



GUANGZHOU EASTERN SOLID RESOURCE RECYCLING CENTER MSW INTEGRATED TREATMENT PLANT PROJECT



Document Prepared by Climate Bridge (Shanghai) Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Guangzhou Eastern Solid Resource Recycling Center MSW Integrated Treatment Plant Project (hereinafter referred to as the project) is located at the Solid Resource Recycling Center, Fushan Village, Jiulong Town, Luogang District, Guangzhou City, Guangdong Province, China. The project is owned and implemented by Guangzhou LEO-KING Environmental Technology Co., Ltd.

The purpose of the project is to treat MSW with anaerobic digesters and utilize recovered biogas for electricity generation. The project activity includes MSW collection, MSW pre-treatment system, biodiesel production system, anaerobic digester, biogas purification, electricity generation system and waste heat recovery. However, in terms of the biodiesel production system and waste heat recovery, waste oil sourced from MSW pre-treatment system is used for biodiesel production, and the waste heat is recovered to be the source of heat supply for the operation. To be conservative, emission reductions is not claimed for waste heat recovery and biodiesel production system.

The fresh waste of the project is mainly kitchen and catering waste of the Guangzhou City and the design processing capacity of the project for the fresh waste is 2,040 tonnes per day. The biogas from anaerobic digestion is used for electricity generation with internal combustion generators. The total installed capacity is 10.45 MW included 4 generators with each 1.053 MW and 2 generators with each 3.119 MW.

The liquid digestate and solid digestate are produced in anaerobic digester. The solid digestate is outward transported and incinerated directly in thermal power plant and will not be stored under anaerobic conditions. And the wastewater is treated aerobically by wastewater treatment plant nearby.

The annual average amount of exported electricity is estimated to 61,842 MWh in the twice renewable crediting period from 01-April-2020 to 31-March-2041. And the expected total emission reductions are 2,513,097 tCO₂e during the first crediting period, with average annual emission reductions 359,014 tCO₂e.

The project started construction on 12-October-2017 and the operation start date was 01-April-2020. In this monitoring period from 01-January-2023 to 31-December-2023, the emission reductions are 320,811 tCO₂e.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
<i>Validation</i>	15-July-2022	Verified Carbon Standard	Shenzhen CTI International Certification Co., Ltd	-
Verification	01-April-2020 to 31-December-2021	Verified Carbon Standard	Shenzhen CTI International Certification Co., Ltd	1 year and 9 months
Verification	01-January-2022 to 31-December-2022	Verified Carbon Standard	China Classification Society Certification Co. Ltd.	1 year
Verification	01-January-2023 to 31-December-2023	Verified Carbon Standard	China Classification Society Certification Co. Ltd.	1 year

1.3 Sectoral Scope and Project Type

Sectoral scope	Sectoral Scope 1: Energy industries (renewable - / non-renewable sources) Sectoral Scope 13: Waste handling and disposal.
Project activity type	The project is not a grouped project.

1.4 Project Proponent

Organization name	Guangzhou LEO-KING Environmental Technology Co., Ltd.
Contact person	Peng Tao
Title	General manager
Address	No.118 fushantandong Road, Huangpu District, Guangzhou City, Guangdong Province, P.R China.
Telephone	+86-2162462036
Email	-

1.5 Other Entities Involved in the Project

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

1.6 Project Start Date

Project start date	01-April-2020
Justification	According to VCS standard, the project start date is the date on which activities that lead to the generation of GHG emission reductions or removals are implemented. For this project, the project start date is 01-April-2020 when the project began recovering biogas for electricity generation

1.7 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-April-2020 to 31-March-2027

1.8 Project Location

The project is located at the Solid Resource Recycling Center, Fushan Village, Jiulong Town, Luogang District, Guangzhou City, Guangdong Province, P.R China. The geographical coordinates for the project site are east longitude 113°30'54" and north latitude 23°17'4". The geographic location of the project is shown in Figure 1 *Location of the project*.

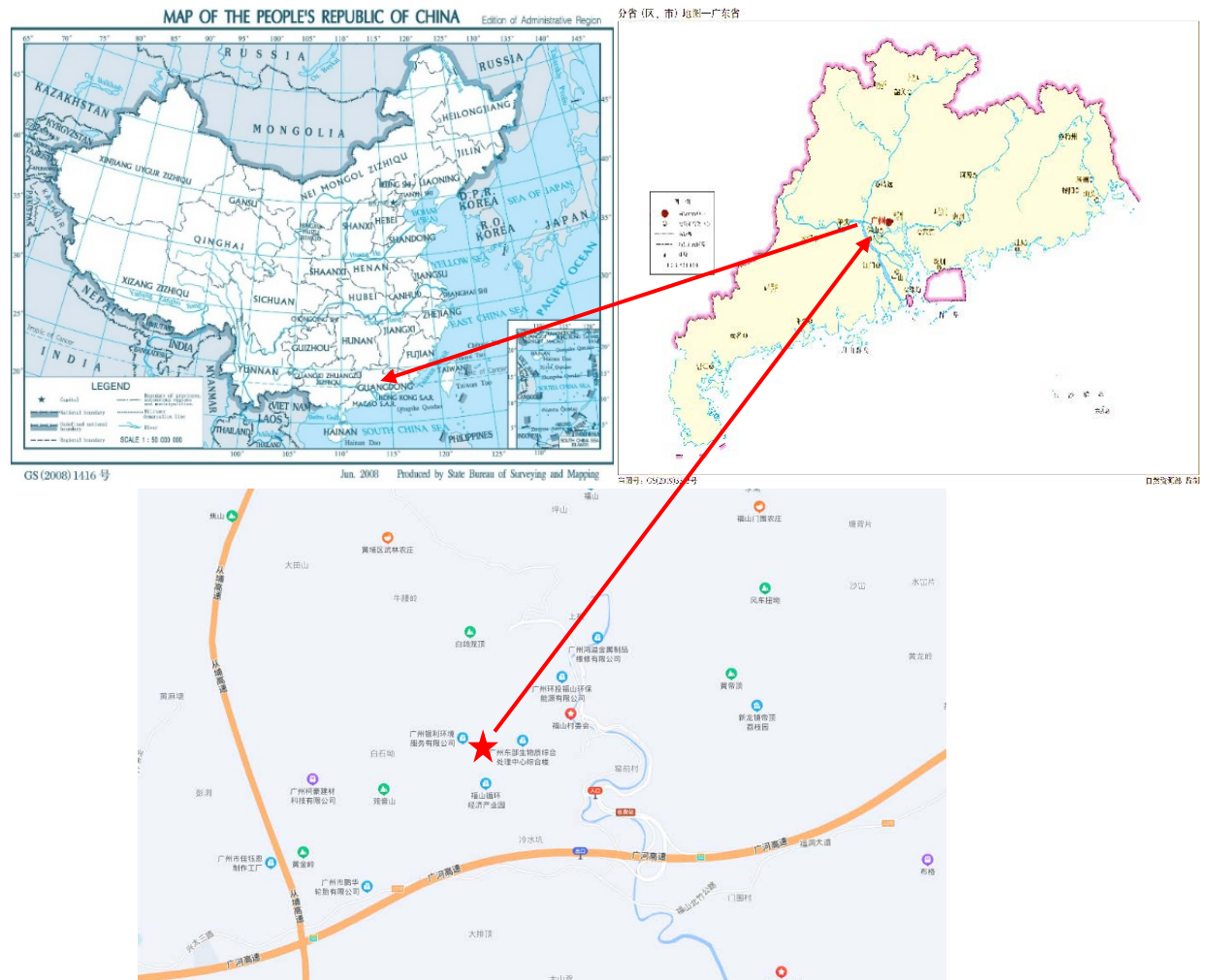


Figure 1 Location of the project

1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0022 ¹	ACM0022 Alternative waste treatment processes	3.0
Tool	TOOL04 ²	TOOL04 Emissions from solid waste disposal sites	08.0
Tool	TOOL05 ³	TOOL05 Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	03.0
Tool	TOOL06 ⁴	TOOL06 Project emissions from flaring	04.0
Tool	TOOL07 ⁵	TOOL07 Tool to calculate the emission factor for an electricity system	07.0
Tool	TOOL08 ⁶	TOOL08 Tool to determine the mass flow of a greenhouse gas in a gaseous stream	03.0
Tool	TOOL14 ⁷	TOOL14 Project and leakage emissions from anaerobic digesters	02.0

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

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

¹ <https://cdm.unfccc.int/methodologies/DB/AUR5PLW743TS0OOCWRS55XXT86WV4J>

² https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v8.1.pdf/history_view

³ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf/history_view

⁴ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v4.0.pdf/history_view

⁵ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf/history_view

⁶ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v3.0.pdf/history_view

⁷ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-14-v2.pdf/history_view

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

Was the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

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

1.11.1 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

1.11.2 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

1.11.3 Supply Chain (Scope 3) Emissions

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

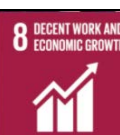
☐ Yes ☒ No

1.12 Sustainable Development Contributions

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

SDG	Indicators	Chinese Sustainable Development Progress ⁸	Project activity contribution
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⁸ Contents of this part are extracted from Chinese Implementation Agenda for Sustainable Development Progress Report (2023). Available at: https://www.mfa.gov.cn/ziliao_674904/zt_674979/dnzt_674981/qtzt/2030kcxzyc_686343/zw/202310/P020231018366004072326.pdf

	13.2 Integrate climate change measures into national policies, strategies and planning	In 2022, China's energy consumption per unit of GDP was reduced by 35% compared with 2012. The reduction of carbon dioxide emissions per unit of GDP by 18% in 2025 compared to 2020 has become a binding target.	The project utilizes fresh waste to generate biogas that would otherwise be treated in a landfill site with a partial capture of the landfill gas (LFG) and flaring of the captured LFG, effectively reducing air pollution and improving the environment around landfills. The project achieves GHG emission reduction and therefore contributes to SDG 13 Climate Action
	8.5 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	China has deeply implemented the 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 provides long-term employment positions for local villagers and increase tax revenue, which has a positive effect on the local economy. Thus, the project achieves SDG 8 Decent Work and Economic Growth
	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	In terms of energy consumption structure, the proportion of non-fossil fuel energy increased from 12% to 16.7%, and coal consumption decreased from 63.8% to 55.9%. In 2022, the number of newly wind and solar power generation capacity in China exceeded 120 thousand MWh, and the	The project supplies renewable electricity to the power grid and contributes to SDG 7 Affordable and Clean Energy

		total generated renewable energy exceeded 1.2 billion kWh, ranking first in the world. Renewable energy generators account for 47.3% of the total. It is expected that by 2030, By 2030, the proportion of non-fossil energy consumption will reach about 25%.	
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Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	10,625.281 MWh of electricity from renewable sources have been supplied to the SCPG during this monitoring period, replacing fossil fuel powered electricity.	From 01-April-2020 onwards, 66,578.881 MWh ⁹ of electricity from renewable sources has been supplied to the power grid.
2)	8.5	8.5.1 Average hourly earnings of employees, by sex, age, occupation and persons with disabilities	Implemented activities to increase	Provided 258 employment positions for local villagers in this monitoring period.	From 01-April-2020 onwards, the project has provided 308 employment positions for local villagers. During this monitoring period, there are 258 people choose to continue to work for the company.
3)	13.2	13.2.2 Total greenhouse gas emissions per year	Implemented activities to increase	The project achieved a GHG emission reduction of 320,811 tCO ₂ e during this monitoring period.	From 01-April-2020 onwards, the project has achieved a GHG emission reduction of 965,818 tCO ₂ e ¹⁰ .

⁹ The first MP contributes 39,353.60MWh. The second MP contributes 16,600MWh. And this MP contributes 10,625.281MWh.

¹⁰ The first MP contributes 332,556tCO₂e. The second MP contributes 312,451 tCO₂e. And this MP contributes 320,811tCO₂e.

1.13 Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of this monitoring report.

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 plant. • Relevant administrative staff of the local government.
Legal or customary tenure/access rights	According to the project approval, the project is located in Guangzhou Eastern Solid Resource Recycling Center MSW Integrated Treatment Plant, which had been a specialized constructed area for solid resource recycling of Guangzhou City projected by the government. the project's construction

	has been approved by the government. The project activities do not involve alterations to the existing legal or customary tenure/access rights of stakeholders, indigenous people (Ips), local communities (LCs), or customary rights holders, as the land is already designated for industrial purposes.
Stakeholder diversity and changes over time	Social, economic, and cultural diversity within stakeholder groups The feedback based on questionnaires (collected on 26-Dec-2023) reflects the social, economic, and cultural diversity within stakeholder groups. The structure of stakeholder composition does not change since validation. The number of male is slightly higher than the female. Age of people mostly locates in the range of 24-45 years old. Source of income of plant staff is the salary paid by the project owner. Occupations of the villagers are workers, farmers, self-employed and waiters. Source of income of famers is agricultural activity and the others are paid by the bodies they serve. As for the government officials, their income is the salary paid by the government. The cultural background of stakeholder is homogeneous. The ethnic group of respondents is Han. The differences and interactions between the stakeholder groups The project provides opportunities to local villagers to be project staff. The staff are responsible for project operation. Government officials play a role of supervising and mediating grievance. The project did not and would not bring negative environmental impacts like water pollution, noise, or air pollution. Nearby villagers and plant staff can report to government officials when they find the project negatively impact their life. Any changes in the make-up of each group over time Reflected from the annual questionnaire survey, there is no change in the make-up of each group during this monitoring period.

Expected changes in well-being	The project is expected to improve the local environment, increase clean electricity supply, and provide work opportunities.
Location of stakeholders	The project does not involve indigenous peoples, customary rights holders, and areas outside the project area that are predicted to be impacted by the project. The identified stakeholders' location are as follows: Project staff: within the plant Residents of the nearby village: as EIA report demonstrates, the nearest villager lives 200 meters away from the project site. Relevant administrative staff of the local government: near the project site
Location of resources	The stakeholders do not own or have access to the project's territories and resources.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	To collect the opinions of local stakeholders during the project operation period, the project owner sets up an ongoing communication mechanism by holding stakeholder meetings, distributing questionnaires, or communicating with stakeholders by phone or other means once a year.
Date(s) of stakeholder consultation	26-Dec-2023
Communication of monitored results	Communications with Local stakeholders were carried out at periodic intervals. Key implementation schedules or changes of the project were communicated to the local authority, who informed the neighborhood committee and the local residents, the comments and suggestions from residents were collected by the local authority meanwhile. Regarding environmental impact or safety issues, the relevant responsible personnel would be promptly notified for inspection and corrective action upon receiving the

	feedback, and an immediate report would be submitted to the company management.
Consultation records	The project proponent prepared total 30 questionnaires for stakeholders in 2023, and 30 copies were collected with valid answers. The project proponent communicates with the stakeholders on following issues by questionnaires: 1) Is there any environmental pollution/economic costs the projects have brought you? 2) Is there any environmental benefit/economic benefits the projects have brought you? 3) Do you know how to reflects your opinions about this project? 4) Do you know about relevant laws and regulations covering workers' rights? 5) Are you informed prior to the project implementation? Stakeholders generally reflect that the project did not bring any costs but bring benefits to them. And stakeholders know about basic laws and regulations about labor right. Paper questionnaires would be retained within the whole crediting period.
Stakeholder input	During the project operation, except for questionnaires, feedback from stakeholders through WeChat, phone calls, etc., regarding the project were collected and regularly reported to company management. Regarding environmental impact or safety issues, the relevant responsible personnel would be promptly notified for inspection and corrective action upon receiving the feedback, and an immediate report would be submitted to the company management. During this monitoring period, there is no comment, so this MR does not involve updates to the project design.

2.1.3 Free, Prior, and Informed Consent

Consent	Before implementing the 3rd verification, the project owner put up a notice on the wall of the project since 01-Dec-2023 to disclose the information below: 1) Purpose of the project The purpose of the project is to treat MSW with anaerobic digesters and utilize recovered biogas for electricity generation. 2) Duration of the monitoring period The 3rd MP is expected to be from 01-Jan-2023 to 31-Dec-2023, subject to change according to actual situation. 3) Project's present capacity and implementation status The total installed capacity is 10.45 MW included 4 generators with each 1.053 MW and 2 generators with each 3.119 MW. 4) A preliminary assessment of the likely economic, social, cultural and environmental impact The project is expected to produce 359,014 tCO₂ emission reductions per year during the whole crediting period, and deliver 61,842MWh feed-in clean electricity to the grid in the twice renewable crediting period from 01/04/2020 to 31/03/2041. 5) Personnel to be involved in the verification (stakeholders, consultant, verifying body) Project staff, local villagers and government officials are invited to participate the subsequent project monitoring questionnaire. Climate Bridge (Shanghai) Ltd. is the consultant to support implementing the verification. And a third-party verifying body will verify the project in-desk and on-site. The verifying body is to be determined. 6) Contact details of the project proponent
Outcome of FPIC	The notice was open to all identified stakeholders. There were no ongoing or unsolved conflicts. The project does not involve IPs or customary right holders. As a result of the

FPIC, stakeholders participate the questionnaire survey held on 26-Dec-2023, which aligns with section 2.1.2.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
N/A	The project owner establishes a complete grievance redress procedure including: -On-site postings for receiving. Stakeholders can write down comments anonymously anytime. -Phone contact for hearing. Stakeholders can make a call directly to the project manager -Responding to the grievance in a week. -Attempting to resolve grievances within a month The grievance procedure is well-documented and easily accessible to stakeholders through the on-site postings. Regular stakeholder meetings and multiple feedback channels ensure stakeholders are aware of and can easily access the grievance process. No grievances were reported during this monitoring period.

2.1.5 Public Comments

Summary of comments received	Actions taken
No comments were received during the stakeholder consultation period, nor were any comments submitted outside of the public comment period for the project.	N/A

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

The project owner Guangzhou LEO-KING Environmental Technology Co., Ltd. delegated the project to Climate Bridge (Shanghai) Ltd. for VCS project development. The project proponent

Climate Bridge (Shanghai) Ltd.¹¹ have developed over 100 Clean Development Mechanism (CDM) projects and over 100 Verified Carbon Standard (VCS) projects and Gold Standard (GS) projects. Climate Bridge (Shanghai) Ltd. has extensive experience in carbon emission reduction projects' development.

2.2.2 Risk assessment

	Risk identified	Mitigation or preventative measure(s) taken
Natural and human-induced risks to stakeholders' wellbeing	No risk identified	There were no risks identified related to stakeholders' wellbeing. The project aims to reduce the methane emissions and generate clean power for the local residents. Compared with the baseline scenario, there is no risk from neither natural nor human-induced risks are identified. What's more, the questionnaire results showed that almost all the stakeholders are supportive to the project operation, believing that the project benefits local economic development, and increase local power supply. Therefore, the implementation of the Project is regarded as beneficial by most of the local stakeholders.
Risks to stakeholder participation	No risk identified	There were no risks identified including project design. The project was designed and implemented to avoid trade-offs including food security, land loss, loss of yields, 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 EIA report assesses gas leakage hazards and fire hazards. To prevent these hazards, relevant facilities are installed according to corresponding standard. The distance between gas transmission pipeline and

¹¹ <https://en.climatebridge.com/>

		other buildings meets the fire protection code for building design (GB50016-2014). There are more than one exists at the production workshop, equipped with fire extinguishing appliances, and fireworks are strictly prohibited in the workshop. Besides, the project provides safety training and adequate labor protection supplies for 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. Article 12 of Labour Law of the People's Republic of China enforces: Labourers, regardless of their ethnic group, race, sex, or religious belief, shall not be discriminated against in employment. The project proponent obeys the anti-discrimination rules set out in the law and the HR Handbook constrains the human resource practice.
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 taken into account to ensure the inclusiveness of project facilities and services. Effective feedback mechanism was established to ensure that community members can give feedback on their opinions and problems at any time. Besides, Article 12 of Labour Law of the People's Republic of China enforces: Labourers, regardless of their ethnic group, race, sex, or religious belief, shall not be discriminated against in employment. And article 15 enforces: The employing units are prohibited from recruiting minors under the age of 16. The project owner strictly obeys the law

		and the HR Handbook constrains the human resource practice.
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 ¹²	Mitigation or preventative measure(s) taken
Discrimination	No risk identified	The project obeys strictly the Labour Law of China and does not engage in any form of discrimination based on race, nationality, ethnic group, sex, religion or any other grounds. During the project design and implementation so far, no discrimination occurred.
Sexual harassment	No risk identified	The project proponent has established a reporting and handling mechanism for complaints over sexual harassment. Anyone could report anonymously to the project proponent whenever they experience or witness such an event. The project proponent verifies the situation and handle it in compliance with laws and regulations. During the project design and implementation so far, no sexual harassment occurred.
Gender equity in labor and work	No risk identified	The project provides the same salary to male and female employees at the same position. Both male and female employees enjoy the same perks and benefits, training opportunities and promotion opportunities.

¹² The identified risks and commensurate mitigation or preventative measure(s) for forced labor, child labor, and human trafficking, must be inclusive of staff and contracted workers employed by third parties.

Forced labor	No risk identified	All the labour is admitted through a legal recruitment process which includes background checks aimed at ensuring that the employees are not exploited and abused. Laborers have the right to resign anytime.
Child labor	No risk identified	Article 15 of Labour Law of People's Republic of China enforces: The employing units are prohibited from recruiting minors under the age of 16. The project proponent strictly obeys the law.
Human trafficking	No risk identified	The project proponent adopts recruitment and employment policies which comply with ILO standards and the Labor Law of China. All the employees are adults, and they all have been The project does not involve any form of human trafficking.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified.	The project construction and operation comply with all applicable laws and regulations. The stakeholder consultation has been conducted prior to the project start, and there are various channels of on-going communication.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified.	No indigenous people lives in the project site. No cultural heritage is found at the project site ¹³ . So the protection of indigenous people and cultural heritage is not involved

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
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¹³ <https://whc.unesco.org/en/statesparties/cn>

No risk identified.	The project site is owned by the local government, and the project is constructed and operated after obtaining government approval, so there is no impact on the property rights of local IPs, LCs, and customary rights holders.
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2.3.5 Benefit Sharing

Summary of the benefit sharing plan	Not applicable. The project is constructed and operated by Guangzhou LEO-KING Environmental Technology Co., Ltd., owned by local government. The project does not involve the property right of IPs, and customary rights holders. So the project does not involve benefit sharing.
Benefit sharing during the monitoring period	Not applicable as the project activity does not involve the property right.

2.4 Ecosystem Health

	Risk identified	Mitigation or preventative measure(s) taken during the monitoring period
Impacts on biodiversity and ecosystems	No risk identified	According to EIA of the project, there is no involved impact on biodiversity and ecosystems.
Soil degradation and soil erosion	No risk identified	According to EIA of the project, there is no involved impact on soil degradation and soil erosion.
Water consumption and stress	No risk identified	The project does not involve groundwater consumption.

2.4.1 Rare, Threatened, and Endangered species

Species or habitat	Not applicable as the project is not located in or adjacent to habitats for rare, threatened, or endangered species.
Areas needed for habitat connectivity	Not applicable as the project is not located in or adjacent to habitats for rare, threatened, or endangered species.

Risks identified	Mitigation or preventative measure(s) taken
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Habitats for rare, threatened, and endangered species	No risks identified.	There is no rare, threatened, and endangered species found in the project site.
Areas for habitat connectivity	No risks identified.	There is no rare, threatened, and endangered species found in the project site.

2.4.2 Introduction of species

Not applicable as the project does not plant or introduce any species.

2.4.3 Ecosystem conversion

Not applicable as the project is not an ARR, ALM, WRC or ACoGS project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The fresh waste collected by the project is mainly kitchen and catering waste of the Guangzhou City and the design processing capacity of the project for the fresh waste is around 2,040 tonnes per day. The project activity includes MSW collection system, MSW pre-treatment system, biodiesel production system, anaerobic digester, biogas purification, electricity generation system and waste heat recovery. However, in terms of the biodiesel production system and waste heat recovery, waste oil sourced from MSW pre-treatment system is used for biodiesel production, and the waste heat is recovered to be the source of heat supply for the operation. To be conservative, emission reductions are not claimed for waste heat recovery and biodiesel production system.

The fresh waste collected by the project is sent to MSW pre-treatment system, then the uniform organic slurry is pumped into the anaerobic digestion system and waste oil is used for biodiesel production system. The anaerobic digestion system produces biogas under medium temperature anaerobic digestion. After at least 25 days retention time in the anaerobic digester, the solid digestate is outward transported and incinerated directly in thermal power plant and is not stored under anaerobic conditions, and the wastewater is treated aerobically by wastewater treatment plant nearby. The biogas from anaerobic digestion is used for electricity generation with internal combustion generators. Detailed technical information and process are shown in Table 2 Technical parameters of the gas generators and enclosed flare and Figure 2 below.

Table 2 Technical parameters of the gas generators and enclosed flare

Gas generator:	
Manufacturer	GE Jenbacher GmbH &Co OG

Type	J620 GS-F25	JGS 320GS-B.L
Quantity	2	4
Rated capacity	3.119 MW	1.053 MW
Rated power factor	1	1
Rated frequency	50HZ	50HZ
Rated Voltage	10500V	10500V
Rotate Current	167A	58A
Enclosed flare		
Manufacturer	Nanjing Carbon Cycling Biomass Technology Co., Ltd.	
Quantity	1	
Model	Φ3100*14000	
Temperature range	0~1200℃	
Pressure range	0~20Kpa	
Flow range	450~4500m ³ /h	

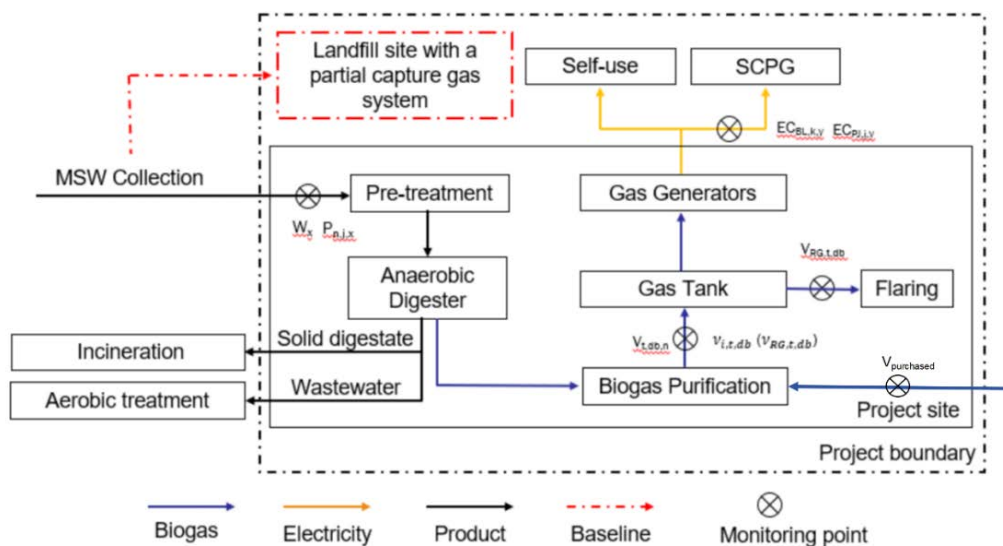


Figure 2 Project process diagram

The project started construction on 12-October-2017 and the operation start date is 01-April-2020. The project has been successfully got two issuance of 1st MP (01/04/2020~31/12/2020) and the 2nd MP (01/01/2022~31/12/2022). During this monitoring period, the project was implemented in accordance with the registered VCS PD. The project has operated without any

accidental or emergency events that might impact the GHG emission reductions and monitoring. The project's anaerobic digester system continuously operated during this monitoring period. The generators operated for 8232 hours during this monitoring period. The flare is in normal operation and operated for 82 hours during this monitoring period. Through the coordinated operation of the biogas generator set and the flare, it can ensure that all the biogas generated by this project is destroyed.

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviates from the registered PD.

3.2.2 Project Description Deviations

Project description deviation of 2nd monitoring period (had been approved)

In the Joint PD&MR (Version 2.1), the total installed capacity will be 10.34 MW included 4 generators with each 1.063 MW and 2 generators with each 3.044 MW, which is based on the data of Electricity Purchase Contract.

According to the nameplate of generators, the total installed capacity is corrected to 10.45 MW included 4 generators with each 1.053 MW and 2 generators with each 3.119 MW in this monitoring period.

This project deviation has been reviewed and approved by VERRA on 27-August-2024.

Project description deviation of 3rd monitoring period (this monitoring period)

There is a project description deviation for the project during this monitoring period (from 01-Jan-2023 to 31-Dec-2023), which is discussed in detail below:

Nature of the deviation

According to the registered VCS-JPM, the project treats MSW with anaerobic digesters and utilizes recovered biogas for electricity generation. The source of biogas is from the MSW treatment process.

Since January 2023, the PP purchased surplus biogas for power generation from a fresh waste anaerobic digestion project (started operation in 2022, later than the operation start date of the project) owned by Grandtop Fushan Environmental Protection Energy Co., Ltd. A new pipeline with a biogas flow meter has been built connecting the project activity with the Grandtop Fushan project. The purchased biogas is measured by the newly installed flow meter and then fed to the pre-treatment system of the project site. This change leads to the project deviation from registered VCS-JPM.

Analysis of impacts by the deviation

The impacts to the applicability of the methodology, additionality or the appropriateness of the baseline scenario by the project deviation is analysis as follows:

Type	The applied methodology ACM0022 and registered PD	The project deviation
Applicability of applied methodology	The methodology applies to project activities that install and operate new plants for the treatment of fresh waste through any combination of the following processes: (a) Composting process under aerobic conditions; (b) Anaerobic digestion with biogas recovery and flaring and/or its use; (c) Co-composting of wastewater in combination with solid waste; (d) Anaerobic co-treatment of wastewater in combination with solid waste; (e) Mechanical/thermal treatment process to produce refuse-derived fuel (RDF) or stabilized biomass (SB) that is produced within the project boundary and its use; (f) Gasification process to produce syngas and its use; (g) Incineration of fresh waste for the generation of thermal/electric energy. (h) The following conditions apply to all project activities using this methodology: (i) The project plant only treats fresh waste/wastewater for which emission reductions are claimed, except for cases involving composting, co-composting and anaerobic digestion; (j) Neither the fresh waste nor the products from the project plant are stored on-site under anaerobic conditions; (k) Any wastewater discharge resulting from the project activity is treated in accordance with applicable regulations; (l) The project activity does not reduce the amount of waste that would be recycled in the absence of the project activity. This shall be justified and documented in the clean	Applicable. The project deviation does not change the facts and conditions prior to the project implementation; therefore, it is still applicable. The project utilizes the biogas from anaerobic digestion of fresh waste for power generation. Therefore, the project falls under process (b). All other processes, i.e. (a), (c), (d), (e), (f), (g), are irrelevant to the project activity. According to condition (h), condition (i) to (n) applies to all project activities using this methodology: (i) The project only treats fresh waste for which emission reductions are claimed. (j) Fresh waste is pre-treated and fed to the anaerobic digester immediately after being transported to the project site and the digestate from the anaerobic digester is transported and incinerated directly by the nearby MSW incineration plant. Both fresh waste and digestate are not stored onsite under anaerobic conditions. (k) The wastewater produced by the project is treated aerobically by wastewater treatment plant in accordance with applicable regulations such as GB18918-2016 "Discharge standard of pollutants for municipal wastewater treatment plant" and HJ/T91-2002 "Technical Specifications Requirements for Monitoring of Surface Water and Wastewater".

	development mechanism project design document (CDM-PDD); (m) When applicable regulations mandate any waste treatment process implemented under the project activity, the rate of compliance with such regulations for the treatment process is below 50 per cent ; (n) Hazardous wastes/wastewater are not eligible under this methodology.	(l) Prior to the implementation of the project, the fresh waste was disposed of at nearby landfill with a partial LFG capture system. The project does not reduce the amount of waste that would be recycled in the absence of the project activity. (m) Up to date, there are no applicable laws or regulations in China that require anaerobic digestion of fresh waste. (n) The project does not treat hazardous waste or hazardous wastewater.
	The methodology is only applicable if the baseline scenario is: (a) The disposal of the fresh waste in a SWDS with or without a partial LFG capture system (M2 or M3); (b) In the case of co-composting or co-treatment of wastewater in an anaerobic digester, the treatment of organic wastewater in either an existing or new anaerobic lagoon or sludge pit without methane recovery (W1 or W4); (c) In the case of electricity generation, the electricity is generated in an existing/new captive fossil fuel fired power-only plant, captive cogeneration plant and/or the grid (P2, P4 or P6); (d) In the case of heat generation, the heat is generated in an existing/new fossil fuel fired cogeneration plant, boiler or air heater (H2 or H4).	Applicable. The project deviation does not change the facts and conditions prior to the project implementation; therefore, it is still applicable. The baseline scenario identified for the project is: the fresh waste was disposed at nearby landfill with a partial capture of the LFG and flaring of the captured LFG (M2); The electricity generated by the project is supplied to China South Power Grid (CSPG) which is dominated by coal-fired power stations (P6). Therefore, the project is applicable to (a) and (c).
	Specific applicability conditions for the different processes are provided	Applicable. The project deviation does not change the facts and conditions

	in Table 2 of ACM0022 (Version 03.0).	prior to the project implementation; therefore, it is still applicable. The project utilizes the biogas from anaerobic digestion of fresh waste for power generation. The fresh waste of the project is mainly kitchen and catering waste from Guangzhou City. The production of this project is biodiesel and electricity, there are no non-biodegradable materials of waste by-products that may have market value. Thus, the project is applicable to the option “Anaerobic digestion” of the column “waste treatment option under the project activity” listed in Table 2 of ACM0022 (version 03.0).
Additionality	As per the registered VCS-JPM, the project activity has a project IRR of 7.87%, lower than the benchmark IRR of 12%	The project IRR after project deviation has been re-calculated by adding the additional sales revenue from electricity generated using purchased biogas to the cash inflow and adding the cost for biogas purchase to the cash outflow. The additional project cost due to construction of biogas pipeline is not considered in this IRR re-calculation, which is deemed conservative. The updated project IRR is 8.17%, still much lower than the benchmarks of 12%. Thus, the project deviation has no impact on the additionality.
Baseline Scenario	The baseline scenario identified for the project is: the fresh waste was disposed at nearby landfill with a partial capture of the LFG and flaring of the captured LFG (M2); The electricity generated by the project is supplied to China South Power Grid (CSPG) which is dominated by coal-fired power stations (P6)	The project deviation does not change the facts and conditions prior to the project implementation; therefore, the baseline scenario of the project activity remains still.

Based on the analysis above, it can be concluded that this deviation does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario. Since the deviation leads to a change in the project investment analysis, in accordance with para. 3.21.2 (1) of the VCS Standard v4.7, the registered Project Description is updated to version 2.2 dated 19-Feb-2025 to justify this deviation.

Outcome of the project deviation

Compared with the registered VCS-JPM, the electricity generated from the purchased biogas generated by the Grandtop Fushan project will result in an increase in the GHG emission reductions. However, the baseline emissions of methane from the SWDS ($BE_{CH_4,y}$) are not impacted by the project deviation. To ensure the ER of the project is not overestimated, the following measures have been taken:

- A. For the calculation of baseline emissions associated with energy generation ($BE_{EC,y}$), the electricity generated from purchased biogas ($EC_{purchased,y}$) is deducted for conservativeness. Due to the fact that the electricity generated from purchased biogas cannot be monitored separately from the biogas generated by the anaerobic digestors of the project as the purchased biogas share the same pre-treatment system, biogas pipeline and biogas generators with the biogas generated by the project, the electricity generated from purchased biogas ($EC_{purchased,y}$) is calculated theoretically assuming the biogas generators working at the highest efficiency of 42%, which means the theoretical maximum electricity generation from purchased biogas is deducted from $BE_{EC,y}$ and is deemed conservative. Details are as follows:

$$BE_{EC,y} = \sum_k (EC_{BL,k,y} - EC_{purchased,y}) \times EF_{EL,k,y} \times (1 + TDL_{k,y})$$

Where,

$EC_{BL,k,y}$ = Quantity of electricity that would be consumed by the baseline electricity consumption source k in year y (MWh), including electricity generated from purchased biogas and biogas generated by the project activity

$EC_{purchased,y}$ = The electricity generated from purchased biogas (MWh), which is the theoretical maximum electricity generation from purchased biogas

The electricity generated from purchased biogas ($EC_{purchased,y}$) is calculated as follows:

$$EC_{purchased,y} = V_{purchased,y} \times V_{purchased,t,db} \times \rho_{CH_4,n} \times NCV_{CH_4} \times \varphi \div 3.6$$

Where,

$V_{purchased,y}$ = Quantity of purchased biogas in year y (m^3)

$V_{purchased,t,db}$	=	100% (m ³ gas CH ₄ /m ³ dry gas)
$\rho_{CH_4,n}$	=	0.71566 (kg/m ³)
NCV_{CH_4}	=	0.0504 (GJ/kg)
φ	=	42%, highest power generation efficiency of biogas generator, sourced from registered VCS-JPM
3.6	=	Unit conversion from GJ to MWh

Quantity of purchased biogas ($V_{purchased,y}$) is monitored by newly installed biogas flow meter. However, the PP did not install gas analyzer to monitor the volumetric fraction of CH₄ in the purchased biogas, it is conservatively assumed that the CH₄ content in the purchased biogas is 100%, since the value of purchased biogas is deducted from total ER and higher value of $V_{purchased,y}$ will result in lower ER of the project.

Monitoring Details of the purchased biogas are as below:

Parameter	Monitoring equipment	Monitoring frequency
$V_{purchased,y}$	Flow meter Type: ZD7200MT3HEX Serial No.: 2207L4628001	Continuous measurement and monthly recording
$V_{purchased,t,db}$	No gas analyzer is newly installed. For Conservativeness, use the default value 100%	-

The updated monitoring diagram of the project is shown below:

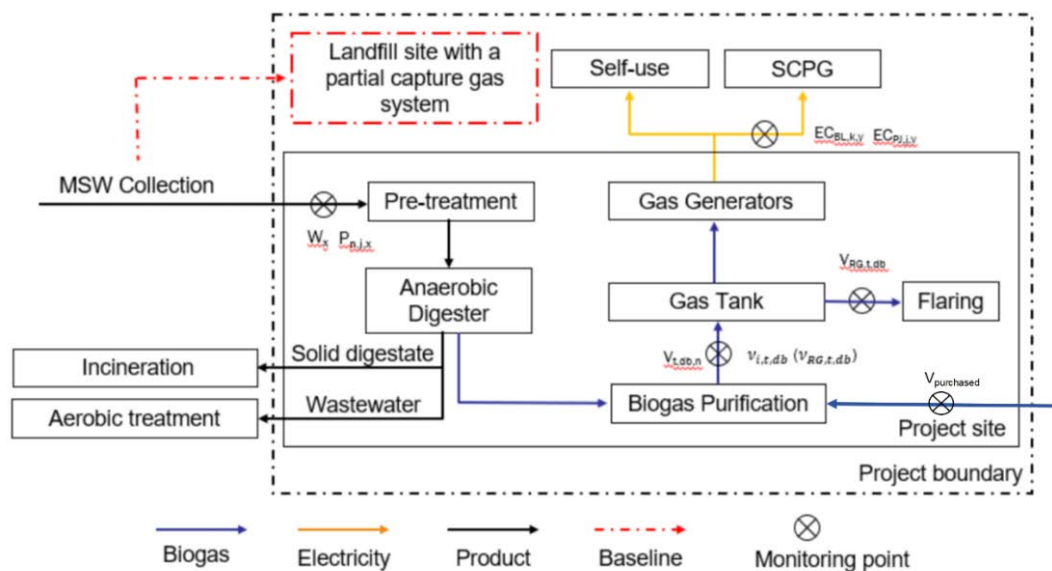


Figure 3 Project monitoring diagram

- B. Although all purchased biogas is used for electricity generation by the project and the associated project emissions from combustion of purchased biogas is considered 0 as per the applied methodology, to ensure conservative calculation of ER, all purchased biogas is considered as flared biogas and corresponding project emissions from combustion of purchased biogas are calculated. Details as follows:

$$PE_{flare,y} = GWP_{CH_4} \times (V_{t,db} \times v_{RG,t,db} \times \rho_{RG,n} \times h + V_{purchased,y} \times V_{purchased,t,db} \times \rho_{RG,n}) \times (1 - \eta_{flare,m}) \times 10^{-3}$$

By adopting the above measures, the ER of the project is conservatively calculated. Please refer to section 4 and section 5 of this MR and ER sheet for calculation details.

3.3 Grouped Projects

Not applicable as the project is not a grouped project.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes ☒ No

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	GWP _{CH4}
Data unit	t CO ₂ e/t CH ₄
Description	Global warming potential of CH ₄
Source of data	IPCC
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Default value of 28 from IPCC Fifth Assessment Report (AR5). Shall be updated according to any future COP/MOP decisions.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	NCV _{CH4}
Data unit	TJ/t CH ₄
Description	Net calorific value of methane at reference conditions
Source of data	Technical literature, ACM0001 version 19.0
Value applied	0.0504
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$\eta_{P/flare,m}$
Data unit	Dimensionless
Description	Flare efficiency in minute m
Source of data	"Project emissions from flaring" (Version 04.0)
Value applied	90%
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of project emissions
Comments	-

Data / Parameter	ϕ_y
Data unit	-
Description	Model correction factor to account for model uncertainties for year y
Source of data	"Emissions from solid waste disposal sites" (version 08.0)
Value applied	0.85

		Humid/wet conditions	Dry conditions
	Application A	0.75	0.75
	Application B	0.85	0.80
Justification of choice of data or description of measurement methods and procedures applied	Default value suggested in the tool. The project selects Option 1: Use a default value to determine ϕ_y in the tool “Emissions from solid waste disposal sites” (version 08.0), and the project belongs to the situation of Application B, additionally, the climate is wet conditions based on the 23°C of average temperature of Guangzhou city and 1,722mm¹⁴ of annual mean precipitation. Thus 0.85 is chosen for ϕ_y.		
Purpose of Data	Calculation of baseline emissions		
Comments	-		

Data / Parameter	OX
Data unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	0.1
Justification of choice of data or description of measurement methods and procedures applied	The landfill is covered with plastic film or soil, for conservative 0.1 was chosen.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	F
Data unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)

¹⁴ FSR

Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	Using IPCC 2006 Guidelines default value
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	DOC _{f,y}
Data unit	Weight fraction
Description	Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	Using IPCC 2006 Guidelines default value
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	MCF _y
Data unit	-
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	1.0
Justification of choice of data or description of measurement methods and procedures applied	The nearby landfill of the project is controlled for anaerobic managed, including the following activities: (i) the nearby landfill of the project applies the cover material on the top of the landfill. (ii) Before landfilling, the waste is compacted mechanically. (iii) After landfilling, the waste is levelled. Therefore, 1.0 for anaerobic

	managed solid waste disposal sites is recommended by "Emissions from solid waste disposal sites (Version 08.1)."
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	DOC _j														
Data unit	-														
Description	Fraction of degradable organic carbon in the waste type <i>j</i> (weight fraction)														
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)														
Value applied	Apply the following values for the different waste types <i>j</i> for MSW: <table border="1"> <thead> <tr> <th>Waste classification</th><th>DOC_j (% wet waste)</th></tr> </thead> <tbody> <tr> <td>Wood and wood product</td><td>43</td></tr> <tr> <td>Pulp, paper and cardboard (other than sludge)</td><td>40</td></tr> <tr> <td>Food, food waste, beverage and tobacco (other than sludge)</td><td>15</td></tr> <tr> <td>Textiles</td><td>24</td></tr> <tr> <td>Gardens, yard and park was</td><td>20</td></tr> <tr> <td>Glass, metal and other inert waste</td><td>0</td></tr> </tbody> </table>	Waste classification	DOC _j (% wet waste)	Wood and wood product	43	Pulp, paper and cardboard (other than sludge)	40	Food, food waste, beverage and tobacco (other than sludge)	15	Textiles	24	Gardens, yard and park was	20	Glass, metal and other inert waste	0
Waste classification	DOC _j (% wet waste)														
Wood and wood product	43														
Pulp, paper and cardboard (other than sludge)	40														
Food, food waste, beverage and tobacco (other than sludge)	15														
Textiles	24														
Gardens, yard and park was	20														
Glass, metal and other inert waste	0														
Justification of choice of data or description of measurement methods and procedures applied	Using IPCC 2006 Guidelines default value														
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	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)		
Value applied	Apply the following default values for the different waste types j:		
	Waste type <i>i</i>	Boreal and	Tropical

			Temperate(MAT≤20℃)		(MAT>20℃)	
			Dry (MAP/PE T<1)	Wet (MAP/PE T>1)	Dry (MAP <1000 mm)	Wet (MAP >1000 mm)
	Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04	0.06	0.045	0.07
		Wood, wood products 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.						
Justification of choice of data or description of measurement methods and procedures applied			The average temperature of Guangzhou city is 23℃. The annual mean precipitation is 1,722mm ¹⁵ , thus, the climate is classed as: Tropical (MAT>20℃), Wet (MAP >1000mm), and the value of k _j for this climate is applied for the project.			
Purpose of Data			Calculation of baseline emissions			
Comments			-			

Data / Parameter	EF _{grid,OM,y}
Data unit	t CO ₂ /MWh

¹⁵ FSR

Description	Operating margin CO ₂ emission factor in year y
Source of data	“2019 Baseline Emission Factors for Regional Power Grids in China” published by DNA of China
Value applied	0.8042
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 and project emissions
Comments	EF _{grid, OM,y} is fixed in the crediting period.

Data / Parameter	EF _{grid,BM,y}
Data unit	t CO ₂ /MWh
Description	Build margin CO ₂ emission factor in year y
Source of data	“2019 Baseline Emission Factors for Regional Power Grids in China” published by DNA of China
Value applied	0.2135
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 and project emissions
Comments	EF _{grid,BM,y} is fixed in the crediting period.

Data / Parameter	EF _{grid,CM,y}
Data unit	t CO ₂ /MWh
Description	Combined margin emission factor for the grid in year y
Source of data	Calculated based on “Tool to calculate the emission factor for an electricity system”
Value applied	0.50885

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 "Tool to calculate the emission factor for an electricity system" (version 07.0).
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	For the project, the weight ω_{OM} and ω_{BM} are both 0.5 by default for the fixed crediting period. Thus, $EF_{grid,CM,y}=0.8042 \text{ tCO}_2/\text{MWh} * 0.5 + 0.2135 \text{ tCO}_2/\text{MWh} * 0.5 = 0.50885 \text{ tCO}_2/\text{MWh}$. The $EF_{grid,CM,y}$ is fixed during the crediting period.

Data / Parameter	$EF_{CH4,default}$
Data unit	t CH ₄ leaked / t CH ₄ produced
Description	Default emission factor for the fraction of CH ₄ produced that leak from the anaerobic digester
Source of data	IPCC (2006), Flesch et al. (2011) and Kurup (2003)
Value applied	0.028
Justification of choice of data or description of measurement methods and procedures applied	The digester with steel and gas tank and monolithic construction are installed by the project proponent
Purpose of Data	Calculation of project emissions
Comments	-

Data / Parameter	$f_{CH4,default}$
Data unit	m ³ CH ₄ / m ³ biogas corrected to reference conditions
Description	Default value for the fraction of methane in the biogas
Source of data	The default value was derived based on reported values from registered projects and research papers (Davidsson, 2007)
Value applied	0.6
Justification of choice of data or description of measurement methods and procedures applied	-

Purpose of Data	Calculation of project emissions
Comments	Use this value for Option 2 of the step “Determination of the quantity of methane produced in the digester”

Data / Parameter	R_u
Data unit	Pa.m ³ /kmol.K
Description	Universal ideal gases constant
Source of data	“Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 03.0)
Value applied	8,314
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	MM_i
Data unit	kg/kmol
Description	Molecular mass of greenhouse gas CH ₄
Source of data	“Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (Version 03.0)
Value applied	16.04
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	P_n
------------------	-------

Data unit	Pa
Description	Total pressure at normal conditions
Source of data	"Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0)
Value applied	101,325 Pa
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	T_n
Data unit	K
Description	Temperature at normal conditions
Source of data	"Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0)
Value applied	273.15
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	$\rho_{i,n}$ & $\rho_{RG,n}$
Data unit	Kg gas i/m ³ gas I, i=RG=CH ₄
Description	Density of greenhouse gas CH ₄ in the gaseous stream at normal conditions
Source of data	Calculated in the section 4 of joint PD&MR as per the latest version of "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0)

Value applied	0.71566
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	Applicable to Option A, $\rho_{i,n} = \rho_{RG,n} = 101,325 \text{ Pa} \times 16.04 \text{ kg/kmol} / (8314 \text{ Pa} \cdot \text{m}^3 / \text{kmol} \cdot \text{K} \times 273.15 \text{ K}) = 0.71566 \text{ kg gas } i / \text{m}^3 \text{ gas } i$

Data / Parameter	$\text{TDL}_{j,y}$ and $\text{TDL}_{k,y}$
Data unit	-
Description	Average technical transmission and distribution losses for providing electricity to source j or k in year y
Source of data	Methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0)
Value applied	$\text{TDL}_{j,y}$: 3% $\text{TDL}_{k,y}$: 3%
Justification of choice of data or description of measurement methods and procedures applied	According to the tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0), the project belongs to the case of Scenario A, use as default values of 3% for project emission since electricity consumption by all project electricity consumption sources is smaller than the electricity consumption of all baseline electricity consumption sources, and 3% for baseline emissions.
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	$\text{RATE}_{\text{compliance},t,y}$
Data unit	Fraction
Description	Rate of compliance with a regulatory requirement to implement the alternative waste treatment t implemented in the project activity
Source of data	Ministry of Ecological Environment

Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	There is no regulatory requirement that mandates the use of anaerobic digestion to treat fresh waste according to the most recent information available from website of Ministry of Ecological Environment. Thus, $RATE_{compliance,t,y} = 0$.
Purpose of Data	Calculation of baseline emissions
Comments	Calculated based on the number of instances of compliance identified at the time of the investment decision and updated once for every subsequent crediting period

4.2 Data and Parameters Monitored

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	ACM0022 (Version 03.0)				
Description of measurement methods and procedures to be applied	According to the <i>ACM0022 (Version 03.0)</i>, if the requirement does not specify any amount or percentage of LFG that should be destroyed but require the installation of a system to capture and flare the LFG, then it is assumed $f_y = 0.2$. In China, the requirement does not specify any amount or percentage of LFG that should be destroyed but require the installation of a system to capture and flare the LFG, so $f_y = 0.2$.				
Frequency of monitoring/recording	Annually				
Value applied	<table border="1"> <thead> <tr> <th>year</th><th>Value</th></tr> </thead> <tbody> <tr> <td>01-January-2023 to 31-December-2023</td><td>0.2</td></tr> </tbody> </table>	year	Value	01-January-2023 to 31-December-2023	0.2
year	Value				
01-January-2023 to 31-December-2023	0.2				
Monitoring equipment	-				
QA/QC procedures to be applied	-				
Purpose of data	Calculation of baseline emissions				

Calculation method	-
Comments	-

Data / Parameter	W _x	
Data unit	t	
Description	Total amount of waste disposed in a SWDS in year x	
Source of data	Measurements by project participants	
Description of measurement methods and procedures to be applied	Measure on wet basis	
Frequency of monitoring/recording	Continuously, aggregated at least annually for year x Recording monthly, aggregated annually	
Value applied	year	Value
	01-January-2023 to 31-December-2023	505,371.01
Monitoring equipment	There are four weighbridges installed at the gate of the project site. In this monitoring period, just one weighbridge was applied to monitor the amount of waste disposed by the project.	
	Monitoring equipment	Weighbridge (Applied)
	Type	SCS-50
	Serial No	22050414BD
	Accuracy	III
	Calibration date	01-January-2023
	Validity date	31-December-2023
	The other three weighbridges were used as backup and were also calibrated regularly.	
	Monitoring equipment	Weighbridge (Backup 1)
	Type	SCS-50
	Serial No	22050413BD
	Accuracy	III

	Calibration date	01-January-2023
	Validity date	31-December-2023
	Monitoring equipment	Weighbridge (Backup 2)
	Type	SCS-50
	Serial No	22050415BD
	Accuracy	III
	Calibration date	01-January-2023
	Validity date	31-December-2023
	Monitoring equipment	Weighbridge (Backup 3)
	Type	SCS-50
	Serial No	22050416BD
	Accuracy	III
	Calibration date	01-January-2023
	Validity date	31-December-2023
QA/QC procedures to be applied	The project proponent monitors the weight of the MSW regularly. The weighbridge is calibrated annually.	
Purpose of data	Calculation of baseline emissions	
Calculation method	-	
Comments	For application B	
Data / Parameter	$P_{n,j,x}$	
Data unit	-	
Description	Weight fraction of the waste type j in the sample n collected during the year x	
Source of data	Sample measurements by project participants	
Description of measurement methods	Sample the waste composition, using the waste types j, as provided in the table for DOC_j and k_j , and weigh each waste fraction (measure on wet basis)	

and procedures to be applied															
Frequency of monitoring/recording	Minimum of three samples every three months														
Value applied	The annual data is calculated based on the number of samples and each corresponding weight fraction of waste composition. In this monitoring period, three samples were collected by project owner every three months, and which were measured according to the relevant standard. Please refer to ER spreadsheet for every sample data during this monitoring period. <table border="1"> <tr> <td>Year</td><td>2023</td></tr> <tr> <td>Food</td><td>75.53%</td></tr> <tr> <td>Paper</td><td>6.72%</td></tr> <tr> <td>Garden and park waste</td><td>0.00%</td></tr> <tr> <td>Wood</td><td>0.00%</td></tr> <tr> <td>Others (Glass, plastic, metal, etc)</td><td>13.37%</td></tr> <tr> <td>Textile</td><td>4.38%</td></tr> </table>	Year	2023	Food	75.53%	Paper	6.72%	Garden and park waste	0.00%	Wood	0.00%	Others (Glass, plastic, metal, etc)	13.37%	Textile	4.38%
Year	2023														
Food	75.53%														
Paper	6.72%														
Garden and park waste	0.00%														
Wood	0.00%														
Others (Glass, plastic, metal, etc)	13.37%														
Textile	4.38%														
Monitoring equipment	-														
QA/QC procedures to be applied	-														
Purpose of data	Calculation of baseline emissions														
Calculation method	-														
Comments	For application B														

Data / Parameter	Z_x
Data unit	-
Description	Number of samples collected during the year x
Source of data	Project participants
Description of measurement methods and procedures to be applied	Minimum of three samples every three months

Frequency of monitoring/recording	Continuously, aggregated annually	
Value applied	year	Value
	01-January-2023 to 31-December-2023	12
Monitoring equipment	-	
QA/QC procedures to be applied	The sample size and sampling technique is representative. The samples are measured by the project owner as per relevant standard.	
Purpose of data	Calculation of baseline emissions	
Calculation method	-	
Comments	For Application B and if the waste includes more than one waste type j. In this monitoring period, the number of samples collected is at least three every three months, which is in line with the requirement of the methodology tool.	

Data / Parameter	EC _{BL,k,y}				
Data unit	MWh				
Description	Quantity of electricity that would be consumed by the baseline electricity consumption source k in year y				
Source of data	Electricity meter, PP's recording				
Description of measurement methods and procedures to be applied	Electricity meter(s) and monthly recorded. All electronic data and paper documents will be archived for two years following the end of the crediting period. In this monitoring period, the electricity is monitored continuously by electricity meter and the recorded at 24:00 on the last day of every month by remote reading system.				
Frequency of monitoring/recording	Monitoring continuously and recording monthly				
Value applied	Period	Meter recording	Meter recording (adjusted value)	Receipts	Minimum
	01-January-2023 to 31-January-2023	479.548	477.150	479.400	477.150

	01-February-2023 to 28-February-2023	962.166	957.355	962.200	957.355
	01-March-2023 to 31-March-2023	474.786	472.412	475.000	472.412
	01-April-2023 to 30-April-2023	1,235.798	1,229.619	1,235.600	1,229.619
	01-May-2023 to 31-May-2023	888.644	884.201	888.600	884.201
	01-June-2023 to 30-June-2023	1,050.310	1,045.058	1,050.200	1,045.058
	01-July-2023 to 31-July-2023	599.076	596.081	599.200	596.081
	01-August-2023 to 31-August-2023	855.518	851.240	855.600	851.240
	01-September-2023 to 30-September-2023	539.776	537.077	539.400	537.077
	01-October-2023 to 31-October-2023	1,032.446	1,027.284	1,032.800	1,027.284
	01-November-2023 to 30-November-2023	1,246.356	1,240.124	1,246.000	1,240.124
	01-December-2023 to 31-December-2023	1,314.250	1,307.679	1,314.200	1,307.679
	Monitoring equipment	Two bidirectional electricity meters M1(main meter) and M2 (backup meter) with accuracy of 0.5S are installed in the high voltage switch room of the project site.			
The key information of the electricity meters is shown as below:					
Monitoring equipment		Electricity meter			
Type		DSSD71		DSSD71	
Serial No		001800010302		001800010306	
Accuracy		0.5S		0.5S	
Calibration date		29-Jan-2022 18-Oct-2024		29-Jan-2022 18-Oct-2024	
Validity date		28-Jan-2023 17-Oct-2025		28-Jan-2023 17-Oct-2025	
QA/QC procedures to be applied	The data is cross checked with sale receipts. The electricity meters should be periodically checked and maintained.				
	The two electricity meters have been tested and calibrated by the grid company annually, however no calibration reports were issued to the project owner and consequently not available for ER verification. Therefore, for conservativeness, the calibration is				

	considered as delayed, and the monitoring results have been adjusted as per para. 366 of CDM VVS for PA by deducting the maximum permissible error (0.5%) of the electricity meters from the quantity of electricity supplied by the project plant to the grid and adding 0.5% to the quantity of electricity delivered to the project plant from the grid. And for the simplification and conservativeness, the adjustment to the monitoring results is made for the whole monitoring period. The adjustment factor of 0.5% is determined as follows: the accuracy of the electricity meters is 0.5S, which means the maximum permissible error of the electricity meters is 0.5%. As per the calibration reports dated 18/10/2024 which is after the monitoring period in consideration, the error of the electricity meters is smaller than the maximum permissible error, in accordance with para. 366 of CDM VVS, the maximum permissible error (0.5%) shall be applied for adjustment.
Purpose of data	Calculation of baseline emissions.
Calculation method	-
Comments	$EC_{BL,k,y}$ is equivalent to the net amount of electricity generated by the alternative waste treatment process t and exported to the grid or displacing fossil fuel fired captive energy plant in year y ($EG_{t,y}$), which is the electricity exported by the project activity.

Data / Parameter	EC _{PJ,j,y}									
Data unit	MWh									
Description	Quantity of electricity consumed by the project electricity consumption source j in year y									
Source of data	Electricity meter									
Description of measurement methods and procedures to be applied	Electricity meter(s) and monthly recorded. All electronic data and paper documents will be archived for two years following the end of the crediting period. In this monitoring period, the electricity is monitored continuously by electricity meter and the recorded at 24:00 on the last day of every month by remote reading system.									
Frequency of monitoring/recording	Monitoring continuously and recording monthly									
Value applied	<table><tr><td>Period</td><td>Meter recording</td><td>Meter recording</td><td>Receipts</td><td>Minimum</td></tr></table>					Period	Meter recording	Meter recording	Receipts	Minimum
Period	Meter recording	Meter recording	Receipts	Minimum						

			(adjusted value)		
	01-January-2023 to 31-January-2023	1,633.000	1,641.165	1,633.000	1,641.165
	01-February-2023 to 28-February-2023	777.600	781.488	777.400	781.488
	01-March-2023 to 31-March-2023	1,056.800	1,062.084	1,057.000	1,062.084
	01-April-2023 to 30-April-2023	620.000	623.100	619.800	623.100
	01-May-2023 to 31-May-2023	661.200	664.506	661.200	664.506
	01-June-2023 to 30-June-2023	563.400	566.217	563.400	566.217
	01-July-2023 to 31-July-2023	931.200	935.856	931.200	935.856
	01-August-2023 to 31-August-2023	827.800	831.939	827.800	831.939
	01-September-2023 to 30-September-2023	702.600	706.113	702.600	706.113
	01-October-2023 to 31-October-2023	780.800	784.704	780.800	784.704
	01-November-2023 to 30-November-2023	217.600	218.688	217.600	218.688
	01-December-2023 to 31-December-2023	85.200	85.626	90.000	90.000
Monitoring equipment	Two bidirectional electricity meters M1(main meter) and M2 (backup meter) with accuracy of 0.5S are installed in the high voltage switch room of the project site.				
	The key information of the electricity meters is shown as below:				
	Monitoring equipment	Electricity meter			
	Type	DSSD71	DSSD71		
	Serial No	001800010302	001800010306		
	Accuracy	0.5S	0.5S		
	Calibration date	29-Jan-2022 18-Oct-2024	29-Jan-2022 18-Oct-2024		
	Validity date	28-Jan-2023 17-Oct-2025	28-Jan-2023 17-Oct-2025		

QA/QC procedures to be applied	The data is cross checked with purchase receipts. The electricity meters should be periodically checked and maintained. The two electricity meters have been tested and calibrated by the grid company annually, however no calibration reports were issued to the project owner and consequently not available for ER verification. Therefore, for conservativeness, the calibration is considered as delayed, and the monitoring results have been adjusted as per para. 366 of CDM VVS for PA by deducting the maximum permissible error (0.5%) of the electricity meters from the quantity of electricity supplied by the project plant to the grid and adding 0.5% to the quantity of electricity delivered to the project plant from the grid. And for the simplification and conservativeness, the adjustment to the monitoring results is made for the whole monitoring period. The adjustment factor of 0.5% is determined as follows: the accuracy of the electricity meters is 0.5S, which means the maximum permissible error of the electricity meters is 0.5%. As per the calibration reports dated 18/10/2024 which is after the monitoring period in consideration, the error of the electricity meters is smaller than the maximum permissible error, in accordance with para. 366 of CDM VVS, the maximum permissible error (0.5%) shall be applied for adjustment.
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	Q _{CH4, y}	
Data unit	t CH ₄ /y	
Description	Quantity of methane produced in the digester in year y	
Source of data	Calculated	
Description of measurement methods and procedures to be applied	-	
Frequency of monitoring/recording	-	
Value applied	Please refer to ER spreadsheet for monthly data.	
	year	Value

	01-January-2023 to 31-December-2023	8,377
Monitoring equipment	-	
QA/QC procedures to be applied	-	
Purpose of data	Calculation of project emissions.	
Calculation method	-	
Comments	-	

Data / Parameter	$V_{t,db,n}$		
Data unit	m ³ dry gas/h		
Description	Volumetric flow of the gaseous stream in time interval t on a dry basis at normal conditions		
Source of data	Measured by a flow meter continuously and converted automatically by the recovery monitoring system		
Description of measurement methods and procedures to be applied	The parameters of $V_{t,db,n}$ is measured by a flow meter continuously, which will be converted automatically into standard value $V_{t,db,n}$ (at the normal condition of 0°C and 101,325 Pa) by the recovery monitoring system		
Frequency of monitoring/recording	Monitoring continuously and recording monthly.		
Value applied	In this monitoring period, volumetric flow of the biogas is monitored continuously on a dry basis at normal conditions and the average value is recorded and calculated on a monthly basis.		
	Period	Value	Adjusted value
	01-January-2023 to 31-January-2023	1,404	1,404
	01-February-2023 to 28-February-2023	2,174	2,174
	01-March-2023 to 31-March-2023	1,794	1,794
	01-April-2023 to 30-April-2023	2,329	2,329
	01-May-2023 to 31-May-2023	2,405	2,405
	01-June-2023 to 30-June-2023	2,284	2,284
	01-July-2023 to 31-July-2023	2,196	2,196
	01-August-2023 to 31-August-2023	2,293	2,293
	01-September-2023 to 30-September-2023	2,215	2,215
	01-October-2023 to 31-October-2023	2,473	2,473

	01-November-2023 to 30-November-2023	2,725	2,725
	01-December-2023 to 31-December-2023	2,690	2,703 ¹⁶
Monitoring equipment	Flow meter		
	The key information of the flow meter installed at inlet of the gas tank is shown as below:		
	Monitoring equipment	Flow meter (old)	
	Type	ZD7200MT5HEX	
	Serial No	2106L3546001	
	Accuracy	±1.5%	
	Calibration date	29-January-2022	
	Validity date	28-January-2024	
	On 07-Dec-2023, this old flow meter was changed by a new one for a better accuracy. The key information of the newly installed flow meter is shown as below:		
	Monitoring equipment	Flow meter (new)	
Type	RVM-VS12 II JF63N2		
Serial No	18101501		
Accuracy	±0.5%		
Calibration date	18-Oct-2024		
Validity date	17-Oct-2026		
QA/QC procedures to be applied	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory for all projects applying large scale methodology(ies). Calibration should be carried out once every two years according to manufacturer's specifications.		
	From 01-Jan-2023 to 30-Nov-2023, the old meter is valid and in normal operation. As the new meter was installed on 07-Dec-2023, the value of December 2023 for this parameter is adjusted for conserveness as follows.		
	The calibration is delayed, and the monitoring results have been adjusted as per para. 366 of CDM VVS for PA by adding 0.5% to the value of volumetric flow of the gaseous stream. And for the simplification and conservativeness, the adjustment to the		

¹⁶ 2,703 m³ dry gas/h=2,690 m³ dry gas/h*(1+1.5%), where 2,690 is the measured value of volumetric flow of the gaseous stream in December 2023 and 1.5% is the flow meter's accuracy. As the new meter was installed on 07-Dec-2023, the value of December 2023 for this parameter is adjusted for conserveness. Please refer to QA/QC procedures of this parameter.

	monitoring results is made for the whole monitoring period. The adjustment factor of 0.5% is determined as follows: the accuracy of the flow meter is 0.5%, which means the maximum permissible error of the meter is 0.5%. As per the calibration reports dated 18-Oct-2024 which is after the monitoring period in consideration, the error of the electricity meters is smaller than the maximum permissible error, in accordance with para. 366 of CDM VVS, the maximum permissible error (0.5%) shall be applied for adjustment.
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	This parameter will be monitored in Option A

Data / Parameter	$F_{CH_4, RG, m}$				
Data unit	t CH ₄				
Description	Mass flow of methane in the residual gas in the minute m				
Source of data	Calculated				
Description of measurement methods and procedures to be applied	-				
Frequency of monitoring/recording	-				
Value applied	Please refer to ER spreadsheet for monthly data. <table border="1"> <thead> <tr> <th>Period</th><th>Value</th></tr> </thead> <tbody> <tr> <td>01-January-2023 to 31-December-2023</td><td>74</td></tr> </tbody> </table>	Period	Value	01-January-2023 to 31-December-2023	74
Period	Value				
01-January-2023 to 31-December-2023	74				
Monitoring equipment	-				
QA/QC procedures to be applied	-				
Purpose of data	Calculation of project emissions.				
Calculation method	-				
Comments	-				

Data / Parameter	$V_{RG, t, db}$
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Data unit	m ³ dry gas/h																										
Description	Volumetric flow of the residue gas in time interval t on a dry basis at normal conditions																										
Source of data	Measured by a flow meter continuously and converted automatically by the recovery monitoring system																										
Description of measurement methods and procedures to be applied	The parameters of $V_{t,db,n}$ is measured by a flow meter continuously, which will be converted automatically into standard value $V_{t,db,n}$ (at the normal condition of 0 °C and 101,325 Pa) by the recovery monitoring system																										
Frequency of monitoring/recording	Monitoring continuously and recording monthly																										
Value applied	In this monitoring period, volumetric flow of the flared biogas is monitored continuously on a dry basis at normal conditions and the average value is recorded and calculated on a monthly basis. <table border="1"> <thead> <tr> <th>Period</th><th>Value</th></tr> </thead> <tbody> <tr> <td>01-January-2023 to 31-January-2023</td><td>1,177</td></tr> <tr> <td>01-February-2023 to 28-February-2023</td><td>2,046</td></tr> <tr> <td>01-March-2023 to 31-March-2023</td><td>1,607</td></tr> <tr> <td>01-April-2023 to 30-April-2023</td><td>2,103</td></tr> <tr> <td>01-May-2023 to 31-May-2023</td><td>2,191</td></tr> <tr> <td>01-June-2023 to 30-June-2023</td><td>2,036</td></tr> <tr> <td>01-July-2023 to 31-July-2023</td><td>0</td></tr> <tr> <td>01-August-2023 to 31-August-2023</td><td>0</td></tr> <tr> <td>01-September-2023 to 30-September-2023</td><td>0</td></tr> <tr> <td>01-October-2023 to 31-October-2023</td><td>0</td></tr> <tr> <td>01-November-2023 to 30-November-2023</td><td>0</td></tr> <tr> <td>01-December-2023 to 31-December-2023</td><td>2,462</td></tr> </tbody> </table>	Period	Value	01-January-2023 to 31-January-2023	1,177	01-February-2023 to 28-February-2023	2,046	01-March-2023 to 31-March-2023	1,607	01-April-2023 to 30-April-2023	2,103	01-May-2023 to 31-May-2023	2,191	01-June-2023 to 30-June-2023	2,036	01-July-2023 to 31-July-2023	0	01-August-2023 to 31-August-2023	0	01-September-2023 to 30-September-2023	0	01-October-2023 to 31-October-2023	0	01-November-2023 to 30-November-2023	0	01-December-2023 to 31-December-2023	2,462
Period	Value																										
01-January-2023 to 31-January-2023	1,177																										
01-February-2023 to 28-February-2023	2,046																										
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01-September-2023 to 30-September-2023	0																										
01-October-2023 to 31-October-2023	0																										
01-November-2023 to 30-November-2023	0																										
01-December-2023 to 31-December-2023	2,462																										

Monitoring equipment	Flow meter												
	The key information of the flow meter installed at inlet of the flare is shown as below:												
	<table><tr><td>Monitoring equipment</td><td>Flow meter</td></tr><tr><td>Type</td><td>JF63N2</td></tr><tr><td>Serial No</td><td>18101502</td></tr><tr><td>Accuracy</td><td>0.5</td></tr><tr><td>Calibration date</td><td>29-January-2022</td></tr><tr><td>Validity date</td><td>28-January-2024</td></tr></table>	Monitoring equipment	Flow meter	Type	JF63N2	Serial No	18101502	Accuracy	0.5	Calibration date	29-January-2022	Validity date	28-January-2024
	Monitoring equipment	Flow meter											
	Type	JF63N2											
	Serial No	18101502											
	Accuracy	0.5											
	Calibration date	29-January-2022											
Validity date	28-January-2024												
QA/QC procedures to be applied	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory for all projects applying large scale methodology(ies). Calibration will be carried out once every two years according to manufacturer's specifications.												
Purpose of data	Calculation of project emissions												
Calculation method	-												
Comments	This parameter is monitored for Option A												

Data / Parameter	$V_{i,t,db}$ ($V_{RG,t,db}$)
Data unit	m ³ gas CH ₄ /m ³ dry gas
Description	Volumetric fraction of greenhouse gas CH ₄ in a time interval t on a dry basis
Source of data	Measured by continuous gas analyzer
Description of measurement methods and procedures to be applied	Continuous gas analyzer operating on dry basis. Volumetric flow measurement should always refer to the actual pressure and temperature.
Frequency of monitoring/recording	Monitoring continuously and recording monthly
Value applied	In this monitoring period, volumetric fraction of the CH ₄ in biogas is monitored continuously on a dry basis and recorded monthly.

	Period	Value	Adjusted value
	01-January-2023 to 31-January-2023	61.54%	63.08%
	01-February-2023 to 28-February-2023	60.99%	62.51%
	01-March-2023 to 31-March-2023	64.21%	65.82%
	01-April-2023 to 30-April-2023	60.99%	62.51%
	01-May-2023 to 31-May-2023	61.76%	63.30%
	01-June-2023 to 30-June-2023	63.20%	64.78%
	01-July-2023 to 31-July-2023	64.86%	66.48%
	01-August-2023 to 31-August-2023	64.97%	66.59%
	01-September-2023 to 30-September-2023	63.78%	65.37%
	01-October-2023 to 31-October-2023	61.37%	62.90%
	01-November-2023 to 30-November-2023	61.72%	63.26%
	01-December-2023 to 31-December-2023	62.49%	64.05%
Monitoring equipment	Gas analyzer.		
	The key information of the gas analyzer installed at inlet of gas tank is shown as below:		
	Monitoring equipment	Gas analyzer	
	Type	UE50	
	Serial No	62387/2	
	Accuracy	±2.5%	
	Calibration date	01-Jan-2022 18-Oct-2024	
Validity date	31-Dec-2022 17-Oct-2026		
QA/QC procedures to be applied	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory for all projects applying large scale methodology(ies). Calibration should be carried out annually according to the relevant national regulation.		
	The calibration is delayed, and the monitoring results have been adjusted as per para. 366 of CDM VVS for PA by adding 2.5% to the value of volumetric flow of the gaseous stream. And for the simplification and conservativeness, the adjustment to the monitoring results is made for the whole monitoring period. The adjustment factor of 2.5% is determined as follows: the accuracy		

	of the flow meter is 2.5%, which means the maximum permissible error of the meter is 2.5%. As per the calibration reports dated 18-Oct-2024 which is after the monitoring period in consideration, the error of the flow meter is smaller than the maximum permissible error, in accordance with para. 366 of CDM VVS, the maximum permissible error (2.5%) shall be applied for adjustment.
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	The value of both $v_{i,t,db}$ and $v_{RG,t,db}$ is same since the biogas from the same gas tank.

Data / Parameter	Operation hours (to calculate $Q_{CH4,y}$)		
	Operation hours (to calculate $F_{CH4,RG,m}$)		
Data unit	Hours		
Description	The total operation hours of the project (to calculate $Q_{CH4,y}$)		
	The total operation hours of the flare (to calculate $F_{CH4,RG,m}$)		
Source of data	Project participants		
Description of measurement methods and procedures to be applied	-		
Frequency of monitoring/recording	Monitoring hourly and recording monthly		
Value applied	In this monitoring period, operation hours of the project plant and flare are monitored continuously and recorded monthly by on-line production system. Please refer to ER spreadsheet for monthly data.		
	Year	Operation hours (to calculate $Q_{CH4,y}$)	Operation hours (to calculate $F_{CH4,RG,m}$)
	01-January-2023 to 31-December-2023	8,232	82
Monitoring equipment	-		
QA/QC procedures to be applied	-		

Purpose of data	Calculation of project emissions.		
Calculation method	-		
Comments	-		
Data / Parameter	V _{purchased,y}		
Data unit	m ³		
Description	Volume of the purchased biogas		
Source of data	Measured by a flow meter continuously and converted automatically by the recovery monitoring system		
Description of measurement methods and procedures to be applied	The parameters is measured by a flow meter continuously, which can be converted automatically into standard value V _{purchased,y} (at the normal condition of 0°C and 101,325 Pa) by the recovery monitoring system		
Frequency of monitoring/recording	Monitoring continuously and recording monthly		
Value applied	Since January of 2023, volume of the purchased biogas is monitored continuously on a dry basis at normal conditions and the average value is recorded and calculated on a monthly basis.		
	Period	Value	Adjusted value
	01-January-2023 to 31-January-2023	5,301	5,381
	01-February-2023 to 28-February-2023	45,713	46,399
	01-March-2023 to 31-March-2023	0	0
	01-April-2023 to 30-April-2023	214,394	217,610
	01-May-2023 to 31-May-2023	181,120	183,837
	01-June-2023 to 30-June-2023	0	0
	01-July-2023 to 31-July-2023	0	0
	01-August-2023 to 31-August-2023	0	0
	01-September-2023 to 30-September-2023	0	0
	01-October-2023 to 31-October-2023	149,945	152,194
	01-November-2023 to 30-November-2023	213,562	216,765
	01-December-2023 to 31-December-2023	124,036	125,897
Monitoring equipment	Flow meter installed in January of 2023.		

	Monitoring equipment	Flow meter
	Type	ZD7200MT3HEX
	Serial No	2207L4628001
	Accuracy	±1.5%
	Calibration date	07-Dec-2023
	Validity date	06-Dec-2025
QA/QC procedures to be applied	Crosschecked by the settlement notes between the project owner and Grandtop Fushan Environmental Protection Energy Co., Ltd. Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory for all projects applying large scale methodology(ies). Calibration should be carried out once every two years according to manufacturer's specifications. The calibration is delayed, and the monitoring results have been adjusted as per para. 366 of CDM VVS for PA by adding 1.5% to the value of volumetric flow of the gaseous stream. And for the simplification and conservativeness, the adjustment to the monitoring results is made for the whole monitoring period. The adjustment factor of 1.5% is determined as follows: the accuracy of the flow meter is 1.5%, which means the maximum permissible error of the meter is 1.5%. As per the calibration reports dated 07-Dec-2023 which is after the monitoring period in consideration, the error of the electricity meters is smaller than the maximum permissible error, in accordance with para. 366 of CDM VVS, the maximum permissible error (1.5%) shall be applied for adjustment.	
Purpose of data	Calculation of baseline emissions.	
Calculation method	-	
Comments	-	
Data / Parameter	$T_{GE,m}$	
Data unit	°C	
Description	Temperature in the exhaust gas of the enclosed flare in the minute m	
Source of data	Operation records	

Description of measurement methods and procedures to be applied	Measured by thermocouple installed at the monitoring port of the enclosed flare		
Frequency of monitoring/recording	Monitoring continuously and recording monthly		
Value applied	633-721 degrees Celsius		
Monitoring equipment	Monitoring equipment	Thermocouple	
	Type	Type N	
	Serial number	2608-24	
	Accuracy	$\pm 1.0\%$	
	Date of calibration	17-Oct-2022	11-Oct-2023
	Calibration Validity	16-Oct-2023	10-Oct-2024
QA/QC procedures to be applied	Thermocouple was calibrated annually to ensure accuracy		
Purpose of data	Calculation of project emissions		
Calculation method	-		
Comments	The flare operated within the manufacturer's operating specification, which is no less than 600 degrees Celsius.		

Data / Parameter	$F_{RG,m}$		
Data unit	m ³ /h		
Description	Flow rate of the residual gas on a dry basis at reference conditions in the minute m. This parameter is identical to parameter $V_{RG,t,db}$		
Source of data	Operation records		
Description of measurement methods and procedures to be applied	Measured by flow meter continuously and converted automatically by the recovery monitoring system		
Frequency of monitoring/recording	Monitoring continuously and recording monthly		
Value applied	Period	Value	
	01-January-2023 to 31-January-2023	1,177	
	01-February-2023 to 28-February-2023	2,046	

	01-March-2023 to 31-March-2023	1,607
	01-April-2023 to 30-April-2023	2,103
	01-May-2023 to 31-May-2023	2,191
	01-June-2023 to 30-June-2023	2,036
	01-July-2023 to 31-July-2023	0
	01-August-2023 to 31-August-2023	0
	01-September-2023 to 30-September-2023	0
	01-October-2023 to 31-October-2023	0
	01-November-2023 to 30-November-2023	0
	01-December-2023 to 31-December-2023	2,462
As per the technical parameters for enclosed flare specified in section 3.1 of this report, the flow range of residue gas is between 450~4500m ³ /h, the monitored actual flow rate of residue gas is within the manufacturer's operating specification for the flare.		
Monitoring equipment	Please refer to the above table for parameter $V_{RG,t,db}$	
QA/QC procedures to be applied	Please refer to the above table for parameter $V_{RG,t,db}$	
Purpose of data	Calculation of project emissions	
Calculation method	-	
Comments	This parameter is identical to parameter $V_{RG,t,db}$	
Data / Parameter	Flame _m	
Data unit	Flame on/Flame off	
Description	Flame detection of flare in minute m	
Source of data	Operation records	
Description of measurement methods and procedures to be applied	Measure using a fixed installation Infra-Red flame detector	
Frequency of monitoring/recording	Once per minute. Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off	
Value applied	Period	Hours of Flame on

	01-January-2023 to 31-January-2023	0.16
	01-February-2023 to 28-February-2023	0.16
	01-March-2023 to 31-March-2023	40.06
	01-April-2023 to 30-April-2023	0.50
	01-May-2023 to 31-May-2023	16.29
	01-June-2023 to 30-June-2023	6.38
	01-July-2023 to 31-July-2023	0
	01-August-2023 to 31-August-2023	0
	01-September-2023 to 30-September-2023	0
	01-October-2023 to 31-October-2023	0
	01-November-2023 to 30-November-2023	0
	01-December-2023 to 31-December-2023	18.62
Monitoring equipment	Monitoring equipment	Infra-Red flame detector
	Type	DH-HY-IF43DA-EX
	Serial number	19662382
	Date of calibration	17-Oct-2022
	Calibration Validity	16-Oct-2024
QA/QC procedures to be applied	Infra-Red flame detector was calibrated every two years in accordance with manufacturer's recommendations	
Purpose of data	Calculation of project emissions	
Calculation method	-	
Comments	-	

4.3 Monitoring Plan

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

(A) Data and parameters to be monitored

Data and parameters monitored are listed below shows the positions of the monitoring instruments:

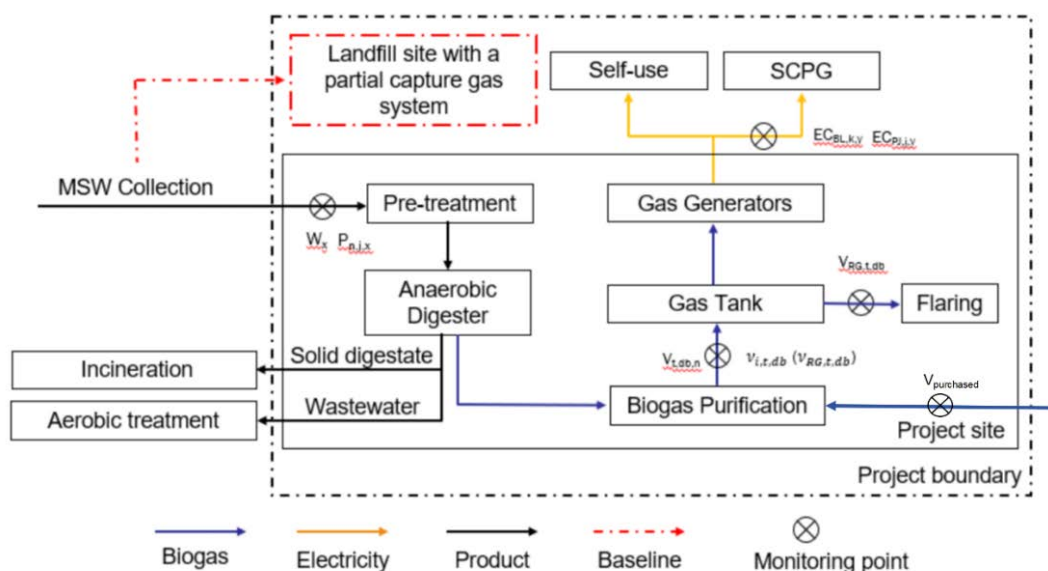


Figure 4 Project monitoring diagram

(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. A monitoring and management manual of the project that identifies detailed duties and responsibilities of the relevant parties is developed and served as the basis of the project monitoring. Figure 5 shows the operation and management structure of the project.

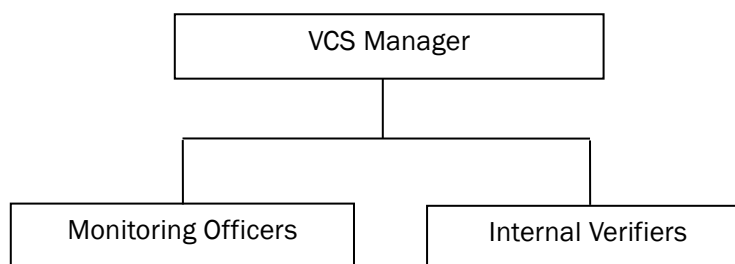


Figure 5 Operation and management structure of the project

1. The competencies of the VCS team in project development department is described as below: There is regular training for all staff of the specific VCS team department about monitoring, measuring, and internal verifying. The training content includes not only the explanation of theoretical knowledge, but also simulation exercises of actual operations to ensure that every staff can master the relevant skills.

2. After each regular training, all staff must be tested before working, this test is designed to assess staff understanding and mastery of the training content. Only staff who pass the test can officially take up their posts to ensure the team's professional level and work quality.
3. Professional monitoring and operation personnel must hold professional certificates issued by the government.

(C) Data collection

Monitoring officers are responsible for data collection. Designated teams should read and collect the monitored data regularly. The computer system automatically monitors and records relevant meter data. The relevant production data records serves as the main data source for emission reductions calculation. All data files, relevant purchase and sales receipts should be collected by a designated monitoring officer, who prepares backup in time and archives all documents properly.

(D) QA&QC

All metering equipment for monitoring was chosen in accordance with VCS requirements and should be calibrated regularly for accuracy by qualified party according to the national regulations. The flow meter should be calibrated every two years as per Verification Regulation of Thermal Mass Gas Flowmeters (JJG 1132) or other national regulations. The weighbridge, electricity meters and gas analyzer should be calibrated annually according to the corresponding national regulations which are listed in below table.

Metering equipment	National regulations
Weighbridge	Verification Regulation for Digital Indication Weighing Instruments (JJG539) or others
Electricity meters	Verification Regulation of Electrical Meters for Measuring Alternating-current Electrical Energy (JJG596) or Technical Administrative Code of Electric Energy Metering (DL/T448) or others
Gas analyzer	Verification Regulation of Alarmer Detectors of Combustible Gas (JJG693) or others

To assist in future verifications, the project owner should preserve the calibration records, along with the data files of project monitoring.

According to the Figure 4.2, the project developer appoints internal verifiers who is responsible for internal check of the measurement, collection of relevant receipts, and the calculation of the emission reductions. The internal verifiers will cross-check all monitoring data and collection of relevant receipts.

Error check routines should be 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 should provide technical support to engage the problem promptly and emission reductions during the corresponding period should be calculated conservatively.

By performing these tasks, internal verifiers ensure that the project's emission reduction claims are credible and verifiable. Their work provides confidence to stakeholders, that the emission reductions reported are based on rigorous and transparent processes.

The installation of the electricity metering equipment fulfills the requirements of the relevant national standard. The accuracy of the electricity meter is not lower than 0.5S. The accuracy of flow meters and gas analyzers fulfills the relevant national standard. All the meters should be checked and maintained periodically. All metering equipment should be calibrated regularly for accuracy by qualified party according to the national regulations.

(E) Data file management

All monitoring data should be electronically filed by the end of each month and the electronic data files should be archived in both disk copy and printed hard copy. Other documents in paper e.g. maps, forms and environment assessment reports should be preserved as well. All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the crediting period. The project owner should provide original records and documents if necessary.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to the methodology ACM0022 (version 03.0), baseline emissions are determined based on the section 4.1 of joint-PD&MR (Version 2.1). The BE_y is ex-post determined as the following equations:

$$BE_y = BE_{CH_4,y} + BE_{EC,y} \quad (1)$$

$$BE_{CH_4,y} = \phi_y \times (1-f_y) \times GWP_{CH_4} \times (1-OX) \times \frac{16}{12} \times F \times DOC_{f,y} \times MCF_y \times \sum_{x=1}^y \sum_j (W_x \times \frac{\sum_{n=1}^{Z_x} P_{n,j,x}}{Z_x} \times DOC_j \times e^{-k_j \cdot (y-x)} \times (1 - e^{-k_j})) \quad (2)$$

$$BE_{EC,y} = \sum_k (EC_{BL,k,y} - EC_{purchased,y}) \times EF_{EL,k,y} \times (1 + TDL_{k,y}) \quad (3)$$

1. Calculate $(\phi_y \times (1-f_y) \times GWP_{CH_4} \times (1-OX) \times \frac{16}{12} \times F \times DOC_{f,y} \times MCF_y)$ in Equation (2)

The fixed value $(\phi_y \times (1-f_y) \times GWP_{CH_4} \times (1-OX) \times \frac{16}{12} \times F \times DOC_{f,y} \times MCF_y)$ is calculated as 5.712.

2. Calculate $\sum_{x=1}^y \sum_j (W_x \times \frac{\sum_{n=1}^{Z_x} P_{n,j,x}}{Z_x} \times DOC_j \times e^{-k_j \cdot (y-x)} \times (1-e^{-k_j}))$ in Equation (2)

$\sum_{x=1}^y \sum_j (W_x \times \frac{\sum_{n=1}^{Z_x} P_{n,j,x}}{Z_x} \times DOC_j \times e^{-k_j \cdot (y-x)} \times (1-e^{-k_j}))$ is calculated based on the monitored data and parameters, which is ex-post calculated value during this monitoring period as the follows.

Table 3 The record of the amount of waste disposed (t) in a SWDS in year $W_{j,x}$ (t)

Parameters		$W_{x(t)}$	Food	Paper	Garden and park waste	Wood	Others (Glass, plastic, metal, other inert waste)	Textile
$W_{j,x}(t)$	2020	482,551.85	374,605	30,304	0	0	61,622	16,021
	2021	654,072.84	508,869	38,525	0	0	83,067	23,612
	2022	673,264.78	524,473	40,665	0	0	86,851	21,275
	2023	502,743.08	379,079	33,961	0	0	67,568	22,135

Table 4 The ex-post calculation of $\sum_{x=1}^y \sum_j (W_x \times \frac{\sum_{n=1}^{Z_x} P_{n,j,x}}{Z_x} \times DOC_j \times e^{-k_j \cdot (y-x)} \times (1-e^{-k_j}))$

Period (y=4)	x	Food (t)	Paper (t)	Garden and park waste (t)	Wood (t)	Others (t)	Textile (t)	Total
01-January-2023 to 31-December-2023	1	5,579.61	664.28	0.00	0.00	0.00	210.71	6,454.59
	2	11,307.17	905.70	0.00	0.00	0.00	333.07	12,545.94
	3	17,385.59	1,025.34	0.00	0.00	0.00	321.86	18,732.79
	4	18,746.20	918.39	0.00	0.00	0.00	359.16	20,023.74

3. Calculate $BE_{CH_4,y}$ according to the calculation results of steps 1 and 2

BE_{CH_4} is ex-post calculated value during this monitoring period as the follows. Please refer to ER calculation spreadsheet for monthly data.

Table 5 The ex-post calculation of $BE_{CH_4,y}$

Period	x	Calculation results of steps 1	Calculation results of steps 2	$BE_{CH_4,y}$ (t CO ₂ e) = Calculation results of steps 1 * Calculation results of steps 2
01-January-2023 to 31-	1	5.712	6,454.59	36,868.64
	2		12,545.94	71,662.41

December-2023	3		18,732.79	107,001.70
	4		20,153.70	115,117.94
Total	-	-	-	330,650

According to the Equation (3), $BE_{EC,y}$ is ex-post calculated value during this monitoring period as the follows.

Table 6 The calculation of $BE_{EN,t,y}$ ($BE_{EC,y}$)

Period	$EC_{BL,k,y}$ (MWh)	$EF_{EL,k,y}$ (tCO ₂ /MWh)	$TDL_{k,y}$	$EC_{purchased,y}$ (MWh)	$BE_{EN,t,y}$ ($BE_{EC,y}$) (t CO ₂ e)
01-January-2023 to 31-December-2023	10,625.281	0.50885	3%	3,936.542	3,477

Therefore, according to the Equation (1), during this monitoring period from 01-January-2023 to 31-December-2023, BE_y is ex-post calculated value as the following table.

Table 7 The ex-post calculation of BE_y

Period	$BE_{EN,t,y}$ ($BE_{EC,y}$) (t CO ₂ e)	$BE_{CH4,y}$ (t CO ₂ e)	BE_y (t CO ₂ e)
01-January-2023 to 31-December-2023	3,477	330,650	334,127

Thus, the total baseline emission of the project is 334,127 tCO₂e during this monitoring period from 01-January-2023 to 31-December-2023.

5.2 Project Emissions

According to the methodology ACM0022 (version 03.0), project emissions (PE_y) are determined based on the section 4.2 of joint-PD&MR (Version 2.1). The PE_y is ex-post determined as the following equations:

$$PE_y = PE_{AD,y} = PE_{EC,y} + PE_{CH4,y} + PE_{flare,y} \quad (2)$$

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \quad (3)$$

$$PE_{CH4,y} = Q_{CH4,y} \times EF_{CH4,default} \times GWP_{CH4} = \frac{V_{t,db} \times v_{i,t,db} \times \rho_{i,n} \times h}{1000} \times EF_{CH4,default} \times GWP_{CH4} \quad (4)$$

$$PE_{flare,y} = GWP_{CH4} \times (V_{t,db} \times v_{RG,t,db} \times \rho_{RG,n} \times h + V_{purchased,y} \times V_{purchased,t,db} \times \rho_{RG,n}) \times (1 - \eta_{flare,m}) \times 10^{-3} \quad (5)$$

Therefore, $PE_{EC,y}$ is ex-post calculated value during this monitoring period as the follows. Please refer to ER calculation spreadsheet for monthly data.

Table 8 The calculation of $PE_{EC,y}$

Period	$EC_{PJ,y}$ (MWh)	$EF_{EL,j,y} = EF_{grid,CM,y}$ (tCO ₂ /MWh)	$TDL_{j,y}$	$PE_{EC,y}$ (t CO ₂ e)
01-January-2023 to 31-December-2023	8,905.860	0.50885	3%	4,668

Based on the monitored data and parameters of section 4.1 and 4.2, $PE_{flare,y}$ and $PE_{CH_4,y}$ are ex-post calculated value during this monitoring period as the follows. $Q_{CH_4,y}$ and $F_{CH_4,RG,m}$ is shown on the monitored parameters in section 4.2.

Table 9 The calculation of $PE_{CH_4,y}$

Period	$Q_{CH_4,y}$ (t CH ₄)	$EF_{CH_4,default}$ (t CH ₄ leaked / t CH ₄ produced)	$GWP_{CH_4}(tCO_2/t$ CH ₄)	$PE_{CH_4,y}$ (t CO ₂ e)
01-January-2023 to 31-December-2023	8,377	0.028	28	6,568

Table 10 The calculation of $PE_{flare,y}$

Period	$F_{CH_4,RG,m}$ (t CH ₄)	$\eta_{flare,m}$ (%)	GWP_{CH_4} (tCO ₂ /tCH ₄)	$\rho_{CH_4,n}$ (kg/m ³)	$V_{purchased}$ (m ³)	$PE_{flare,y}$ (t CO ₂ e)
01-January-2023 to 31-December-2023	74	90	28	0.71566	948,082	2,080

Therefore, during this monitoring period from 01-January-2023 to 31-December-2023, PE_y is ex post calculated value as the following table.

Table 11 The ex-post calculation of PE_y

Period	$PE_{EC,y}$ (t CO ₂ e)	$PE_{flare,y}$ (t CO ₂ e)	$PE_{CH_4,y}$ (t CO ₂ e)	PE_y (t CO ₂ e)
01-January-2023 to 31-December-2023	4,668	2,080	6,568	13,316
Total	4,668	2,080	6,568	13,316

Thus, during this monitoring period from 01-January-2023 to 31-December-2023, the total project emission of the project is 13,316 tCO₂e.

5.3 Leakage Emissions

According to the ACM0022 (Version 03.0), leakage emissions are associated with composting/co-composting, anaerobic digestion and the use of RDF/SB that is exported outside the project boundary.

And the waste by-products of the project do not involve compost or co-compost and the use of RDF/SB outside the project boundary. Leakage emissions associated with anaerobic digestion of waste ($LE_{AD,y}$) are calculated according to “TOOL14: Project and leakage emissions from anaerobic digesters” (Version 02.0).

According to the tool, the leakage emissions associated with the anaerobic digester ($LE_{AD,y}$) depend on how the digestate is managed. They include emissions associated with storage and composting of the digestate. Since the solid digestate is outward transported and incinerated directly in thermal power plant and not be stored under anaerobic conditions and the wastewater is treated aerobically by wastewater treatment plant nearby during this monitoring period, leakage emission is zero, $LE_y = 0$.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

As described in section 5.1, 5.2 and 5.3 above, in this monitoring period from 01-January-2023 to 31-December-2023:

$$BE_y = 334,127 \text{ tCO}_2\text{e};$$

$$PE_y = 13,316 \text{ tCO}_2\text{e};$$

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

$$ER_y = BE_y - PE_y - LE_y = 320,811 \text{ tCO}_2\text{e}$$

This monitoring period is from 01-January-2023 to 31-December-2023 (Both days included), with totally 365 days. Based on the annual estimated emission reductions, the amount of emission reductions for this monitoring period would be 382,808 tCO₂e. The actual emission reductions in this monitoring period (365 days) are 320,811 tCO₂e, which is 16.20% lower than the estimation and at the normal fluctuation range. Thus, net GHG emission reduction during this monitoring period is considered to be reasonable. The detail information can be obtained as below:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCUs (tCO ₂ e)
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01-Jan-2023 to 31-Dec- 2023	334,127	13,316	0	320,811	0	320,811
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Vintage period	Ex-ante estimated reductions/ removals	Achieved reductions/ removals	Percent difference	Explanation for the difference
01-Jan-2023 to 31-Dec- 2023	382,808	320,811	-16.20%	This is the normal fluctuation range caused by the generation efficiency, temperature, waste composition, etc.