SHAOYANG XINNING LFG POWER GENERATION PROJECT

Document Prepared by Climate Bridge (Shanghai) Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Shaoyang Xinning LFG Power Generation Project (hereinafter referred to as the Project) is a landfill gas (LFG) recovery and utilization project developed by Xinning Xinzhongshui Bio-energy Power Generation Co., Ltd. The project is located at the Laohutuo Landfill in Hengqiao Village, Wantang Town, Xinning County, Shaoyang City, Hu'nan Province, P.R. China.

The Laohutuo Landfill started operating on 27-June-2013. It has a design capacity of 4,800,000 m^3 and a design lifetime of 30 years. The municipal solid waste (MSW) deposition rate is estimated to be 400 tons/day. The landfill handles MSW from the urban area of Xinning County, the nearby townships, and the Langshan Scenic Area.

The Project aims to collect LFG from the Laohutuo Landfill and utilize it for power generation The Project started construction on 30-December-2022. Two power generators of 1.067 MW each (2.134 MW in total) were installed and put into operation on 01-July-2023.

Before the implementation of the project activity, the LFG generated from the Laohutuo Landfill was released into the atmosphere; the equivalent amount of electricity generated by the project activity was supplied by the fossil-fuel-dominated Central China Power Grid (CCPG). The baseline scenario is the same as the conditions existing prior to the implementation of the project activity. Greenhouse gas (GHG) emissions will be reduced by avoiding CO_2 emissions from those fossil fuel-based power plants connected to the grid and by avoiding GHG emissions from releasing LFG into the atmosphere at the landfill site.

The Project is expected to supply a total of 86,994 MWh electricity to CCPG during the fixed 10-year crediting period (from 01-July 2023 to 30-June-2033), with an annual average amount of 8,699 MWh. It is estimated that the total GHG emission reductions will be 373,721 tCO_2e during the 10-year crediting period, with annual emission reductions of 37,372 tCO_2e.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation	-	VCS	Carbon Check (India) Private Ltd.	-

1.3 Sectoral Scope and Project Type

Sectoral scope	1: Energy industries (renewable-/non-renewable sources) 13: Waste handling and disposal
Project activity type	LFG Power Generation Project

1.4 Project Eligibility

1.4.1 General eligibility

The scope of the VCS Program includes:

1) The seven Kyoto Protocol greenhouse gases.

   The Project reduces CH_4 and CO_2 emissions. Both CH_4 and CO_2 are Kyoto Protocol GHGs.

2) Ozone-depleting substances (ODS).

   Not applicable. The Project does not involve ozone-depleting substances.

3) Project activities supported by a methodology approved under the VCS Program through the methodology development and review process.

   Not applicable. The project activity is not supported by a methodology approved under the VCS Program through the methodology development and review process.

4) Project activities supported by a methodology approved under an approved GHG program, unless explicitly excluded (see the Verra website for exclusions).

   The Project is supported by methodologies ACM0001 (Version 19.0) approved under the CDM program. The methodologies have been proven not to be excluded by checking the Verra website[1]. Also, the Project is not a fragmented part of a larger project or activity, thus within the scale and/or capacity limits of the methodologies. No single cluster of project activity instances exceeds the capacity limit.

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

   Not applicable. The Project is not a jurisdictional REDD+ program or a nested REDD+ project.

Meanwhile, the Project does not belong to the projects excluded in Table 2.1 of VCS Standard 4.7.

According to requirements of VCS Standard 4.7, Non-AFOLU projects applying a standardized method shall complete validation within two years of the project start date. The validation deadline of the Project is 30-June-2025 since it started operation on 01-July-2023. The Project meets the timeline criteria. In addition, The Project follows the requirements that the project is listed on the project pipeline with a status of under validation before the opening meeting. Furthermore, validation does not begin until the 30-day public comment period has begun.

[1] Methodologies - Verra

Therefore, the Project is eligible under the scope of the VCS Program.

1.4.2 AFOLU project eligibility

The project is not an AFOLU project.

1.4.3 Transfer project eligibility

The project is not a transfer project.

1.5 Project Design

☒ Single location or installation

☐ Multiple locations or project activity instances (but not a grouped project)

☐ Grouped project

1.5.1 Grouped Project Design

The project is not a grouped project.

1.6 Project Proponent

Organization name	**Xinning Xinzhongshui Bio-energy Power Generation Co., Ltd.**
Contact person	HU Shenghua
Title	Project Manager
Address	Hengqiao Village, Wantang Town, Xinning County, Shaoyang City, Hu'nan Province, P.R. China
Telephone	+86 021-23019950
Email	3542346576@qq.com

1.7 Other Entities Involved in the Project

Organization name	**Climate Bridge (Shanghai) Ltd.**
Role in the project	Consultant
Contact person	GAO Zhiwen

Title	General Manager
Address	Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, China 200120
Telephone	+86 021-62462036
Email	gao.zhiwen@climatebridge.com

1.8 Ownership

The project owner is Xinning Xinzhongshui Bio-energy Power Generation Co., Ltd. Evidence of project ownership following the VCS Program requirements includes Project Approval issued by Shaoyang Development and Reform Commission, EIA approval issued by Shaoyang Municipal Bureau of Ecology and Environment, Power Purchase Agreement signed with the purchaser National Grid Hunan Electric Power Co., Ltd. Xinning County Power Supply Branch, and the LFG Harmless Collection and Power Generation Agreement signed with the Laohutuo landfill, etc.

1.9 Project Start Date

Project start date	01-July-2023
Justification	According to VCS standards, the project start date is when activities that lead to the generation of GHG emission reductions or removals are implemented. For this project, the project start date is 01-July-2023 when the LFG collection system, LFG pre-treatment system, and electricity generation system of the project operated.

1.10 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☒ Ten years, fixed ☐ Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)
Start and end date of first or fixed crediting period	01-July-2023 to 30-June-2033

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

☒ < 300,000 tCO_2e/year (project)

☐ ≥ 300,000 tCO_2e/year (large project)

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO_2e)
01-Jul-2023 to 31-Dec-2023	16,498
01-Jan-2024 to 31-Dec-2024	33,977
01-Jan-2025 to 31-Dec-2025	35,073
01-Jan-2026 to 31-Dec-2026	36,043
01-Jan-2027 to 31-Dec-2027	36,937
01-Jan-2028 to 31-Dec-2028	37,718
01-Jan-2029 to 31-Dec-2029	38,431
01-Jan-2030 to 31-Dec-2030	39,061
01-Jan-2031 to 31-Dec-2031	39,647
01-Jan-2032 to 31-Dec-2032	40,170
01-Jan-2033 to 30-Jun-2033	20,166
Total estimated ERRs during the first or fixed crediting period	**373,721**
Total number of years	**10**
Average annual ERRs	**37,372**

1.12 Description of the Project Activity

The project activity, which collects LFG from the Laohutuo Landfill and utilizes it for power generation, includes the following installations:

- **Gas collection system**

The gas collection system includes wells, pipelines, and blowers. The blowers draw the LFG extracted from the gas wells, and then the LFG is transported via the pipelines to the pre-treatment system

- **Gas pre-treatment system**

Before entering the gas engines, the LFG is pre-treated so that impurities and moisture are removed to avoid corrosion of the electricity generation system. In addition, the pre-treatment system maintains the LFG in a continuously stable condition before the gas generator inlets. The pre-treatment includes filtration, dehumidification, cooling and pressurization

- **Power generation system**

Two gas generators with a rated capacity of 1.067 MW each have been installed and they are fed with the LFG to generate electricity, which is then exported to the grid. The service provided by the project is electricity. In the baseline scenario, the same amount of electricity would have been supplied by power plants connected to the grid. The technical parameters of the installed generators are shown in Table 1-1.

The technical parameters of the systems are shown in Table 1-1:

Table 1-1 Technical parameters of the systems

System	Parameter	Value
Gas collection system	Type	Integrated system with impermeable cover and vertical wells
	Capture efficiency	50%
Gas pre-treatment system	Type	QC-02, QC-03
	Number	1
	Capacity	1100 – 1400 Nm^3/h
Power generation system	Type	JGS 320 GS -L,L
	Number	2
	Rated capacity	1.067 MW
	Rated frequency	50 Hz
	Rated voltage	400 V
	Rated current	1540 A
	Lifetime	24 yr
	Manufacturer	Jenbacher GmbH & Co OG

1.13 Project Location

The Project is located in Hengqiao Village, Wantang Town, Xinning County, Shaoyang City, Hu'nan Province, P.R. China. The coordinates at the center of the project site are 26°29'39.41"N, 110°49'34.54"E.

The project location is shown in Figure 1-1.

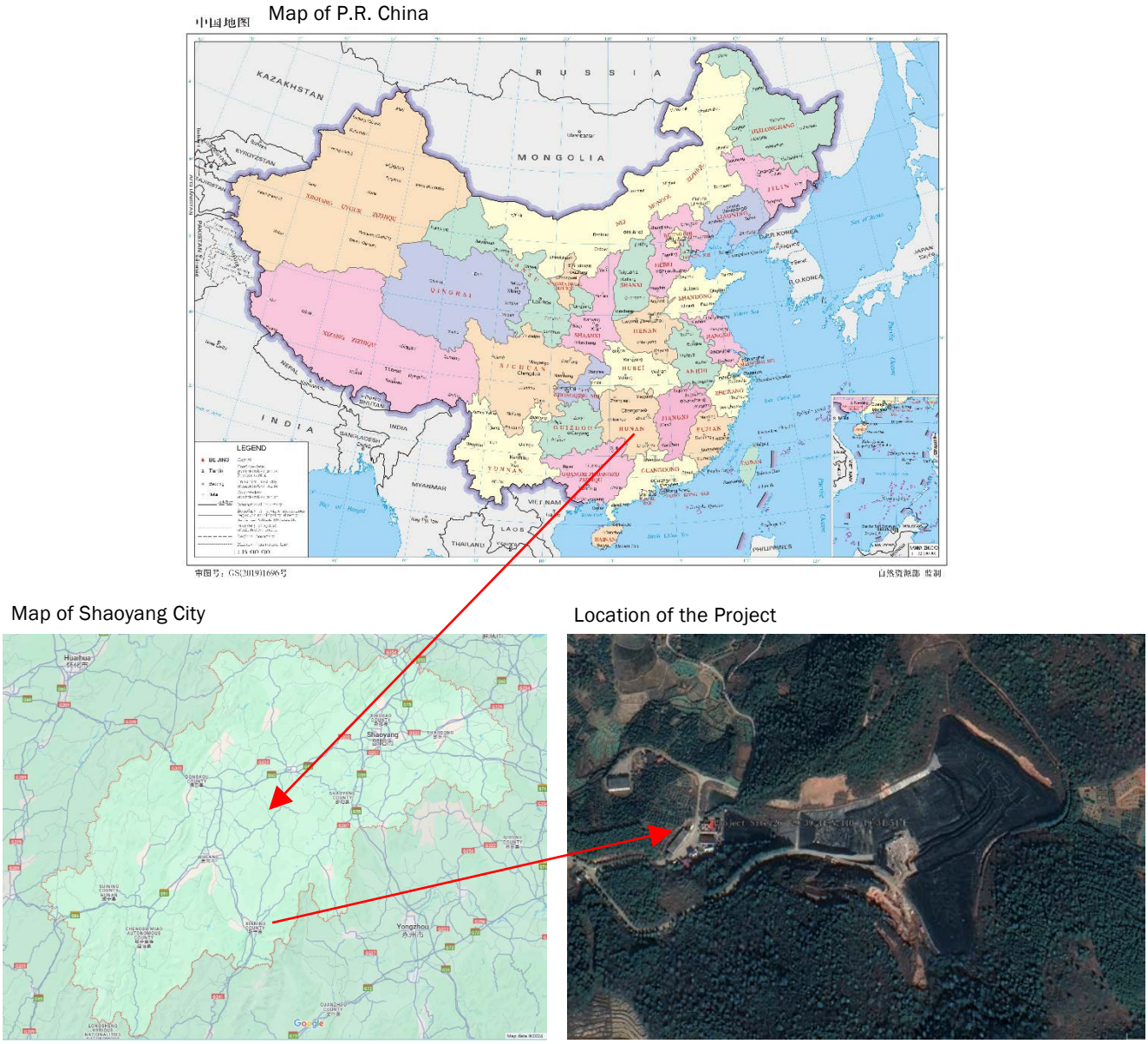


Figure 1-1 Location of the project

1.14 Conditions Prior to Project Initiation

Prior to the implementation of the project activity, the LFG generated from the Laohutuo landfill was released into the atmosphere; the equivalent amount of electricity supplied by the project activity was supplied by the fossil-fuel-dominated Central China Power Grid (CCPG).

The baseline scenario is the same as the conditions existing before the project initiation. Please refer to Section 3.4 (Baseline Scenario).

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

The Project complies with all Chinese relevant laws and regulations, mainly including:

1. Renewable Energy Law of the People's Republic of China;
2. National Action plan for the collection and Utilization of municipal landfill gas;
3. Catalogue for the Guidance of Industrial Structure Adjustment (2019 version);

The project has obtained the project approval and EIA approval from governmental authorities:

Shaoyang Development and Reform Bureau and Shaoyang Municipal Bureau of Ecology and Environment. The two approvals well demonstrate that the local government permits the construction of the project.

Consequently, the project complies with laws, status, and other regulatory frameworks.

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

Has the project registered under any other GHG programs?

☐ Yes ☒ No

Is the project active under the other program?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

1.17 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.17.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit?

☐ Yes ☒ No

1.17.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system?

☐ Yes ☒ No

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

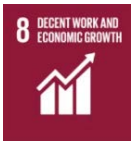
☐ Yes ☒ No

1.18 Sustainable Development Contributions

The Project contributes to achieving sustainable development goals (SDGs) in the following aspects:

SDG	Indicators	Chinese Sustainable Development Progress[2]	Project Activity Contribution
	SDG 7: Affordable and Clean Energy	By the end of 2015, China had fully solved the problem of providing electricity to all people without electricity and reached the goal of the Sustainable Development Agenda 15 years ahead of schedule. From 2015 to 2021, the share of non-fossil energy increased from 14.5 % to 20.6%, while the share of raw coal decreased from 72.2% to 66.7%.	The project utilizes LFG for power generation and accordingly substitutes equivalent electricity from thermal power. This contributes to achieving China's stated sustainable development priorities "By 2030, the proportion of non-fossil energy consumption will reach about 25%".

[2] https://www.cikd.org/detail?docId=1701419996870234114

	SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	China has deeply implemented an innovation-driven development strategy, and small, medium and micro enterprises have developed rapidly. Adhering to the policy of giving priority to employment, the unemployment rate has remained at a low level. By coordinating epidemic prevention and control with economic and social development, China has become the only major economy to achieve positive growth in 2020 and has made positive contributions to global economic recovery.	The project activity can provide employment opportunities for local villagers. This contributes to one of China's actions for promoting sustainable development: "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 13: Take urgent action to combat climate change and its impacts	In 2022, China's energy consumption per unit of GDP was reduced by 35% compared with 2012; in 2020, carbon dioxide emissions per unit of GDP were reduced by 18.8% compared with 2015 and 48.4% compared with 2005, all of which have already fulfilled China's commitment to the international community in 2020 ahead of schedule.	The project is to utilize the LFG for electricity generation to avoid methane emissions and CO_2 emissions from the production of the equivalent amount of electricity replaced by the Project that would otherwise have been purchased from the CCPG. This contributes to achieving China's stated sustainable development priorities "China's carbon dioxide emissions would strive to peak by 2030 and strive to achieve carbon neutrality by 2060".

1.19 Additional Information Relevant to the Project

1.19.1 Leakage Management

As per methodology ACM0001 (Version 19.0), no leakage effects are accounted for. Therefore, leakage management does not apply to the Project.

1.19.2 Commercially Sensitive Information

The Project does not include commercially sensitive information in the project description to be excluded in the public version.

1.19.3 Further Information

There is no additional information that has a bearing on the eligibility of the Project, the GHG emission reductions or carbon dioxide removals, or the quantification of the Project's reductions or removals.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	The stakeholder identification process for the project involved a step-by-step approach. Initially, the project owner performed a project scope analysis. This included evaluating the geographic boundary, potential environmental impacts, and the communities served by each subproject. Following this, the project owner engaged in a stakeholder mapping exercise, identifying individuals and organizations with a vested interest or potential influence over the project. Interviews and surveys were conducted with residents, businesses, and subject matter experts to gather various perspectives. In addition, the project owner reviewed regulatory standards and consulted with government entities to ensure compliance and to identify any legal stakeholders. The following people are considered as the stakeholders of this project during the implementation stage:

	• Residents of the nearby village. • Staff of the project. • Relevant administrative staff of the local government.
Legal or customary tenure/access rights	Applicable legal frameworks and existing agreements safeguard land use and access rights. The Shaoyang Development and Reform Commission has approved the project construction, and the Project was built in the reserved area of the Laohutuo landfill, which is state owned and managed by the local government. Therefore, the project activities do not involve conflicts on the existing legal or customary tenure/access rights of stakeholders, indigenous people (LPs), local communities (LCs), or customary rights holders, as the land is already designated for industrial purposes following relevant legal proceedings.
Stakeholder diversity and changes over time	Stakeholder groups encompass individuals from diverse social, economic, and cultural backgrounds. They represent various societal strata, including genders, age groups, education levels, and occupations. In general, residents of the nearby villages are mostly the elderly with an education background lower than junior high school. Many of them work as farmers or peasants and some take on temporary work in the landfill. The majority of the project staff has received a senior high school education or higher. Males are responsible for the most technical work, while females mainly support related administration work. The majority of relevant administrative staff of the local government is graduated from college or above. They have the highest social status and supervise the project overall. Different stakeholder group compositions change minimally over time due to the enduring nature of societal strata and slow changes in social factors.
Expected changes in well-being	The Project is expected to improve the local environment conditions by contributing to GHG reduction, provide clean electricity supply, and offer both long-term and temporary work opportunities.
Location of stakeholders	Residents of the nearby villages that may be influenced by the Project refer to communities around the project site, and most staff of the project live in urban area of Xinning County, southeast of the project site. The local government is located in the urban center of Xinning County in the southeast of the LFG power plant.

Location of resources	The project is in an existing landfill and no identified stakeholders own or have customary access to the land and resources occupied by the project.

2.1.2 Stakeholder Consultation and Ongoing Communication

Date of stakeholder consultation	27-September-2022 14-September-2023 24-September-2024
Stakeholder engagement process	Prior to the project construction, the project owner decided that the local stakeholder consultation would be conducted by means of a questionnaire survey. The project proponent will contact the local government and the Ecology and Environment Bureau by phone calls, informing them of the project site locations, the planned dates of construction and commissioning as well as the date and the purpose of the upcoming questionnaire survey two weeks in advance of the consultation. Meanwhile, the project proponent puts up public announcements on bulletin boards at the landfill and at neighborhoods near the project site on various dates two weeks ahead of the upcoming consultation. The general information about the project, the date and the purpose of the questionnaire survey as well as the project proponent's phone number and email address are clearly conveyed via these public announcements and phone calls. During the consultation, the project proponent distributes questionnaires at a variety of places to collect the stakeholders' opinions about the project in various aspects: they go to the landfill to distribute questionnaires to employees; they go to the neighborhoods nearby to distribute questionnaires to families living there; they also go to the office buildings of the local government and the Ecology and Environment Bureau. In addition, stakeholders are able to get the questionnaires at the locations communicated via public announcements and phone calls. Reports of the questionnaire survey are submitted to the company management department.
Consultation outcome	In general, the design and implementation of the project are regarded as beneficial by the majority of the local stakeholders. Most local stakeholders think the Project will help improve the lives of local people and promote local

	economic development with little adverse environmental impact. Almost all of the stakeholders believe that the Project will provide more employment opportunities, help local economic development, and increase local clean electricity supply. Several respondents expressed their concern over air pollution, water pollution and noise that the project might bring; faced with this, the project proponent explained the requirements of national and industry standards that have to be followed as well as the mitigation measures taken. Stakeholders are supportive of the free, prior, and informed consent (FPIC) process via questionnaire surveys and phone calls and the VCS validation and verification process to obtain emission reduction benefits.
Ongoing communication	The project owner implemented an ongoing communication mechanism, including holding stakeholder meetings, distributing questionnaires, or communicating with stakeholders by phone calls or other means regularly to collect the opinions of local stakeholders during the operation period. In addition, stakeholders can bring forward their opinions directly by phone calls, emails, and leaving comments on the project bulletin boards set up at the landfill gate and neighborhoods nearby. Residents can also give suggestions or complaints via village heads or resident staff taking on temporary or long-term work at the Project.
Stakeholder input	During the project operation, feedback from stakeholders through surveys, phone calls, etc., regarding the project are collected and regularly reported to company management. Considering environmental impacts or safety issues, the relevant responsible personnel is promptly notified for inspection and corrective action upon receiving the feedback, and an immediate report is required to be submitted to the company management. The landfill is located at least 500 m away from local neighborhoods and the power plant has had a scientific design of wastewater and other pollutants processing system strictly following the requirements of national and industry standards. Since no complaints were collected during the past consultations, there were no necessary or

	appropriate updates to the project design during the reporting period.

2.1.3 Free Prior and Informed Consent

Obtaining consent	Prior to the project construction, the local stakeholder consultations were conducted by means of a questionnaire survey. The project proponent put up public announcements on bulletin boards at the landfill and at neighborhoods near the project site on various dates in advance; also, the project proponent contacted the local government and the Ecology and Environment Bureau by phone, informed them of the project site locations, the planned dates of construction and commissioning as well as the date and the purpose of the upcoming questionnaire survey. The general information about the project, the date and the purpose of the questionnaire survey as well as the project proponent's phone number and email address were clearly conveyed via these public announcements and phone calls. Eventually, the project proponent obtained approval from the local government in accordance with laws and regulations prior to project construction. In addition, all stakeholders agreed and supported the construction and operation of the project. Residents of the nearby village and staff of the project have also well known the project and shown great consent. Therefore, the project complies with the relevant VCS regulations for FPIC. There are no ongoing or unresolved conflicts for this project.
Outcome of FPIC	All stakeholders agree with the construction and operation of the Project. Most respondents support the opinion that the Project improves regional economic development without adverse environmental impact. The project proponent disclosed the related information of the Project following the requirements of local government and relevant laws and regulations. Basic project information and updates are revealed via bulletin boards at the landfill and at neighborhoods nearby, phone calls, stakeholder meetings etc. The Project strictly follows China's laws and regulations and has obtained legal land use rights before construction. No residents were relocated because the project site is in the reserve area of the Laohutuo landfill. Thus, the Project has

	not encroached on land, relocated people without consent, or forced physical or economic displacement, which are total bans, and the stakeholders are supportive of the project.

2.1.4 Grievance Redress Procedure

Development process	If any grievances are received during the project construction and operation, the project proponent will take on a series of reactions to resolve stakeholders' concerns. When stakeholders express their misgivings in the questionnaire survey, the project proponent will explain related issues including the corresponding measures on time. After collecting the questionnaires and analyzing the survey results, the project proponent will contact the stakeholders by phone calls to elaborate on the measures against the concerns raised within one week and ask for their feedback; the project proponent will also inform them how to contact the project and express opinions if they have any concerns in the future. Any grievances received by phone calls, emails, or direct communication will be explained within one week by phone calls or face-to-face conversations with the claimants. If updates of the Project are necessary, the project proponent will assess the problem seriously, formulate a scientific solution, timely update the progress with the complainants and ask for feedback until the grievance is resolved.
Grievance redress procedure	The project owner organized internal staff meetings to ensure that the project operation complies with requirements in the Environmental Impact Assessment (EIA) form and applicable laws, regulations and national standards and develop grievance redress procedures. The draft of the procedure was revealed to the public during the stakeholder consultations and agreed by all stakeholders. After full consideration and assessment, suggestions from stakeholders were included in the final grievance redress procedure.

Grievances received	Resolution and outcome
N/A	No grievances were reported during this monitoring period. The grievance procedure is well-documented and easily

	accessible to stakeholders through the on-site postings. Regular stakeholder meetings and multiple feedback channels such as phone calls and emails ensure stakeholders are aware of and can easily access the grievance process.

2.1.5 Public Comments

No comment was received during the public comment period from 25/Nov/2024 to 25/Dec/2024 on the Verra Registry site: https://registry.verra.org/app/projectDetail/VCS/5336.

Comments received	Actions taken
N/A	N/A

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

Xinning Xinzhongshui Bio-energy Power Generation Co., Ltd. was established on 20-May-2022, and Xinzhongshui (Nanjing) Renewable Resources Investment Co., Ltd. (hereinafter referred to as the Xinzhongshui (Nanjing)) is its 100% controlling shareholder. The Xinzhongshui (Nanjing) specializes in the harmless, reduction, and resource recycling of municipal solid waste and the reclamation and recycling of land resources in landfills. The company provides project consulting, process design, product provision, engineering construction, operation management and other multi-faceted services. The company has owned rich management experience in construction and operation of landfill gas resource utilization projects.

2.2.2 Risk Assessment

	Risks identified	Mitigation or preventative measure taken
Natural and human-induced risks to stakeholders' wellbeing	No risk identified	Stakeholders' well-being is fully considered during the project operation. The Project is expected to improve the local environmental conditions by contributing to GHG reduction, providing a clean electricity supply, offering both long-term and temporary work

		opportunities, and bringing economic interest to the owner.
Risks to stakeholder participation	No risk identified	There were no risks identified including project design and consultation. The project was designed and implemented to avoid trade-offs including negative impacts on livelihoods and climate change adaptation. The mechanism for ongoing communication with local stakeholders has been set up.
Working conditions	No risk identified	Requirements for working conditions have been described in the project design and management manual. The project provides safety training and adequate labor protection supplies for the employees.
Safety of women and girls	No risk identified	There were no risks identified related to the safety of women and girls in the local community due to project activities. The project pays attention to the occupational health of female employees, providing regular health checkups and mental health support. The pay structure is reviewed regularly to ensure fair pay for both male and female employees.
Safety of minority and marginalized groups, including children	No risk identified	There were no risks identified related to safety of minority and marginalized groups, including children. At the project design and planning stage, the special needs of children, minorities and marginalized groups are fully considered to ensure the inclusiveness of project facilities and services. An effective feedback mechanism was established to ensure that community members can give feedback on their opinions and problems at any time.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	No risk identified	Measures have been identified in the EIA of the project to mitigate environmental pollution caused by construction and operation, which were implemented per environment pollution-related laws and

		regulations and supervised by the local government.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified	Mitigation or preventative measure(s) taken
Discrimination	No risk identified	The project has well-established HR policies that strictly prohibit all forms of discrimination inclusive of staff and contracted workers employed by third parties. These policies ensure no discrimination on race, gender, disability, or any other characteristic occurring during the design or implementation phases. Workers, including women, are provided with equal pay for equal work under these regulations. Employees are provided with safe and effective reporting channels and procedures for handling reported information quickly.
Sexual harassment	No risk identified	The project has well-established HR policies that strictly prohibit all forms of sexual harassment inclusive of staff and contracted workers employed by third parties. Workers, especially women, are fully protected under these regulations. Employees are provided with safe and effective reporting channels and procedures for handling reported information quickly.
Equal pay for equal work	No risk identified	The project employees are paid equally for equal work. To ensure equity in pay for men and women employees, pay structures are regularly reviewed.
Gender equity in labor and work	No risk identified	The project-employed women are provided equal pay for equal work. No discrimination on gender is allowed due to the HR policy. Safe and effective reporting channels and procedures for handling gender discrimination are easily accessible to all workers inclusive of staff and contracted workers employed by third parties.
Forced labor	No risk identified	When overtime work is required, employees inclusive of staff and contracted workers employed by third parties are reasonably compensated and there is no

		forced labor. Employees are provided with safe and effective reporting channels and procedures for handling reported information quickly.
Child labor	No risk identified	HR policy of the project owner strictly follows the laws and regulations in China, child labor is totally prohibited. Furthermore, the operation of the project requires professional knowledge and skills that can't be found in children, thus there's no possibility of child labor used by the project.
Human trafficking	No risk identified	All employees inclusive of staff and contracted workers employed by third parties are employed voluntarily. HR policy of the project owner strictly follows the laws and regulations in China that human trafficking is prohibited.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	The project is committed to upholding the rights of LPs, LCs, and customary rights holders by engaging in ongoing, informed consultations, obtaining FPIC for any activities, and ensuring that their cultural heritage and traditional knowledge are respected and preserved by international human rights law, the United Nations Declaration on the Rights of Indigenous Peoples, and ILO Convention 169. The project has obtained approval from the local government in accordance with laws and regulations before project construction. In addition, the project owner has conducted regular local stakeholder consultations and all stakeholders have agreed and supported the construction and operation of the project. The project proponent ensures that all employees' labor contracts are fair and equitable, specifying working conditions, wages and working hours. Any form of deposit, withholding of identity documents or restriction of employees' freedom is prohibited, ensuring all employees are preserved by international human rights law.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken

No risk identified	No indigenous people residences and cultural heritages are located within the scope of the landfill and power plant, so the project had no negative impact on them.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	The project prioritizes protecting stakeholders' property rights by engaging in regular consultations, complying with legal standards, documenting rights, offering accessible conflict resolution, and ensuring fair benefit sharing and transparent monitoring. Applicable legal frameworks and existing agreements safeguard land use and access rights. The Project proponent has obtained land use rights before construction. The Project was built in the reserved area of the Laohutuo landfill, which is state owned and managed by the local government, and the Shaoyang Development and Reform Commission has approved the project construction. Therefore, the project activities do not involve any risks related to providing and preserving the property rights of indigenous people (LPs), local communities (LCs), or customary rights holders, as the land is already designated for industrial purposes following relevant legal proceedings.

2.3.5 Benefit Sharing

Process used to design the benefit sharing plan	Not applicable as the project does not impact property rights described in Section 2.3.4.
Summary of the benefit sharing plan	Not applicable as the project does not impact property rights described in Section 2.3.4.
Approval and dissemination of benefit sharing plan	Not applicable as the project does not impact property rights described in Section 2.3.4.
Benefit sharing during the monitoring period	Not applicable as the project does not impact property rights described in Section 2.3.4.

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure(s) taken

Impacts on biodiversity and ecosystems	No risk identified	According to EIA of the project, there are no nature reserves in the project site, so the project has no further impact on biodiversity and ecosystems.
*S*oil degradation and soil erosion	No risk identified	According to EIA of the project, the project has no further impact on the soil.
Water consumption and stress	No risk identified	The wastewater mainly consists of domestic sewage and condensate. The condensate, which mainly contains BOD and COD, together with domestic sewage, enters the regulating tank for landfill leachate. After the biochemical treatment, the wastewater reaches the "Domestic Waste Landfill Pollution Control Standard" (GB16889-1997) "Domestic Waste Leachate" Level I standard before being discharged. According to the EIA, the project does not add wastewater stress and has little impact on the environment.

2.4.1 Rare, Threatened, and Endangered species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes ☒ No

Species and habitat	There are no nature reserves or rare, threatened, or endangered species identified in the project site. As a result, no adverse impacts on habitats and areas needed for habitat connectivity for rare, threatened, or endangered species have been brought by the project during the monitoring period.
Areas needed for habitat connectivity	There are no nature reserves in the project site and the construction of the Project is within the reserve area of the Laohutuo landfill. According to the EIA, the Project has no adverse impact on areas needed for habitat connectivity.

	Risks identified	Mitigation or preventative measure(s) taken

Habitats for rare, threatened, and endangered species	No risk identified	According to the EIA of the project, the project has no impact on habitats and local rare, threatened, or endangered species.
Areas for habitat connectivity	No risk identified	According to the EIA of the project, the project has no adverse impact on areas needed for habitat connectivity.

2.4.2 Introduction of species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
N/A	N/A	N/A	N/A

Existing invasive species	Mitigation measures to prevent the spread or continued existence of invasive species
N/A	N/A

	Risks identified	Mitigation or preventative measure(s) taken
Invasive species	No risk identified	According to the EIA of the project, no invasive species existed on the project site before construction. In the project design, the Project does not involve the introduction of any plant or animal species.

2.4.3 Ecosystem conversion

	Risks identified	Mitigation or preventative measure(s) taken
Ecosystem conversion	No risk identified	Not applicable as the project is not an ARR, ALM, WRC or ACoGS project.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0001	Flaring or use of landfill gas[3]	19.0
Tool	TOOL04	Emissions from Solid Waste Disposal Sites[4]	08.1
Tool	TOOL05	Baseline, Project and/or Leakage Emissions from Electricity Consumption and Monitoring of Electricity Generation[5]	03.0
Tool	TOOL07	Tool to Calculate the Emission Factor for an Electricity System[6]	07.0
Tool	TOOL08	Tool to determine the mass flow of a greenhouse gas in a gaseous stream[7]	03.0
Tool	TOOL32	Positive Lists of Technologies[8]	04.0

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
ACM0001	3. The methodology is applicable under the following conditions: (a) Install a new LFG capture system in an existing or new (Greenfield) SWDS where no LFG capture system was or would have been installed prior to the implementation of the project activity; or (b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that: (i) The captured LFG was vented or flared and not used prior to the implementation of the project activity; and (ii) In the case of an existing	3. Applicable. The Project involves the installation of a new LFG capture system in an existing SWDS, i.e., the Laohutuo Landfill, where no LFG capture system was installed prior to the project activity.

[3] https://cdm.unfccc.int/UserManagement/FileStorage/HEJ2MD41GB0PUZISL9FNTAYQV3875O

[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v6.0.1.pdf

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf

[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

[7] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v3.0.pdf

[8] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-32-v4.0.pdf

	active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available; (c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways: (i) Generating electricity; (ii) Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace; and/or (iii) Supplying the LFG to consumers through a natural gas distribution network; (iv) Supplying compressed/liquefied LFG to consumers using trucks; (v) Supplying the LFG to consumers through a dedicated pipeline; (d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.	
	4. The methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is: (a) Atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and (b) In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heater, glass melting furnace or kiln: (i) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or (ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary; (c) In the case of LFG supplied to the end-user(s) through natural gas distribution network, trucks or the dedicated pipeline, the baseline scenario is assumed to be displacement of natural gas.	4. Applicable. The identified most plausible baseline scenario is: (a) the LFG from the Laohutuo landfill would have been totally released into the atmosphere; (b) the equivalent amount of electricity supplied by the Project would have been supplied by the CCPG.

	(d) In the case of LFG from a Greenfield SWDS, the identified baseline scenario is atmospheric release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons.	
	5. This methodology is not applicable: (a) In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement energy efficiency measures at a kiln or glass melting furnace; (b) If the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.	5. N/A. The Project exclusively applies the methodology ACM0001 (Version 19.0); no other methodologies are applied in combination. And the management of the SWDS remains the same bothe prior to and during the implementation of the project activity; it is not deliberately changed under any circumstance to increase methane generation.
	6.The applicability conditions included in the tools referred to below also apply.	6. Applicable.
TOOL04	3. The tool can be used to determine emissions for the following types of applications: (a) Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. Methane emissions are mitigated by capturing and flaring or combusting the methane (e.g. “ACM0001: Flaring or use of landfill gas”). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an ex ante estimation of emissions in the project design document (CDM-PDD). The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from	3. Applicable. The Project is to capture the LFG from an existing landfill and utilize the LFG to generate electricity, thus reducing the methane emission. Therefore, the Project meets the requirements of Application A.

	the SWDS); (b) Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS. An example of this application of the tool is ACM0022, in which municipal solid waste (MSW) is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or avoided from disposal during the crediting period. In these cases, the tool can be applied for both ex ante and ex post estimation of emissions. These project activities may apply the simplified approach detailed in 0 when calculating baseline emissions.	
	4. These two types of applications are referred to in the tool for determining parameters.	4. Applicable.
	5. In the case that: (a) different types of residual waste are disposed or prevented from disposal; or that (b) both MSW and residual waste(s) are prevented from disposal, then the tool should be applied separately to each residual waste and to the MSW.	5. Irrelevant. The project is a landfill gas recovery and utilization project, which does not involve disposal of MSW or residual wastes.
TOOL05	5. If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer; (b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or (c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power	5. Applicable. The Project meets the requirement of Scenario A that the electricity consumption is from the grid.

	plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.	
	6. This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: (a) Scenario I: Electricity is supplied to the grid; (b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or (c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	6. Applicable. The Project meets the requirement of Scenario I: supply electricity to the grid - CCPG.
	7. This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO_2 emissions.	7. Applicable. There were no captive renewable power generation technologies installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. Only CO_2 emissions are included in the Project.
TOOL07	3. 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).	3. Applicable. The electricity generated by the Project is supplied to the grid - CCPG.
	4. 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	4. Applicable. As off-grid power generation is an insignificant part of the

	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.	national energy mix in China, the emission factor for the project electricity system is calculated only for the grid power plants.
	5. 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.	5. Applicable. The project's electricity system is totally located in China, which is not an Annex I country.
	6. Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	6. Applicable. The calculation of the emission factor considers the emission factor of biofuels as zero.
TOOL08	5. Typical applications of this tool are methodologies where the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions.	5. Applicable. For the Project, the volumetric flow of the gaseous stream LFG and the volumetric fraction of CH_4 are measured for the determination of baseline emissions.
	6. Methodologies where CO_2 is the particular and only gas of interest should continue to adopt material balances as the means of flow determination and may not adopt this tool as	6. Applicable. For the Project and the applied methodology ACM0001, both CH_4 and CO_2 are

	material balances are the cost effective way of monitoring flow of CO_2.	involved, but CH_4 instead of CO_2 is the particular gas of interest.
	7. The underlying methodology should specify: (a) The gaseous stream the tool should be applied to; (b) For which greenhouse gases the mass flow should be determined; (c) In which time intervals the flow of the gaseous stream should be measured; and (d) Situations where the simplification offered for calculating the molecular mass of the gaseous stream (equations (3) or (17)) is not valid (such as the gaseous stream is predominantly composed of a gas other than N_2).	7. Applicable. The applied methodology ACM0001 specifies all the required information from (a) to (d).
TOOL32	4. The use of this methodological tool is not mandatory for the project participants of a CDM project activity or CDM PoA for demonstrating their additionality.	4. Applicable. The project selects the use of the tool to demonstrate the additionality.
	5. This methodological tool shall be applied in conjunction with a small-scale or large-scale methodology which refers to this tool.	5. Applicable. The methodology ACM0001 (Version 19.0) refers to the methodological tool.
	6. The positive lists as contained in section 5 of this tool are valid up to 10 March 2025. Notwithstanding the provisions on the validity of new, revised and previous versions of methodologies and methodological tools in the "Procedure: Development, revision and clarification of baseline and monitoring methodologies and methodological tools", there will be no grace period for the application of this tool and the validity of the positive list after this date, including in cases where further technologies are added to the positive list through revisions of this tool before this date.	6. Applicable. The validation is expected to be finished before March 2025. Thus, the tool is valid and applicable for the Project.

3.3 Project Boundary

According to the methodology ACM0001 (Version 19.0), the project boundary of the project activity shall include the site where the LFG is captured and, as applicable:

(a) Sites where the LFG is flared or used (e.g., flare, power plant, boiler, air heater, glass melting furnace, kiln, natural gas distribution network, dedicated pipeline or biogas processing facility);

=> the LFG is combusted in the gas generators to generate electricity; therefore, the power generation system shall be included in the project boundary;

(b) Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity to the project activity;

=> when the generators installed in the project are out of operation or not able to supply electricity, the project purchases a small amount of electricity from CCPG, and there is no captive power plant installed at the project site; therefore, power generation sources connected to CCPG shall be included in the project boundary.

(c) Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity in the baseline that is displaced by electricity generated by captured LFG in the project activity;

=> power generation sources connected to CCPG shall be included in the project boundary;

(d) Heat generation equipment or sources which are supplying heat in the baseline that is displaced by heat generated by captured LFG in the project activity;

=> the project activity does not involve heat generation;

(e) The transportation of the compressed/liquefied LFG from the biogas processing facility to consumers;

=> the project activity does not involve the transportation of the LFG to consumers.

In summary, the project boundary includes the Laohutuo Landfill, the entire LFG related system (including the collection system, the pre-treatment system and the power generation system) and all power plants connected to CCPG. The diagram of the project boundary is shown in Figure 3-1.

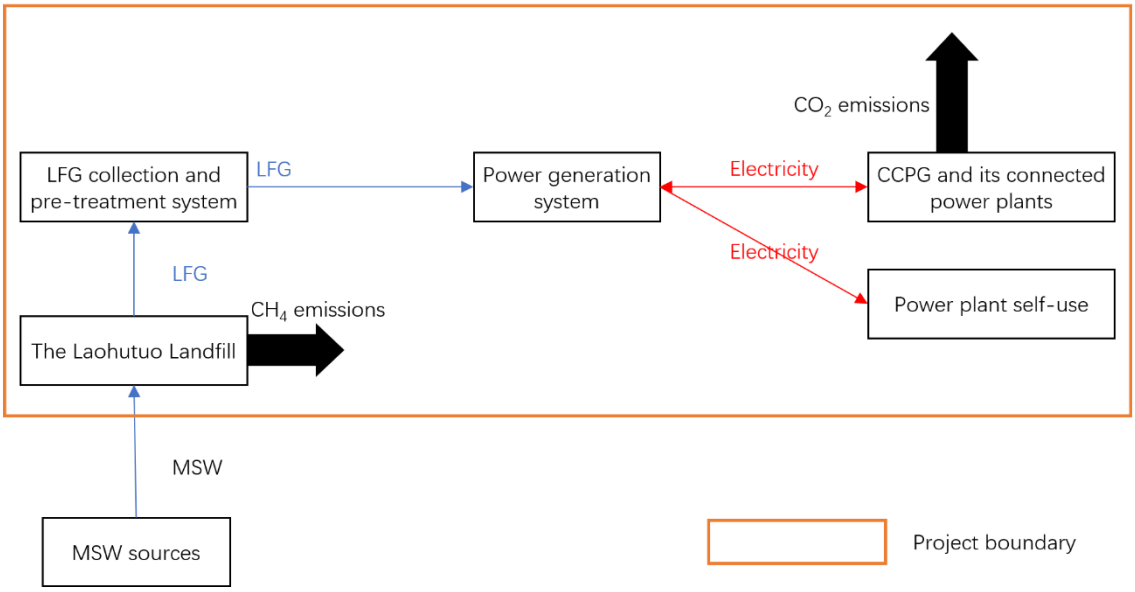


Figure 3-1 Diagram of the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Emission from decomposition of waste at the SWDS site	CO_2	No	CO_2 emissions from decomposition of organic waste are not accounted for since CO_2 is also released under the project activity.
		CH_4	Yes	The major source of emissions in the baseline scenario is CH_4.
		N_2O	No	N_2O emissions are small compared to CH_4 emissions from SWDS. This is conservative.
	Emissions from electricity generation	CO_2	Yes	CO_2 is the major emission source, given that power generation is included in the project activity.
		CH_4	No	CH_4 is excluded for simplification. This is conservative.
		N_2O	No	N_2O is excluded for simplification. This is conservative.
	Emission from heat generation	CO_2	No	The project does not involve heat generation.
		CH_4	No	The project does not involve heat generation.

Source		Gas	Included?	Justification/Explanation
		N_2O	No	The project does not involve heat generation.
	Emissions from the use of natural gas	CO_2	No	The project does not involve the use of natural gas.
		CH_4	No	The project does not involve the use of natural gas.
		N_2O	No	The project does not involve the use of natural gas.
Project	Emissions from fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity	CO_2	No	The project activity does not involve fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity.
		CH_4	No	The project activity does not involve fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity.
		N_2O	No	The project activity does not involve fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity.
	Emissions from electricity consumption due to the project activity	CO_2	Yes	The project activity may use electricity from the CCPG, so CO_2 may be an important emission source.
		CH_4	No	This emission source is assumed to be very small.
		N_2O	No	This emission source is assumed to be very small.
	Emissions from flaring	CO_2	No	Not applicable
		CH_4	No	Not applicable
		N_2O	No	Not applicable
	Emissions from distribution of LFG using	CO_2	No	The project activity does not involve distribution of LFG using trucks or dedicated pipelines.

Source		Gas	Included?	Justification/Explanation
	trucks and dedicated pipelines	CH_4	No	The project activity does not involve distribution of LFG using trucks or dedicated pipelines.
		N_2O	No	The project activity does not involve distribution of LFG using trucks or dedicated pipelines.

3.4 Baseline Scenario

As per methodology ACM0001 (Version 19.0), project participants may either apply the simplified procedures in section 5.3.1 in ACM0001 or the procedures in section 5.3.2 in ACM0001 to select the most plausible baseline scenario. The simplified procedures are applied to identify the baseline scenario for the Project.

According to the simplifies procedures to identify the baseline scenario, the baseline scenario for LFG is assumed to be the atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons. Prior to the implementation of the project activity, the LFG generated from the landfill is totally released into the atmosphere; therefore, the baseline scenario for LFG is assumed to be the continuous atmospheric release of the LFG.

If all or part of the electricity generated by the project activity is exported to the grid, the baseline scenario for all or the part of the electricity exported to the grid is assumed to be electricity generation in existing and/or new grid-connected power plants. The electricity generated by the project activity is mainly exported to the grid, with a small amount of electricity consumed by the equipment and facilities at the project site; therefore, the baseline scenario for the part of the electricity exported to the grid is assumed to be electricity generation in grid-connected power plants in CCPG.

In conclusion, the baseline scenario for the project activity is the LFG from the Laohutuo landfill site would have been released into the atmosphere; the equivalent amount of electricity supplied by the project would have been supplied by CCPG.

3.5 Additionality

The project uses the following steps to demonstrate additionality. The project meets the additionality criteria as outlined in the VCS methodology as:

Step 1: Regulatory Surplus: the project is not mandated by any legal requirements. Please refer to section 3.5.1 below for details.

Step 2: Positive List: the project conforms to the positive list as stipulated in the applies the simplified procedures in Section 5.3.1 of the methodology ACM0001 (Version 10.0), according to which, the methodological tool "TOOL32: Positive lists of technologies" (Version 04.0) shall be referenced. Please refer to section 3.5.2 below for details.

3.5.1 Regulatory Surplus

Is the project registered or seeking registration in an UNFCCC Annex 1 or Non-Annex 1 country?

☐ Annex 1 country ☒ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

☐ Yes ☒ No

If the project is located inside a Non-Annex 1 country and the project activities are mandated by a law, statute, or other regulatory framework, are such laws, statutes, or regulatory frameworks systematically enforced?

☐ Yes ☒ No

3.5.2 Additionality Methods

According to Section 5.1.1 of Tool32 (Version 04.0), for landfill gas recovery and its gainful use, The project activities at new or existing landfills (greenfield or brownfield) are deemed automatically additional, if it is demonstrated that prior to the implementation of the project activities the landfill gas (LFG) was only vented and/or flared (in the case of brownfield projects) or would have been only vented and/or flared (in the case of greenfield projects) but not utilized for energy generation, and that under the project activities any of the following conditions are met:

(a) The LFG is used to generate electricity in one or several power plants with a total nameplate capacity that equals or is below 10 MW;

(b) The LFG is used to generate heat for internal or external consumption;

(c) The LFG is flared.

For the Project involving landfill gas recovery and its gainful use, the LFG from the existing Laohutuo Landfill was vented to the atmosphere instead of utilizing for energy generation prior to the implementation of the project activity. In addition, the project activity utilizes LFG to generate electricity and the total nameplate capacity of all generators installed in the Project is 2.134 MW, which is below 10 MW.

3.6 Methodology Deviations

Not applicable.

4 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

As per the methodology ACM0001 (Version 19.0), the baseline emissions are determined according to Equation 1 and comprise the following sources:

(a) Methane emissions from the SWDS in the absence of the project activity;

(b) Electricity generation using fossil fuels or supplied by the grid in the absence of the project activity;

(c) Heat generation using fossil fuels in the absence of the project activity; and

(d) Natural gas used from the natural gas network in the absence of the project activity.

$$BE_y = BE_{CH4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y}$$ Equation 1

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2e/yr)
$BE_{CH4,y}$	=	Baseline emissions of methane from the SWDS in year *y* (t CO_2e/yr)
$BE_{EC,y}$	=	Baseline emissions associated with electricity generation in year *y* (t CO_2/yr)
$BE_{HG,y}$	=	Baseline emissions associated with heat generation in year *y* (t CO_2/yr)
$BE_{NG,y}$	=	Baseline emissions associated with natural gas use in year *y* (t CO_2/yr)

The Project does not involve heat generation or natural gas use, which means that $BE_{HG,y}$ = 0, and $BE_{NG,y}$= 0. Therefore, the baseline emissions are calculated as follows:

$$BE_y = BE_{CH4,y} + BE_{EC,y}$$ Equation 2

- **Calculation of $BE_{CH4,y}$:**

As per ACM0001 (Version 19.0), baseline emissions of methane from the SWDS ($BE_{CH4,y}$) is calculated using the equation below:

$$BE_{CH4,y} = ((1 - OX_{top\_layer}) \times F_{CH4,PJ,y} - F_{CH4,BL,y}) \times GWP_{CH4} \quad \text{Equation 3}$$

Where:

$BE_{CH4,y}$	=	Baseline emissions of methane from the SWDS in year *y* (t CO_2e/yr)
OX_{top_layer}	=	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)
$F_{CH4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year *y* (t CH_4/yr)
$F_{CH4,BL,y}$	=	Amount of methane in the LFG that would be flared in the baseline in year *y* (t CH_4/yr)
GWP_{CH4}	=	Global warming potential of CH_4 (t CO_2e/t CH_4)

Ex ante:

An ex ante estimate of $F_{CH4,PJ,y}$ is determined as follows:

$$F_{CH4,PJ,y} = \eta_{PJ} \times BE_{CH4,SWDS,y}/GWP_{CH4} \quad \text{Equation 4}$$

Where:

$F_{CH4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year *y* (t CH_4/yr)
$BE_{CH4,SWDS,y}$	=	Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year *y* (t CO_2e/yr)
η_{PJ}	=	Efficiency of the LFG capture system that will be installed in the project activity
GWP_{CH4}	=	Global warming potential of CH_4 (t CO_2e/t CH_4)

$BE_{CH4,SWDS,y}$ is determined using the TOOL04 "Emissions from solid waste disposal sites" (Version 08.1) as follows:

$$BE_{CH4,SWDS,y} = \varphi_y \times (1 - f_y) \times GWP_{CH4} \times (1 - OX) \times \frac{16}{12} \times F \times DOC_{f,y} \times MCF_y \times \sum_{x=1}^{y} \sum_{j} (W_{j,x} \times DOC_j \times e^{-k_j \times (y-x)} \times (1 - e^{-k_j})) \quad \text{Equation 5}$$

Where, for the yearly model:

$BE_{CH4,SWDS,y}$	=	Baseline, project or leakage methane emissions occurring in year *y* generated from waste disposal at a SWDS during a time period ending in year *y* (t CO_2e/yr)
x	=	Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period (*x* = 1) to year *y* (*x* = *y*)
y	=	Year of the crediting period for which methane emissions are calculated (*y* is a consecutive period of 12 months)
$DOC_{f,y}$	=	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year *y* (weight fraction)
$W_{j,x}$	=	Amount of solid waste type *j* disposed or prevented from disposal in the SWDS in the year *x* (t)
φ_y	=	Model correction factor to account for model uncertainties for year *y*
f_y	=	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year *y*
GWP_{CH4}	=	Global Warming Potential of methane
OX	=	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
F	=	Fraction of methane in the SWDS gas (volume fraction)
MCF_y	=	Methane correction factor for year *y*
DOC_j	=	Fraction of degradable organic carbon in the waste type *j* (weight fraction)
k_j	=	Decay rate for the waste type *j* (1 / yr)
j	=	Type of residual waste or types of waste in the MSW

The model correction factor (φ_y) depends on the uncertainty of the parameters used in the FOD model. For baseline emissions, project participants may choose between the following two options to calculate φ_y.

- **Option 1:** Use a default value. Use a default value: $\varphi_y = \varphi_{default}$. Default values for different applications and climatic conditions are provided in the section "Data and parameters not monitored" below.
- **Option 2:** Determine φ_y based on specific situation of the project activity.

In the Project, option 1 is chosen to determine φ_y as 0.75 for both humid/wet and dry conditions.

According to the previous study in the Feasibility Study Report (FSR) of the Project and Tool04: "Emissions from solid waste disposal sites" (Version 08.1), the data of $DOC_{f,y}$, $W_{j,x}$, and k_j are determined as follow:

Table 5-1 Parameters of different waste types

j	a	b	c	d	e
	Wood	Paper	Food	Textile	Other (rubber, plastic, glass, metal, etc.)
DOC_j	43%	40%	15%	24%	0
k_j (1/yr)	0.03	0.06	0.185	0.06	0
$W_{j,x}$ (t)	9,680	8,483	76,796	1,913	49,129

For the Project meeting the requirements of Application A, the MCF should be selected as a default value ($MCF_y = MCF_{default}$) provided in the section "Data and parameters not monitored", where $MCF_{default}$ = 1 for anaerobic managed solid waste disposal sites.

The amount of LFG that would have been captured and destroyed is already accounted for in Equation 3, so the f_y in the tool shall be assigned a value of 0 according to the description of $BE_{CH4,SWDS,y}$ in ACM0001. And since the start year of the landfill accepting wastes is 2013, x equals to 2013. According to Tool04: "Emissions from solid waste disposal sites" (Version 08.1), default OX is equal to 0.1, default $DOC_{f,y}$ is determined as 0.5, and the value of fraction of methane in the SWDS gas (volume fraction) (F) is 0.5. Based on IPCC Fifth Assessment Report (AR5), the value of GWP_{CH4} is equal to 28[9].

The determination of $F_{CH4,BL,y}$ follows a procedure to determine the amount of methane that would have been captured and destroyed (by flaring) in the baseline due to regulatory or contractual requirements, to address safety and odour concerns, or for other reasons (collectively referred to as requirement in this section). The four cases in Table 5-2 are distinguished. The appropriate case should be identified, and the corresponding instructions followed:

Table 5-2 Case for determining methane captured and destroyed in the baseline

Situation at the start of the project activity	Requirement to destroy methane	Existing LFG capture and destruction system
Case 1	No	No
Case 2	Yes	No
Case 3	No	Yes
Case 4	Yes	Yes

[9] Microsoft Word - Global-Warming-Potential-Values.docx (ghgprotocol.org)

LFG recovery and destruction is recommended but not mandated for landfills, i.e., no requirement to destroy methane. However, to be conservative, it is assumed that methane destruction is required. The Laohutuo Landfill was not equipped with an LFG capture and destruction system prior to the implementation of the Project. Based on these two conditions, Case 2 in the above table is applicable. In this situation:

$$F_{CH4,BL,y} = F_{CH4,BL,R,y}$$ Equation 6

Where:

$F_{CH4,BL,R,y}$ = Amount of methane in the LFG which is flared in the baseline due to a requirement in year *y* (t CH_4/yr)

$F_{CH4,BL,R,y}$ should be determined based on the information contained in the requirement to destroy methane, as follows:

- If the requirement specifies the amount of methane that must be flared then that amount is $F_{CH4,BL,R,y}$;
- If the requirement specifies a percentage of the captured LFG that is required to be flared, the amount shall be calculated as follows:

$$F_{CH4,BL,R,y} = \rho_{reg,y} \times F_{CH4,PJ,capt,y}$$ Equation 7

Where:

$\rho_{reg,y}$ = Fraction of LFG that is required to be flared due to a requirement in year *y*

$F_{CH4,PJ,capt,y}$ = Amount of methane in the LFG which is captured in the project activity in year *y* (t CH_4/yr)

Project participants may choose to calculate $F_{CH4,PJ,capt,y}$ by either of the two options:

- **Option 1:** Calculate using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", applying the following requirements:
  - (i) The gaseous stream tool shall be applied to the LFG pipeline immediately downstream of the LFG capture system and before any split in the gaseous flow to different uses or flares;
  - (ii) CH_4 is the greenhouse gases for which the mass flow should be determined;
  - (iii) The simplification offered for calculating the molecular mass of the gaseous stream is valid; and
  - (iv) The mass flow should be calculated on an hourly basis for each hour *h* in year *y*
- **Option 2:** Calculate as the sum of the amount of methane that is sent to the flare, electricity generating or heat generating equipment in year *y* as measured in section

5.4.1.1 in Methodology ACM0001, however, not taking into account the working hours of the equipment;

(i) If the requirement does not specify the amount or percentage of LFG that should be destroyed but requires the installation of a capture system, without requiring the captured LFG to be flared then:

$$F_{CH4,BL,R,y} = 0 \quad \text{Equation 8}$$

(ii) If the requirement does not specify any amount or percentage of LFG that should be destroyed, but requires the installation of a system to capture and flare the LFG, then a typical destruction rate of 20 per cent is assumed[10]:

$$F_{CH4,BL,R,y} = 0.2 \times F_{CH4,PJ,capt,y} \quad \text{Equation 9}$$

There is no requirement specifying the amount or percentage of LFG that should be destroyed, and no requirement on the installation of a system to capture and flare the LFG. As a result, it is assumed a typical destruction rate of 20 per cent by Option 2 (ii) to calculate the required LFG destruction.

Ex post:

During the crediting period, $F_{CH4,PJ,y}$ is determined as follows:

$$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} + F_{CH4,HG,y} + F_{CH4,NG,y} \quad \text{Equation 10}$$

Where:

$F_{CH4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year *y* (t CH_4/yr)
$F_{CH4,flared,y}$	=	Amount of methane in the LFG which is destroyed by flaring in year *y* (t CH_4/yr)
$F_{CH4,EL,y}$	=	Amount of methane in the LFG which is used for electricity generation in year *y* (t CH_4/yr)
$F_{CH4,HG,y}$	=	Amount of methane in the LFG which is used for heat generation in year *y* (t CH_4/yr)
$F_{CH4,NG,y}$	=	Amount of methane in the LFG which is sent to the natural gas distribution network and/or dedicated pipeline and/or to the trucks in year *y* (t CH_4/yr)

[10] This default value of 20 per cent is based on assuming a situation in which: the efficiency of the LFG capture system in the project is 50 per cent; the efficiency of the LFG capture system in the baseline is 20 per cent; and, the amount captured in the baseline is flared using an open flare with a destruction efficiency of 50 per cent (consistent with the default value provided in the tool "Project emissions from flaring"). Project participants may propose and justify an alternative default value as a request for revision to this methodology.

The Project utilizes the LFG only for power generation. Therefore, $F_{CH4,flared,y}$ = 0, $F_{CH4,HG,y}$ = 0, and $F_{CH4,NG,y}$ =0. Therefore,

$$F_{CH4,PJ,y} = F_{CH4,EL,y} \quad \text{Equation 11}$$

$F_{CH4,EL,y}$ is determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" and monitoring the working hours of the power plant(s), boiler(s), air heater(s), glass melting furnace(s) and kiln(s), so that no emission reduction are claimed for methane destruction during non-working hours. This is taken into account by monitoring the hours that the equipment utilizing the LFG is operating in year *y* ($Op_{j,h,y}$). The following requirements apply:

(a) As per the gaseous stream tool, if the LFG is used for multiple purposes (e.g., flaring or energy generation), and all methane destruction devices are verified to be operational (e.g., by means of flame detectors records, energy generated), a single flow meter may be used to record the flow into multiple destruction devices. The destruction efficiency of the least efficient among the destruction devices shall be used as the destruction efficiency for all destruction devices monitored by this flow meter. If there are any periods for which one or more destruction devices are not operational, paragraph 5 (a) and (b) of the Appendix of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" tool shall be followed;

(b) CH_4 is the greenhouse gas for which the mass flow should be determined;

(c) The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations (3) or (17) in the tool);

(d) The mass flow should be calculated on an hourly basis for each hour *h* in year *y*;

(e) The mass flow calculated for hour *h* is 0 if the equipment is not working in hour *h* ($Op_{j,h}$= not working), the hourly values are then summed to a yearly unit basis.

TOOL08 (version 03.0) shows 6 different ways to measure and calculate the mass flow of a greenhouse gas *i* in a gaseous stream ($F_{i,t}$), as shown in Table 5-3.

Table 5-3 Measurement options

Option	Flow of gaseous stream	Volumetric Fraction
A	Volume flow-dry basis	Dry or wet basis
B	Volume flow-wet basis	Dry basis
C	Volume flow-wet basis	Wet basis
D	Mass flow- dry basis	Dry or wet basis
E	Mass flow-wet basis	Dry basis

F	Mass flow-wet basis	Wet basis

Option C is applied in the project.

CH_4 is the greenhouse gas for which the mass flow should be determined. Therefore, $F_{CH4,EL,y}$ to be determined is equivalent to the mass flow of a greenhouse gas *i* in a gaseous stream $F_{i,t}$ in TOOL08 (Version 03.0).

The mass flow of greenhouse gas *i*, i.e., CH_4, shall be determined as follows:

$$F_{i,t} = V_{t,wb,n} \times v_{i,t,wb} \times \rho_{i,n} \quad \text{Equation 12}$$

With:

$$\rho_{i,n} = \frac{P_n \times MM_i}{R_u \times T_n} \quad \text{Equation 13}$$

Where:

$F_{i,t}$ = Mass flow of greenhouse gas *i* in the gaseous stream in the interval *t* (kg gas/h)

$V_{t,wb,n}$ = Volumetric flow of the gaseous stream in time interval *t* on a wet basis at normal conditions (m^3 wet gas/h)

$v_{i,t,wb}$ = Volumetric fraction of greenhouse gas *i* in the gaseous stream in a time interval *t* on a wet basis (m^3 gas *i* /m^3 wet gas)

$\rho_{i,n}$ = Density of greenhouse gas *i* in the gaseous stream at normal conditions (kg gas *i* /m^3 wet gas *i*)

P_n = Absolute pressure at normal conditions (Pa)

MM_n = Molecular mass of greenhouse gas *i* (kg/kmol)

R_u = Universal ideal gases constant (Pa.m^3/kmol.K)

T_n = Temperature at normal conditions (K)

The following equation should be used to convert the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure:

$$V_{t,wb,n} = V_{t,wb} \times \frac{T_n}{T_t} \times \frac{P_t}{P_n} \quad \text{Equation 14}$$

Where:

$V_{t,wb,n}$ = Volumetric flow of the gaseous stream in time interval *t* on a wet basis at normal conditions (m^3 wet gas/h)

$V_{t,wb}$ = Volumetric flow of the gaseous stream in time interval *t* on a wet basis (m^3 wet gas/h)

P_t = Pressure of the gaseous stream in time interval *t* (Pa)

T_t = Temperature of the gaseous stream in time interval *t* (K)

P_n = Absolute pressure at normal conditions (Pa)

T_n = Temperature at normal conditions (K)

A flow meter, a temperature transmitter, a pressure transmitter have been installed by the project proponent to monitor the volumetric flow, the temperature and the pressure of the LFG, respectively, and send data to the computer, which then automatically converts the flow into values at normal conditions ($V_{t,wb}$). In addition, gas analyser has been installed to measure the volumetric fraction of CH_4 in the LFG ($v_{i,t,wb}$)

- **Calculation of $BE_{EC,y}$:**

The baseline emissions associated with electricity generation in year *y* ($BE_{EC,y}$) shall be calculated using the TOOL05 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0):

$$BE_{EC,y} = EC_{BL,k,y} \times EF_{EF,k,y} \times (1 + TDL_{k,y}) \quad \text{Equation 15}$$

Where:

$BE_{EC,y}$ = Baseline emission from electricity consumption in year *y* (tCO_2/yr)

$EC_{BL,k,y}$ = Quantity of electricity that would be consumed by the baseline electricity consumer *k* in year *y* (MWh/y)

$EF_{EF,k,y}$ = Emission factor for electricity generation for source *k* in year *y* (tCO_2/MWh)

$TDL_{k,y}$ = Average technical transmission and distribution losses for providing electricity to source *k* in year *y*

k = Sources of electricity consumption in the baseline

For Scenario A: electricity consumption from the grid, project participants may choose among the following options to determine $EF_{EF,k,y}$:

Option A1: Calculate the combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the TOOL07 "Tool to calculate the emission factor for an electricity system" ($EF_{EF,j/k/l,y} = EF_{grid,CM,y}$).

Option A2: Use the following conservative default values:

(a) A value of 1.3 t CO_2/MWh if:

(i) Scenario A applies only to project and/or leakage electricity consumption sources but not to baseline electricity consumption sources; or

(ii) Scenario A applies to: both baseline and project (and/or leakage) electricity consumption sources; and the electricity consumption of the project and leakage sources is greater than the electricity consumption of the baseline sources;

(b) A value of 0.4 t CO_2/MWh for electricity grids where hydro power plants 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, and a value of 0.25 t CO_2/MWh for other electricity grids. These values can be used if:

(i) Scenario A applies only to baseline electricity consumption sources but not to project or leakage electricity consumption sources; or

(ii) Scenario A applies to: both baseline and project (and/or leakage) electricity consumption sources; and the electricity consumption of the baseline sources is greater than the electricity consumption of the project and leakage sources.

On the basis of TOOL07: "Tool to Calculate the Emission Factor for an Electricity System" (Version 07.0), the value of $EF_{grid,CM,y}$ is determined as 0.57335 tCO_2/MWh, referring to Appendix 2 for the procedure. Thus, $EF_{EF,k,y}$ = $EF_{grid,CM,y}$ = 0.57335 tCO_2/MWh.

$TDL_{k,y}$ can be determined with one of the following options according to TOOL05 (Version 03.0):

1. Use annual average value based on the most recent data available within the host country;
2. Use as default values of 20% for:

   (a) project or leakage electricity consumption sources;

   (b) baseline electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies is larger than the electricity consumption of all baseline electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies;
3. Use as default values of 3% for:

   (a) baseline electricity consumption sources;

   (b) project and leakage electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies is smaller than the electricity consumption of all baseline electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies.

The electricity consumption by all project and leakage electricity consumption sources is smaller than the electricity consumption of all baseline electricity consumption sources. The default value of 3% is applied for $TDL_{k,y}$.

4.2 Project Emissions

As per methodology ACM0001 (Version 19.0), project emission is calculated as per equation below:

$$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y} + PE_{SP,y} \quad \text{Equation 16}$$

Where:

PE_y = Project emissions in year *y* (t CO_2e)

$PE_{EC,y}$ = Emissions from consumption of electricity due to the project activity in year *y* (t CO_2/yr)

$PE_{FC,y}$ = Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year *y* (t CO_2/yr)

$PE_{DT,y}$ = Emissions from the distribution of compressed/liquefied LFG using trucks, in year *y* (t CO_2/yr)

$PE_{SP,y}$ = Emissions from the supply of LFG to consumers through a dedicated pipeline, in year *y* (t CO_2/yr)

The Project does not involve consumption of fossil fuels, distribution of compressed/liquefied LFG using trucks or supply of LFG to consumers through a dedicated pipeline, which means that $PE_{FC,y}$ = 0, $PE_{DT,y}$ = 0 and $PE_{SP,y}$ = 0. Thus,

$$PE_y = PE_{EC,y} \quad \text{Equation 17}$$

Project emissions from consumption of electricity due to the project activity ($PE_{EC,y}$) shall be calculated using TOOL05 (version 03.0).

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \quad \text{Equation 18}$$

Where:

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

$EC_{PJ,j,y}$ = Quantity of electricity consumed by the project electricity consumption source *j* in year *y* (MWh/y)

$EF_{EL,j,y}$ = Emission factor for electricity generation for source *j* in year *y* (tCO_2/MWh)

$TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to source *j* in year *y*

$TDL_{j,y}$ can be determined with one of the following options according to TOOl05 (Version 03.0):

1. Use annual average value based on the most recent data available within the host country;
2. Use as default values of 20% for:

   (a) project or leakage electricity consumption sources;

   (b) baseline electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies is larger than the electricity consumption of all baseline electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies;
3. Use as default values of 3% for:

(a) baseline electricity consumption sources;

(b) project and leakage electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies is smaller than the electricity consumption of all baseline electricity consumption sources to which scenario A or scenario C (cases C.I or C.III) applies.

The default value of 20% is applied for $TDL_{j,y}$ since it is used to determine project electricity consumption sources.

4.3 Leakage Emissions

As per applied ACM0001 (Version 19.0), leakage emissions (LE_y) of the project are equal to 0.

4.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

According to ACM0001 (Version 19.0), the emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{Equation 19}$$

Where:

ER_y	=	Emission reductions in year *y* (t CO_2e)
BE_y	=	Baseline emissions in year *y* (t CO_2e)
PE_y	=	Project emissions in year *y* (t CO_2e)

The estimated emission reductions ($ER_{y,estimated}$) of the project is calculated as follows:

- **Calculation of estimated baseline emissions resulted from SWDS:**

  In the PD, Equation 3-9 are applied to ex-ante estimate the baseline emissions resulted from methane recovery:

Table 5-4 The ex-ante estimation of baseline emissions resulted from SWDS

Year	η_{PJ}	$BE_{CH4,SWDS,y}$ (tCO_2e)	OX_{top_layer}	GWP_{CH4} (tCO_2e /tCH_4)	$F_{CH4,PJ,y}$ (tCH_4)	$F_{CH4,BL,y}$ (tCH_4)	$BE_{CH4,y}$ (tCO_2e)
2023	0.5	80,594.91	0.1	28	1,439	287	28,231
2024	0.5	83,672.27	0.1	28	1,494	598	29,308
2025	0.5	86,391.91	0.1	28	1,543	617	30,252
2026	0.5	88,807.08	0.1	28	1,586	634	31,087
2027	0.5	90,962.37	0.1	28	1,624	650	31,861

2028	0.5	92,895.18	0.1	28	1,659	664	32,534
2029	0.5	94,636.91	0.1	28	1,690	676	33,150
2030	0.5	96,213.96	0.1	28	1,718	687	33,692
2031	0.5	97,648.54	0.1	28	1,744	697	34,197
2032	0.5	98,959.39	0.1	28	1,767	707	34,647
2033	0.5	100,162.33	0.1	28	1,789	715	35,077
Total							354,036

- **Calculation of estimated baseline emissions resulted from electricity generation:**

Baseline emissions resulting from electricity generation are ex-ante estimated as follows:

Table 5-5 The ex-ante estimation of baseline emissions resulted from electricity

Year	$EG_{PJ,y}$ (MWh/y)	$EF_{grid,CM,y}$ (tCO_2/MWh)	$TDL_{k,y}$	$BE_{EC,y}$ (tCO_2)
2023	7,616.97	0.57335	3%	4,498
2024	7,907.81	0.57335	3%	4,669
2025	8,164.84	0.57335	3%	4,821
2026	8,393.09	0.57335	3%	4,956
2027	8,596.79	0.57335	3%	5,076
2028	8,779.46	0.57335	3%	5,184
2029	8,944.07	0.57335	3%	5,281
2030	9,093.11	0.57335	3%	5,369
2031	9,228.69	0.57335	3%	5,450
2032	9,352.58	0.57335	3%	5,523
2033	9,466.27	0.57335	3%	5,590
Total				56,417

- **Calculation of estimated emissions reductions:**

Considering the project emissions and leakage emissions are 0 as described above, the estimated emission reductions are calculated as follows:

Table 5-6 The ex-ante estimation of emissions reductions

Year	$BE_{CH4,y}$ (tCO_2e)	$BE_{EC,y}$ (tCO_2)	BE_y (tCO_2)	PE_y (tCO_2)	ER_y (tCO_2)
2023	28,231	4,498	32,729	0	32,729
2024	29,308	4,669	33,977	0	33,977
2025	30,252	4,821	35,073	0	35,073
2026	31,087	4,956	36,043	0	36,043
2027	31,861	5,076	36,937	0	36,937

2028	32,534	5,184	37,718	0	37,718
2029	33,150	5,281	38,431	0	38,431
2030	33,692	5,369	39,061	0	39,061
2031	34,197	5,450	39,647	0	39,647
2032	34,647	5,523	40,170	0	40,170
2033	35,077	5,590	40,667	0	40,667
Total	**354,036**	**56,417**	**410,453**	**0**	**410,453**

During the fixing 10-year crediting period from 01-July-2023 to 30-June-2033, the estimated emission reductions are calculated as follows:

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCUs (tCO_2e)
01/Jul/2023 to 31/Dec/2023	16,498	0	0	16,498	0	16,498
01/Jan/2024 to 31/Dec/2024	33,977	0	0	33,977	0	33,977
01/Jan/2025 to 31/Dec/2025	35,073	0	0	35,073	0	35,073
01/Jan/2026 to 31/Dec/2026	36,043	0	0	36,043	0	36,043
01/Jan/2027 to 31/Dec/2027	36,937	0	0	36,937	0	36,937
01/Jan/2028 to 31/Dec/2028	37,718	0	0	37,718	0	37,718
01/Jan/2029 to 31/Dec/2029	38,431	0	0	38,431	0	38,431
01/Jan/2030 to 31/Dec/2030	39,061	0	0	39,061	0	39,061
01/Jan/2031 to 31/Dec/2031	39,647	0	0	39,647	0	39,647
01/Jan/2032 to 31/Dec/2032	40,170	0	0	40,170	0	40,170
01/Jan/2033 to 30/Jun/2033	20,166	0	0	20,166	0	20,166
Total	**373,721**	**0**	**0**	**373,721**	**0**	**373,721**

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$DOC_{f,y}$
Data unit	%
Description	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
Source of data	TOOL04: "Emissions from solid waste disposal sites" (Version 08.1)
Value applied:	50%
Justification of choice of data or description of measurement methods and procedures applied	For methane calculation from MSW, the national value of DOC_f is equal to 0.5.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	DOC_j
Data unit	%
Description	Fraction of degradable organic carbon in the waste type j (weight fraction)
Source of data	Tool04: "Emissions from solid waste disposal sites" (Version 08.1)
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied	Using default value provided by Tool04 (Version 08.1)
Purpose of data	Calculation of baseline emissions
Comments	-

j	a	b	c	d	e
	Wood	Paper	Food	Textile	Others (rubber, plastic, glass, metal, etc.)
DOC_j	43%	40%	15%	24%	0%

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor in year *y*
Source of data	Calculated based on TOOL07: "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Value applied:	0.57335 tCO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	$EF_{grid,CM,y}$ is calculated based on $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ as per the latest version of TOOL07
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor r in year *y*
Source of data	"2023 Operating Margin Emission Factors for Regional Power Grids in China" [11] by DNA of China
Value applied:	0.8771 tCO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	Official and authoritative statistic data.
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

[11] W020240709709437370462.pdf (ncsc.org.cn)

Source of data	"2023 Build Margin Emission Factors for Regional Power Grids in China"[12] by DNA of China
Value applied:	0.2696 tCO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	Official and authoritative statistic data.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	f_y
Data unit	%
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year *y*
Source of data	TOOL04: "Emissions from solid waste disposal sites" (Version 08.1)
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied	With the factor "f=0.0" because the amount of LFG that would have been captured and destroyed is already accounted for in Equation 4. For the Project, the amount of LFG that would have been captured and destroyed is already counted in the parameter $F_{CH4,BL,y}$ in the equation. Hence f_y = 0.
Purpose of data	Calculation of baseline emissions
Comments	For Application A: f_y is calculated once for the crediting period.

Data / Parameter	F
Data unit	%
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	TOOL04: "Emissions from solid waste disposal sites" (Version 08.1)
Value applied:	50%

[12] W020240709709439048191.pdf (ncsc.org.cn)

Justification of choice of data or description of measurement methods and procedures applied	The default value from the latest version of Tool04 is 0.5.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	GWP_{CH4}
Data unit	t CO_2e/t CH_4
Description	Global warming potential of CH_4
Source of data	IPCC AR5[13]
Value applied:	28 t CO_2e/t CH_4
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	k_j
Data unit	1 / yr
Description	Decay rate for the waste type *j*
Source of data	TOOL04: "Emissions from solid waste disposal sites" (Version 08.1)
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied	Using following default value for waste type *j*:

j	a	b	c	d	e
	Wood	Paper	Kitchen	Textile	Others (rubber, plastic, glass, metal, etc.)
k_j	0.03	0.06	0.185	0.06	0

Waste type j	Boreal and Temperate (MAT ≤20℃)		Tropical (MAT >20℃)	
	Dry (MAP/PET <1)	Wet (MAP/PET > 1)	Dry (MAP <1000 mm)	Dry (MAP >1000 mm)

[13] Microsoft Word - Global-Warming-Potential-Values.docx (ghgprotocol.org)

	Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04	0.06	0.045	0.07
		Wood, wood product and straw	0.02	0.03	0.025	0.035
	Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.05	0.10	0.065	0.17
	Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06	0.185	0.085	0.40

Note: MAT – mean annual temperature, MAP – Mean annual precipitation, PET – potential evapotranspiration. MAP/PET is the ratio between the mean annual precipitation and the potential evapotranspiration.

For the project site in Shaoyang, Hu'nan, the climate zone is subtropical monsoon humid climate with an annual average temperature from 16.1 to 17.1 ℃[14], below 20 ℃. The average annual PET in Hu'nan province is about 819.22 mm/yr[15]. The annual average precipitation is about 1953 mm/yr[16], thus MAP/PET >1. Therefore, the values for Boreal and Temperate (MAT≤20 ℃) and Wet (MAP/PET >1) are applicable.

Purpose of data	Calculation of baseline emissions
Comments	-

[14] https://www.shaoyang.gov.cn/shaoyang/szrdl/202207/7423a1198a4f4dd5b917e1330379ed92.shtml

[15] Liu N, Jiang W, Huang L, Li Y, Zhang C, Xiao X, Huang Y. Evolution of Sustainable Water Resource Utilization in Hunan Province, China. *Water*. 2022; 14(16):2477. https://doi.org/10.3390/w14162477

[16] Liu N, Jiang W, Huang L, Li Y, Zhang C, Xiao X, Huang Y. Evolution of Sustainable Water Resource Utilization in Hunan Province, China. *Water*. 2022; 14(16):2477. https://doi.org/10.3390/w14162477

Data / Parameter	MCF_y
Data unit	-
Description	Methane correction factor for year *y*
Source of data	TOOL04: "Emissions from solid waste disposal sites" (Version 08.1)
Value applied:	1.0
Justification of choice of data or description of measurement methods and procedures applied	In case of Application A, MCF_y = 1.0 for anaerobic managed solid waste disposal sites. These must have controlled placement of waste (i.e. waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) levelling of the waste.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	OX_{top_layer}
Data unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	TOOL04: "Emissions from solid waste disposal sites" (Version 08.1)
Value applied:	0.1
Justification of choice of data or description of measurement methods and procedures applied	A default value of 0.1 may be used.
Purpose of data	Calculation of baseline emissions
Comments	OX_{top_layer} is the fraction of the methane in the LFG that would oxidize in the top layer of the SWDS in the absence of the project activity. Under the project activity, this effect is reduced as a part of the LFG is captured and does not pass through the top layer of the SWDS. This oxidation effect is also accounted for in the methodological tool "Emissions from solid waste disposal sites". In addition to this effect, the installation of a LFG capture system under the project activity may result in the suction of additional air into the SWDS. In some cases, such as with a high suction pressure, the air may decrease the amount of methane that is generated under the project activity. However, in most circumstances where the LFG is captured and used this effect was

	very small, as the operators of the SWDS have in most cases an incentive to maintain a high methane concentration in the LFG. For these reasons, the oxidation factor shall be included in the calculation of baseline emissions whereas the effect of oxidation is, as a conservative assumption, neglected under the project activity.

Data / Parameter	$\rho_{CH4,n}$
Data unit	tonnes/Nm^3
Description	Density of methane at the temperature and pressure of the landfill gas
Source of data	TOOL06: "Project emissions from Flaring" (Version 04.0)[17]
Value applied:	0.000716 tonnes/Nm^3
Justification of choice of data or description of measurement methods and procedures applied	$LFG_{i,y}$ is reported at normal conditions of temperature and pressure, so the density of methane is also determined as 0.000716 tonnes/Nm^3 at normal conditions.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	$TDL_{j,y}$
Data unit	-
Description	Average technical transmission and distribution losses for providing electricity to source j in year *y*
Source of data	TOOL05: "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0)
Value applied:	20%
Justification of choice of data or description of measurement methods and procedures applied	In case of scenario A, a default values of 20% is used for project electricity consumption sources.
Purpose of data	Calculation of project emissions
Comments	-

[17] EB113_repan10_TOOL06_ver04 (unfccc.int)

Data / Parameter	$TDL_{k,y}$
Data unit	-
Description	Average technical transmission and distribution losses for providing electricity to source *k* in year *y*
Source of data	TOOL05: "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0)
Value applied:	3%
Justification of choice of data or description of measurement methods and procedures applied	In case of scenario A, a default values of 3% is used for baseline electricity consumption sources.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	$W_{j,x}$
Data unit	t
Description	Amount of solid waste type *j* disposed or prevented from disposal in the SWDS in the year *x*
Source of data	TOOL04: "Emissions from solid waste disposal sites" (Version 08.1)
Value applied:	Refer to the ER sheet
Justification of choice of data or description of measurement methods and procedures applied	It is calculated as total waste amount dumped in the landfill site in the year *x* multiplied by organic waste type *j* fraction on wet basis. Both total waste amount and waste type *j* fraction are referred to FSR.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	w_{OM}
Data unit	%
Description	Weighting of operating margin emissions factor
Source of data	TOOL07: "Tool to calculate the emission factor for an electricity system" (version 07.0)

Value applied:	50%
Justification of choice of data or description of measurement methods and procedures applied	For projects other than wind and solar power generation project activities, w_{OM} = 0.5 for the first crediting period.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	w_{BM}
Data unit	%
Description	Weighting of build margin emissions factor in year *y*
Source of data	TOOL07: "Tool to calculate the emission factor for an electricity system" (version 07.0)
Value applied:	50%
Justification of choice of data or description of measurement methods and procedures applied	For projects other than wind and solar power generation project activities, w_{BM} = 0.5 for the first crediting period.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	η_{PJ}
Data unit	Dimensionless
Description	Efficiency of the LFG capture system that will be installed in the project activity.
Source of data	
Value applied:	50%
Justification of choice of data or description of measurement methods and procedures applied	A default value of 50 per cent is applied.
Purpose of data	Calculation of baseline emissions
Comments	-

<table>
<tr><td>Data / Parameter</td><td>φ_y</td></tr>
<tr><td>Data unit</td><td>-</td></tr>
<tr><td>Description</td><td>Model correction factor to account for model uncertainties for year y</td></tr>
<tr><td>Source of data</td><td>TOOL04: “Emissions from solid waste disposal sites” (Version 08.1)</td></tr>
<tr><td>Value applied:</td><td>0.75</td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied</td><td>Option 1: use a default value is chosen to calculate φ_y.
<table><tr><td></td><td>Humid/wet conditions</td><td>Dry conditions</td></tr><tr><td>Application A</td><td>0.75</td><td>0.75</td></tr><tr><td>Application B</td><td>0.85</td><td>0.80</td></tr></table>For the Project under Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS, φ_y = 0.75.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Comments</td><td>-</td></tr>
</table>

5.2 Data and Parameters Monitored

Data / Parameter	$Management\ of\ SWDS$
Data unit	-
Description	Management of SWDS
Source of data	Original design of the landfill
Description of measurement methods and procedures applied	Project participants should refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications.
Frequency of monitoring/recording	Annually
Value applied:	-
Monitoring equipment	-
QA/QC procedures applied	-

Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Amount of electricity generated using LFG by the project activity in year *y*
Source of data	Electricity meter
Description of measurement methods and procedures applied	Measured by bi-directional electricity meter and daily recorded. All electronic data and paper documents will be archived for two years following the end of the crediting period.
Frequency of monitoring/recording	Continuously measured and recorded every day in the daily operation records.
Value applied:	Refer to ER sheet.
Monitoring equipment	Electricity meter
QA/QC procedures applied	The data will be crosschecked with sales receipts of electricity. The electricity meter is to be calibrated every two years in compliance with the latest version of "*Technical administrative code of electric energy metering*".
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	This parameter is required for calculating baseline emissions associated with electricity generation ($BE_{EC,y}$) using the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation".

Data / Parameter	$EG_{EC,y}$
Data unit	MWh
Description	Amount of electricity consumed by the project activity in year y
Source of data	Electricity meter

Description of measurement methods and procedures applied	Sources of consumption shall include, where applicable, electricity consumed for the operation of the LFG capture system, for any processing and upgrading of the LFG, for transportation of the LFG to the flare or other applications (boilers, power generators), for the compression of the LFG into the natural gas network, etc. Measured by bi-directional electricity meter with accuracy of no lower than 0.5S.
Frequency of monitoring/recording	Continuously measured and monthly recorded
Value applied:	0 estimated at ex ante
Monitoring equipment	Electricity meter
QA/QC procedures applied	The electricity meters are to be calibrated every two years in compliance with the latest version of "*Technical administrative code of electric energy metering*".
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	This parameter is required for calculating baseline emissions.

Data / Parameter	$OP_{j,h}$
Data unit	-
Description	Operation of the equipment that consumes the LFG
Source of data	Project participants
Description of measurement methods and procedures applied	For each equipment unit *j* using the LFG monitor that the plant is operating in hour *h* by the monitoring any one or more of the following three parameters: (a) Temperature. Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the burning equipment. Document and justify the location and minimum threshold in the PD; (b) Flame. Flame detection system is used to ensure that the equipment is in operation; (c) Products generated. Monitor the generation of steam for the case of boilers and air-heaters and glass for the case of glass melting furnaces. This option is not applicable to brick kilns. $OP_{j,h} = 0$ when: (a) One of more temperature measurements are missing or below the minimum threshold in hour *h* (instantaneous measurements are made at least every minute); (b) Flame is not detected continuously in hour *h* (instantaneous measurements are made at least every minute);

	(c) No products are generated in the hour *h*. Otherwise, $OP_{j,h} = 1$.
Frequency of monitoring/recording	Hourly
Value applied:	Monitored ex-post
Monitoring equipment	The DCS operation system
QA/QC procedures applied	-
Purpose of data	Calculation of emission reduction
Calculation method	-
Comments	-

Data / Parameter	$V_{t,wb,n}$
Data unit	m^3 wet gas/d
Description	Volumetric flow of the gaseous stream in time interval *t* on a wet basis at normal conditions
Source of data	Measured by a flow meter and converted automatically by the recovery monitoring system into standard value.
Description of measurement methods and procedures applied	This parameter ($V_{t,wb,n}$) is monitored by a flow meter, and is automatically recorded, accumulated and converted into standard value (at the normal condition of 0℃ and 101,325 Pa) by the recovery monitoring system. The staff of the project will record the data every day.
Frequency of monitoring/recording	Measured continuously and recorded daily
Value applied:	Monitored ex-post
Monitoring equipment	Flow meter
QA/QC procedures applied	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory for all projects applying large scale methodology(ies). The metering instruments will be calibrated every two years in accordance with the national standard. Evidence will be saved two years after the crediting period.
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	This parameter will be monitored in Options C

Data / Parameter	$v_{i,t,wb}$
Data unit	m^3 gas CH_4/m^3 wet gas
Description	Volumetric fraction of greenhouse gas *i* in the gaseous stream in a time interval *t* on a wet basis
Source of data	Measured by continuous gas analyzer
Description of measurement methods and procedures applied	Continuous monitored by gas analyzer
Frequency of monitoring/recording	Continuously monitored and recorded daily
Value applied:	Monitored ex-post
Monitoring equipment	Gas analyzer
QA/QC procedures applied	Gas analyzer is to be calibrated every two years in accordance with the national standard. Calibration should include zero verification with an inert gas (e.g. N_2) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period. Evidence will be saved two years after the crediting period.
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	$CAPEX\ and\ OPEX$
Data unit	Currency (CNY)
Description	Total investment to implement the project and total cost to operate the project
Source of data	Engineering, procurement and construction contracts; and maintenance contracts
Description of measurement methods and procedures applied	-
Frequency of monitoring/recording	At the first issuance request after each phase of the project is fully implemented

Value applied:	-
Monitoring equipment	Not applicable as this parameter is confirmed in ways of paper documents.
QA/QC procedures applied	Audited by professional, independent financial auditors. The VVB should only verify that the data provided corresponds to the data from independent financial auditors
Purpose of data	-
Calculation method	-
Comments	The information provided for CAPEX shall indicate the investment made: (i) in the collection and flaring system; (ii) in the power plant and connection to the grid (if applicable); and (iii) in the purchase of the new boiler or refurbishment of the existing one and in the steam/hot air pipeline if steam/hot air is exported out of the project boundary (if applicable). The information supplied for OPEX shall indicate the costs for: (i) staff and maintenance involved in the operation of the collection and flaring system; and (ii) staff and maintenance involved in the operation of the collection and power generation system.

Data / Parameter	$Tariff\ of\ electricity\ exported$
Data unit	Currency (CNY/MWh)
Description	Tariff of the electricity exported
Source of data	Electricity Transaction Note
Description of measurement methods and procedures applied	-
Frequency of monitoring/recording	At the first issuance request after each phase of the project is fully implemented
Value applied:	-
Monitoring equipment	Not applicable as this parameter is confirmed in ways of paper documents.
QA/QC procedures applied	Audited by professional, independent financial auditors. The VVB should only verify that the data provided corresponds to the data from independent financial auditors
Purpose of data	-

Calculation method	-
Comments	The monitoring of this parameter is only required for projects applying the simplified procedures to identify the baseline scenario and demonstrate additionality

5.3 Monitoring Plan

The monitoring plan assures that real, measurable, long-term GHG emission reductions can be monitored, recorded and reported. It is a crucial procedure to identify the final VCUs of the project. This monitoring plan is implemented by the project owner during the project operation. The details of the monitoring plan are specified as follows:

(A) Data and parameters to be monitored

Data and parameters to be monitored are listed below and show the positions of the monitoring instruments and Table 6-1 lists the corresponding parameters monitored.

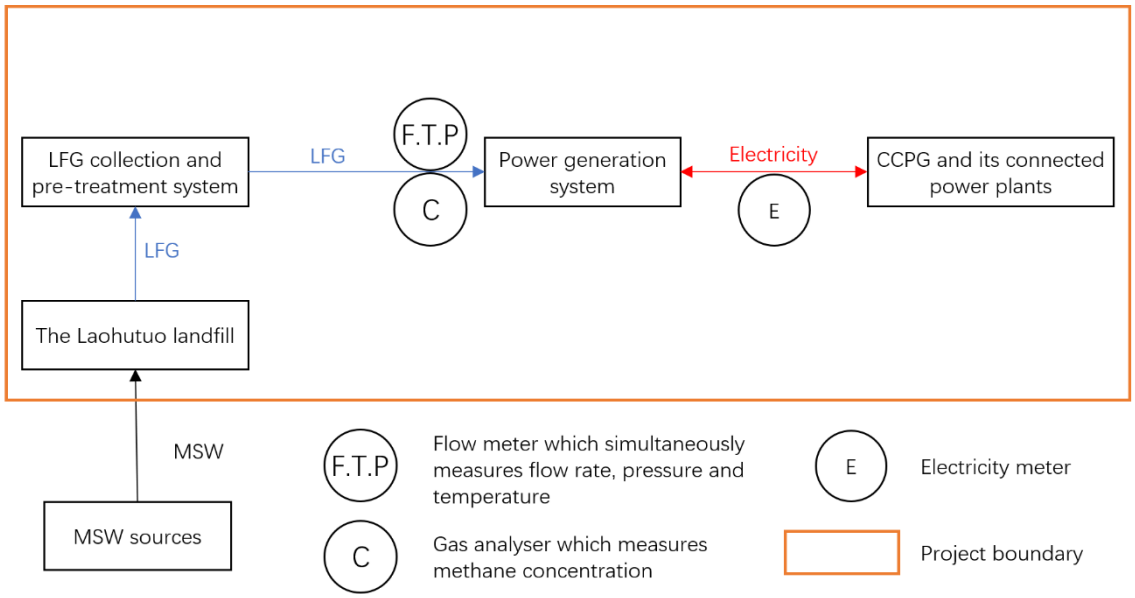


Figure 6-1 Project monitoring diagram

Table 6-1 Corresponding parameters monitored

Position	Monitoring Instrument	Parameter Monitored	Description
LFG inlet of the power	Flow meter, temperature	$V_{t,wb,n}$	The flow meter, the temperature transmitter and the pressure transmitter continuously

generation system	transmitter and pressure transmitter		measure the volumetric flow, the temperature and the pressure of the LFG, respectively, and then automatically converts into values at normal conditions (101,325 Pa and 273.15 K).
LFG inlet of the power generation system	Methane content analyzer	$v_{CH4,t,db}$	The gas analyzer measures the volumetric fraction of greenhouse gas CH4 in the LFG stream.
Control Room	Computer	$Op_{j,h}$	The DCS system connected to the power generation system monitors the operation status of each power generator as well as the power plant as a whole and records the number of operational hours. The data are aggregated for every month.
10 kV Xinning line connecting the project to the grid	Electricity meter	$EG_{PJ,y}, EG_{EC,y}$	The electricity meter measures the amount of electricity supplied to the grid by the project activity and electricity imported from the grid by the project activity

(B) Management Structure

The Project owner organizes a specific VCS team in project development department to be responsible for data collection, supervision and witness the whole process of data measuring and recording. A VCS manager is appointed to take full responsibility for the overall monitoring of the project. The monitoring and measurement of extracted gas, electricity generation and consumption etc. are carried out by a few designated monitoring officers. In addition, the Project developer appoints internal verifiers who is responsible for internal check of the measurement, collection of relevant receipts and invoices, and the calculation of the emission reductions. A monitoring and management manual of the project that identifies detailed duties

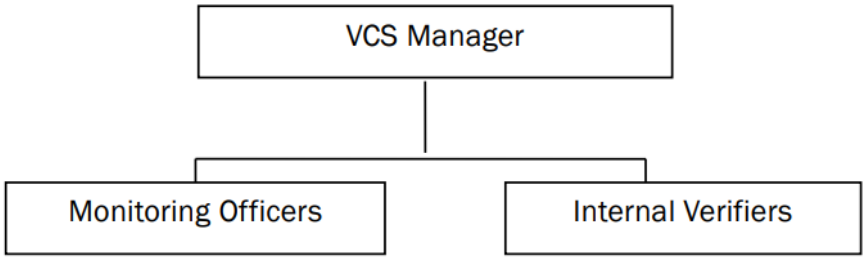


Figure 6-2 Operation and management structure of the project

and responsibilities of the relevant parties is developed and served as the basis of the project monitoring. Figure 6-2 shows the operation and management structure of the Project.

(C) Data collection

Monitoring officers are responsible for data collection. Designated teams read and collect the monitored data regularly. Meter reading records serve as the main data source for emission reductions calculation. All data files, relevant purchase invoices and sales receipts is collected by a designated monitoring officer, who prepares backup in time and archive all documents properly.

(D) Quality assurance

All metering equipment for monitoring is chosen in accordance with VCS requirements and is calibrated regularly for accuracy by qualified party according to the national regulations. To assist in future verifications, the Project owner preserves the calibration records, along with the data files of project monitoring.

Error check routines are established on site and at the point of data storage to detect data measuring/transmission failures as well as malfunctions. In the case of malfunction of the meters, the meter supplier provides technical support to engage the problem promptly and emission reductions during this monitoring period are calculated conservatively.

The installation of the electricity metering equipment fulfills the requirements of “DL/T448–2016 Technical Administrative Code of Electric Energy Metering”. The accuracy of the electricity meter will be no lower than 0.5s. The electricity meter is checked and maintained periodically.

(E) Data file management

All monitoring data is electronically filed by the end of each month and the electronic data files are archived in both disk copy and printed hard copy. All data collected as part of monitoring is archived electronically and will be kept at least for two years after the end of the crediting period.

(F) Emergency

The monitoring team members are in charge of identifying any emergency, such as failure or malfunction of a monitoring instrument, and then reporting it to the VCS Manager. The VCS Manager will promptly turn to professionals, such as technicians/engineers from the plant and/or equipment suppliers, to address the emergency. When the issue is successfully handled, the manager will inform the monitoring team members that the emergency is ended.

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

The project does not include commercially sensitive information in the project description to be excluded in the public version.

Section	Information	Justification
N/A	N/A	N/A

APPENDIX 2: CALCULATION OF BASELINE EMISSION FACTOR FOR CCPG

Evidence of $EF_{grid,CM,y}$ calculation:

According to "Tool to calculate the emission factor for an electricity system" (version 07.0), the following six steps are applied to calculate the project baseline emission factor:

(a) **Step 1:** Identify the relevant electricity systems

Project participants may delineate the project electricity system using any of the following options:

- **Option 1**. A delineation of the project electricity system and connected electricity systems published by the DNA or the group of the DNAs of the host country(ies). In case a delineation is provided by a group of DNAs, the same delineation should be used by all the project participants applying the tool in these countries;
- **Option 2**. A delineation of the project electricity system defined by the dispatch area of the dispatch centre responsible for scheduling and dispatching electricity generated by the project activity. Where the dispatch area is controlled by more than one dispatch centre, i.e. layered dispatch area, the higher level area shall be used as a delineation of the project electricity system (e.g. where regional dispatch centres are required to comply with dispatch orders of the national dispatch centre then area controlled by the national dispatch centre shall be used);
- **Option 3**. A delineation of the project electricity system defined by more than one independent dispatch areas, e.g. multi-national power pools.

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

(b) **Step 2:** Choose whether to include off-grid power plants in the project electricity system (optional)

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

- **Optional I:** Only grid power plants are included in the calculation.
- **Optional II:** Both grid power plants and off-grid power plants are included in the calculation.

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

(c) **Step 3:** Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

- Simple OM; or
- Simple adjusted OM; or
- Dispatch data analysis OM; or
- Average OM.

According to the data from Electric Power Industry Statistical Data Compilation 2017 – 2021 and China Energy Statistical Yearbook 2018 – 2022, from 2017 to 2021, for the CCPG the project activity connected to, the low-cost/must-run resources (LCMR)[18] electric power resources generation accounting for the total grid total is 36.99%, 35.75%, 36.66%, 40.78%, and 41.27%, respectively, all lower than 50%.

On the grounds of Flow chart: Overview of the application of OM methods in "Tool to calculate the emission factor for an electricity system" (version 07.0) as shown in Figure 0-1, since the LCMR share is less than 50% of total grid generation in the average of the five most recent years, the simple OM method is chosen for the calculation of the OM emission factor EF.

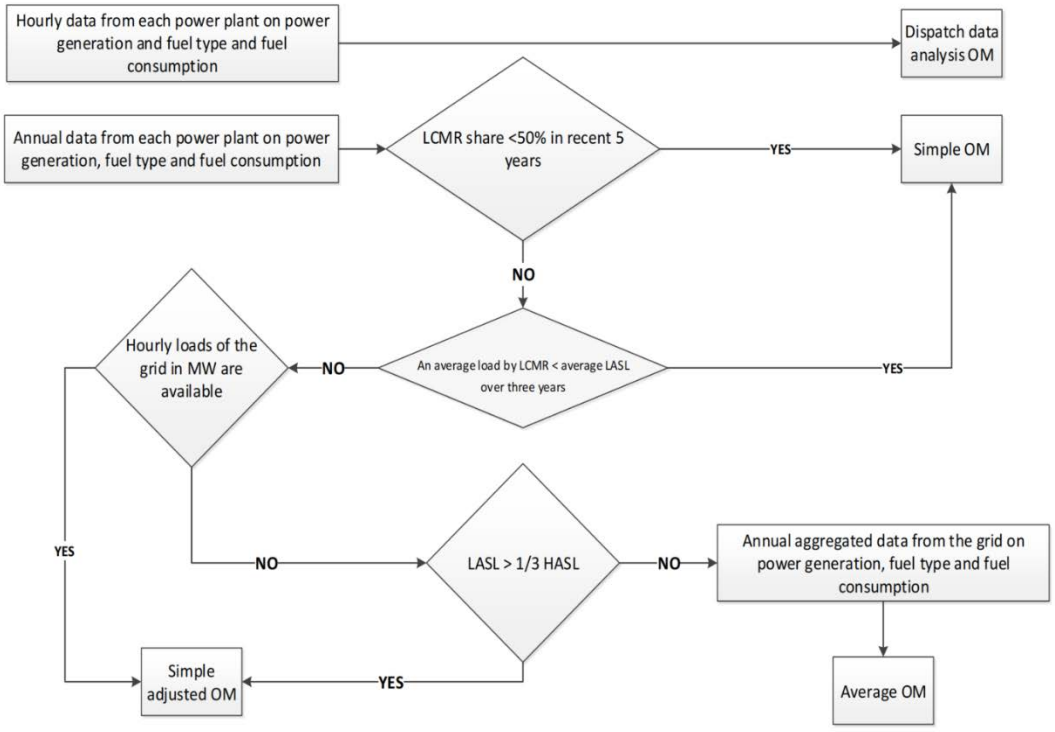


Figure 0-1 Flow chart: Overview of the application of OM methods

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

As per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0), the emissions factor for the simple OM can be calculated using either of the two following data vintages:

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

The Ex ante option is selected, and the $EF_{grid,OM}$ is fixed during the crediting period.

(d) **Step 4:** Calculate the operating margin emission factor according to the selected method

Since the simple OM method is determined to calculate the CCPG OM emission factor in step 3, the simple OM emission factor is calculated as the generation-weighted average CO emissions per unit net electricity generation (t CO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following two options:

- **Option A**: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
- **Option B**: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system. Option B can only be used if:
  - (i) The necessary data for Option A is not available; and
  - (ii) Only 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; and
  - (iii) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2).

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

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

$$EG_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad \text{Equation 20}$$

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year *y* (t CO_2/MWh)
$FC_{i,y}$	=	Amount of fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fuel type *i* in year *y* (t CO_2/GJ)
EG_y	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i	=	All fuel types combusted in power sources in the project electricity system in year *y*
y	=	The relevant year as per the data vintage chosen in Step 3

For this approach (simple OM) to calculate the operating margin, the subscript *m* refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units.

Data such as EG_y, $FC_{i,y}$ and $NCV_{i,y}$ used in the calculation of OM are derived from the China Energy Statistical Yearbook 2020 – 2022 and the Statistical Survey System of Energy Consumption of Public Institutions (formulated by the National Government Offices Administration and approved by the National Bureau of Statistics, August 2019). The data of plant electricity consumption rate are derived from the China Electricity Yearbook 2020 – 2022, the data of electricity exchange between grids are derived from the Statistical Data of the Electric Power Industry 2019 – 2021, and $EF_{CO2,i,y}$ are derived from Table 1.4, Chapter 1 of the Energy volume of the 2006 IPCC Guidelines for the Preparation of National Inventories. The lower limit of 95% confidence interval for each fuel emission factor is obtained according to the conservative principle.

Based on these data, the latest Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) of the CCPG is 0.8771 tCO_2/MWh in 2023[19].

(e) **Step 5:** Calculate the build margin (BM) emission factor

[19] W020240709709437370462.pdf (ncsc.org.cn)

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

- Option 1: for the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period;
- Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

For the Project, Option 1 is chosen to calculate the ex ante BM emission factor based on the most recent information available on units already built for sample group m at the time of this project description submission.

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

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

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

(iii) From $SET_{5\text{-}units}$ and $SET_{\geq 20\ per\ cent}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}); Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. In this case ignore Steps (iv), (v) and (vi).

Otherwise:

(iv) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activities, starting with power units that started to supply electricity to the grid most

recently, until the electricity generation of the new set comprises 20 per cent of the annual electricity generation of the project electricity system (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);

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

Otherwise:

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

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

The build margin emissions factor is the generation-weighted average emission factor (t CO_2/MWh) of all power units *m* during the most recent year *y* for which electricity generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \text{Equation 21}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year *y* (t CO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (mass or volume unit)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (t CO_2/GJ)
m	=	Power units included in the build margin
y	=	Most recent historical year for which electricity generation data is available

According to the instructions of China DNA[20], for the determination of the set of samples, a sample merging processing in some degree has been adopted due to that the power generation data, energy consumption data or thermal efficiency data of each plant cannot be consulted in the public statistical data. In this calculation, the newly-installed power units in the past years are classified by year, province and power generation technology, and the same type of newly-installed power units in the same province and in the same year are bundled as a "newly-installed power units".

[20] W020240709709436742308.pdf (ncsc.org.cn)

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

$$EG_{m,y} = CAP_m \times H_{m,y}$$ Equation 22

Where:

$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
CAP_m	=	Installed capacity of electricity generated and delivered to the grid by power unit *m* in year *y* (MW)
$H_{m,y}$	=	The number of power utilization hours (h) of electricity generated and delivered to the grid by power unit *m* in year y. And it selects the average utilization hours of similar units in the province in which it is located in year *y*;
m	=	Power units included in the build margin
y	=	Most recent historical year for which electricity generation data is available

The power unit m is selected from the "newly-installed power plants" in the most recent year *y* (For the calculation of the grid BM in 2023, the *y* is equal to 2021) to the "newly-installed power plants" in the earlier year, until the cumulative power generation reaches 20% of the total power generation in the year *y* (*y* = 2021).

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

$$CAP_m = CAP_m|_{m=(A,t,k)} = CAP_{A,t,k}$$ Equation 23

Where

CAP_m	=	Installed capacity of electricity generated and delivered to the grid by power unit *m* in year *y* (MW), and *m* is equivalent to an established combination of (A, t, k)
$CAP_{A,t,k}$	=	Capacity of newly-installed power units of a given province (A), given year (t), and given unit type (k) (MW)
A	=	It is the various provincial regions covered by the regional power grid
t	=	It is the sampling year of the "newly-installed power units". For the calculation of the grid BM in 2023, t is equal to 2021, 2020, until the units that comprise at least 20 percent of the system generation in 2021.
k	=	It is the power generation technology classification of "newly-installed power units", which is divided into hydro-power, coal-

thermal power, gas-thermal power, oil-thermal power, Waste-thermal power plant, other thermal power, nuclear power, wind power, solar power, and others.

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

The emission factor of each power unit *m* should be determined as follows:

- **Option A1:** If for a power unit *m* data on fuel consumption and electricity generation is available, the emission factor ($EF_{EL,m,y}$) should be determined as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}} \quad \text{Equation 24}$$

Where:

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (t CO_2/MWh)
$FC_{i,m,y}$	=	Amount of fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fuel type *i* in year *y* (t CO_2/GJ)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m	=	All power units serving the grid in year *y* except low-cost/must-run power units
i	=	All fuel types combusted in power unit *m* in year *y*
y	=	The relevant year as per the data vintage chosen in Step 3

- **Option A2:** If for a power unit *m* only data on electricity generation and the fuel types used is available, the emission factor should be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit, as follows:

$$EG_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad \text{Equation 25}$$

Where:

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (t CO_2/MWh)
$EF_{CO2,m,i,y}$	=	CO_2 emission factor of fuel type *i* in year *y* (t CO_2/GJ)
$\eta_{m,y}$	=	Average net energy conversion efficiency of power unit *m* in year *y* (ratio)
m	=	All power units serving the grid in year *y* except low-cost/must-run power units

y	=	The relevant year as per the data vintage chosen in Step 3
3.6	=	Conversion factor (GJ/MWh)

Where several fuel types are used in the power unit, use the fuel type with the lowest CO_2 emission factor for $EF_{CO2,m,i,y}$.

- **Option A3:** If for a power unit *m* only data on electricity generation is available, an emission factor of 0 t CO_2/MWh can be assumed as a simple and conservative approach.

Option A2 is selected to determine $EG_{EL,m,y}$ because only data on electricity generation and the fuel types used is available.

If the power units included in the build margin *m* correspond to the sample group $SET_{sample\text{-}CDM\text{-}>10yrs}$, then, as a conservative approach, only Option A2 from guidance in Step 4 section 6.4.1 can be used and the default values provided in Table 2, Appendix of TOOL09: "Determining the baseline efficiency of thermal or electric energy generation systems" shall be used to determine the parameter $\eta_{m,y}$ for the power units that started to supply electricity to the grid more than 10 years ago.

The data of $CAP_{A,t,k}$ and $H_{m,y}$ used in the calculation of BM over the past years are mainly derived from the China Electricity Yearbook for 2017-2022, and the data of $\eta_{m,y}$ are derived from the Statistical Data Collection of Electric Power Industry in 2019.

Based on these data, the latest Simple BM Emission Factor ($EF_{grid,BM,y}$) of the CCPG is 0.2696 tCO_2/MWh in 2023[21].

(f) **Step 6:** Calculate the combined margin (CM) emission factor

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

- **Option a:** Weighted average CM; or
- **Option b:** Simplified CM

[21] W020240709709439048191.pdf (ncsc.org.cn)

According to the Flow chart: Determination of CM emission factor in Figure 0-2, the weighted average CM method is used since data to determine OM and BM are available, which also should be used as the preferred option.

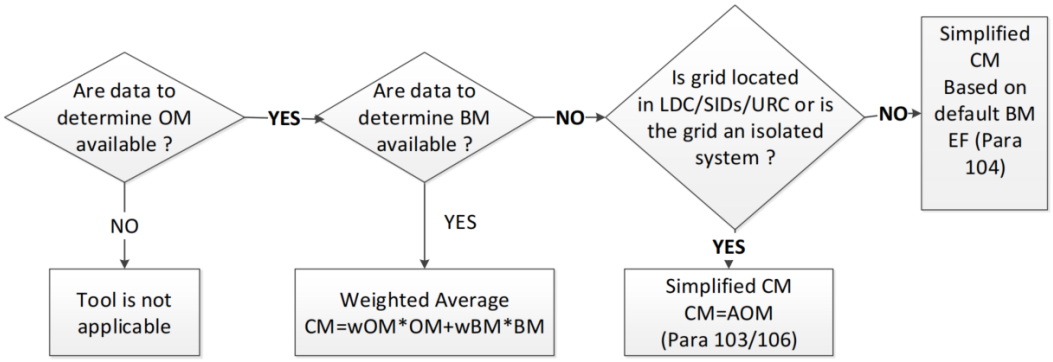


Figure 0-2 Flow chart: Determination of CM emission factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \text{Equation 26}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year *y* (t CO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year *y* (t CO_2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (per cent)
w_{BM}	=	Weighting of build margin emissions factor (per cent)

The following default values should be used for w_{OM} and w_{BM}:

- Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;
- All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

Considering that the Project is a LFG power generation project instead of wind and solar power generation projects, w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period. Thus,

$$EF_{grid,CM,y} = 0.8771\, tCO_2/MWh \times 0.5 + 0.2696\, tCO_2/MWh \times 0.5 = 0.57335\, tCO_2/MWh$$