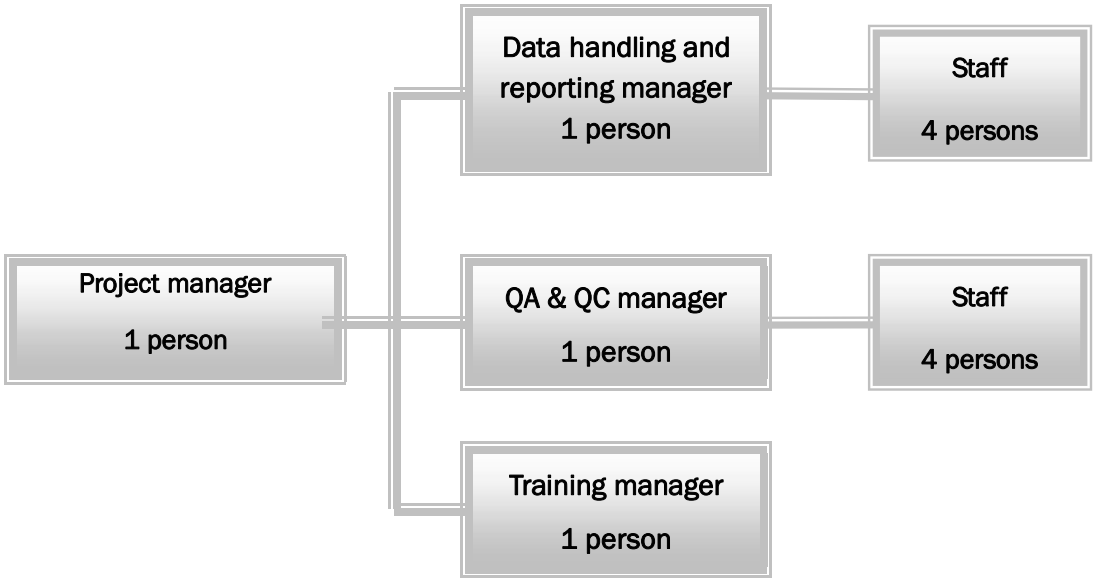
Description	Project electricity imports from the grid in year y
Source of data	Measured by electricity meter
Description of measurement methods and procedures to be applied	The electricity is monitored continuously by electricity meter, and the cumulative data is recorded.
Frequency of monitoring/recording	Data monitored continuously and aggregated annually.
Value applied	0 for ex-ante and the actual data will be monitored.
Monitoring equipment	Electricity meter，with accuracy of 0.5S
QA/QC procedures to be applied	The electricity meter will be calibrated according to national standard.
Purpose of data	Calculation of baseline emissions Calculation of project emissions
Calculation method	/
Comments	/

5.3 Monitoring Plan

This monitoring plan will set out a number of monitoring tasks in order to ensure that all aspects of greenhouse gas (GHG) emission reductions for the project are controlled and reported. This requires an ongoing monitoring of the project to ensure performance according to its design and that the claimed Emission Reductions are actually achieved.

The following monitoring plan is set out according to the monitoring requirement in ACM0018

1. Monitoring structure



The project manager is responsible for 1) implementation and supervision of the monitoring activity 2) periodical training on the staff of the whole monitoring system 3) liaison of this CDM project.

The data handling and reporting staff is responsible for managing, processing and submitting data.

The QA & QC staff is responsible for calibration of meters and supervision of the whole process quality. The training manger is in charge of training plan and implementation for relevant staffs

2. **Installation of meters**

Instruments used are described in section B.5.2, and their locations are as below:

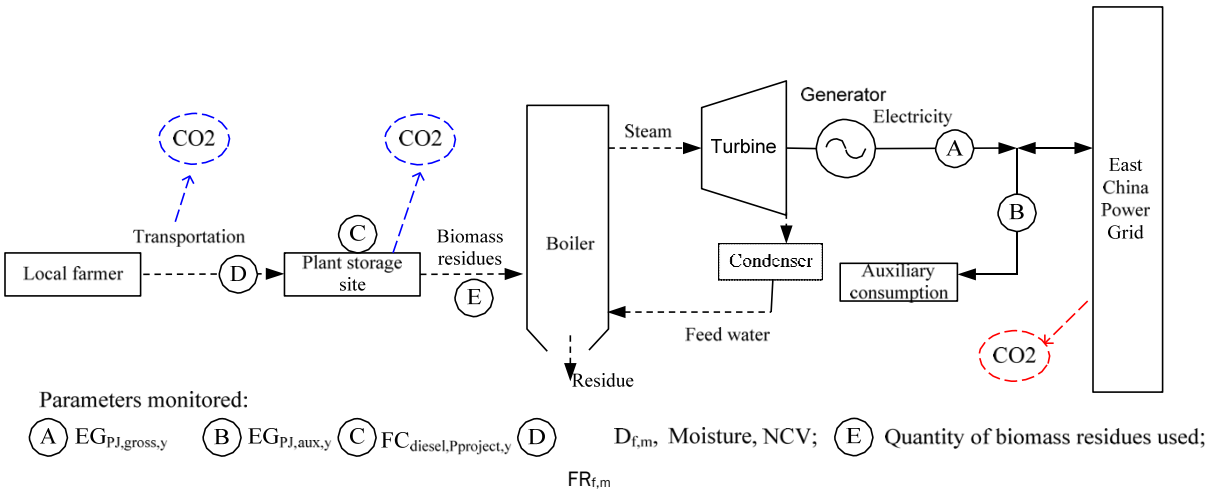


Figure 5. installation of meters

Table 9. Monitoring parameters and monitoring equipment information

Symbol	Monitored parameter	Description of the parameter	Monitoring equipment	Installation	Meter accuracy
A	$EG_{PJ,gross,y}$	Gross quantity of electricity generated	Electricity meter	Outlet of generator	0.5S
B	$EG_{PJ,aux,y}$	Total auxiliary electricity consumption required for the operation of the power plants at the project site	Electricity meter	In the power plant	0.5S
	$EG_{PJ,imp,y}$	Project electricity imports from the grid in year y	Electricity meter	Inlet of substation	0.5S
C	$FC_{diesel,project,y}$	Quantity of diesel combusted that are attributable to the project activity during the year y	Flow meter	In the plant	±0.3%
D	$D_{f,m}$	Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m	/	Vehicle operator	/
	$FR_{f,m}$	Total mass of freight transported in freight transportation activity f in monitoring period m	Weighbridge	In the plant	Class III
	Moisture content of the biomass residues	Moisture content of the biomass residues	Moisture analyzer,	In the laboratory of the plant	±0.1mg
E	Biomass categories and quantities used in the project activity	Quantity of biomass consumed	Belt scale	In the plant	1.0

3. Calibration

The meters, weigh bridges and moisture analyzers of the Project will be calibrated once a year by qualified third parties. And such calibration will be carried out in line with national norms.

4. Data Management System

Specific staff will be appointed by the project owner to take the overall responsibility for monitoring greenhouse gas emission reductions and keeping all the data collected as part of monitoring archived electronically and kept at least for two years after the end of the last crediting period.

Electronic data and documents, including readings from meters, will be regularly copied and archived via optical discs, and kept at least for two years after the end of the last crediting period.

Written data and documents, including receipts for cross-checking of data, will be copied and archived with an explanation of the department or company where the original copy is kept, and kept for at least two years after the end of the last crediting period.

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

The QA/QC manager is in charge of calibration and maintenance of the instruments to ensure their accuracy and reliability; verify the data monitored according to the QA/QC procedure described in table B.5.2 and the requirement of internal audit; report to the project manager immediately when find out any abnormal.