



NANCHANG ZHONGLAN HUANNENG TECHNICAL SERVICE CO. LTD. MAIYUAN LFG POWER GENERATION PROJECT



Document Prepared by Climate Bridge (Shanghai) Ltd.

Project title	Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project (hereinafter referred to as the Project) is located at the Nanchang Maiyuan landfill in Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, P.R China. The project is owned and implemented by Nanchang Zhonglan Huanneng Technical Service Co. Ltd.

Nanchang Maiyuan landfill is owned by local City Management Bureau, the first phase began operation in 1997 and second phase operated in 2002, with an aggregate designed capacity of 17,930,000 m³ and an operational lifespan of 31.5 years. It handles an average of 1,800 tonnes MSW per day which is mainly from the Nanchang City. The area used for waste disposal covers 655,000 m² and the average depth is 20~30m.

Before the implementation of the project activity, there was an existing landfill gas (LFG) power generation project named “Nanchang Maiyuan Landfill Gas Recovery and Utilisation Project” (hereinafter refers to as the existing LFG project) with the installed capacity of 3MW, which has been registered as a CDM project (reference number 1745). With the increasing amount of waste in landfills about 2,800 tonnes/day, the landfill gas in the landfill was greatly exceed the amount of the existing project demands. In this condition, the proposed VCS project is to utilize landfill gas (LFG), which consists mainly of methane, for electricity generation. It includes LFG collection system, LFG pre-treatment system and electricity generation system. LFG collected will be used for electricity generation with internal combustion generators. The electricity generated by the project is supplied to Central China Power Grid (CCPG). Before the implementation of the project activity, the landfill gas that captured and utilized by the project was emitted into the atmosphere directly. The electricity is provided by Central China Power Grid (CCPG) which is dominated by coal-fired power stations. This is the scenario that existed prior to the implementation of the project activity and is also the baseline scenario. The total installed capacity will be 6.402MW (6*1.067MW). The timeline of the project is shown below:

Start date of construction	14-Dec-2018
Start date of operation	01-Jan-2019
Start date of the crediting period	01-Jan-2019

The total amount of feed-in electricity is estimated to be 307,882 MWh during the fixed 10 years crediting period, with the annual average amount of feed-in electricity 30,788 MWh. And the expected average annual emission reductions are 155,699 tCO_{2e} during the fixed 10 years crediting period.

During this monitoring period (01-May-2022 to 31-Aug-2024, both days included), all equipment worked well and no error or accident occurred. There are no events or situation that may impact the applicability of the methodology. The actual emission reductions achieved in this monitoring period are 174,138 tCO₂e.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation	27-Dec-2020	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	/
Verification	01-Jan-2019 to 28-Feb-2021	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	2.2 years (790 days)
Verification	01-Mar-2021 to 30-Apr-2022	VCS	CTI Certification Co., Ltd	1.2 years (426 days)
Verification	01-May-2022 to 31-Aug-2024	VCS	CTI Certification Co., Ltd	2.3 years (854 days)

1.3 Sectoral Scope and Project Type

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

1.4 Project Proponent

Organization name	Nanchang Zhonglan Huanneng Technical Service Co. Ltd.
Contact person	Lai Xinjiang
Title	Deputy general manager

¹ Projects, activities, or methodologies may be developed under any of the 16 VCS sectoral scopes: <https://verra.org/programs/verified-carbon-standard/vcs-program-details/#sectoral-scopes>

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Email	3542346576@qq.com

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
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Telephone	+86-21 62462036
Email	gao.zhiwen@climatebridge.com

1.6 Project Start Date

Project start date	01-January-2019
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-January-2019 when the LFG collection system, LFG pre-treatment system and electricity generation system of project operated.

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)
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Start and end date of
first or fixed crediting
period

01-Jan-2019 to 31-Dec-2028 (both days included)

1.8 Project Location

The Project is located at the Nanchang Maiyuan landfill in Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, P.R China. The geographical coordinates for the project site are east longitude 115°46'49" and north latitude 28°44'6".

The geographic location of the project is shown in Figure 1-1.



Figure 1-1 Location of the project

1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0001	ACM0001 – “Flaring or use of landfill gas” ²	19.0
Tool	TOOL04	Emissions from solid waste disposal sites ³	08.0
Tool	TOOL07	Tool to calculate the emission factor for an electricity system ⁴	07.0
Tool	TOOL05	Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation ⁵	03.0
Tool	TOOL08	Tool to determine the mass flow of a greenhouse gas in a gaseous stream ⁶	03.0
Tool	TOOL32	Positive lists of technologies ⁷	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?

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

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

☐ Yes ☒ No

² <https://cdm.unfccc.int/methodologies/DB/IPYB4DYQUXQPZLBDVPHA87479EMY9M>

³ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v8.1.pdf>

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

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

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

⁷ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-32-v4.0.pdf>

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? See the *VCS Program Definitions* for definitions of emissions trading program and 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? See the *VCS Program Definitions* for definition of 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 is located at the Nanchang Maiyuan landfill in Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, P.R China. The purpose of the project is to utilize landfill gas (LFG), which consists mainly of methane, for electricity generation. It includes LFG collection system, LFG pre-treatment system and electricity generation system. LFG collected is used for electricity generation with internal combustion generators.

The project contributes to achieving Chinese sustainable development priorities is described as below:

SDG	Targets	Chinese Sustainable Development Progress	Project activity contribution
	SDG 7 Affordable and Clean Energy	By the end of 2015, China had fully solved the problem of providing electricity to all people without electricity, and reached the goal of the	The project utilizes LFG for power generation and accordingly substitute equivalent electricity from thermal power. This contributes to achieve China's

		Sustainable Development Agenda 15 years ahead of schedule. From 2015 to 2021, the share of non-fossil energy increased from 14.5 % to 20.6%, while the share of raw coal decreased from 72.2 % to 66.7%.	stated sustainable development priorities “By 2030, the proportion of non-fossil energy consumption will reach about 25%”.
	SDG 8 “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”.	China is deeply implementing the employment priority strategy, placing the promotion of employment as a top priority for economic and social development, and promoting decent work and comprehensive development for workers. Firstly, the scale of employment continues to expand, while the level of unemployment remains low. From 2015 to 2022, the average annual increase in urban employment was about 13 million, with 733.51 million employed people nationwide in 2022. The second is the continuous optimization of the employment structure, and the employment structure of the "inverted pyramid" of the three industries is gradually forming. Thirdly, the quality of employment continues to improve, and the employment of key groups remains stable.	The project activity can provide employment opportunities for local villagers. This contributes to one of China's actions for promoting sustainable developing: "by 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value”.
	SDG 13 “Take urgent action to combat climate change and its impacts”.	China has promoted the clean, low-carbon and efficient use of energy, and made new achievements in the clean and low-carbon	The project is to utilize the LFG for electricity generation to avoid methane emissions and CO ₂ emissions from the production of the equivalent amount of

		transformation of industry, construction, transportation and other fields. In 2022, China's energy consumption per unit of GDP was reduced by 35% compared with 2012.	electricity replaced by the Project that would otherwise have been purchased from the CCPG. This contributes to achieve China's stated sustainable development priorities "China's carbon dioxide emissions would strive to peak by 2030 and strive to achieve carbon neutrality by 2060 ".
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During the third monitoring period from 01-May-2022 to 31-Aug-2024, the Project contributes to sustainable development in the following ways:

- 35,592.755 MWh of electricity from clean and environmentally sound technologies with LFG by the project has been supplied to the grid in the monitoring period from 01-May-2022 to 31-Aug-2024.
- 11 employment positions for local villagers have been provided by the project in the reporting period (which corresponds to the monitoring period from 01-May-2022 to 31-Aug-2024, which increases income of local residences and accelerate economy development. Thus, the project achieves SDG 8 “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”.
- The project achieved a GHG emission reduction of 174,138 tCO₂e during the monitoring period 01-May-2022 to 31-Aug-2024. Thus, the project achieves SDG 13 “Take urgent action to combat climate change and its impacts”.

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	SDG7. Ensure access to affordable, reliable, sustainable and modern energy for all 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1 Renewable energy share in the total final energy consumption Project Level indicator: Renewable energy supplied to the power grid.	Implemented activities to increase	35,592.755 MWh of electricity from renewable sources has been supplied to the power grid during this reporting period (01-May-2022 to 31-Aug-2024, both days included).	From 01-January-2019 onwards, an accumulated 177,068.599 MWh including 93,689.600 MWh in the 1st monitoring period and 47,786.244 MWh in the 2nd monitoring period of electricity from renewable sources has been supplied to the power grid by end of the reporting period.

2)	SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all 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	Indicator 8.5.2: Unemployment rate, by sex, age and persons with disabilities Project Level indicator: The number of long-term jobs by the implementation of the project.	Implemented activities to increase	11 people (3 females and 8 males) have been employed by the project as long-term employee during this reporting period (01-May-2022 to 31-Aug-2024, both days included). Employees range in age from 26 to 52 years old and are equally paid for equal work in accordance with labor laws.	11 people have been employed by the project as long-term employee by end of the reporting period.
3)	SDG13 Take urgent action to combat climate change and its impacts 13.2 Integrate climate change measures into national policies, strategies and planning	13.2.2 Total greenhouse gas emissions per year Project Level indicator: Tonnes of greenhouse gas emissions avoided or removed.	Implemented activities to increase	The project has achieved a total GHG emission reduction of 174,138 tCO₂e during the third monitoring period (01-May-2022 to 31-Aug-2024, both days included).	From 01-January-2019 onwards, an accumulated 907,293 tCO₂e including 467,671 tCO₂e in the 1st monitoring period and 265,484 tCO₂e in the 2nd monitoring period of GHG emission reduction have been achieved by the project by end of the reporting period.

1.13 Commercially Sensitive Information

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

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, we 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, we reviewed regulatory standards and consulted with government entities to ensure compliance and to identify any legal stakeholders. The following people are considered as the stakeholders of this project during the implementation stage. ● Residents of the nearby village. ● Staff of the project. ● Relevant administrative staff of the local government.
Legal or customary tenure/access rights	Applicable legal frameworks and existing agreements govern land use and access rights. 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	The economic sources of the stakeholders mainly come from farming, migrant work, individual enterprises and working in enterprises and governments. The project employs some local residents to solve some employment problems and increase their income and have no other impact on economic diversity within stakeholder groups. The stakeholders involved in the project are all Han, no minority ethnic groups are involved, and there is no cultural difference among Han people, which has no impact on social and culture diversity within stakeholder groups. The interactions between the stakeholder groups are mainly collaboratively, involves project information sharing and joint decision-making. Workers in government departments come from different backgrounds and have different expertise and experience. Government authorities are responsible for regulating and approving the operation of the project, and different government authorities have different policies and regulations. Over time, the members of each group will adjust, but their groups does not change much in terms of society, economy, culture, etc..
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	Stakeholders in this project located at the project site and within a few kilometers of it.
Location of resources	The project is in an existing landfill and no identified stakeholders own or have customary access to the land and resources occupied by the project.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	To collect the opinions of local stakeholders during the project operation period, the project owner has set up an ongoing communication mechanism by holding stakeholder meetings, distributing questionnaires, collecting public opinions through Internet platform such as WeChat official account or communicating with stakeholders by phone or other means.
Date(s) of stakeholder consultation	20-March-2023
Communication of monitored results	Communications with Local stakeholders are being carried out at periodic intervals, and stakeholders are informed one week in advance. The project proponent prepared 30 questionnaires for stakeholders in 2023, and 28 copies were collected with valid answers. 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. In addition, the staff of the local Environmental Protection Bureau has visited the project site to supervise the operation of the project. There were no negative comments received for the project in this monitoring period. In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.
Consultation records	Paper questionnaires were distributed and recollected at the communication meeting and would be retained within the whole crediting period. The project proponent prepared 30 questionnaires for stakeholders in 2023, and 28 copies

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	receiving the feedback, and an immediate report would be submitted to the company management. During this monitoring period (01-May-2022 to 31-Aug-2024, both days included), all equipment worked well and no error or accident occurred. Thus, there was no updates to project design.
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2.1.3 Free, Prior, and Informed Consent

Consent	During the ex-ante local stakeholder consultation, the Project owner collected comments by local stakeholders on the project activity. Survey questionnaires were distributed to relevant personnel of the landfill site, local villagers and government officials by the Project owner on 20-December-2018. In general, local stakeholders were supportive of the project construction. The project is located at Nanchang Maiyuan landfill owned and managed by the local government. The project has obtained approval from the local government in accordance with laws and regulations prior to project construction. In addition, the project owner has conducted regular local stakeholders consultation and all stakeholders have agreed and supported the construction and operation of the project. Meanwhile, the project proponent obtained the approval from the Landfill site through signing the cooperation Agreement on Landfill Gas Collecting and utilization. Therefore, the project complies with the relevant VCS regulations for FPIC. There are no ongoing or unresolved conflicts for this project.
Outcome of FPIC	Local stakeholders are supportive of the construction of the project. Most surveyed stakeholders think the project improves regional economic development without adverse environmental impact. The survey shows that the project has not encroached on land, relocated people without consent, and forced physical or economic displacement, and the stakeholders are supportive of the project.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
No grievance received	LSC meetings were held during this monitoring period to inform stakeholders about the ongoing input/grievance mechanism. In order to ensure all input received during the LSC has been taken, key implementation schedules or changes of the project will be communicated to the local authority, who will inform the neighbourhood committee and the local residents, the comments and suggestions from residents will be collected by the local authority meanwhile. The PP and stakeholders will discuss the solution firstly. If agreement could not be reached, then, the local government will be invited to solve the problem. By simplifying the process, providing multiple access channels including contacting the local environmental management department or direct telephone complaints (contact information is posted on the project site and nearby public notices), training staff, and implementing a feedback mechanism as mentioned above, the threshold for stakeholders to submit grievances can be effectively lowered, ensuring that the grievance mechanism reaches all stakeholders. In addition to the regular LSC meetings, the PP has also set up a grievance book at the project site to collect and record the relevant opinions of the stakeholders. There is no grievance raised during the 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.	There are no comments received

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

The project proponent, Nanchang Zhonglan Huanneng Technical Service Co. Ltd. has sufficient capacity and experience in project management, and the project has been running since January 2019 without any problems. The project management team possesses the capacity to engage with the community, including effective communication, understanding of the community's historical, cultural, economic, and social contexts, as well as organizing community meetings and activities and coordinating the involvement of diverse stakeholders.

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 survey shows that almost all the stakeholders are supportive to the proposed project, believing that the Project will provide more employment opportunities, help 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 related to stakeholder participation. The mechanism for ongoing communication with local stakeholders has been set up. During the local stakeholder consultation, most of the local stakeholders believed that the project had positive impact on the environment and employment and were supportive of the project construction.
Working conditions	No risk identified	Requirements for working conditions have been described in the project design and management manual. The project provides safety training and adequate labor protection supplies for employees.
Safety of women and girls	No risk identified	There were no risks identified related to the safety of women and girls in the local community due to project activities. The project pays attention to the

		occupational health of female employees, providing regular health checkups and mental health support. The pay structure is reviewed regularly to ensure fair pay for both male and female employees.
Safety of minority and marginalized groups, including children	No risk identified	There were no risks identified related to safety of minority and marginalized groups, including children. At the project design and planning stage, the special needs of children, minorities and marginalized groups are fully 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.
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 ⁸	Mitigation or preventative measure(s) taken
Discrimination	No risk identified	The project has well-established HR policies that strictly prohibit all forms of discrimination. These policies ensure no discrimination based on race, gender, disability, or any other characteristic occurs during the design or implementation phases. Workers, including women, are provided with equal pay for equal work and fully protected under these regulations.
Sexual harassment	No risk identified	The project has well-established HR policies that strictly prohibit all forms of sexual harassment.

⁸ 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.

		Surveillance cameras have been installed on the project site to prevent sexual harassment. Employees are provided with safe and effective reporting channels and procedures for handling reported information quickly.
Gender equity in labor and work	No risk identified	The project employed women and all workers were provided equal pay for equal work. And regular review of pay structures was carried out to ensure equity in pay for men and women employees.
Forced labor	No risk identified	All employees including women are employed voluntarily. When overtime work is required, employees are reasonably compensated and there is no forced labor.
Child labor	No risk identified	HR policy of the project owner strictly follows the laws and regulations in China, child labor is prohibited. Furthermore, the operation of the project requires professional knowledge and skills which can't be found on children, thus there's no possibility of child labor used by the project.
Human trafficking	No risk identified	All employees including women are employed voluntarily. There's no possibility of human trafficking.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	The project is committed to upholding the rights of IPs, LCs, and customary rights holders by engaging in ongoing, informed consultations, obtaining their free, prior, and informed consent for any activities, and ensuring that their cultural heritage and traditional knowledge are respected and preserved by international human rights law, the United Nations Declaration on the Rights of Indigenous Peoples, and ILO Convention 169. The project is located at Nanchang Maiyuan landfill owned and managed by the local government and there are no residents in the landfill. The project has obtained approval from the local government in accordance with laws and regulations prior to project construction. In addition, the project owner has conducted regular local stakeholders consultation and all stakeholders have agreed and supported the construction and operation of the project. The project

proponent ensures that all employees' labor contracts are fair and equitable, specifying working conditions, wages and working hours. Any form of deposit, withholding of identity documents or restriction of employees' freedom is prohibited, ensuring all employees were preserved by international human rights law. Therefore, the project complies with the relevant VCS regulations for FPIC. There are no ongoing or unresolved conflicts for this project.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified	There were no Indigenous Peoples and Cultural Heritage in the project area.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	The project prioritizes protecting stakeholders' property rights by engaging in regular consultations, complying with legal standards, documenting rights, offering accessible conflict resolution, and ensuring fair benefit sharing and transparent monitoring.

2.3.5 Benefit Sharing

As the project does not impact property rights described in Section 2.3.4 above, the following information is irrelative.

Summary of the benefit sharing plan	Not applicable.
Benefit sharing during the monitoring period	Not applicable.

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, the project has no further impact on biodiversity and ecosystems.

Soil degradation and soil erosion	No risk identified	According to EIA of the project, the project has no further impact on the soil.
Water consumption and stress	No risk identified	The wastewater is mainly domestic sewage and condensate. The wastewater is treated by the leachate treatment station of Maiyuan Landfill, and after being processed, it reaches the level III standard of " Environmental Quality Standards for Surface Water " (GB3838-2002). It has little influence on the receiving water body.

2.4.1 Rare, Threatened, and Endangered species

Species or habitat	The project is located at Maiyuan landfill and there are no rare, threatened, or endangered species in the landfill.
Areas needed for habitat connectivity	According to the EIA of the project, the project has no impact on habitats and areas needed for habitat connectivity for rare, threatened, or endangered species.

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	No risk identified	According to the EIA of the project, the project is located at Maiyuan landfill and there are no rare, threatened, or endangered species in the landfill.
Areas for habitat connectivity	No risk identified	According to the EIA of the project, the project has no impact on habitats and areas needed for habitat connectivity for rare, threatened, or endangered species.

2.4.2 Introduction of species

According to the EIA of the project, the project does not involve the introduction of any plant or animal species. As such, the table for categorizing species as native or non-native and assessing the adverse effects and mitigation measures does not apply to this project. The project activities focus on capturing and utilizing LFG from landfill site for power generation, and no species introduction is part of these activities.

Species introduced	Classification	Justification for use	Adverse effects and mitigation
Not applicable	Not applicable	Not applicable	Not applicable

2.4.3 Ecosystem conversion

This is 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 project has been implemented as per the registered VCS-PD. The project system involves LFG collection, LFG pre-treatment, electricity generation and LFG emergency flaring. The key systems involved in the proposed project are as follows:

Gas collection system

The landfill gas collecting system is a gas pipeline network, consisting of gas collecting wells, gas collecting pipelines, and gas collection blower. LFG is extracted by gas collection blower and transported by pipeline from gas collection wells.

Gas pre-treatment system

Before electricity generation and flaring, the LFG is pre-treated to remove impurities and moisture etc., to prevent the corrosion of the electricity generation system. In addition, land fill gas is continuously in a stable condition before flows into gas engine or flare. The pre-treatment consists of pre-filtration, dehumidification, dewatering, cooling and fine filtration.

Electricity generation system

The electricity generated using LFG, except small portion for on-site usage, was predominantly sold to the CCPG through nearby distribution network. Six electricity generators with each capacity of 1.067MW, internal combustion engine generators, were installed by the project. The annual average running time is 7200 hours as determined by a certified design institute.

LFG emergency flaring system

A flare system has been installed to combust LFG when the power generators are out of operation under maintenance; however, as stated in the registered PD, such emission reductions will not be included in the calculation and VCUs from flare will not be claimed by the project owner, which is conservative. In this monitoring period, the project is in normal operation and the flaring is not used.

The technical process of the Project is shown in Figure 3-1. Table 3-1 shows the key technical specifications of LFG gas generators installed.

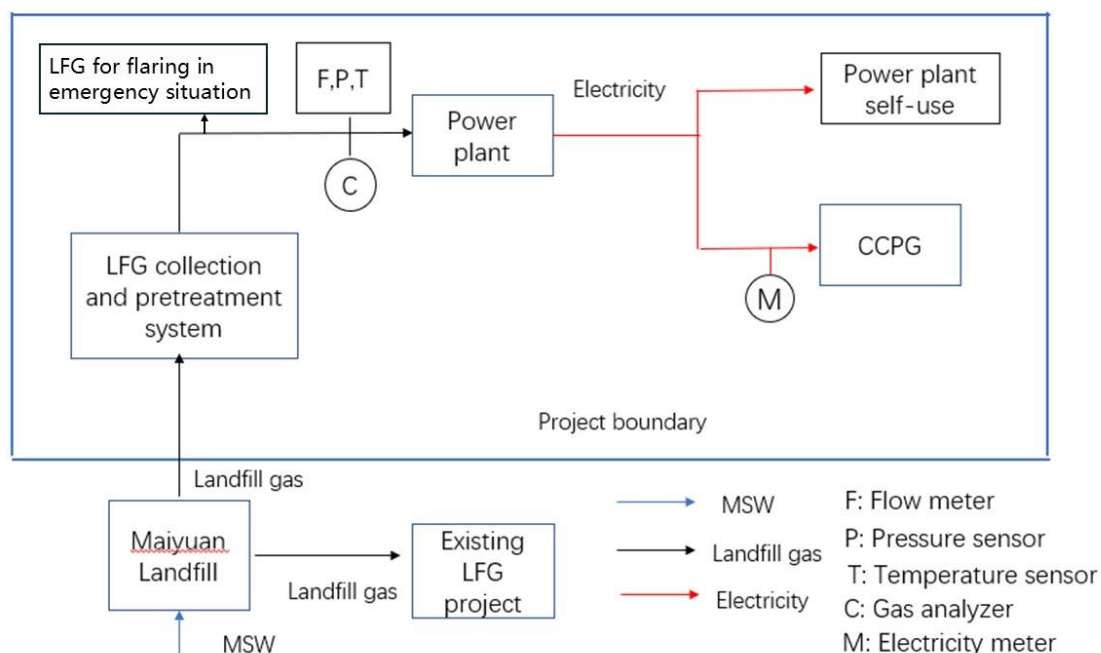


Figure 3-1 Diagram of the project boundary and flow

Table 3-1 Quantity & Capacity of power generators

Type	JGS 320GS-L.L
Quantity	6
Rated capacity	1.067 MW
Rated power factor	1
Rated frequency	50HZ
Rated Voltage	400V
Rated current	1540A

This monitoring period covers from 01-May-2022 to 31-Aug-2024. During this monitoring period, the project has supplied 35,592.755 MWh to the grid and achieved 174,138 tCO₂e emission reductions.

In this monitoring period, the electricity meter was changed on 29-Mar-2024. The serial number of the electricity meter was changed from 3630001201800010936364 to 3630001492249049842312. The new meter is a bidirectional meter, with the same model and accuracy as the old meter and meets industry requirements of “Technical administrative code of electric energy metering” (DL/T 448).

The project was implemented per the monitoring plan, and the equipment run well. There were no other changes including project proponent or other entities. No events or emergencies that may impact the emission reductions and monitoring occurred during this monitoring period.

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation for the project.

3.2.2 Project Description Deviations

There is a deviation regarding the parameter $\rho_{i,n}$ "density of greenhouse gas CH₄ in the gaseous stream at normal conditions". In the registered PD, the value of methane density at normal conditions was calculated as 0.71338 kg /m³, which was a typo. In this monitoring period, the value is corrected as 0.71566 kg /m³. As per equation (10) in "Tool to demonstrate the mass flow of a greenhouse gas in a gaseous stream", $\rho_{i,n}$ is calculated as follows:

$$\rho_{i,n} = \frac{P_i \times MM_i}{R_u \times T_i} = 101,325 Pa \times \frac{\frac{16.04 kg}{kmol}}{8314 Pa \cdot \frac{m^3}{kmol \cdot K} \times 273.15 K} = 0.71566 kg \text{ gas}_i / m^3 \text{ gas}_i$$

This change would not influence the additionality and conservation of the project because the parameter $\rho_{i,n}$ was not involved in the baseline emission calculation in registered PD. This deviation is made in order to increase the accuracy of the calculations in monitoring report.

This deviation was made in the previous monitoring period (2nd) and was approved by Verra, there is no project description deviation involved in this monitoring period.

3.3 Grouped Projects

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

In this monitoring report, the data and parameters (η_{PJ} , ϕ_y , OX, F, DOC_{f,y}, MCF_{f,y}, W_{j,x}, DOC_j, and k_j) available at validation in the PD was not listed in the following part, the reason is that these parameters were used to ex ante estimate the FCH_{4,PJ,y}, which will be ex post monitored.

Data / Parameter	OX_{top_layer}
Data unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	Consistent with how oxidation is accounted for in the methodological tool “Emissions from solid waste disposal sites”
Value applied	0.1
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	GWP_{CH_4}
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. For emission reductions achieved in this report, the CH ₄ GWP of 28 is applied for conservative consideration.
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	NCV_{CH_4}
Data unit	TJ/t CH ₄
Description	Net calorific value of methane at reference conditions
Source of data	Technical literature
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	EF _{grid,OM,y}
Data unit	t CO ₂ /MWh
Description	Operating margin CO ₂ emission factor in year y
Source of data	“2017 Baseline Emission Factors for Regional Power Grids in China” published by DNA of China
Value applied	0.9014
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	According to section 4.1, the ex-ante option is selected to calculate EF _{grid, OM,y} and 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	“2017 Baseline Emission Factors for Regional Power Grids in China” published by DNA of China
Value applied	0.3112
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	According to section 4.1, the ex-ante option is selected to calculate EF _{grid, BM,y} and 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	0.6063
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	According to section 4.1, the ex-ante option is selected to calculate $EF_{grid, OM,y}$ and $EF_{grid,BM,y}$ and fixed in the crediting period, thus the $EF_{grid,CM,y}$ is fixed during the crediting period.

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”
Value applied	8,314
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of data	Calculation of baseline 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"
Value applied	16.04
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of data	Calculation of baseline 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"
Value applied	101,325 Pa
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of data	Calculation of baseline 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"
Value applied	273.15
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	$\rho_{i,n}$
Data unit	kg gas i/m ³ wet gas i
Description	Density of greenhouse gas CH ₄ in the gaseous stream at normal conditions
Source of data	Calculated based on the equation (7) in the PD as per the latest version of "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"
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	-

Data / Parameter	TDL _{j,y} and 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	TDL _{j,y} : 20% 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 20% for project emission, and 3% for baseline emissions.
Purpose of data	Calculation of baseline emissions and project emissions
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	Management of SWDS
Data unit	-
Description	Management of SWDS
Source of data	Original design of the landfill
Description of measurement methods and procedures to be applied	Project participants should refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications
Frequency of monitoring/recording	Annually
Value monitored	Since the implementation of the project activity, no changes have taken place in the management of the landfill. In China, the regulations and standards currently issued and in force as below:

	-In July 2008, the State Environmental Protection Bureau and the State Administration of Quality Supervision and Quarantine jointly issued the "Standard for Pollution Control of Domestic Waste Landfills" (GB16889-2008) - In 2013, the ministry of construction released the technical specification for domestic waste sanitary landfill (GB50869 2013). GB16889-2008 and GB50869 -2013 are used to regulate the landfill site construction, management and operation, and encourage the use of landfill gas from a safety perspective with the installation of LFG capture system, but no clear requirements on the amount of landfill gas destroyed or percentage reaches a certain value. Due to financial and/or technical difficulties, these regulations have not been widely implemented in China. According to the "Overview of the Development of China's Municipal Solid Waste Treatment Industry in 2012"⁹, there were 648 landfill sites in China by the end of 2012. However, only 50 of the 648 landfill sites were equipped to utilize and collect or combust landfill gases. As "2019 Statistical Yearbook of Urban and Rural Construction" and "2020 China Biomass Power Generation Industry Development Report", As of 2019, there were 1,885 landfill sites in cities and counties across the country, and only 216 landfill sites were installed gas generators and connected to the power grid, with a coverage rate of less than 12%. By the end of the implementation of the project, the provisions on methane recovery and utilization have not changed in the current effective laws and standards in China, and it is a common phenomenon in China that methane is discharged into the atmosphere without any use without control. Meanwhile, according to the "Statement of Management Technical " of the landfill site, it is confirmed that after the implementation of the project activity, the management of the landfill site has not undergone any changes, and there has been no increase in methane production.
Monitoring equipment	-
QA/QC procedures to be applied	All electronic data and paper documents will be archived for two years following the end of the crediting period.

⁹ <https://doc.mbalib.com/view/604143e8e7ecadf5b5410f95fee266fc.html>

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

Data / Parameter	f_y
Data unit	-
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
Source of data	historic data on the amount captured from FSR
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	For application A: Once for the crediting period
Value monitored	0 (the methane was not captured at SWDS or not flare, combusted. And no other measures that prevents the emissions of methane to the atmosphere are taken)
Monitoring equipment	Not applicable as this parameter is confirmed in ways of paper documents and oral interviews.
QA/QC procedures to be applied	The parameter is cross-checked with interviews with the staff of the power plant. All electronic data and paper documents will be archived for two years following the end of the crediting period.
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	$F_{CH_4, BL, R, y}$
Data unit	t CH ₄ /yr
Description	Amount of methane in the LFG which is flared due to a requirement in year y

Source of data	Information of the host country's regulatory requirements relating to LFG, contractual requirements, or requirements to address safety and odour concerns		
Description of measurement methods and procedures to be applied	-		
Frequency of monitoring/recording	Annually		
Value monitored	Monitoring period		Value
	Start Date	End Date	
	01/05/2022	31/05/2022	114.510
	01/06/2022	30/06/2022	115.119
	01/07/2022	31/07/2022	102.910
	01/08/2022	31/08/2022	78.736
	01/09/2022	30/09/2022	85.661
	01/10/2022	31/10/2022	64.507
	01/11/2022	30/11/2022	58.316
	01/12/2022	31/12/2022	59.983
	01/01/2023	31/01/2023	46.651
	01/02/2023	28/02/2023	40.839
	01/03/2023	31/03/2023	44.164
	01/04/2023	30/04/2023	48.680
	01/05/2023	31/05/2023	48.177
	01/06/2023	30/06/2023	45.462
	01/07/2023	31/07/2023	51.837
	01/08/2023	31/08/2023	55.109
	01/09/2023	30/09/2023	48.792
	01/10/2023	31/10/2023	48.557
	01/11/2023	30/11/2023	40.815
	01/12/2023	31/12/2023	37.271

	01/01/2024	31/01/2024	40.608
	01/02/2024	29/02/2024	33.970
	01/03/2024	31/03/2024	40.809
	01/04/2024	30/04/2024	36.473
	01/05/2024	31/05/2024	51.596
	01/06/2024	30/06/2024	38.321
	01/07/2024	31/07/2024	37.779
	01/08/2024	31/08/2024	34.546
	Total		1,550.198
Monitoring equipment	Not applicable as this parameter is a calculated value.		
QA/QC procedures to be applied	Refer to the QA/QC to the monitored parameter $\rho_{reg,y}$ and $F_{CH4,PJ,y}$.		
Purpose of the data	Calculation of baseline emissions		
Calculation method	The data is calculated as annual methane destroyed multiplied by fraction of LFG that is required to be flared due to a requirement. $F_{CH4,BL,y} = \max \{F_{CH4,BL,R,y}; F_{CH4,BL,sys,y}\} = \rho_{reg,y} \times F_{CH4,PJ,y} = 0.2 \times F_{CH4,PJ,y}$		
Comments	Applicable to Case 2 of section 5.4.1.3		

Data / Parameter	$\rho_{reg,y}$
Data unit	Dimensionless
Description	Fraction of LFG that is required to be flared due to a requirement in year y
Source of data	Information of the host country's regulatory requirements relating to LFG, contractual requirements, or requirements to address safety and odour concerns
Description of measurement methods and procedures to be applied	According to the methodology ACM0001 (version 19.0), If the requirement does not specify any amount or percentage of LFG that should be destroyed, but requires the installation of a system to capture and flare the LFG, then a typical destruction rate of 20 per cent is assumed

Frequency of monitoring/recording	Annually
Value monitored	20%
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	Applicable to Case 2 of section 5.4.1.3

Data / Parameter	V _{t,wb,n}		
Data unit	m³ wet gas/h		
Description	Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions		
Source of data	Measured by a flow meter continuously and converted automatically by the recovery monitoring system		
Description of measurement methods and procedures to be applied	The parameters of V _{t,wb} is measured by a flow meter continuously, which was converted automatically into standard value V _{t,wb,n} (at the normal condition of 0 °C and 101,325 Pa) by the recovery monitoring system		
Frequency of monitoring/recording	Continuously. Recorded by the project participant every day.		
Value monitored	Monitoring period		Value
	Start Date	End Date	
	01/05/2022	31/05/2022	3,181.40
	01/06/2022	30/06/2022	3,002.86
	01/07/2022	31/07/2022	2,769.01
	01/08/2022	31/08/2022	2,576.20
	01/09/2022	30/09/2022	2,534.19
	01/10/2022	31/10/2022	2,110.63
	01/11/2022	30/11/2022	2,065.24

	01/12/2022	31/12/2022	1,671.44
	01/01/2023	31/01/2023	1,266.13
	01/02/2023	28/02/2023	1,192.66
	01/03/2023	31/03/2023	1,168.24
	01/04/2023	30/04/2023	1,444.55
	01/05/2023	31/05/2023	1,409.36
	01/06/2023	30/06/2023	1,404.90
	01/07/2023	31/07/2023	1,457.42
	01/08/2023	31/08/2023	1,410.09
	01/09/2023	30/09/2023	1,061.56
	01/10/2023	31/10/2023	1,277.25
	01/11/2023	30/11/2023	1,158.05
	01/12/2023	31/12/2023	1,067.06
	01/01/2024	31/01/2024	1,053.39
	01/02/2024	29/02/2024	919.12
	01/03/2024	31/03/2024	1,047.05
	01/04/2024	30/04/2024	1,095.72
	01/05/2024	31/05/2024	1,251.98
	01/06/2024	30/06/2024	920.42
	01/07/2024	31/07/2024	982.72
	01/08/2024	31/08/2024	916.39
	Average		1,552.41
Monitoring equipment			
	Monitoring equipment	Flow meter	
	Model	RVM VS14IIJF 63N2	
	Accuracy	0.5	
	Serial No.	18081001	
	Calibration date	18-Dec-2021 17-Dec-2022 16-Dec-2023	

	Valid till	17-Dec-2022 16-Dec-2023 15-Dec-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 is carried out every year and the independent accredited laboratory issues verification certificates. All flow data and paper documents will be archived for two years following the end of the crediting period.	
Purpose of the data	Calculation of baseline emissions	
Calculation method	-	
Comments	This parameter was monitored in Options A	

Data / Parameter	$V_{i,t,wb}$	
Data unit	m ³ gas CH ₄ /m ³ wet gas	
Description	Volumetric fraction of greenhouse gas CH ₄ in a time interval t on a wet basis	
Source of data	Measured by continuous gas analyzer	
Description of measurement methods and procedures to be applied	Continuous gas analyzer operating on wet basis. Volumetric flow measurement should always refer to the actual pressure and temperature.	
Frequency of monitoring/recording	Continuously. Recorded by the project participant everyday.	
Value monitored	Monitoring period	
	Start Date	End Date
	01/05/2022	31/05/2022
	01/06/2022	30/06/2022
	01/07/2022	31/07/2022
	01/08/2022	31/08/2022
	01/09/2022	30/09/2022
	01/10/2022	31/10/2022
	01/11/2022	30/11/2022
	01/12/2022	31/12/2022
	01/01/2023	31/01/2023
	Value	
	33.80%	
	37.20%	
	34.90%	
	28.70%	
	32.80%	
	28.70%	
	27.40%	
	33.70%	
	34.60%	

	01/02/2023	28/02/2023	35.60%
	01/03/2023	31/03/2023	35.50%
	01/04/2023	30/04/2023	32.70%
	01/05/2023	31/05/2023	32.10%
	01/06/2023	30/06/2023	31.40%
	01/07/2023	31/07/2023	33.40%
	01/08/2023	31/08/2023	36.70%
	01/09/2023	30/09/2023	44.60%
	01/10/2023	31/10/2023	35.70%
	01/11/2023	30/11/2023	34.20%
	01/12/2023	31/12/2023	32.80%
	01/01/2024	31/01/2024	36.20%
	01/02/2024	29/02/2024	37.10%
	01/03/2024	31/03/2024	36.60%
	01/04/2024	30/04/2024	32.30%
	01/05/2024	31/05/2024	38.70%
	01/06/2024	30/06/2024	40.40%
	01/07/2024	31/07/2024	36.10%
	01/08/2024	31/08/2024	35.40%
	Average		34.04%
Monitoring equipment			
	Monitoring equipment	Gas analyzer	
	Model	GFA800 MOH	
	Accuracy	2%	
	Serial No.	1803020	
	Calibration date	18-Dec-2021 17-Dec-2022 16-Dec-2023	
	Valid till	17-Dec-2022 16-Dec-2023 15-Dec-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 is carried out every year and the independent accredited laboratory issues verification certificates. All operation data and paper documents will be archived for two years following the end of the crediting period.
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	O _{pj,h}														
Data unit	-														
Description	Operation of the equipment that consumes the LFG														
Source of data	Recorded in project operation logs														
Description of measurement methods and procedures to be applied	For each equipment unit j using the LFG monitor that the plant is operating in hour h by the monitoring any one or more of the following three parameters: (a) Temperature. Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the burning equipment. Document and justify the location and minimum threshold in the PD; (b) Flame. Flame detection system is used to ensure that the equipment is in operation; (c) Products generated. Monitor the generation of steam for the case of boilers and air-heaters and glass for the case of glass melting furnaces. This option is not applicable to brick kilns. O_{pj,h}=0 when: (a) One of more temperature measurements are missing or below the minimum threshold in hour h (instantaneous measurements are made at least every minute); (b) Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); (c) No products are generated in the hour h. Otherwise, O_{pj,h}=1														
Frequency of monitoring/recording	Hourly														
Value monitored	<table><tr><td colspan="2">Monitoring period</td><td>Value</td></tr><tr><td>Start Date</td><td>End Date</td><td></td></tr><tr><td>01/05/2022</td><td>31/05/2022</td><td>744</td></tr><tr><td>01/06/2022</td><td>30/06/2022</td><td>720</td></tr></table>			Monitoring period		Value	Start Date	End Date		01/05/2022	31/05/2022	744	01/06/2022	30/06/2022	720
Monitoring period		Value													
Start Date	End Date														
01/05/2022	31/05/2022	744													
01/06/2022	30/06/2022	720													

	01/07/2022	31/07/2022	744
	01/08/2022	31/08/2022	744
	01/09/2022	30/09/2022	720
	01/10/2022	31/10/2022	744
	01/11/2022	30/11/2022	720
	01/12/2022	31/12/2022	744
	01/01/2023	31/01/2023	744
	01/02/2023	28/02/2023	672
	01/03/2023	31/03/2023	744
	01/04/2023	30/04/2023	720
	01/05/2023	31/05/2023	744
	01/06/2023	30/06/2023	720
	01/07/2023	31/07/2023	744
	01/08/2023	31/08/2023	744
	01/09/2023	30/09/2023	720
	01/10/2023	31/10/2023	744
	01/11/2023	30/11/2023	720
	01/12/2023	31/12/2023	744
	01/01/2024	31/01/2024	744
	01/02/2024	29/02/2024	696
	01/03/2024	31/03/2024	744
	01/04/2024	30/04/2024	720
	01/05/2024	31/05/2024	744
	01/06/2024	30/06/2024	720
	01/07/2024	31/07/2024	744
	01/08/2024	31/08/2024	744
	Total		20,496
Monitoring equipment	The on-line operation system		
QA/QC procedures to be applied	The staff of the power plant record the value of on-line operation system every day and exported the records of on-line operation		

	system every month. The Daily Operation Report and Monthly Report will be saved two years after the crediting period.
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	The on-line operation system simultaneously monitors the operation of each generator as well as the entire power station, and there is no record of all generators being shut down at the same time during the monitoring period; the shutdown of a single generator does not interrupt the operation of the project, only if ALL 6 generators are shut down at the same time in any hour h, the project is not in operation. During this monitoring period, there is no records that all 6 generators being shut down at the same time, so the project is in continuous operation, i.e., operates for 24 hours per day. Thus, the overall operating hours of the project in each month is calculated as the number of days in that month multiple 24h.

Data / Parameter	EG _{PJ,y}		
Data unit	MWh		
Description	Amount of electricity generated using LFG by the project activity in year y		
Source of data	Monthly report of electricity meter		
Description of measurement methods and procedures to be applied	A bi-directional electricity meter (with accuracy of 0.5S) was installed by local grid company at 10kV Xiangzhang line to monitor continuously and the meter reading was recorded monthly. The electricity generated by the project is recorded on 00:00 of the first day every month. The data electricity meter is confirmed by the project participant and the grid company ¹⁰ . At the same cut-off time, meter readings will be recorded remotely and digitally by local power grid company and the data will be downloaded and transcribed into Electricity Transaction Notes (ETNs). All electronic data and paper documents will be archived for two years following the end of the crediting period.		
Frequency of monitoring/recording	Continuously measured and monthly recorded		
Value monitored	Monitoring period		Monitored value
	Start Date	End Date	
	01/05/2022	31/05/2022	2,646.800
	01/06/2022	30/06/2022	2,462.200
	01/07/2022	31/07/2022	2,438.600
			Conservative value for calculation

¹⁰ As per the description in Page 5 of the Power Purchase Agreement (PPA)

	01/08/2022	31/08/2022	2,140.500	2,140.500
	01/09/2022	30/09/2022	1,935.600	1,935.600
	01/10/2022	31/10/2022	1,579.500	1,579.500
	01/11/2022	30/11/2022	1,443.400	1,443.400
	01/12/2022	31/12/2022	1,307.700	1,307.700
	01/01/2023	31/01/2023	1,288.800	1,288.800
	01/02/2023	28/02/2023	1,090.000	1,090.000
	01/03/2023	31/03/2023	994.700	994.700
	01/04/2023	30/04/2023	1,131.400	1,131.400
	01/05/2023	31/05/2023	1,048.000	1,048.000
	01/06/2023	30/06/2023	960.500	960.500
	01/07/2023	31/07/2023	1,066.000	1,066.000
	01/08/2023	31/08/2023	1,118.200	1,118.200
	01/09/2023	30/09/2023	1,096.800	1,096.800
	01/10/2023	31/10/2023	1,056.900	1,056.900
	01/11/2023	30/11/2023	789.700	789.700
	01/12/2023	31/12/2023	904.000	904.000
	01/01/2024	31/01/2024	880.700	876.297
	01/02/2024	29/02/2024	807.700	803.662
	01/03/2024	31/03/2024	916.500	911.918
	01/04/2024	30/04/2024	741.600	737.892
	01/05/2024	31/05/2024	879.300	874.904
	01/06/2024	30/06/2024	927.300	922.664
	01/07/2024	31/07/2024	983.600	978.682
	01/08/2024	31/08/2024	992.400	987.438
	Total		35,628.400	35,592.755
Monitoring equipment				
	Monitoring equipment		Electricity meter	
	Model		DTZ1296	

	Accuracy	0.5S
	Serial No.	3630001201800010936364(old)
	Calibration date	01-Feb-2022 30-Jan-2023
	Valid till	31-Jan-2023 29-Jan-2024
	The old electricity meter was changed to the following new one on 29-Mar-2024.	
	Monitoring equipment	Electricity meter
	Model	DTZ1296
	Accuracy	0.5S
	Serial No.	3630001492249049842312(new)
	Calibration date	/
	Valid till	/
QA/QC procedures to be applied	The data from the monthly reports was cross checked with Electricity Transaction Note, and the conservative values will be applied for ER calculation. The electricity meter is periodically checked and maintained. Calibration is carried out according to the standard of " Calibration specification for digital energy meters " (DL/T 1507-2016) once a year to ensure normal operation. All electronic data and paper documents will be archived for two years following the end of the crediting period. From 30-Jan-2024, the meter was not calibrated on time by the project owner, thus the corrected value deducted the maximum permissible error of the equipment is applied to calculate the emission reduction. The maximum permissible error of the meter with the accuracy of 0.5S is 0.5%, thus the corrected value = The monitored value * (1-0.5%). For conservative, the data from 01-Jan-2024 to 29-Jan-2024 was also deducted the maximum permissible error. Details please refer to the ER calculation sheet.	
Purpose of the data	Calculation of baseline emissions	
Calculation method	-	
Comments	This parameter is required for calculating baseline emissions associated with electricity generation ($BE_{EC,y}$) using the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation".	
Data / Parameter	$EG_{EC,y}$	
Data unit	MWh	

Description	Amount of electricity consumed by the project activity in year y																																																																												
Source of data	Monthly report of electricity meter																																																																												
Description of measurement methods and procedures to be applied	A bi-directional electricity meter (with accuracy of 0.5S) was installed by local grid company at 10kV Xiangzhang line to monitor continuously and the meter reading was recorded monthly. At 0:00 hr of first day of each month, the staff from project owner will record the electricity meter readings and generate Monthly Report. At the same cut-off time, main meter readings will be recorded remotely and digitally by local power grid company and the data will be downloaded and transcribed into Electricity Transaction Notes (ETNs). 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.																																																																												
Frequency of monitoring/recording	This parameter is monitored continuously by electricity meter and recorded monthly.																																																																												
Value monitored	<table border="1"> <thead> <tr> <th colspan="2">Monitoring period</th><th rowspan="2">Monitored value</th><th rowspan="2">Conservative value for calculation</th></tr> <tr> <th>Start Date</th><th>End Date</th></tr> </thead> <tbody> <tr><td>01/05/2022</td><td>31/05/2022</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/06/2022</td><td>30/06/2022</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/07/2022</td><td>31/07/2022</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/08/2022</td><td>31/08/2022</td><td>0.100</td><td>0.100</td></tr> <tr><td>01/09/2022</td><td>30/09/2022</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/10/2022</td><td>31/10/2022</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/11/2022</td><td>30/11/2022</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/12/2022</td><td>31/12/2022</td><td>0.100</td><td>0.100</td></tr> <tr><td>01/01/2023</td><td>31/01/2023</td><td>0.400</td><td>0.400</td></tr> <tr><td>01/02/2023</td><td>28/02/2023</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/03/2023</td><td>31/03/2023</td><td>1.200</td><td>1.200</td></tr> <tr><td>01/04/2023</td><td>30/04/2023</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/05/2023</td><td>31/05/2023</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/06/2023</td><td>30/06/2023</td><td>0.100</td><td>0.100</td></tr> <tr><td>01/07/2023</td><td>31/07/2023</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/08/2023</td><td>31/08/2023</td><td>0.000</td><td>0.000</td></tr> <tr><td>01/09/2023</td><td>30/09/2023</td><td>0.000</td><td>0.000</td></tr> </tbody> </table>			Monitoring period		Monitored value	Conservative value for calculation	Start Date	End Date	01/05/2022	31/05/2022	0.000	0.000	01/06/2022	30/06/2022	0.000	0.000	01/07/2022	31/07/2022	0.000	0.000	01/08/2022	31/08/2022	0.100	0.100	01/09/2022	30/09/2022	0.000	0.000	01/10/2022	31/10/2022	0.000	0.000	01/11/2022	30/11/2022	0.000	0.000	01/12/2022	31/12/2022	0.100	0.100	01/01/2023	31/01/2023	0.400	0.400	01/02/2023	28/02/2023	0.000	0.000	01/03/2023	31/03/2023	1.200	1.200	01/04/2023	30/04/2023	0.000	0.000	01/05/2023	31/05/2023	0.000	0.000	01/06/2023	30/06/2023	0.100	0.100	01/07/2023	31/07/2023	0.000	0.000	01/08/2023	31/08/2023	0.000	0.000	01/09/2023	30/09/2023	0.000	0.000
Monitoring period		Monitored value	Conservative value for calculation																																																																										
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01/09/2023	30/09/2023	0.000	0.000																																																																										

	01/10/2023	31/10/2023	0.300	0.300
	01/11/2023	30/11/2023	0.500	0.500
	01/12/2023	31/12/2023	0.200	0.200
	01/01/2024	31/01/2024	0.000	0.000
	01/02/2024	29/02/2024	0.100	0.101
	01/03/2024	31/03/2024	0.000	0.000
	01/04/2024	30/04/2024	0.400	0.402
	01/05/2024	31/05/2024	0.100	0.101
	01/06/2024	30/06/2024	0.100	0.101
	01/07/2024	31/07/2024	0.600	0.603
	01/08/2024	31/08/2024	0.600	0.603
	Total		4.800	4.810
Monitoring equipment				
	Monitoring equipment	Electricity meter		
	Model	DTZ1296		
	Accuracy	0.5S		
	Serial No.	3630001201800010936364(old)		
	Calibration date	01-Feb-2022 30-Jan-2023		
	Valid till	31-Jan-2023 29-Jan-2024		
	The electricity meter was changed on 29-Mar-2024.			
	Monitoring equipment	Electricity meter		
	Model	DTZ1296		
	Accuracy	0.5S		
Serial No.	3630001492249049842312(new)			
Calibration date	/			
Valid till	/			
QA/QC procedures to be applied	The data from the monthly reports was cross checked with Electricity Transaction Note, and the conservative values will be applied for ER calculation. The electricity meter is periodically			

	checked and maintained. Calibration is carried out according to the standard of " Calibration specification for digital energy meters " (DL/T 1507-2016) once a year to ensure normal operation. All electronic data and paper documents will be archived for two years following the end of the crediting period. From 30-Jan-2024, the meter was not calibrated on time by the project owner, thus the corrected value added the maximum permissible error of the equipment is applied to calculate the emission reduction. The maximum permissible error of the meter with the accuracy of 0.5S is 0.5%, thus the corrected value = The monitored value * (1+0.5%). For conservative, the data from 01-Jan-2024 to 29-Jan-2024 was also added the maximum permissible error. Details please refer to the ER calculation sheet.
Purpose of the data	Calculation of project emissions
Calculation method	-
Comments	This parameter is required for calculating project emissions from electricity consumption due to an alternative waste treatment process t (PE _{EC,y}) using the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation".

Data / Parameter	CAPEX and OPEX
Data unit	Currency (RMB)
Description	Total investment to implement the project and total cost to operate the project
Source of data	Engineering, procurement and construction contracts; and maintenance contracts
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	At the first issuance request after each phase of the project is fully implemented
Value monitored	Total investment of the project is 62,969,370.54 RMB; and total cost is 10,360,000 RMB, of which, O &M cost is 4,560,000 RMB.
Monitoring equipment	-
QA/QC procedures to be applied	Audited by professional, independent financial auditors. The VVB should only verify that the data provided corresponds to the data from independent financial auditors

Purpose of the data	-
Calculation method	-
Comments	The information provided for CAPEX shall indicate the investment made: (i) in the collection and flaring system; (ii) in the power plant and connection to the grid (if applicable); and (iii) in the purchase of the new boiler or refurbishment of the existing one and in the steam/hot air pipeline if steam/hot air is exported out of the project boundary (if applicable). The information supplied for OPEX shall indicate the costs for: (i) staff and maintenance involved in the operation of the collection and flaring system; and (ii) staff and maintenance involved in the operation of the collection and power generation system. The monitoring of this parameter is only required for projects applying the simplified procedures to identify the baseline scenario and demonstrate additionality

Data / Parameter	Tariff of electricity exported
Data unit	RMB/kwh
Description	Tariff of the electricity exported
Source of data	Power purchase agreement
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	At the first issuance request after each phase of the project is fully implemented
Value monitored	0.58 (including VAT)
Monitoring equipment	-
QA/QC procedures to be applied	Audited by professional, independent financial auditors. The VVB should only verify that the data provided correspond to the data from independent financial auditors.
Purpose of the data	-
Calculation method	-
Comments	The monitoring of this parameter is only required for projects applying the simplified procedures to identify the baseline scenario and demonstrate additionality.

4.3 Monitoring Plan

The monitoring plan presented in this PD 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 of the project. This monitoring plan was implemented by the project owner during the project operation. The details of the monitoring plan are specified as follows:

- (A) Data and parameters to be monitored Data and parameters to be monitored are listed below shows the positions of the monitoring instruments and Table 4-1 lists the corresponding parameters monitored:

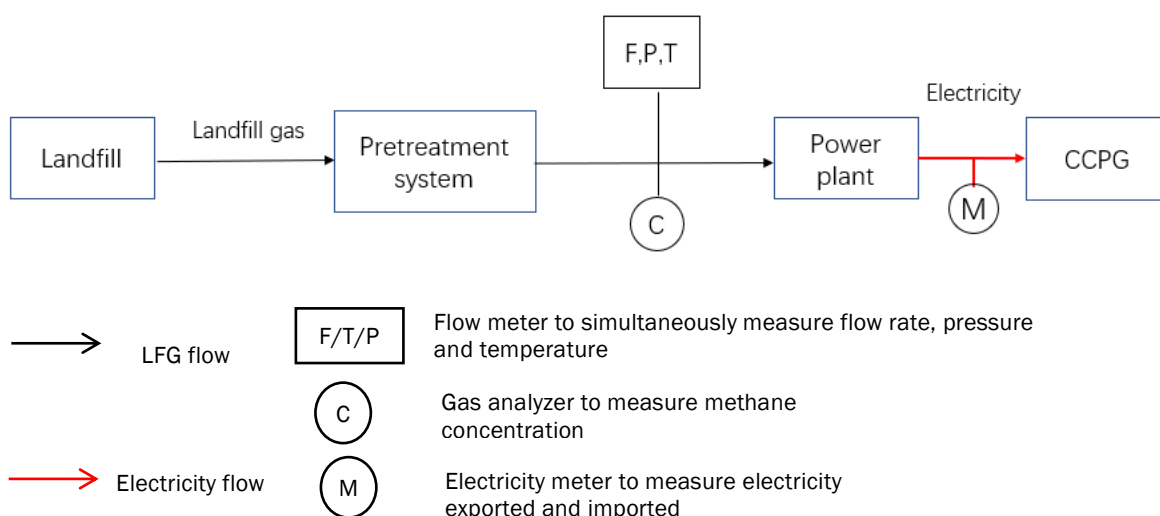


Figure 4-1 Project monitoring diagram

Table 4-1 Corresponding parameters monitored

Position	Parameter Monitored	Description
LFG Inflow Monitoring: Flow meter	$V_{t,wb,n}$	Volumetric flow of the gaseous stream ($V_{t,wb}$), pressure and temperature are monitored on-site by flow meter, which was converted automatically into standard value $V_{t,wb,n}$ (at the normal condition of 0°C and 101,325 Pa) by the recovery monitoring system. The monitoring frequency is continuous. And the data was recorded and electronic archived once per one hour by computer automatically. The operators checks the data every day and totalize the amount of LFG destroyed every month.

LFG Inflow Monitoring: Gas analyzer	$V_{i,t,wb}$	Volumetric fraction of greenhouse gas CH ₄ is monitored on-site by gas analyzer. The Monitoring frequency is continuous. And the data was recorded and electronic archived once per one hour by computer automatically. The operators checks the data every day and average the data every month.
Electricity Monitoring: Electricity meter	$EG_{PJ,y}$, $EG_{EC,y}$	Amount of electricity generated using LFG by the project activity and electricity consumed by the project activity are continuously monitored by bi-directional electricity meter installed by local grid company at 10kV Xiangzhang line with the accuracy of no less than 0.5s.

Table 4-2 Information of monitoring equipment installed

Equipment	Model	Serial No.	Accuracy	Parameter monitored
Flow meter	RVM VS14IJJF63 N2	18081001	0.5	$V_{t,wb,n}$
Gas analyzer	GFA800 MOH	1803020	2%	$V_{i,t,wb}$
Electricity meter(old)	DTZ1296	3630001201800010936364	0.5S	$EG_{PJ,y}$, $EG_{EC,y}$
Electricity meter(new)	DTZ1296	3630001492249049842312	0.5S	

(B) Management Structure

The Project owner organizes a specific VCS team in project development department to be responsible for data collection, supervision and witness the whole process of data measuring and recording. A VCS manager is appointed to take full responsibility for the overall monitoring of the project. The monitoring and measurement of extracted gas, electricity generation and consumption etc. are carried out by a few designated monitoring officers. In addition, the Project developer appoints internal verifiers who is responsible for internal check of the measurement, collection of relevant receipts and invoices, and the calculation of the emission reductions. A monitoring and management manual of the project that identifies detailed duties and responsibilities of the relevant parties is developed and served as the basis of the project monitoring. Figure 4-2 shows the operation and management structure of the Project.

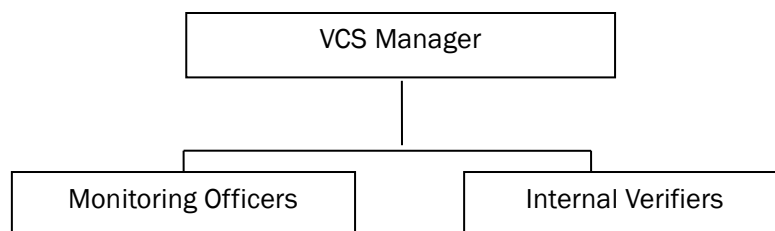


Figure 4-2 Operation and management structure of the project

(C) Data collection

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

(D) Quality assurance

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

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

The installation of the electricity metering equipment fulfills the requirements of “DL/T448 – 2016 Technical Administrative Code of Electric Energy Metering”¹¹. The accuracy should not be less than 0.5S. The installation of flow meters and gas analyzers fulfills the national standard (JJG 640-2016 and JJG 1138-2017). All the meters were checked and maintained periodically.

(E) Data file management

All monitoring data will be electronically filed by the end of each month and the electronic data files will be archived in both disk copy and printed hard copy. Other documents in paper e.g. maps, forms and environment assessment reports will be preserved as well. All data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the

¹¹ <https://wenku.baidu.com/view/c8ad0b432379168884868762caaedd3383c4b59e.html>

end of the crediting period. The Project owner will provide original records and documents if necessary.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to the methodology ACM0001 (V19.0), baseline emissions are determined according to equation (1) and comprise the following sources:

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

Where:

BE_y	=	Baseline emissions in year y (t CO ₂ e/yr)
$BE_{CH_4,y}$	=	Baseline emissions of methane from the SWDS in year y (t CO ₂ e/yr)
$BE_{EC,y}$	=	Baseline emissions associated with electricity generation in year y (t CO ₂ /yr)
$BE_{HG,y}$	=	Baseline emissions associated with heat generation in year y (t CO ₂ /yr)
$BE_{NG,y}$	=	Baseline emissions associated with natural gas use in year y (t CO ₂ /yr)

The project is not involved in heat generation and natural gas use, thus, the baseline emissions is calculated as follows:

$$BE_y = BE_{CH_4,y} + BE_{EC,y} \quad (2)$$

1. Baseline emissions of methane from the SWDS ($BE_{CH_4,y}$)

Baseline emissions of methane from the SWDS are determined as follows, based on the amount of methane that is captured under the project activity and the amount that would be captured and destroyed in the baseline (such as due to regulations). In addition, the effect of methane oxidation that is present in the baseline and absent in the project is taken into account:

$$BE_{CH_4,y} = \left((1 - OX_{top_layer}) \times F_{CH_4,PJ,y} - F_{CH_4,BL,y} \right) \times GWP_{CH_4} \quad (3)$$

Where:

$BE_{CH_4,y}$	=	Baseline emissions of methane from the SWDS in year y (t CO ₂ e/yr)
OX_{top_layer}	=	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)

$F_{CH_4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year y (t CH ₄ /yr)
$F_{CH_4,BL,y}$	=	Amount of methane in the LFG that would be flared in the baseline in year y (t CH ₄ /yr)
GWP_{CH_4}	=	Global warming potential of CH ₄ (t CO ₂ e/t CH ₄)

Ex post determination of $F_{CH_4,PJ,y}$

During the crediting period, $F_{CH_4,PJ,y}$ is determined as the sum of the quantities of methane flared and used in power plant(s), boiler(s), air heater(s), glass melting furnace(s), kiln(s) and natural gas distribution, as follows:

$$F_{CH_4,PJ,y} = F_{CH_4,flared,y} + F_{CH_4,EL,y} + F_{CH_4,HG,y} + F_{CH_4,NG,y} \quad (4)$$

Where:

$F_{CH_4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year y (t CH ₄ /yr)
$F_{CH_4,flared,y}$	=	Amount of methane in the LFG which is destroyed by flaring in year y (t CH ₄ /yr)
$F_{CH_4,EL,y}$	=	Amount of methane in the LFG which is used for electricity generation in year y (t CH ₄ /yr)
$F_{CH_4,HG,y}$	=	Amount of methane in the LFG which is used for heat generation in year y (t CH ₄ /yr)
$F_{CH_4,NG,y}$	=	Amount of methane in the LFG which is sent to the natural gas distribution network and/or dedicated pipeline and/or to the trucks in year y (t CH ₄ /yr)

The flare will not be used when the power plant is in normal operation, thus, the PD decides not to claim the emission reduction from the flare, even if any methane is destroyed by flare during the crediting period.

Meanwhile, the project is not involved in heat generation and natural gas use, thus,

$$F_{CH_4,PJ,y} = F_{CH_4,EL,y} \quad (5)$$

$F_{CH_4,EL,y}$ is determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" and monitoring the working hours of the power plant(s), boiler(s), air heater(s), glass melting furnace(s) and kiln(s), so that no emission reduction are claimed for methane destruction during non-working hours. This is taken into account by monitoring the hours that the equipment utilizing the LFG is operating in year y ($Op_{j,h,y}$).

For the project, the flow of gaseous stream is volume flow-wet basis, and the volumetric fraction is wet basis, thus, as per the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0), Option C is applied to determine the parameter of $F_{CH_4,EL,y}$.

Option C

The mass flow of greenhouse gas i ($F_{i,t}$) is determined as follows:

$$F_{i,t} = V_{t,wb,n} \times v_{i,t,wb} \times \rho_{i,n} \quad (6)$$

With:

$$\rho_{i,n} = \frac{P_n \times MM_i}{R_u \times T_n} \quad (7)$$

Where:

$F_{i,t}$	=	Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h)
$V_{t,wb,n}$	=	Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions (m ³ wet gas/h)
$v_{i,t,wb}$	=	Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a wet basis (m ³ gas i/m ³ wet gas)
$\rho_{i,n}$	=	Density of greenhouse gas i in the gaseous stream at normal conditions (kg gas i/m ³ wet gas i)
P_n	=	Absolute pressure at normal conditions (Pa)
T_n	=	Temperature at normal conditions (K)
MM_i	=	Molecular mass of greenhouse gas i (kg/kmol)
R_u	=	Universal ideal gases constant (Pa.m ³ /kmol.K)

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

$$V_{t,wb,n} = V_{t,wb} \times \left[\left(\frac{T_n}{T_t} \right) \times \left(\frac{P_t}{P_n} \right) \right] \quad (8)$$

Where:

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

P_n = Absolute pressure at normal conditions (Pa)

T_n = Temperature at normal conditions (K)

The calculation process of $BE_{CH_4,y}$ are as follows:

$$F_{CH_4,PJ,y} = V_{t,wb,n} \times V_{i,t,wb} \times Op_{j,h,y} \times \rho_{i,n}^{12} \quad (9)$$

$$F_{CH_4,BL,y} = \rho_{reg,y} \times F_{CH_4,BL,y}^{13} \quad (10)$$

Calculation results of $F_{CH_4,PJ,y}$ and $F_{CH_4,BL,y}$ are shown in table 5-1.

¹² $\rho_{i,n}$ = 0.71566 kg gas i/m³ wet gas I, for details please see section 4.1. The other values are monitored by the project participant.

¹³ $\rho_{reg,y}$ = 0.2, for details please see section 4.1. The other values are monitored by the project participant.

Table 5-1 Calculation results of $F_{CH_4,PJ,y}$ and $F_{CH_4,BL,y}$

Monitoring period		$V_{t,wb,n}$	$V_{i,t,wb}$	$Op_{j,h,y}$							$F_{CH_4,PJ,y}$	$F_{CH_4,BL,y}$
Start Date	End Date	m ³ wet gas/h	m ³ wet gas/h	#1	#2	#3	#4	#5	#6	the project/h	t CH ₄	t CH ₄
01/05/2022	31/05/2022	3,181.40	33.80%	742	740	743	589	738	0	744	572.552	114.510
01/06/2022	30/06/2022	3,002.86	37.20%	718	719	717	0	720	0	720	575.595	115.119
01/07/2022	31/07/2022	2,769.01	34.90%	741	740	723	0	739	0	744	514.552	102.910
01/08/2022	31/08/2022	2,576.20	28.70%	735	731	630	0	742	0	744	393.678	78.736
01/09/2022	30/09/2022	2,534.19	32.80%	718	719	713	0	566	0	720	428.304	85.661
01/10/2022	31/10/2022	2,110.63	28.70%	737	740	742	0	0	0	744	322.533	64.507
01/11/2022	30/11/2022	2,065.24	27.40%	719	718	718	0	0	0	720	291.582	58.316
01/12/2022	31/12/2022	1,671.44	33.70%	315	178	737	0	0	560	744	299.917	59.983
01/01/2023	31/01/2023	1,266.13	34.60%	0	0	740	0	0	740	744	233.257	46.651
01/02/2023	28/02/2023	1,192.66	35.60%	0	0	671	0	0	671	672	204.194	40.839
01/03/2023	31/03/2023	1,168.24	35.50%	0	0	80	0	629	705	744	220.821	44.164
01/04/2023	30/04/2023	1,444.55	32.70%	0	0	0	0	714	715	720	243.399	48.680
01/05/2023	31/05/2023	1,409.36	32.10%	0	0	0	0	717	720	744	240.883	48.177
01/06/2023	30/06/2023	1,404.90	31.40%	0	0	0	0	743	738	720	227.308	45.462
01/07/2023	31/07/2023	1,457.42	33.40%	0	0	0	0	737	742	744	259.186	51.837
01/08/2023	31/08/2023	1,410.09	36.70%	0	0	0	0	743	743	744	275.545	55.109
01/09/2023	30/09/2023	1,061.56	44.60%	0	0	0	0	734	733	720	243.960	48.792

01/10/2023	31/10/2023	1,277.25	35.70%	0	0	0	0	723	724	744	242.786	48.557
01/11/2023	30/11/2023	1,158.05	34.20%	0	0	0	0	713	583	720	204.076	40.815
01/12/2023	31/12/2023	1,067.06	32.80%	0	0	0	0	664	739	744	186.356	37.271
01/01/2024	31/01/2024	1,053.39	36.20%	0	0	0	0	738	740	744	203.038	40.608
01/02/2024	29/02/2024	919.12	37.10%	0	0	0	0	691	691	696	169.849	33.970
01/03/2024	31/03/2024	1,047.05	36.60%	0	0	0	0	741	740	744	204.046	40.809
01/04/2024	30/04/2024	1,095.72	32.30%	0	0	0	0	699	694	720	182.365	36.473
01/05/2024	31/05/2024	1,251.98	38.70%	0	0	0	0	739	740	744	257.981	51.596
01/06/2024	30/06/2024	920.42	40.40%	0	0	0	0	716	637	720	191.605	38.321
01/07/2024	31/07/2024	982.72	36.10%	0	0	0	0	640	734	744	188.893	37.779
01/08/2024	31/08/2024	916.39	35.40%	0	0	0	0	728	726	744	172.728	34.546
Total /Average of 2022		2,488.32	32.46%	5,425	5,285	5,723	589	3,505	560	5,880	5,880	679.743
Total /Average of 2023		1,277.23	34.74%	0	0	1,491	0	7,117	8,553	8,760	8,760	556.354
Total /Average of 2024		1,024.33	36.58%	0	0	0	0	5,692	5,702	5,856	5,856	314.101
Total/Average		1,552.41	34.04%	5,425	5,285	7,214	589	16,314	14,815	20,496	20,496	1,550.198

$$BE_{CH_4,y} = \left((1 - OX_{top_layer}) \times F_{CH_4,PJ,y} - F_{CH_4,BL,y} \right) \times GWP_{CH_4} \quad (11)$$

The calculation result of $BE_{CH_4,y}$ is as the following table 5-2.

Table 5-2 Calculation of $BE_{CH_4,y}$

Monitoring period	OX_{top_layer}	$F_{CH_4,PJ,y}$ (t CH ₄)	$F_{CH_4,BL,y}$ (t CH ₄)	GWP_{CH_4} (tCO _{2e} /tCH ₄)	$BE_{CH_4,y}$ (t CO _{2e})
01/05/2022~31/12/2022	0.1	3,398.713	679.743	28	66,614
01/01/2023~31/12/2023	0.1	2,781.771	556.354	28	54,522
01/01/2024~31/08/2024	0.1	1,570.505	314.101	28	30,781
Total	0.1	7,750.989	1,550.198	28	151,917

2. Baseline emissions associated with electricity generation ($BE_{EC,y}$)

According to methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0),

$$BE_{EC,y} = \sum_k EC_{BL,k,y} \times EF_{EL,k,y} \times (1 + TDL_{k,y}) \quad (12)$$

Where:

- $BE_{EC,y}$ = Baseline emissions from electricity consumption in year y (t CO₂ / yr)
- $EC_{BL,k,y}$ = Quantity of electricity that would be consumed by the baseline electricity consumer k in year y (MWh/yr)
- $EF_{EL,k,y}$ = Emission factor for electricity generation for source k in year y (t CO₂/MWh)
- $TDL_{k,y}$ = Average technical transmission and distribution losses for providing electricity to source k in year y
- k = Sources of electricity consumption in the baseline

Values of monitored parameter $EG_{PJ,y}$ ($=EC_{BL,k,y}$) are presented in table 5-3.

Table 5-3. Amount of electricity generated using LFG by the project activity in year y

Monitoring Period		EG _{PJ,y} =EC _{BL,k,y} (MWh)		
Start Date	End Date	Monitored data in monthly report	ETN Data	Conservative value for calculation
		A	B	C=MIN(A,B)
01/05/2022	31/05/2022	2,646.800	2,646.800	2,646.800
01/06/2022	30/06/2022	2,462.200	2,462.200	2,462.200
01/07/2022	31/07/2022	2,438.600	2,438.600	2,438.600
01/08/2022	31/08/2022	2,140.500	2,140.500	2,140.500
01/09/2022	30/09/2022	1,935.600	1,935.600	1,935.600
01/10/2022	31/10/2022	1,579.500	1,579.500	1,579.500
01/11/2022	30/11/2022	1,443.400	1,443.400	1,443.400
01/12/2022	31/12/2022	1,307.700	1,307.700	1,307.700
01/01/2023	31/01/2023	1,288.800	1,288.800	1,288.800
01/02/2023	28/02/2023	1,090.000	1,090.000	1,090.000
01/03/2023	31/03/2023	994.700	994.700	994.700
01/04/2023	30/04/2023	1,131.400	1,131.400	1,131.400
01/05/2023	31/05/2023	1,048.000	1,048.000	1,048.000
01/06/2023	30/06/2023	960.500	960.500	960.500
01/07/2023	31/07/2023	1,066.000	1,066.000	1,066.000
01/08/2023	31/08/2023	1,118.200	1,118.200	1,118.200
01/09/2023	30/09/2023	1,096.800	1,096.800	1,096.800
01/10/2023	31/10/2023	1,056.900	1,056.900	1,056.900
01/11/2023	30/11/2023	789.700	789.700	789.700
01/12/2023	31/12/2023	904.000	904.000	904.000
/	/	A	B	C=MIN(A,B)*(1-0.5%)
01/01/2024	31/01/2024	880.700	880.700	876.297 ¹⁴
01/02/2024	29/02/2024	807.700	807.700	803.662

¹⁴ From 30/01/2024 to 31/08/2024, due to the meter was not calibrated on time, amount of electricity generated using LFG by the project activity is conservatively adjusted by applying the lower limits of maximum permissible error (-0.5%). For conservative, the data for the whole month (Jan, 2024) was adjusted.

01/03/2024	31/03/2024	916.500	916.500	911.918
01/04/2024	30/04/2024	741.600	741.600	737.892
01/05/2024	31/05/2024	879.300	879.300	874.904
01/06/2024	30/06/2024	927.300	927.300	922.664
01/07/2024	31/07/2024	983.600	983.600	978.682
01/08/2024	31/08/2024	992.400	992.400	987.438
Total of 2022		15,954.300	15,954.300	15,954.300
Total of 2023		12,545.000	12,545.000	12,545.000
Total of 2024		7,129.100	7,129.100	7,093.455
Total		35,628.400	35,628.400	35,592.755

Thus, the calculation result of $BE_{EC,y}$ is as the following table 5-4.

Table 5-4 Calculation of $BE_{EC,y}$

Year	$EG_{PJ,y}=EC_{BL,k,y}$	$EF_{EL,k,y}$	$TDL_{k,y}$	$BE_{EC,y}$
	MWh	tCO ₂ e/MWh	%	tCO ₂
01/05/2022~31/12/2022	15,954.300	0.6063	3%	9,963
01/01/2023~31/12/2023	12,545.000	0.6063	3%	7,834
01/01/2024~31/08/2024	7,093.455	0.6063	3%	4,429
Total	35,592.755	0.6063	3%	22,226

As a summary, the baseline emission is as table 5-5.

Table 5-5 Summary of baseline emission

Monitoring period	$BE_{CH4,y}$	$BE_{EC,y}$	BE_y
	tCO ₂	tCO ₂	tCO ₂
01/05/2022~31/12/2022	66,614	9,963	76,577
01/01/2023~31/12/2023	54,522	7,834	62,356
01/01/2024~31/08/2024	30,781	4,429	35,210
Total	151,917	22,226	174,143

5.2 Project Emissions

Project emissions are calculated as follows:

$$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y} + PE_{SP,y} \quad (13)$$

Where:

PE_y	=	Project emissions in year y (tCO ₂ /yr)
$PE_{EC,y}$	=	Emissions from consumption of electricity due to the project activity in year y (tCO ₂ /yr)
$PE_{FC,y}$	=	Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year y (tCO ₂ /yr)
$PE_{DT,y}$	=	Emissions from the distribution of compressed/liquefied LFG using trucks, in year y (tCO ₂ /yr)
$PE_{SP,y}$	=	Emissions from the supply of LFG to consumers through a dedicated pipeline, in year y (tCO ₂ /yr)

The project is only included the emissions from consumption of electricity, not involved in the emissions from consumption of fossil fuels, the distribution of compressed/liquefied LFG using trucks and the supply of LFG to consumers through a dedicated pipeline, thus,

$$PE_y = PE_{EC,y} \quad (14)$$

According to the PD,

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \quad (15)$$

Where:

$PE_{EC,y}$	=	Project emissions from electricity consumption in year y (tCO ₂ / yr)
$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EL,j,y}$	=	Emission factor for electricity generation for source j in year y (tCO ₂ /MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to source j in year y
j	=	Sources of electricity consumption in the project

Values of monitored parameter $EG_{EC,y}$ ($=EC_{PJ,j,y}$) are shown in table 5-6.

Table 5-6. Monitored values of quantity of electricity consumed by the project electricity consumption source

Monitoring period		EG _{EC,y} =EC _{PJ,j,y} (MWh)		
		Monitored data in monthly report	ETN Data	Conservative value for calculation
		D	E	F=MAX(D,E)
01/05/2022	31/05/2022	0.000	0.000	0.000
01/06/2022	30/06/2022	0.000	0.000	0.000
01/07/2022	31/07/2022	0.000	0.000	0.000
01/08/2022	31/08/2022	0.100	0.100	0.100
01/09/2022	30/09/2022	0.000	0.000	0.000
01/10/2022	31/10/2022	0.000	0.000	0.000
01/11/2022	30/11/2022	0.000	0.000	0.000
01/12/2022	31/12/2022	0.100	0.100	0.100
01/01/2023	31/01/2023	0.400	0.400	0.400
01/02/2023	28/02/2023	0.000	0.000	0.000
01/03/2023	31/03/2023	1.200	1.200	1.200
01/04/2023	30/04/2023	0.000	0.000	0.000
01/05/2023	31/05/2023	0.000	0.000	0.000
01/06/2023	30/06/2023	0.100	0.100	0.100
01/07/2023	31/07/2023	0.000	0.000	0.000
01/08/2023	31/08/2023	0.000	0.000	0.000
01/09/2023	30/09/2023	0.000	0.000	0.000
01/10/2023	31/10/2023	0.300	0.300	0.300
01/11/2023	30/11/2023	0.500	0.500	0.500
01/12/2023	31/12/2023	0.200	0.200	0.200
/	/	D	E	F=MAX(D,E)*(1+0.5%)
01/01/2024	31/01/2024	0.000	0.000	0.000 ¹⁵

¹⁵ From 30/01/2024 to 31/08/2024, due to the meter was not calibrated on time, amount of electricity generated using LFG by the project activity is conservatively adjusted by applying the lower limits of maximum permissible error (-0.5%). For conservative, the data for the whole month (Jan, 2024) was adjusted.

01/02/2024	29/02/2024	0.100	0.100	0.101
01/03/2024	31/03/2024	0.000	0.000	0.000
01/04/2024	30/04/2024	0.400	0.400	0.402
01/05/2024	31/05/2024	0.100	0.100	0.101
01/06/2024	30/06/2024	0.100	0.100	0.101
01/07/2024	31/07/2024	0.600	0.600	0.603
01/08/2024	31/08/2024	0.600	0.600	0.603
Total of 2022		0.200	0.200	0.200
Total of 2023		2.700	2.700	2.700
Total of 2024		1.900	1.900	1.910
Total		4.800	4.800	4.810

The calculation result of $PE_{EC,y}$ is as table 5-7.

Table 5-7 Calculation of $PE_{EC,y}$

Monitoring period	$EC_{PJ,j,y}$	$EF_{EL,j,y}(EF_{grid,CM,y})$	$TDL_{j,y}$	$PE_{EC,y}$	PE_y
	MWh	tCO ₂ /MWh	%	tCO ₂	tCO ₂
01/05/2022~31/12/2022	0.200	0.6063	20%	1	1
01/01/2023~31/12/2023	2.700	0.6063	20%	2	2
01/01/2024~31/08/2023	1.910	0.6063	20%	2	2
Total	4.810	0.6063	20%	5	5

5.3 Leakage Emissions

No leakage effects are accounted for under this methodology.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Based on the above calculation process, the emission reduction is summarized as follows:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCUs (tCO ₂ e)	Removal VCUs (tCO ₂ e)	Total VCUs (tCO ₂ e)
01-May-2022 to 31-Dec-2022	76,577	1	0	76,576	/	76,576
01-Jan-2023 to 31-Dec-2023	62,356	2	0	62,354	/	62,354
01-Jan-2024 to 31-Aug-2024	35,210	2	0	35,208	/	35,208
Total	174,143	5	0	174,138	/	174,138

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
01-May-2022 to 31-Dec-2022	129,092	76,576	-58.25%	This monitoring period is from 01-May-2022 to 31-Aug-2024, with totally 854 days. Based on the annual estimated emission reductions, the amount of emission reductions for this monitoring period would be 417,092 tCO₂e. The actual emission reductions in this monitoring period (854 days) are 174,138 tCO₂e, which is 58.25% less than the estimation, because of insufficient gas supply from landfills. Thus, the net GHG emission reduction during this monitoring period is not overestimated.
01-Jan-2023 to 31-Dec-2023	177,712	62,354		
01-Jan-2024 to 31-Aug-2024	110,288	35,208		
Total	417,092	174,138		

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

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

APPENDIX 2: SUPPORTING EVIDENCE

Evidence for SDG 7 and 13: From project operation date onwards, the net electricity supplied to the grid and the emission reduction in every monitoring period have been listed in below table. Please refer to following links for details.

<https://registry.verra.org/app/projectDetail/VCS/2358>

Period		The electricity delivered to CCPG	Emission Reduction
From	To	MWh	tCO ₂ e
01-Jan-2019	28-Feb-2021	93,689.600	467,671
01-Mar-2021	30-Apr-2022	47,786.244	265,484
01-May-2022	31-Aug-2024	35,592.755	174,138
Cumulative impacts		177,068.599	907,293

Evidence for 8.5: The payroll of the project staff, including name, gender, wage and other specific information has been submitted to VVB for verification. Thus, the payroll is not included as appendices to this report due to confidentiality requirement of the project proponent.