



NANNING LANDFILL GAS POWER GENERATION PROJECT

Document Prepared by Swiss Carbon Value Ltd.

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Project title	Nanning Landfill Gas Power Generation Project
Project ID	2464
Monitoring period	01-Jul-2023 to 31-Dec-2024
Original date of issue	01-Apr-2025
Most recent date of issue	11-Jun-2025
Version	03
VCS Standard Version	Version 4.7
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Nanning Landfill Gas Power Generation Project (hereafter referred to as the project) is located at Pingli Landfill Site in Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, P.R China. The Project is owned by Guangxi Ruirong Energy Technology Co., Ltd. (hereafter referred to as the project owner). The project captures the landfill gas that would have been released to the atmosphere in the absence of the project and generates electricity with the landfill gas. The electricity is supplied to the South China Power Grid (SCPG) to replace the electricity generated from coal-fired power plants of SCPG.

The purpose of the project is to utilize landfill gas (LFG) from the Pingli Landfill site, which consists mainly of methane, for electricity generation. The landfill handles an average of 1,135 tonnes MSW per day which is mainly from the Nanning City. The project includes LFG collection system, LFG pre-treatment system, electricity generation system and flare system. LFG collected is used for electricity generation with internal combustion generators. Meanwhile, the flare is only involved when the electricity generation system is not in operation, hence, the project developer determined that VCUs from flare are not claimed. VCUs are only claimed from the methane destroyed by power generation system and the power displacement. The feed-in electricity is estimated to be 365,083 MWh during the fixed 10 years crediting period. The expected average annual emission reductions are 231,811 tCO₂e during the fixed 10 years crediting period. The total estimated emission reductions over the whole crediting period of the project will be 2,318,113 tCO₂e.

The project started construction on 30-Sep-2019 and started operation on 03-Apr-2020. This monitoring period is from 01-Jul-2023 to 31-Dec-2024. The total installed capacity is 5.8MW, consisting of 6 sets of 0.966MW generator. For this monitoring period, the amount of electricity generated using LFG by the project activity (EG_{PJ,y}), also the electricity exported to the grid was 28,724.09 MWh, the amount of electricity consumed by the project activity (EC_{PJ,y}), also the electricity imported from the grid was 0.50 MWh, and the net electricity delivered to SCPG¹ was 28,723.59 MWh. The total GHG emission reduction was 181,997 tCO₂e.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation	03-Apr-2020 – 02-Apr-2030	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	10

¹ The net electricity delivered to SCPG is calculated as: amount of electricity generated using LFG by the project activity (EG_{PJ,y}) minus amount of electricity consumed by the project activity (EC_{PJ,y}).

Verification	03-Apr-2020 -- 30-Jun-2021	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	1.24
Verification	01-Jul-2021 -- 31-Dec-2021	VCS	CTI Certification Co., Ltd.	0.50
Verification	01-Jan-2022 -- 30-Sep-2022	VCS	CTI Certification Co., Ltd.	0.75
Verification	01-Oct-2022 -- 30-Jun-2023	VCS	CTI Certification Co., Ltd.	0.75
Verification	01-Jul-2023 -- 31-Dec-2024	VCS	CTI Certification Co., Ltd.	1.50

1.3 Sectoral Scope and Project Type

Sectoral scope ²	1. Energy (renewable/non-renewable) 13. Waste handling and disposal
Project activity type	Non-grouped project

Sectoral scope	Not applicable. This is a non-AFOLU project.
AFOLU project category ³	Not applicable. This is a non-AFOLU project.
Project activity type	Not applicable. This is a non-AFOLU project.

1.4 Project Proponent

Organization name	Guangxi Ruirong Energy Technology Co., Ltd.
Contact person	Ouyang Yuewen
Title	Carbon Management Department Manager
Address	Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, China
Telephone	+86 17707313599
Email	ouyangyuewen@chinawaterind.com

1.5 Other Entities Involved in the Project

Organization name	Swiss Carbon Value Ltd.
Role in the project	Project developer

² 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>

³ See Appendix 1 of the VCS Standard

Contact person	Xuan Yang
Title	Regional Director
Address	Technoparkstr. 1, 8005, Switzerland.
Telephone	+41 43 501 35 50
Email	registration@southpolecarbon.com

1.6 Project Start Date

Project start date	03-Apr-2020
Justification	The operation start date of the project, is the date on which the project began generating GHG emission reductions.

1.7 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☒ Ten years, fixed ☐ Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)
Start and end date of first or fixed crediting period	03-Apr-2020 to 02-Apr-2030

1.8 Project Location

The project is located at Pingli landfill site in Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, P.R China. The geographical location of the project site is shown in Figure 1. The central coordinates of the project location are longitude of 108° 38' 11" E and latitude of 23° 00' 43" N.



Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0001	Large-scale Consolidated Methodology: Flaring or use of landfill gas	19.0
Tool	TOOL04	Emissions from solid waste disposal sites	08.0

Tool	TOOL05	Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	03.0
Tool	TOOL07	Tool to calculate the emission factor for an electricity system	07.0
Tool	TOOL08	Tool to determine the mass flow of a greenhouse gas in a gaseous stream	03.0
Tool	TOOL32	Positive lists of technologies	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

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

☐ Yes ☒ No

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

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

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? 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 provides many benefits that helps achieve China's Sustainable Development Goals (SDG), a set of 17 universal goals covering the thematic areas of environmental, economic and social development.



The project contributes to local and global sustainable development in the following ways:

- Provide clean energy. The project makes use of landfill gas to generate electricity and supplies clean electricity to SCPG, which is dominated by fossil fuel fired electricity. During this monitoring period, 28,723.59 MWh of net electricity was delivered to SCPG. This helps diversify power structure of the SCPG and reduce the dependence on exhaustible fossil fuels for power generation. This contributes to one of the China's actions for promoting the sustainable developing, "By 2030, increase the share of non-fossil fuels in primary energy consumption to about 20 percent"; (SDG 7)
- Provide decent work. The project creates 12 employment opportunities related to the management, operation and maintenance of the power plant, which meets one of the China's action plans "Increase labor force participation rate through implementation of the classification policy. Vigorously enforce the Law on Promotion of Employment." (SDG 8)
- Reduce GHG emissions. The project utilizes and destroys landfill gas that would otherwise be released directly into the atmosphere, effectively reducing GHG emissions and air pollution. That means not only the project reduces GHG emissions to local environment, but

also provide an environmentally sound solution to minimize explosion risks and odour at the landfill site, which improves the environment around landfills. During this monitoring period, the total GHG emission reduction was 181,997 tCO₂e. This contributes to achieving one of China's stated sustainable development priorities "Actively adapt to climate change and strengthen resistance capacity to climate risks in agriculture, forestry, water resources and other key fields, as well as cities, coastal regions and ecologically vulnerable areas"; (SDG 13)

The project's quantifiable contributions to specific targets and indicators of the Sustainable Development Goals (SDGs) for the monitoring period have been provided in table 1 below.

For SDG 8 contribution, the employee roster as evidence has been provided as appendix to this report. For SDG 7 and 13, please refer to this monitoring report and previous approved verification report⁴ for data source.

⁴ <https://registry.terra.org/app/projectDetail/VCS/2464>

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	7.2	MWh of renewable energy generated	Implemented activities to increase	During this monitoring period, 28,723.59 MWh of renewable electricity was delivered to SCPG.	From the operation start date of the project to the end of this monitoring period, 145,280.61 ⁵ MWh of renewable electricity was delivered to SCPG.
2)	8.5	Number of jobs created	Implemented activities to increase	No further changes this monitoring period	The project creates 12 long-term employment opportunities.
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	During this monitoring period, the total GHG emission reduction was 181,997 tCO ₂ e.	From the operation start date of the project to the end of this monitoring period, the total GHG emission reduction was 931,201 ⁶ tCO ₂ e.

⁵ 36,077.41+21682.20+31,152.41+27,645.00+28,723.59 = 145,280.61

⁶ 246,932+127,862+199,420+174,990+181,997 = 931,201

1.13 Commercially Sensitive Information

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

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	The project locates at Pingli Landfill Site in Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, P.R China, and the project captures the landfill gas from the Pingli Landfill site that would have been released to the atmosphere in the absence of the project and generates electricity with the landfill gas, therefore, local residents nearby the project site, the local government, and employees of the project and the Pingli Landfill site are considered as stakeholders. The project owner held a local stakeholder consultation meeting on 15-May-2020 in the company office before validation. Before the stakeholder consultation meeting, the project description summary with the project owner contact information and the stakeholder meeting notice were published on the bulletins at the project site and nearby on 15-Apr-2020. The local stakeholders were invited to get to know their opinions and/or suggestions about the implementation of the project and the design of the project. Since the validation till the end of this monitoring period, the stakeholder make up has not changed. Therefore, the stakeholders identified for the project are local residents nearby the project site, the local government, and employees of the project and the Pingli Landfill site.
Legal or customary tenure/access rights	The project locates at Pingli Landfill Site in Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, P.R

	China, and the project captures the landfill gas from the Pingli Landfill site that would have been released to the atmosphere in the absence of the project and generates electricity with the landfill gas. The project was approved to be constructed by Nanning City Xingning District Environmental Protection Bureau, therefore, the project does not involve land issues and resource access issues. Therefore, in this project, no legal or customary tenure/access rights to territories and resources, including collective and conflicting rights, held by stakeholders, indigenous people (IPs), local communities (LCs), and customary rights holders, are violated.																																															
Stakeholder diversity and changes over time	The structure of the stakeholders surveyed on 15-May-2020 is as follows. <table><tr><th colspan="2">Distribution</th><th>Quantity</th><th>Percentage</th></tr><tr><td rowspan="2">Number of stakeholders surveyed</td><td>Male</td><td>15</td><td>50.00%</td></tr><tr><td>Female</td><td>15</td><td>50.00%</td></tr><tr><td rowspan="4">Age</td><td><25</td><td>4</td><td>13.33%</td></tr><tr><td>25-45</td><td>9</td><td>30.00%</td></tr><tr><td>45-55</td><td>12</td><td>40.00%</td></tr><tr><td>>55</td><td>5</td><td>16.67%</td></tr><tr><td rowspan="3">Education</td><td>Junior high school or below</td><td>9</td><td>30.00%</td></tr><tr><td>Senior high school</td><td>14</td><td>46.67%</td></tr><tr><td>College or above</td><td>7</td><td>23.33%</td></tr><tr><td rowspan="4">Occupation</td><td>Worker</td><td>5</td><td>16.67%</td></tr><tr><td>Peasant</td><td>23</td><td>76.67%</td></tr><tr><td>Civil servant</td><td>2</td><td>6.67%</td></tr><tr><td>Unspecified</td><td>0</td><td>0.00%</td></tr></table> Stakeholders identified for this project are diverse in nature – in terms of socio-economic status, age and gender wise and the diversity is unlikely to change over time. During this monitoring period, the stakeholder make up has not changed.	Distribution		Quantity	Percentage	Number of stakeholders surveyed	Male	15	50.00%	Female	15	50.00%	Age	<25	4	13.33%	25-45	9	30.00%	45-55	12	40.00%	>55	5	16.67%	Education	Junior high school or below	9	30.00%	Senior high school	14	46.67%	College or above	7	23.33%	Occupation	Worker	5	16.67%	Peasant	23	76.67%	Civil servant	2	6.67%	Unspecified	0	0.00%
Distribution		Quantity	Percentage																																													
Number of stakeholders surveyed	Male	15	50.00%																																													
	Female	15	50.00%																																													
Age	<25	4	13.33%																																													
	25-45	9	30.00%																																													
	45-55	12	40.00%																																													
	>55	5	16.67%																																													
Education	Junior high school or below	9	30.00%																																													
	Senior high school	14	46.67%																																													
	College or above	7	23.33%																																													
Occupation	Worker	5	16.67%																																													
	Peasant	23	76.67%																																													
	Civil servant	2	6.67%																																													
	Unspecified	0	0.00%																																													
Expected changes in well-being	The project utilizes and destroys landfill gas that would otherwise be released directly into the atmosphere, effectively reducing GHG emissions and air pollution. The project makes use of landfill gas to generate electricity and supplies clean electricity to SCPG. That means not only the project reduces GHG emissions to local environment, but also provide an environmentally sound solution to minimize																																															

	explosion risks and odour at the landfill site, which improves the environment around landfill site. In addition, the project provides job opportunities for local residents.
Location of stakeholders	The project locates at Pingli Landfill Site in Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, P.R China, and the project captures the landfill gas from the Pingli Landfill site that would have been released to the atmosphere in the absence of the project and generates electricity with the landfill gas. The project location and the landfill site are identified as the location of stakeholders, local communities, indigenous people, customary rights holders.
Location of resources	The project locates at Pingli Landfill Site in Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, P.R China, and the project captures the landfill gas from the Pingli Landfill site that would have been released to the atmosphere in the absence of the project and generates electricity with the landfill gas, therefore, the location of resources is the project location and the landfill site.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation

During the stakeholder consultation meeting held on 15-May-2020 before validation, the project information and the continuous input / grievance mechanism have been introduced to the local stakeholders. The project information with contact information has also been posted on the bulletins at the project site and nearby, which states that there is a grievance book at the project site, and everyone is welcome to give comments. The continuous input / grievance mechanism is as below.

	Method Chosen (include all known details e.g. location of book, phone number)	Justification
Continuous Input / Grievance Expression Process Book	A grievance book is put at the project site.	The grievance book is kept at the project owner office. Anyone can go there to record their grievance or comment in the book. The project owner personnel will review and respond to the comments and record the response in the book as well.

	Telephone access	+86 17707313599	Mr. Ouyang Yuewen, Guangxi Ruirong Energy Technology Co., Ltd.
		+10 59070872	Ms. Sui Yang, Swiss Carbon Value Ltd.
	Email access	ouyangyuewen@chinawaterind.com	Mr. Ouyang Yuewen, Guangxi Ruirong Energy Technology Co., Ltd.
		s.yang@southpole.com	Ms. Sui Yang, Swiss Carbon Value Ltd.
During the project lifetime, the project documents related to VCS will be printed and archived at the project owner office for stakeholders to know about the project design and implementation of the project, the VCS validation and verification process, the VCS registration and issuance Process, etc. Till the end of this monitoring period, the VCS PD, VCS Validation report, the Monitoring report and VCS Verification report for the previous monitoring periods, VCS Monitoring procedure, the VCS FactSheet, and the non-technical project summaries were printed and put at the project owner office for stakeholders reviewing. During this monitoring period, a stakeholder meeting was conducted on 05-Aug-2023 in the company office. The participants were the stakeholders identified for the project, including the representatives of local residents nearby the project site, of the local government, and of employees from the project and the Pingli Landfill site. During the meeting, the implementation of project has been reported to local stakeholders by the project owner, and the comments have been asked. All stakeholders expressed their support to the project and no negative comments have been received. During this monitoring period, no inputs/grievances received through all the methods.			
Date(s) of stakeholder consultation	15-May-2020 and 05-Aug-2023		
Communication of monitored results	During the meeting on 15-May-2020 before validation and the meeting on 05-Aug-2023 in this monitoring period, all stakeholders expressed their support to the project and no negative comments have been received. The non-technical project summaries including the monitored results were printed and put at the project owner office for stakeholders reviewing.		

	The grievance book is kept at the project owner office. Anyone can go there to record their grievance or comment in the book. The project owner personnel review the grievance book weekly and respond to the comments and record the response in the book if there are inputs/grievances. For email and phone call, if there are inputs/grievances, they are archived and recorded and responded immediately by the project owner and project developer personnel. During this monitoring period, no inputs/grievances received through all the methods.
Consultation records	During the meeting on 15-May-2020 before validation, a survey was carried out on the local residents to get their comments, and records were archived. During the meeting on 05-Aug-2023 in this monitoring period, the project owner appointed one person to make a meeting minute. The meeting minute was archived. The grievance book is kept at the project owner office. Anyone can go there to record their grievance or comment in the book. The project owner personnel review the grievance book weekly and respond to the comments and record the response in the book if there are inputs/grievances. For email and phone call, if there are inputs/grievances, they are archived and recorded and responded immediately by the project owner and project developer personnel. During this monitoring period, no inputs/grievances received through all the methods.
Stakeholder input	During the meeting on 15-May-2020 before validation, the project owner first explained the purpose and procedure of the meeting and made a brief introduction of the project to the attendees. Then, a survey was carried out on the local residents to get their comments. The survey was conducted through distributing and collecting responses to questionnaires which include a brief summary description of the project above the questions box, describing the project design and key information in text to local

	stakeholders. In total 30 out of 30 questionnaires were returned with a 100% response rate. The survey shows the stakeholders believe that the project will have positive impacts on the local ecology and employment. All stakeholders expressed their support to the project and no negative comments have been received. During the meeting on 05-Aug-2023 in this monitoring period, all stakeholders were supportive of the project, there were no negative comments received for the project. There are no updates to the project design. During this monitoring period, no inputs/grievances received through all the methods.
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2.1.3 Free, Prior, and Informed Consent

Consent	In this project, no legal or customary tenure/access rights to territories and resources, including collective and conflicting rights, held by stakeholders, indigenous people (IPs), local communities (LCs), and customary rights holders, are violated, thus, no FPIC for those is involved in the project. For stakeholder consultation, the stakeholders are invited to attend, therefore, the FPIC is ensured. According to the records of the stakeholder consultation meeting held on 15-May-2020 and 05-Aug-2023, all stakeholders expressed their support to the project and there are no ongoing or unresolved conflicts in the project. During this monitoring period, no inputs/grievances were received through all the methods, and no conflicts occurred in the project.
Outcome of FPIC	In this project, no legal or customary tenure/access rights to territories and resources, including collective and conflicting rights, held by stakeholders, indigenous people (IPs), local communities (LCs), and customary rights holders, are violated, thus, no FPIC is involved in the project. The project also obtained the approval letter from local governmental authority, the Nanning City Xingning District Environmental Protection Bureau, which well demonstrated

	that local governments permit the construction of the project, and the project has not encroached on land, relocated people without consent, and forced physical or economic displacement. According to the records of the stakeholder consultation meeting, all stakeholders consented to attend the meeting.
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2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
NA	NA The grievance book is kept at the project owner office. Anyone can go there to record their grievance or comment in the book. The project owner personnel review the grievance book weekly. If there are inputs/grievances, the project owner will contact and discuss with the stakeholders or relevant communities within 24 hours striving to propose a solution and mediation plan within 2 weeks. And the solution determined will be recorded in the book. If no agreement can be reached, then the local government will be invited to solve the problem. For email and phone call, if there are inputs/grievances, they are archived and recorded and responded immediately by the project owner and project developer personnel. During this monitoring period, no inputs/grievances received through all the methods.

2.1.5 Public Comments

Summary of comments received	Actions taken
No comments were received during this period. ⁷	NA

⁷ <https://registry.verra.org/app/projectDetail/VCS/2464>

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

The business scope of the project owner includes use of landfill gas and power generation, and the project owner has been operated for years since 2018. The management team has the experience and expertise to effectively implement similar project activities. The team members have many years of working experience in the field of landfill gas power generation and environmental protection, with relevant skills and expertise in project planning, implementation, and supervision to effectively manage the project operation.

Trainings on safety and operation are provided to employees to improve their proficiency in the landfill gas power generation and aim at that safety hazards will not occur and to ensure and improve the management expertise of the project management team.

No new entity is involved in the project design or implementation during this monitoring period.

2.2.2 Risk assessment

	Risk identified	Mitigation or preventative measure(s) taken
Natural and human-induced risks to stakeholders' wellbeing	No risk identified.	The project utilizes and destroys landfill gas that would otherwise be released directly into the atmosphere, effectively reducing GHG emissions and air pollution. That means not only the project reduces GHG emissions to local environment, but also provide an environmentally sound solution to minimize explosion risks and odour at the landfill site, which improves the environment around landfill site. In addition, the project provides job opportunities for local residents.
Risks to stakeholder participation	No risk identified.	According to the records of the stakeholder consultation meeting held on 15-May-2020 and 05-Aug-2023, all stakeholders expressed their support to the project and no risks identified. The project also obtained the approval letter from local governmental authority, Nanning City Xingning District Environmental Protection Bureau, which well demonstrated that local governments permit the construction of the project.
Working conditions	No risk identified.	The project utilizes and destroys landfill gas that would otherwise be released directly into the atmosphere, effectively reducing GHG emissions and

		air pollution, which improves the working environment of the workers. The project makes use of landfill gas to generate electricity and supplies clean electricity to SCPG. The amount of wastewater which is produced by the project is very small. The condensate water during the process of landfill gas collection is treated by the landfill leachate treatment system. The domestic wastewater from onsite employees is treated in the septic tank and then treated by the landfill leachate treatment system. The project is surrounded by landfill site and mountains, the only building which is next to the project is Pingli Landfill site office building. Under the influence of distance attenuation, air absorption and trees blocking, the noise of the project has no impact on surrounding residential areas. This project produces small amounts of solid waste. The general industrial solid waste is dust. All solid waste is sent to the landfill site, which could not only ensure the safety of disposal, but also has little impact on surrounding environment. In case for device maintenance etc., safety protection equipment has been prepared for the staff. In addition, in order to ensure the safety of operation, the regularly trains on safety were conducted to improve their proficiency in the use of landfill gas and ensure that safety hazards will not occur. The working conditions in the project are ensured safe.
Safety of women and girls	No risk identified.	The project provides job opportunities for local people. Equal pay for work of equal value is made to both men and women. In China, “Women’s Rights Protection Law”⁸ has published to provide support and protection to women and girls. In the project, the safety of women and girls is not harmed.
Safety of minority and marginalized groups, including children	No risk identified.	No minority and marginalized groups, including children, are involved in the project.

⁸ https://www.gov.cn/guoqing/2021-10/29/content_5647634.htm

Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	No risk identified.	The Environmental Impact Assessment (EIA) Report for the project was compiled by Guangxi Bohuan Environmental Consultancy Service Co., Ltd. The EIA Report for the project has been approved by Nanning City Xingning District Environmental Protection Bureau on 21-May-2019. Every aspect of environmental impact has been considered in the EIA report with corresponding measures during project development, the construction of the project is in line with national policies and no net harm has been detected. During the project operation, the project utilizes and destroys landfill gas that would otherwise be released directly into the atmosphere, effectively reducing GHG emissions and air pollution. The emission of NO_x, SO₂ and NH₃ for this project is less than the emission standards, that is because prior to electricity generation, LFG has been pre-treated to remove its impurities and moisture. After that, LFG is sent to gas-fired engines. And the exhaust gas is emitted to atmosphere which is far away from sensitive targets. The amount of wastewater produced is very small. The condensate water during the process of landfill gas collection is treated by the landfill leachate treatment system. The domestic wastewater from onsite employees is treated in the septic tank and then treated by the landfill leachate treatment system. The project is surrounded by landfill site and mountains, the only building which is next to the project is Pingli Landfill site office building. Under the influence of distance attenuation, air absorption and trees blocking, the noise of the project has no impact on surrounding residential areas. This project produces small amounts of solid waste. The general industrial solid waste is dust. All solid waste is sent to the landfill site, which could not only ensure the safety of disposal, but also has little impact on surrounding environment. Hazardous waste produced in the project, including waste oil and waste oil drums, are temporarily stored in the
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hazardous waste room after collection, and then regularly entrusted with qualified units for disposal.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified ⁹	Mitigation or preventative measure(s) taken
Discrimination	No risk identified.	The Labour Law of the People's Republic of China ¹⁰ and Law of the People's Republic of China on Employment Contract ¹¹ forbid any form of discrimination based on gender, race, religion, sexual orientation or any other basis. The project abides the rules of equality accordingly and does not involve and complicit in any form of discrimination.
Sexual harassment	No risk identified.	The Labour Law of the People's Republic of China and Women's Rights Protection Law ¹² forbid any form of sexual harassment. The project abides the rules accordingly and does not involve and complicit in any form of sexual harassment.
Gender equity in labor and work	No risk identified.	The project provides job opportunities for local people. Qualified local residents, both men and women, are recruited to work for the project. The project follows the provisions of the "Constitution" ¹³ and "Labour Law" on equal pay to both men and women for work of equal value. The project abides the rules of equality accordingly and does not involve and is not complicit in any form of discrimination. Specific to gender equality, detailed enforcement rules are regulated in

⁹ 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.

¹⁰ https://www.gov.cn/banshi/2005-05/25/content_905.htm

¹¹ <https://flk.npc.gov.cn/detail2.html?MmM5MDImZGQ2NzhizjE3OTAxNjc4YmY3NGQ3MTA2YjM>

¹² https://www.gov.cn/guoqing/2021-10/29/content_5647634.htm

¹³ https://www.gov.cn/guoqing/2018-03/22/content_5276318.htm

		“Women’s Rights Protection Law” to provide support and benefits to women. During stakeholders’ consultation process, comments were collected from the local people, including both men and women.
Forced labor	No risk identified.	The Labour Law of the People's Republic of China and Law of the People's Republic of China on Employment Contract forbid for any form of forced labor. The project abides the rules accordingly and does not involve and complicit in any form of forced labor.
Child labor	No risk identified.	The Labour Law of the People's Republic of China and Provisions on Prohibition of Child Labor¹⁴ forbid for any form of child labor. The project abides the rules accordingly and no child labor is employed in the project.
Human trafficking	No risk identified.	The project complies with the Labour Law of the People's Republic of China, Special provisions on labour protection of female employees and other related regulation and policies. The project does not involve human trafficking

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified.	The Constitution of the People's Republic of China¹⁵ regulates that the nation respect and protect human rights of IPs, LCs, and customary rights holders. The project abides the rules accordingly and does not involve and complicit in any form of human rights violation. The project does not involve demolition and resettlement, and the project was approved to be constructed by Nanning City Xingning District Environmental Protection Bureau, therefore, the

¹⁴ <https://flk.npc.gov.cn/detail2.html?ZmY4MDgwODE2ZjNjYmIzYzAxNmY0MGExYjcyMzA1ODM>

¹⁵ https://www.gov.cn/guoqing/2018-03/22/content_5276318.htm

	project does not involve land and resource issues. Therefore, the project does not violate the rights of IPs, LCs, and customary rights holders.
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2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation or preventative measure(s) taken
No risk identified.	The Constitution of the People's Republic of China regulates that the nation respect and protect human rights including dignity, cultural property and uniqueness of indigenous people. The project abides the rules accordingly and does not involve and complicit in any form of human rights violation of indigenous people. And the project does not involve cultural heritage as part of project activities, therefore, the project does not violate the rights of IPs, LCs, and customary rights holders.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified.	The project does not involve demolition and resettlement, and the project was approved to be constructed by Nanning City Xingning District Environmental Protection Bureau, therefore, the project does not involve land and resource issues. Therefore, the project does not involve property rights.

2.3.5 Benefit Sharing

Summary of the benefit sharing plan	The project does not involve benefit sharing plan.
Benefit sharing during the monitoring period	The project does not involve benefit sharing plan.

2.4 Ecosystem Health

	Risk identified	Mitigation or preventative measure(s) taken during the monitoring period
Impacts on biodiversity and ecosystems	No risk identified	The project is not located in an area within a high conservation value area or within critical natural habitats. The project activity does not physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified.
Soil degradation and soil erosion	No risk identified	The project is a landfill gas power generation project that makes use of landfill gas to generate electricity and supplies clean electricity to SCPG, which will not cause soil degradation and soil erosion. And the project was approved to be constructed by Nanning City Xingning District Environmental Protection Bureau, thus, the project does not involve land and soil issues. Therefore, the project could not directly or indirectly cause soil degradation and soil erosion.
Water consumption and stress	No risk identified	The project is a landfill gas power generation project that makes use of landfill gas to generate electricity and supplies clean electricity to SCPG, which will not affect the natural or pre-existing pattern of watercourses, groundwater and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity. The circulating water was used by the generators and was not discharged externally. The project does not involve water consumption stress.

2.4.1 Rare, Threatened, and Endangered species

Species or habitat	The project does not involve habitats for rare, threatened, or endangered species.
Areas needed for habitat connectivity	The project does not involve habitats for rare, threatened, or endangered species.

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	No risk identified	The project does not involve habitats for rare, threatened, or endangered species.

Areas for habitat connectivity	No risk identified	The project does not involve habitats for rare, threatened, or endangered species.
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2.4.2 Introduction of species

N/A.

2.4.3 Ecosystem conversion

	Risks identified	Mitigation or preventative measure(s) taken
Ecosystem conversion	No risk identified	The project is a landfill gas power generation project, and the project does not involve ecosystem conversion.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project uses LFG for electricity generation. It includes an LFG collection system, an LFG pre-treatment system, an electricity generation plant, and a flare system. The electricity generated is exported to SCPG to replace equivalent amount of electricity from those fossil fuel power plants connected to SCPG.

LFG 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.

LFG pre-treatment system

Prior to electricity generation, LFG must be pre-treated to remove its impurities and moisture, etc., to prevent corrosion in the generators. According to the EIA, the pre-treatment system consists of six equipment: 1) Impurity Filter to remove the impurity in LFG primarily; 2) Condenser to remove the water in LFG; 3) Gas-liquid Separator to remove the liquid in LFG further; 4) Fan Blower to boost the LFG; 5) Heat Exchanger to cool down the gas; 6) Advanced Impurity Filter to remove the impurity thoroughly.

The LFG pre-treatment procedure and the main equipment are shown as the following chart:

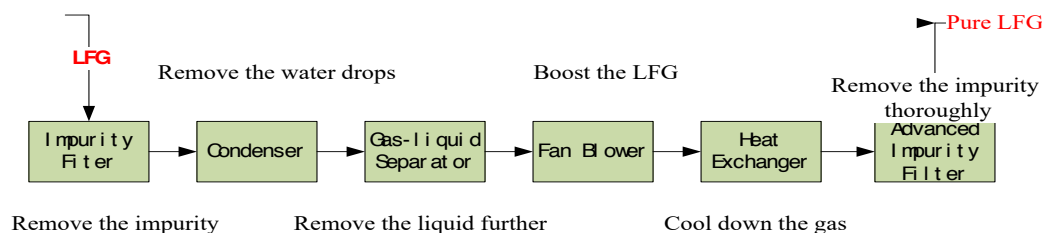


Figure 2 The flow chart of the LFG pre-treatment system

Power generation and grid connection system

A power plant is installed in order to generate electricity with the LFG captured. It adopts internal combustion engine generating sets. 6 sets with each capacity of 0.966MW have been installed for power generation. The electricity generated using LFG, except small portion for on-site usage, is exported to SCPG.

This is a well-known and high reliable technology for biogas utilization. Furthermore, internal combustion engine generating sets have modular design and are available in many different sizes permitting the installation of power plant step by step as the LFG flow increases. High performance and reliability are guaranteed for the equipment.

The detailed information about the technology of the project is shown in the table below.

Table 2 Key technical parameters of internal combustion engine generating set

Type	Gas-fired Engine and generator
Manufacturer	Jenbacher
Model	J320 GS
Rated Voltage	400 V
Rated capacity	966kW
Lifetime	15 years

Flaring system

The landfill gas would be sent to be burnt in the flare device when the plant totally stopped. An enclosed flare is installed in the project. Meanwhile, the flare will only be involved when the electricity generation system is not in operation, hence, the project developer determined that VCU from flare will not be claimed, even if any methane is destroyed by flare during the crediting period. During the monitoring period, no landfill gas was flared in the project.

During this monitoring period, the project is under normal operation, no special event occurred which may impact the applicability of the methodology, the GHG emission reductions or removals and monitoring. And the project is implemented in accordance with the registered PD. However, during this monitoring period, the actual amount of CH₄ generated from the waste was less than estimated in the registered PD, and thus the generator 3# did not operate. Other generators operated individually or alternately or simultaneously during this monitoring period. During this monitoring period, there were no simultaneous shutdowns of all units. The six units were not overhauled at the same time. Throughout the project, methane collection and use were unaffected by the maintenance of some units.

During this monitoring period, the net electricity export is 28,723.59 MWh. The operation time of the project is 13,200h. The project uses recovered landfill gas to generate electricity with a destruction efficiency of 100 per cent in the working gas generator. The operation time of each generator in this monitoring period is 2,721 h (generator 1#), 3,868 h (generator 2#), 0 h (generator 3#), 9,326 h (generator 4#), 11,032 h (generator 5#), 10,521 h (generator 6#).

During normal operation, the LFG flow can be adjusted according to the demand of the project. Even if all the gas generators are shut down due to an emergency, the landfill will be able to contain the landfill gas. The solenoid valves on the inlet pipework at the front of each gas generator can also be activated automatically. The LFG will be temporarily stored in the landfill and pipework and is not likely to be vented to the atmosphere. The landfill is equipped with gas wells that have the capacity to store the LFG generated. When the facility is shut down in an emergency, the inlet pressure increases, the Roots blower pumps decrease in frequency, and less LFG is extracted from the landfill. This is an interlocking control that ensures that the pressure within the unit remains balanced and accommodates the very small amount of LFG stored in the pipework. So, the landfill gas does not enter the atmosphere, ensuring that all of the landfill gas collected is used to generate electricity and does not escape. For safety, the flare is also installed in the project in case of the unlikely situation where all units shut down and the shutdown persists, though this hasn't occurred during this monitoring period.

There are no changes to the project proponent or other entities involved in the project during this monitoring period.

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation applied during this monitoring period.

3.2.2 Project Description Deviations

There is no project description deviation applied during 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

The parameter of methane generation from the landfill in the absence of the project activity ($BE_{CH_4,SWDS,y}$) is used for ex-ante estimation of relevant parameter $F_{CH_4,PJ,y}$. For $F_{CH_4,PJ,y}$, there is an ex post determination method. Thus, in this monitoring period, $BE_{CH_4,SWDS,y}$ and the relevant basic parameters (ϕ_y , OX, F, DOC_f , MCF_y , k_j , $W_{j,x}$, DOC_j , η_{PJ}) for calculation of $BE_{CH_4,SWDS,y}$ are not included here.

Data / Parameter	OX _{top_layer}
Data unit	-
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	Based on an extensive review of published literature on this subject, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	0.1
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	GWP _{CH₄}
Data unit	tCO ₂ e/tCH ₄
Description	Global warming potential of CH ₄
Source of data	IPCC Fifth Assessment Report (AR5)

Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	Updated according to VCS Standard_v4.7

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	2019 Baseline Emission Factors for Regional Power Grids in China
Value applied	0.8042
Justification of choice of data or description of measurement methods and procedures applied	Official publication data from the Chinese DNA
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	-

Data / Parameter	$EF_{grid,BM,y}$
Data unit	t CO ₂ /MWh
Description	Build margin CO ₂ emission factor in year y
Source of data	2019 Baseline Emission Factors for Regional Power Grids in China
Value applied	0.2135
Justification of choice of data or description of measurement methods and procedures applied	Official publication data from the Chinese DNA
Purpose of Data	Calculation of baseline emissions Calculation of project emissions

Comments	-
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Data / Parameter	$EF_{grid,CM,y}$
Data unit	t CO ₂ /MWh
Description	Combined margin CO ₂ emission factor in year y
Source of data	Calculated following the "Tool to calculate the emission factor for an electricity system"
Value applied	0.50885
Justification of choice of data or description of measurement methods and procedures applied	Calculated following the "Tool to calculate the emission factor for an electricity system"
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	-

Data / Parameter	R_u
Data unit	Pa.m ³ /kmol.K
Description	Universal ideal gases constant
Source of data	Value from "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
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Data unit	kg/kmol
Description	Molecular mass of greenhouse gas i
Source of data	Value from "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	Value from "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"
Value applied	101,325
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	Value from "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	-

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	There is no change in the management of the SWDS after the implementation of the project activity.
Frequency of monitoring/recording	Annually
Value monitored	-
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	Op _{j,h}
Data unit	-
Description	Operation of the electricity generators that consume the LFG
Source of data	Project participants
Description of measurement methods	Products generated.

and procedures to be applied	$Op_{j,h}=0$ when: No products are generated in the hour h. Otherwise, $Op_{j,h} = 1$ The LFG flow meter of the project is installed at the LFG pipe inlet to gas engines, which monitors the total amount of the LFG consumed by all generators. Therefore, the corresponding parameter $Op_{j,h}$ is the working hours of the power plant (the operating time of the entire project), which is determined hourly based on the operation hours of all generators. Each generator's runtime is timed by a built-in programmer within the generator set's control module. For each hour, when the project is operational (i.e., at least one generator is running), the parameter $Op_{j,h} = 1$, indicating that the landfill gas (LFG) is being utilized. If the project is non-working (simultaneous shutdowns of all the 6 units), the parameter $Op_{j,h} = 0$. To ensure the integrity of the monitoring information, the operating time for six generators are listed as well.
Frequency monitoring/recording of	Hourly
Value monitored	01-Jul-2023-31-Dec-2023: 4,416 01-Jan-2024-31-Dec-2024: 8,784 Total: 13,200 In this monitoring period, the operation hours of each generator are as follows: 2,721 h (generator 1#), 3,868 h (generator 2#), 0 h (generator 3#), 9,326 h (generator 4#), 11,032 h (generator 5#), 10,521 h (generator 6#)
Monitoring equipment	The generator set controller continuously monitors and records the operation hours of gas generator by a built-in programmer when receiving voltage and speed signals from the gas generator.
QA/QC procedures to be applied	-
Purpose of the data	Calculation of baseline emissions
Calculation method	-

Comments	During this monitoring period, there are no simultaneous shutdowns of all units. Other than generator 3#, other generators operated individually or alternately or simultaneously during this monitoring period.				
Data / Parameter	EG _{PJ,y}				
Data unit	MWh				
Description	Amount of electricity generated using LFG by the project activity in year y				
Source of data	Electricity meter				
Description of measurement methods and procedures to be applied	Monitor net electricity generation by the project activity using LFG				
Frequency of monitoring/recording	Continuous measurement and monthly recording				
Value monitored	01-Jul-2023-31-Dec-2023: 13,683.95 01-Jan-2024-31-Dec-2024: 15,040.14 Total: 28,724.09				
Monitoring equipment	Bi-directional electricity meters at the transformer substation located at the project site				
	Model	Serial number	Accuracy class	Date of calibration	Validity
	DSSD718 (Main)	001700006603	0.5S	13-Mar-2023	12-Mar-2024
				12-Mar-2024	11-Mar-2025
	DSSD718 (Backup)	001700007636	0.5S	13-Mar-2023	12-Mar-2024
12-Mar-2024				11-Mar-2025	
QA/QC procedures to be applied	Data from the main electricity meter are recorded remotely and digitally by the grid company with the cut-off time of 24:00 o'clock on the last day of every month. The grid company incorporates the downloaded electric data into the monthly Electricity Transaction Notes (ETNs) and sends to the project owner for confirmation on the electricity amount. The project owner confirms the electricity amount on the ETNs with the monthly reading records and keeps the ETNs. When the emergency occurred to the main meter, the measurement result of back-up meter will be used.				

	The meters are calibrated and maintained by the grid company. The calibration of meters, including the frequency of calibration, is done in accordance with national standards or requirements set by the meter supplier or requirements set by the grid operators. The accuracy class of the meters is in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements.
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	$TDL_{k,y}$
Data unit	-
Description	Average technical transmission and distribution losses for providing electricity to source k in year y
Source of data	Default value from methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	Annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years
Value monitored	3%
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	EC _{PJ,y}																							
Data unit	MWh																							
Description	Amount of electricity consumed by the project activity in year y																							
Source of data	Electricity meter																							
Description of measurement methods and procedures to be applied	Sources of consumption include electricity consumed for the operation of the LFG capture system, for any processing and upgrading of the LFG, for transportation of the LFG to the flare or power generators, etc.																							
Frequency of monitoring/recording	Continuous measurement and monthly recording																							
Value monitored	01-Jul-2023-31-Dec-2023: 0.20 01-Jan-2024-31-Dec-2024: 0.30 Total: 0.50																							
Monitoring equipment	Bi-directional electricity meters at the transformer substation located at the project site <table><tr><td>Model</td><td>Serial number</td><td>Accuracy class</td><td>Date of calibration</td><td>Validity</td></tr><tr><td rowspan="2">DSSD718 (Main)</td><td rowspan="2">00170000 6603</td><td rowspan="2">0.5S</td><td>13-Mar-2023</td><td>12-Mar-2024</td></tr><tr><td>12-Mar-2024</td><td>11-Mar-2025</td></tr><tr><td rowspan="2">DSSD718 (Backup)</td><td rowspan="2">00170000 7636</td><td rowspan="2">0.5S</td><td>13-Mar-2023</td><td>12-Mar-2024</td></tr><tr><td>12-Mar-2024</td><td>11-Mar-2025</td></tr></table>					Model	Serial number	Accuracy class	Date of calibration	Validity	DSSD718 (Main)	00170000 6603	0.5S	13-Mar-2023	12-Mar-2024	12-Mar-2024	11-Mar-2025	DSSD718 (Backup)	00170000 7636	0.5S	13-Mar-2023	12-Mar-2024	12-Mar-2024	11-Mar-2025
Model	Serial number	Accuracy class	Date of calibration	Validity																				
DSSD718 (Main)	00170000 6603	0.5S	13-Mar-2023	12-Mar-2024																				
			12-Mar-2024	11-Mar-2025																				
DSSD718 (Backup)	00170000 7636	0.5S	13-Mar-2023	12-Mar-2024																				
			12-Mar-2024	11-Mar-2025																				
QA/QC procedures to be applied	Data from the main electricity meter are recorded remotely and digitally by the grid company with the cut-off time of 24:00 o'clock on the last day of every month. The grid company incorporates the downloaded electric data into the monthly Electricity Transaction Notes (ETN) and sends to the project owner for confirmation on the electricity amount. The project owner confirms the electricity amount on the ETNs with the monthly reading records and keeps the ETNs. When the emergency occurred to the main meter, the measurement result of back-up meter will be used. The meters are calibrated and maintained by the grid company. The calibration of meters, including the frequency of calibration, is done in accordance with national standards or requirements set by the meter supplier or requirements set by the grid operators. The accuracy class of the meters is in accordance with the																							

	stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements.
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 ($PE_{EC,y}$) using the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation".

Data / Parameter	$TDL_{j,y}$
Data unit	-
Description	Average technical transmission and distribution losses for providing electricity to source j in year y
Source of data	Default value from methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	Annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years
Value monitored	20%
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of project 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 from SWDS
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	For application A: Once for the crediting period
Value monitored	0
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	$V_{i,t,wb}$
Data unit	m ³ gas i/m ³ wet gas
Description	Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a wet basis
Source of data	Gas analyzer
Description of measurement methods and procedures to be applied	Continuous in-situ analyzer
Frequency of monitoring/recording	Continuous measurement and hourly recording
Value monitored	40.5% (hourly average for this monitoring period) ¹⁶
Monitoring equipment	Gas analyzer

¹⁶ During this monitoring period, there were 75 hourly records missing caused by the loss of electronic signal due to adverse weather conditions. For those missing data, the most conservative data is "0", and "0" were applied.

	Model	Serial number	Accuracy class	Date of calibration	Validity
	GTR 196	63523/5	2%	20-Jan-2023	19-Jan-2024
				19-Jan-2024	18-Jan-2025
QA/QC procedures to be applied	The calibration includes zero verification with an inert gas (N ₂) and one reading verification with a standard gas (calibration gas). All calibration gases have a certificate provided by the manufacturer and are under their validity period.				
Purpose of the data	Calculation of baseline emissions				
Calculation method	-				
Comments	-				

Data / Parameter	$V_{t,wb}$				
Data unit	m ³ wet gas/h				
Description	Volumetric flow of the gaseous stream in time interval t on a wet basis				
Source of data	Flow meter				
Description of measurement methods and procedures to be applied	Volumetric flow measurement should always refer to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital) are required.				
Frequency of monitoring/recording	Continuous measurement and hourly recording				
Value monitored	1,693.79 (hourly average for this monitoring period at normal conditions) ¹⁷				
Monitoring equipment	Flow meter				
	Model	Serial number	Accuracy class	Date of calibration	Validity
	KZV	19122401	0.5%	06-Dec-2022	05-Dec-2023
				05-Dec-2023	04-Dec-2024
				04-Dec-2024	03-Dec-2025
QA/QC procedures to be applied	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory for all projects				

¹⁷ During this monitoring period, there were 75 hourly records missing caused by the loss of electronic signal due to adverse weather conditions. For those missing data, the most conservative data is "0", and "0" were applied.

	applying large scale methodology(ies). Calibration and frequency of calibration is according to manufacturer’s specifications.				
Purpose of the data	Calculation of baseline emissions				
Calculation method	-				
Comments	For the project, $V_{t,wb}$ is automatically converted to $V_{t,wb,n}$ at normal conditions of 273.15K (0 °C) and 101,325Pa during the monitoring process, therefore, T_t and P_t are not included as separate parameters according to the registered Project Description. The monitoring equipment for T_t and P_t , temperature transducer and pressure transducer with recordable electronic signal, are calibrated periodically according to relevant national standards and regulations.				
	Temperature transducer				
	Model	Serial number	Accuracy class	Date of calibration	Validity
	KZW/P-240E	19120776	0.2	06-Dec-2022	05-Dec-2023
				05-Dec-2023	04-Dec-2024
				04-Dec-2024	03-Dec-2025
	Pressure transducer				
	Model	Serial number	Accuracy class	Date of calibration	Validity
	KZY-KB-P	19120342	0.25	09-Jun-2023	08-Jul-2023
				09-Jul-2023	08-Aug-2023
				09-Aug-2023	08-Sep-2023
				09-Sep-2023	08-Oct-2023
				09-Oct-2023	08-Nov-2023
				09-Nov-2023	08-Dec-2023
				09-Dec-2023	08-Jan-2024
09-Jan-2024				08-Feb-2024	
09-Feb-2024				08-Mar-2024	
09-Mar-2024				08-Apr-2024	
09-Apr-2024				08-May-2024	
09-May-2024				08-Jun-2024	
09-Jun-2024				08-Jul-2024	
09-Jul-2024				08-Aug-2024	
09-Aug-2024	08-Sep-2024				

				09-Sep-2024	08-Oct-2024
				09-Oct-2024	08-Nov-2024
				09-Nov-2024	08-Dec-2024
				09-Dec-2024	08-Jan-2025

Data / Parameter	CAPEX and OPEX
Data unit	CNY
Description	Total investment to implement the project and total cost to operate the project
Source of data	Engineering, procurement and construction contracts; and maintenance contracts
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	At the first issuance request
Value monitored	CAPEX: 61 million OPEX: 11.2 million
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 indicates the investment made: (i) in the collection and flaring system; (ii) in the power plant and connection to the grid.

	The information supplied for OPEX indicates 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
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Data / Parameter	Tariff of electricity exported
Data unit	CNY/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
Value monitored	0.4207
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 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

Operational and Management Structure

The operational and management structure of the project is summarized as below.

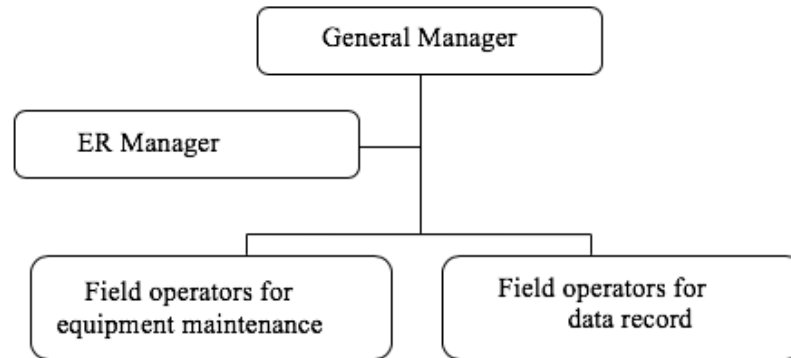


Figure 3 The management flow chart

The general manager of the power plant is the principal of the monitoring task, who sets out the responsibility of everyone in the monitoring system and establishing related documents. The principal should confirm that the staffs in the monitoring system have the ability to deal with the distributive tasks.

An ER Manager is appointed, specifically responsible for meter calibration, training, checking the daily operation, reporting and archiving. The ER Manager reports monthly to the General Manager (GM) about the project performance and monitored data. In the event that non-conformance in the performance to the mentioned procedures and/or functioning problems of the monitoring equipment are identified, the ER manager will inform the GM about the situation and work out relevant measures to be taken.

The ER manager is also responsible for aggregating the monitored data monthly and yearly, archiving and keeping data during the crediting period and two years after.

Field operators take turns to work in the control centre 24 hours a day. They are in charge of data supervision, checking and inspecting the system. If necessary, they will have the responsibility for executing the emergency plan and drafting emergency situation reports.

In addition, all the data will be reviewed by the project developer and VVB.

Monitoring Equipment and Data

The data sets relating to the monitoring parameters outlined in section 4.2. above are monitored and stored for the project. Installation and configuration of meters are shown as Figure 4. In order to ensure measurements with a low degree of uncertainty, the data metering equipment are calibrated and checked by an appropriately qualified third party according to an appropriate national standard. The calibration records are appropriately maintained and made available for review by VVB.

Monitoring equipment and data for the project are as below:

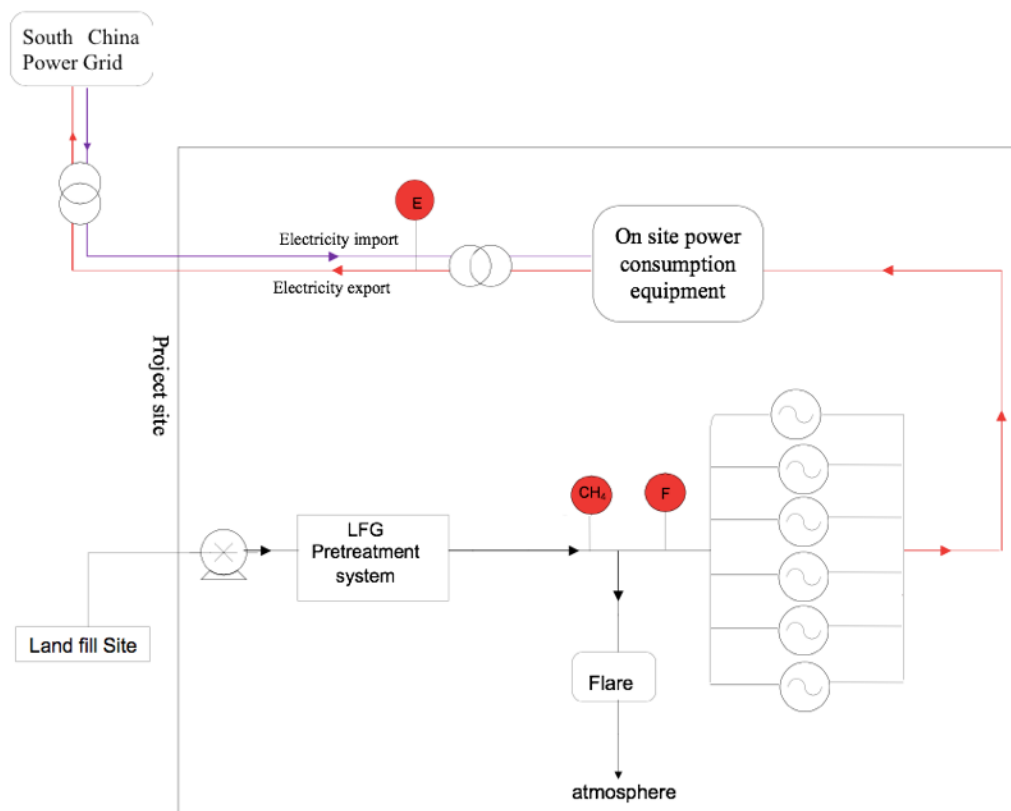


Figure 4 The monitoring flow chart

CH₄ - Gas analyzer to continuously measure methane fraction in LFG

F - Flow meter to continuously measure flow of LFG fed to the Power Plant

E - Bi-directional electricity meters to continuously measure the net electricity exported to SCPG and electricity imported from SCPG (Main meter and Backup meter)

Flow of LFG fed to the Power Plant

The flow meter is installed at the LFG pipe inlet to gas engines to monitor the flow of landfill gas fed to the gas engines. The monitoring frequency should be Continuous. And the data are recorded and electronic archived once per one hour by computer automatically. The field operators check the data every day.

Methane fraction in the landfill gas

Install the Gas analyzer to monitor the concentration of CH₄. The Monitoring frequency should be Continuous. And the data are recorded and electronic archived once per one hour by computer automatically. The field operators check the data every day.

Net electricity exported to the grid

From the diagram above, the bi-directional electricity meters E include one main meter and one backup meter for monitoring the net amount of the electricity exported by project (EG_{PJ,y}).

E is installed by local grid company at the transformer substation located at the project site. E monitors the electricity exported to SCPG (after the voltage is increased in the transformer substation). Data from the main electricity meter are recorded remotely and digitally by the grid company with the cut-off time of 24:00 o'clock on the last day of every month. The grid company incorporates the downloaded electric data into the monthly Electricity Transaction Notes (ETN) and sends to the project owner for confirmation on the electricity amount. The project owner confirms the electricity amount on the ETNs with the monthly reading records and keeps the ETNs. When the emergency occurred to the main meter, the measurement result of back-up meter will be used.

Electricity imported from the grid

E is the bi-directional electricity meter, it could continuously measure the electricity imported from SCPG ($EC_{PJ,y}$) simultaneously, when the power plant is shut down and non-operation.

When the emergency occurred to the main meter, the measurement result of back-up meter will be used.

QA/QC

In order to ensure monitoring plan with high quality, QA/QC measures are carried out in monitoring data recording and checking, equipment calibrating and staff training.

For staffs involved in the project, necessary trainings are provided by the project owner. The training contents should be regard to the general and technical aspects of the project to the extent appropriate, as well as basic understandings of VCS Standard and climate change.

All the monitoring devices used (including flow meters, gas analyzer and electricity meter) are calibrated periodically according to relevant national standards and regulations. Flow meters, electricity meter and other critical project monitoring equipment are subject to regular maintenance and testing according to technical specifications from the manufactures to ensure accuracy and good performance. The calibration of meters, including the frequency of calibration, are done in accordance with national standards or requirements. The accuracy class of the meters are in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements.

According to the Chinese national standard "Technical Management Code for Electricity Metering" (DL/T448-2020), the electricity meters were properly configured and checked by both the project owner and the grid company before the project is in operation.

And the calibration records are kept in the archives by the project owner and be kept at least for 2 years after the end of last the crediting period.

The ER Manager is appointed, specifically responsible for meter calibration, training, checking the daily operation, data recording and archiving. All data collected are recorded and regularly backed up. Internal audits are carried out to check compliance with operational procedures

outlined in this monitoring plan. This internal audits also identify potential possible adjustments for operational procedures to improve monitoring and reporting in future years. The ER Manager reports monthly to the General Manager (GM) about the project performance and monitored data. In the event that non-conformance in the performance to the mentioned procedures and/or functioning problems of the monitoring equipment are identified, the ER manager will inform the GM about the situation and work out relevant measures to be taken. In case such nonconformities are observed:

- An analysis of the nonconformity and its causes will be carried out immediately by the project owner, with the help of external experts if necessary.
- A corrective action plan should then be developed to eliminate the non-conformity and its causes to prevent its recurrence.
- Corrective actions are implemented and reported back to the ER Manager.
- Relative information will be included in the monitoring report and reported to VVB during the verification.

Data Management

- Specific staff are appointed by the project owner to take the overall responsibility for monitoring greenhouse gas emission reductions and keeping all monitored data collected as part of monitoring archived electronically and be kept at least for 2 years after the end of last the crediting period.
- Electronic data and documents are regularly copied and archived via hard disk and CD-ROM and will be kept at least two years after the end of the crediting period.
- Written data and documents, including electricity receipts for cross-checking, are copied and archived and will be kept at least two years after the end of the crediting period.

Procedure in case of failure

If during the data collection, one data exceeds the permissible range, or if an abnormal situation is detected, the ER manager should analyze the reason of the error as soon as possible and take action. The relevant errors and solutions should be archived and stored.

Once a meter (including flow meters, gas analyzer and electricity meter) in fault, it shall be immediately repaired or replaced with another calibrated meter by a professional engineer, and the LFG or electricity generated during the period of erroneous measurement and replacement of the fault meter shall not be accounted for conservative consideration.

If the data record is missing or damaged during the monitoring periods, the following makeup process will be conducted:

- The general principle is that conservative value will be used for the missing or damaged data. This is most conservative approach. The monitoring personnel will be trained before the starting

of the project operation to ensure that each team member is fully aware of and able to strictly follow this conservative principle. During the monitoring process, the monitoring personnel will be required to strictly abide by the above conservative principle in data recording, i.e., use Conservative value for all the missing or damaged data. For example, when there are missing data concerning LFG flow due to sensor failures or power outages, the lowest methane fraction and LFG flow rate, i.e., 0 will be adopted to filling the gap. During this monitoring period, there were 75 hourly records for $V_{i,t,wb}$ (volumetric fraction of greenhouse gas i in the gaseous stream at time t on a wet basis) and $V_{t,wb,n}$ (volumetric flow of the gaseous stream at time t on a wet basis at normal conditions) missing caused by the loss of electronic signal of the flow meter and gas analyzer due to adverse weather conditions. For those missing data, the most conservative data is “0”, and “0” were applied.

-If this is due to the working error of the monitoring personnel, further train the person until he or she can perform the job properly. And in the meantime, use conservative value for the missing or damaged data;

-If this is due to the inability or attitude of a particular worker in monitoring team, dismiss such worker and re-hire those with proper ability and attitude. And in the meantime, use Conservative value for the missing or damaged data;

-If some data recorded are significantly higher than the normal range, the monitoring personnel should ask for the reason. If the measurement is high due to the damage of measurement equipment, Conservative value will be used for that day's data. And need to calibrate and maintain the measuring equipment immediately and avoid this situation in the future.

If the monitoring results are satisfactory in terms of correct reporting, data completeness and correct analysis, the data will be accepted for the monitoring report.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions are calculated as follows:

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

Parameter	Description	01-Jul-2023 to 31-Dec-2023	01-Jan-2024 to 31-Dec-2024	Total	Unit
BE_y	Baseline emissions	87,667	94,332	181,999	tCO ₂ e

BE _{EC,y}	Baseline emissions associated with electricity generation	7,171	7,882	15,053	tCO ₂ e
BE _{CH₄,y}	Baseline emissions of methane from the SWDS	80,496	86,450	166,946	tCO ₂ e

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

Equation (2)

Parameter	Description	01-Jul-2023 to 31-Dec-2023	01-Jan-2024 to 31-Dec-2024	Total	Unit
BE _{EC,y}	Baseline emissions associated with electricity generation	7,171	7,882	15,053	tCO ₂
EC _{BL,k,y}	Quantity of electricity that would be consumed by the baseline electricity consumption source k. In this project, the equivalent electricity is from SCPG.	13,683.95	15,040.14	28,724.09	MWh
EF _{EL,k,y}	Emission factor for electricity generation for source k (tCO ₂ /MWh). In this project, it is EF of SCPG. EF _{EL,k,y} =EF _{grid,CM,y}	0.50885	0.50885	0.50885	tCO ₂ /MWh
TDL _{k,y}	Average technical transmission and distribution losses for providing electricity to source k	3%	3%	3%	/

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

Equation (3)

Parameter	Description	01-Jul-2023 to 31-Dec-2023	01-Jan-2024 to 31-Dec-2024	Total	Unit
BE _{CH₄,y}	Baseline emissions of methane from the SWDS	80,496	86,450	166,946	tCO ₂ e
OX _{top_layer}	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)	0.1	0.1	0.1	/

$F_{CH_4,PJ,y}$	Amount of methane in the LFG which is flared and/or used in the project activity	3,194	3,431	6,625	tCH ₄
$F_{CH_4,BL,y}$	Amount of methane in the LFG that would be flared in the baseline. No requirement in the baseline, therefore, it is 0.	0	0	0	tCH ₄
GWP_{CH_4}	Global warming potential of CH ₄	28	28	28	tCO ₂ e/tCH ₄

$$F_{CH_4,PJ,y} = F_{CH_4,EL,y} \quad \text{Equation (4)}$$

Parameter	Description	01-Jul-2023 to 31-Dec-2023	01-Jan-2024 to 31-Dec-2024	Total	Unit
$F_{CH_4,PJ,y}$	Amount of methane in the LFG which is flared and/or used in the project activity	3,194	3,431	6,625	tCH ₄
$F_{CH_4,EL,y}$	Amount of methane in the LFG which is used for electricity generation	3,194	3,431	6,625	tCH ₄

$$F_{i,t} = V_{t,wb,n} \times v_{i,t,wb} \times \rho_{i,n} \quad \text{Equation (5)}$$

$$\rho_{i,n} = \frac{P_n \times MM_i}{R_u \times T_n} = \frac{101,325 \times 16.04}{8,314 \times 273.15} = 0.7157 \quad \text{Equation (6)}$$

- $F_{i,t}$ = Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h), calculated on an hourly basis
 $V_{t,wb,n}$ = Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions (m³ wet gas/h)
 $v_{i,t,wb}$ = Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a wet basis (m³ gas i/m³ wet gas)
 $\rho_{i,n}$ = Density of greenhouse gas i in the gaseous stream at normal conditions (kg gas i/m³ wet gas i)
 P_n = Absolute pressure at normal conditions (101,325 Pa)
 T_n = Temperature at normal conditions (273.15 K)
 MM_i = Molecular mass of greenhouse gas i (16.04 kg/kmol)
 R_u = Universal ideal gases constant (8,314 Pa.m³/kmol.K)

As per the registered PD, for the project, the mass flow of methane is calculated on an hourly basis for each hour h in year y based on the hourly data of $V_{i,t,wb}$ and $V_{t,wb,n}$, with the unit of kg gas/h and taking into account of Operation of the electricity generators that consume the LFG ($Op_{j,h}$). For each hour, when the project is operational (i.e., at least one generator is running), the parameter $Op_{j,h} = 1$, indicating that the landfill gas (LFG) is being utilized. If the project is non-working (simultaneous shutdowns of all the 6 units), the parameter $Op_{j,h} = 0$. And the hourly values are then summed to a yearly unit basis. During this monitoring period, there were no simultaneous shutdowns of all the 6 units. However, 75 hours of mass flow of methane were “0” because of the missing data of LFG flow caused by the loss of electronic signal of LFG flow during this monitoring period. For details, please refer to the “LFG” tab of the ER Sheet.

5.2 Project Emissions

Project emissions are calculated as follows:

$$PE_y = PE_{EC,y} \quad \text{Equation (7)}$$

Parameter	Description	01-Jul-2023 to 31-Dec-2023	01-Jan-2024 to 31-Dec-2024	Total	Unit
PE_y	Project emissions	1	1	2	tCO ₂
$PE_{EC,y}$	Emissions from consumption of electricity due to the project activity	1	1	2	tCO ₂

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \quad \text{Equation (8)}$$

Parameter	Description	01-Jul-2023 to 31-Dec-2023	01-Jan-2024 to 31-Dec-2024	Total	Unit
$PE_{EC,y}$	Emissions from consumption of electricity due to the project activity	1	1	2	tCO ₂
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source j	0.20	0.30	0.50	MWh
$EF_{EL,j,y}$	Emission factor for electricity generation for source j	0.50885	0.50885	0.50885	tCO ₂ /MWh
$TDL_{j,y}$	Average technical transmission and	20%	20%	20%	/

	distribution losses for providing electricity to source j				
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5.3 Leakage

According to ACM0001, no leakage effects need to be accounted.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{Equation (9)}$$

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-Jul-2023 to 31-Dec-2023	87,667	1	0	87,666	0	87,666
01-Jan-2024 to 31-Dec-2024	94,332	1	0	94,331	0	94,331
Total	181,999	2	0	181,997	0	181,997

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
01-Jul-2023 to 31-Dec-2023	116,858 ¹⁸	87,666	-24.98%	The difference is mainly because the actual amount of CH ₄ generated from the waste was less than estimated for ex-ante ER calculation in the registered PD.
01-Jan-2024 to 31-Dec-2024	231,811	94,331	-59.31%	The difference is mainly because the actual amount of CH ₄ generated from the waste was less than estimated for ex-ante ER calculation in the registered PD.

¹⁸ From 01-Jul-2023 to 31-Dec-2023, there were 184 days. Based on the registered VCS PD, the amount of estimated emission reductions from 01-Jul-2023 to 31-Dec-2023 would be 231,811*184/365 = 116,858 tCO₂e.

Total	348,669	181,997	-47.80%	The difference is mainly because the actual amount of CH ₄ generated from the waste was less than estimated for ex-ante ER calculation in the registered PD.
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APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

Section	Information	Justification
	N/A	

APPENDIX 2: SUPPORTING EVIDENCE

The employee roster as evidence for SDG 8 contribution is as below.

广西睿荣能源科技有限公司在职员工花名册

序号	姓名	二级部门	职位
1	陈	综合部	总经理
2	陈	综合部	行政兼出纳
3	张	财务部	财务
4	莫	生产部	技术员
5	李	生产部	技术员
6	赵	生产部	技术员
7	方	生产部	维修组长
8	李	生产部	技术员
9	莫	生产部	技术员
10	韦	生产部	技术员
11	李	生产部	生产部长
12	韦	生产部	技术员