



VCS VERIFICATION REPORT

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

(VCS PROJECT ID: 2358)



Document Prepared By

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Summary:

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions reported for the project activity "Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project" (VCS Project ID: 2358) for the monitoring period 01/03/2021 to 30/04/2022, to review and determine the monitored reductions in GHG emissions that have occurred as a result of the project activity. These emission reductions are claimed as Verified Carbon Units (VCU) under the Verified Carbon Standard (VCS) version 4.3.

The verification was performed on the basis of VCS Programme Guide version 4.2 and VCS Standard version 4.3 for the VCS projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. The verification was conducted by means of document review, follow-up interviews and site inspections, and the resolution of outstanding issues. The verification team identified 2 CARs, 1 CL or no FAR in this monitoring period.

In CTI's opinion, the GHG emission reductions reported for the project in the monitoring report (version 3.0 dated 04/11/2022) are fairly stated. The GHG emission reductions of the period were calculated correctly on the basis of approved methodology ACM0001 "Flaring or use of landfill gas" (Version 19.0) and the monitoring plan contained in the VCS PD (version 2.0 dated 26/12/2020).

CTI does not assume any responsibility towards the issuance and utilization of the VCUs hereby verified and

certified. Request for issuance of VCU's shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to CTI and the engagement conditions detailed in this report. CTI cannot be held liable by any party for decisions made or not made based on this report.

Hence, CTI is able to certify that the emission reductions from the "Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project" during the period amount to 265,484 tCO₂e.

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1 INTRODUCTION

Climate Bridge (Shanghai) Ltd. has commissioned Shenzhen CTI International Certification Co., Ltd (CTI) to carry out the verification and certification of emission reductions reported for the "Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project" (the project) for the period 01/03/2021 to 30/04/2022. This report contains the findings from the verification and includes a verification statement for the verified carbon units.

1.1 Objective

Verification is the periodic independent review and ex-post determination by an accredited verification body of the monitored reductions in GHG emissions that have occurred as a result of the registered VCS project activity during a defined verification period.

A verification statement is the written assurance by a verification body that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and provide a verification statement of emission reductions reported for the "Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project" for the period 01/03/2021 to 30/04/2022.

1.2 Scope and Criteria

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan;
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement;
- To verify that reported GHG emissions data is sufficiently supported by evidence.

The criteria of the verification are:

- VCS Program Guide (version 4.2) /35/
- VCS Standard (version 4.3) /34/ and other relevant requirements defined by Verra;
- The approved methodology ACM0001 (Version 19.0) /36/ applied by the project;
- All information and references relevant to the project activity's resulting in emission reductions.

The verification shall ensure that reported emission reductions are complete and accurate in order to be verified.

1.3 Level of Assurance

The verification report expresses a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement. CTI applied a materiality threshold of 5% (for projects with $ER \leq 300,000$ tCO₂e per year) with respect to emission or misstatements concerning reported quantities as per VCS standard (i.e. para 3.9.1 and 4.1.8 (4) of VCS Standard, version 4.3).

1.4 Summary Description of the Project

Sectoral Scope and Project Type

According to the VCS Program Guide (version 4.2) /35/ and Annex A of the Kyoto Protocol, the project is applicable under the following activity categories:

- Sectoral Scope: 1. Energy (Renewable/non-renewable); 13. Waste handling and disposal
- Project type: Landfill gas power generation project.

Project Background

Project title:	Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project
Project proponent:	Nanchang Zhonglan Huanneng Technical Service Co. Ltd. (China)
Project location:	Nanchang Maiyuan landfill in Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, P.R China
VCS Project ID:	2358
Applied methodology:	ACM0001 Version 19.0
VCS project crediting period:	01/01/2019 to 31/12/2028 (the 10-year fixed VCS crediting period)
VCU verification period:	01/03/2021 to 30/04/2022

2 VERIFICATION PROCESS

2.1 Method and Criteria

The verification was performed through means of the following three phases in accordance with the requirement of the VCS PD (version 2.0 dated 26/12/2020), the applied methodology, and the VCS Standard (version 4.3) and other relevant VCS requirements:

- A desk review of the monitoring report and all support documents;
- Follow-up interviews with project stakeholders and site inspection;
- The resolution of outstanding issues and the issuance of the verification report and statement.

The following sections outline each step in more detail.

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- The emission reduction calculations and the relevant data records;
- The calibration and maintenance records for the monitoring instruments;
- The management systems to support the project operation and monitoring.

2.2 Document Review

Based on the requirements of competency, experience and qualified sectoral scopes, CTI appointed a verification team in accordance with CTI's internal procedures.

Function	Name	Technical competence	Task Performance*
Team Leader	Du Wenjun	1,4,5,11,12,13	☒ DR ☒ SV ☒ RP ☐ TR
Technical Reviewer	Zhang Lei	1,4,13	☒ DR ☐ SV ☐ RP ☒ TR

*DR=Document review; SV=Site visit; RP=Reporting; TR=Technical review

In addition to the VER/VCU monitoring report /1/, VCS PD (version 2.0 dated 26/12/2020) /12/ and emission reduction calculation spreadsheet /2/, the following documents also were assessed as a part of the verification audit:

- Validation Report version 01.0 dated 27/12/2020 /13/;
- Monitoring Report of 1st VCS monitoring period version 2.0 dated 20/04/2021 /27/;
- Verification Report of 1st VCS monitoring period version 01.0 dated 28/04/2021 /28/;
- Baseline and monitoring methodology ACM0001 applied by the project /36/;
- Relevant decisions, clarifications and guidance from the Verra /34/-/35/; and

- Other information and references relevant to the project activity.

During the desk review, CTI has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures; and

An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

2.3 Interviews

On 03/08/2022 and 04/08/2022, CTI visited Nanchang Zhonglan Huanneng Technical Service Co. Ltd. performed on-site assessment. The key personnel of the project were interviewed or assisted the verification team. Main topics of the interview cover implementation of the project construction, applicability of selected methodology, implementation of project monitoring, emission reduction calculation, etc.

The key personnel interviewed are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Tian Hongye	Plant Manager	Nanchang Zhonglan Huanneng Technical Service Co. Ltd.	Operation of the project activity; Implementation of the monitor plan of the project activity; Data collection and data achievement; Calibration of meters and equipment maintenance;
Mr. Yang Xinshan	Operation Staff		
Ms. Yan Wenyan	Operation Staff		
Mr. Long Yong	Staff	Nanchang Maiyuan landfill Site	Status of Nanchang Maiyuan landfill Site; Management of Nanchang Maiyuan landfill Site.
Mr. Yu Ming	Staff	Jiangxi Environmental Protection Bureau	The impact of the project activity; The complaint by local stakeholders; The stakeholder consultation during the operation of the project activity.
Mr. Yang Baosheng	Villager	Shuangling Village	
Ms. Pan Lanping	Villager/Staff of the project owner	Shuangling Village	
Mr. Pan Honglang	Villager	Shuangling Village	
Ms. Liu Yun	Villager	Shuangling Village	
Ms. Gu Jiayi	Project Manager	Climate Bridge (Shanghai) Ltd.	Data collection and ER calculation.

2.4 Site Inspections

The verification team performed the on-site verification (Nanchang Maiyuan landfill in Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, P.R China) on 03/08/2022 and 04/08/2022. The interviewed personnel and objective are listed in above table. During the on-site assessment, CTI has applied standard auditing techniques to assess the quality of information provided. The following aspects of the project activity have been verified:

- An assessment of the implementation and operation of the registered project activity is as per the VCS PD;
- An assessment of the status and management of the landfill site is as per the VCS PD;
- A review of information flows for generating, aggregating and reporting the monitoring parameters; and
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the VCS PD;
- A cross-check between information provided in the monitoring report and data from other sources such as plant logbooks and electricity sale receipts;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the VCS PD and the selected methodology;
- A review of calculations and assumptions made in determining the GHG data and emission reductions; and
- An identification that quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

The data presented in the monitoring report were assessed by review of the detailed project documentation and production records, as well as by interviews with personnel from the project developer Nanchang Zhonglan Huanneng Technical Service Co. Ltd. and observation of collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results, to verify the correct application of the approved monitoring methodology and the determination of the emission reductions.

In addition, all parameters required by the monitoring methodology ACM0001 (Version 19.0), methodological tool, ie. "Emissions from solid waste disposal sites" (version 08.0); "Tool to calculate the emission factor for an electricity system" (version 07.0); "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0); "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0); and the management system were assessed during the site visit.

2.5 Resolution of Findings

A corrective action request (CAR) shall be raised, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project proponents.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

The verification team identified 2 CARs and 1 CL in this monitoring period.

2.5.1 Forward Action Requests

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

CTI confirmed that there was no FAR identified in validation /13/, and no FAR was raised during this verification.

2.6 Eligibility for Validation Activities

The VCS PD of the project activity was validated by LGAI Technological Center, S.A. (Applus+ Certification) on 27/12/2020 /13/. The proposed monitoring period 01/03/2021 to 30/04/2022 is the 2nd VCS verification, and CTI just undertook verification activities for the project according to the VCS Program Guide under scope 1 and 13. This section is thus not applicable.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The project was validated by LGAI Technological Center, S.A. (Applus+ Certification) on 27/12/2020 for registration of VCS PD (<https://registry.verra.org/app/projectDetail/VCS/2358>). The project does not participate in the other emissions trading program by checking public information on Internet, interviewing with project owner and statement issued by project owner.

Therefore, CTI deemed the project is eligible to participate under the VCS Program as there is no double counting for the emission reduction during any period.

3.2 Methodology Deviations

The validation process /12/ /13/ has assessed all factors and issues that constitute the basis for emission reductions from the project according to the applicable CDM methodology ACM0001 (Version 19.0) /34//36/. There was not any methodology deviation applied to this project. Details refer to section 4.1.

3.3 Project Description Deviations

By checking the registered VCS PD /12/ and site visit interview with project owner, a project description deviation was identified in relation with ex-ante parameter “density of greenhouse gas CH₄ in the gaseous stream at normal conditions ($\rho_{i,n}$)” during this monitoring period.

In the registered VCS PD (version 2.0 dated 26/12/2020) /12/, the value of parameter $\rho_{i,n}$ was 0.71338 kg /m³.

However, parameter $\rho_{i,n}$ was calculated via equation (9) and (10) in "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" and was determined to be $\rho_{i,n} = 101,325\text{Pa} \times 16.04\text{kg/kmol} / (8314\text{Pa} \cdot \text{m}^3 / \text{kmol} \cdot \text{K} \times 273.15\text{K}) = 0.71566 \text{ kg gas i/m}^3 \text{ gas i}$

As explained by PP, the value in the registered VCS PD was a clerical error. CTI confirmed that this deviation will increase the accuracy of emission reductions calculation without affecting the applicability of the methodology, additionality or the appropriateness of the baseline scenario and meet all appropriate rules and requirements of VCS standard.

3.4 Grouped Project

The project was not a grouped project; hence this clause is not applicable.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

Project Implementation in accordance with the registered project design document

The project is a landfill gas recovery and power generation project, which is located in Nanchang Maiyuan landfill in Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, P.R China. The installed capacity of the project activity is 6.402MW, consisting of 6 sets with each capacity of 1.067 MW. The landfill where the project located will process 2,800 tonnes MSW each day. The annual average feed-in electricity is estimated to be 30,788 MWh during the fixed 10 years crediting period. The actual implementation of the project during this verification period was verified in terms of name plate capacities of each gas-fired Engine /

generator and monitoring equipment. The details of gas-fired Engine / generator with respect to installation and capacity have been verified to be consistent with description indicated in the VCS PD. The project activity started construction on 14/12/2018, which has been verified through checking Completion Acceptance Form and Project Settlement Confirmation Form /20/. The gas-fired Engine / generator put into operation on 01/01/2019, which has been verified by site visit interview and checking Validation Report and Verification Report of previous VCS monitoring period /28/, Operation and Maintenance Record /6/. The electricity generated by the project activity was supplied to the Central China Power Grid (CCPG), which can be confirmed by the Power Purchase Agreement (PPA) signed between the project owner and State Grid Jiangxi Electric Power Company /3/. The project start date was identified as 01/01/2019 when the gas-fired Engine / generator started to operate and began generating GHG emission reductions.

The technical parameters have been verified with the nameplates /22/ as below:

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

Via onsite investigation and checking daily operation and maintenance records /6/, the verification team confirmed that:

- all required equipments and procedures are available and implemented in an appropriate manner;
- the project is completely operational and all necessary monitoring instruments are installed;
- all required instruments including standby and operating procedures for the same have been implemented in an appropriate manner;
- neither mistakes nor malfunction on main meters have been observed during this monitoring period.
- the control system at the power plant is automated and assures continuous operation, including monitoring on malfunction of equipment;
- no serious malfunction happened and the plant was under a normal operation as expected in this monitoring period.

Furthermore, on-site training for the related procedures including monitoring, recording and reporting was verified to be in place /5/ and their implementation was confirmed by interview with the key operators and observing the operation.

In conclusion, as part of the site visit, CTI confirms that:

- the monitoring plan contained in the VCS PD (version 2.0 dated 26/12/2020) is in accordance with the approved methodology applied by the project activity, i.e. ACM0001 (Version 19.0);
- the project implementation is in accordance with the VCS PD (version 2.0 dated 26/12/2020) /12/;
- all the monitoring system in operation period is in accordance with the VCS PD (version 2.0 dated 26/12/2020) /12/;
- all physical features of the proposed project activity including data collection systems and storage systems have been implemented in accordance with the VCS PD (version 2.0 dated 26/12/2020) /12/ through visual inspection and document review.

Participation or any rejection under any other GHG programs, any other form of environmental credit or emissions trading program since validation or previous verification

CTI checked public information from the UNFCCC website, REC Mechanism database of China, Chinese Emission Trading System (Chinese ETS), Chinese Certified Emission Reduction Mechanism (CCER), Gold Standard Registry and interviewed with project owner during site visit, it is confirmed that except VCS scheme, the project has not been participated or been rejected under any other GHG programs since validation. Also, CCER mechanism is currently suspended by Chinese government, the project activity will not and is not allowed to registered under CCER mechanism.

Furthermore, as per "Notice on Strengthening Enterprise Greenhouse Gas Emission Report Management" /23/ issued by National Development and Reform Committee of P.R.China, China has a national emissions trading scheme only cover the high-emission industries, including thermal power generation, petrochemical, chemical, building materials, iron and steel, non-ferrous, paper, aviation and other key emission industries that emitted at least 26,000 tons of CO₂e/year. By checking "List of key emissions in the national carbon emissions transaction quota management in 2019-2020" /10/ issued by Ministry of Ecology and Environment of P.R.China, the project owner is not included in the mandatory emission control scheme and thus no emission cap was enforced for the project activity.

Therefore, the verification team confirmed that the project only applies VCUs under VCS, and no rejection from VCS occurs, the project activity not involved on other emissions trading programs, other form of environmental credit or other binding limits. The emission reduction resulted from the project during this monitoring period would only apply for VCUs.

SD contributions resulted by implementation of the project activity

By checking registered VCS PD (version 2.0 dated 26/12/2020) /12/, Staff roster /9/, Samples of Labor Contract /33/, Chinese Fourteenth-Five-Years-Plan 2021 and 17 SDGs defined by UNDP, interviewing with stakeholders during site visit, the verification team confirmed that the project activity would contribute sustainable development in the region and China's Sustainable Development Goals (SDG). The specific sustainable development goals that the project activity could achieve have been listed as follows:

- SDG13 "Take urgent action to combat climate change and its impacts": the project will utilize and destroy landfill gas that would otherwise be released directly into the atmosphere, effectively reducing GHG emissions and air pollution in the surrounding area and decreasing odour nuisance and

minimizing health risks of local residents. Meanwhile, the project activity is able to increase the safety on the landfill through Proper extraction and utilization of the landfill gas, which minimizes the potential for LFG migration on site and reduce the explosion risks of landfill gas. This contributes to achieve one of China's stated sustainable development priorities to achieve carbon balance by the end of 2060 by reducing CO₂ emissions. During this monitoring period, total GHG emission reductions were 265,484 tCO₂e. By checking emission reductions of previous monitoring period through VERRA website, it is confirmed that the cumulative Contributions Over Project Lifetime were 733,155 tCO₂e achieved emission reductions.

- SDG7 "Ensure access to affordable, reliable, sustainable and modern energy for all": the project activity will provide clean and renewable energy source through making use of landfill gas, displacing the power generation of fossil fuel power plants by using renewable energy sources, reducing fossil fuel consumption in CCPG. This contributes to one of the China's actions for promoting sustainable developing through enlarging the scale of clean energy. During this monitoring period, 47,786.244 MWh of renewable electricity was delivered to CCPG. By checking Monitoring Report (version 2.0 dated 20/04/2021) of previous monitoring period from VERRA website, it is confirmed that the cumulative Contributions Over Project Lifetime were 141,475.844 MWh renewable energy supplied to CCPG.

- SDG 8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all": the project activity increases 11 long term employment opportunities (7 for males and 4 for females) for the management, operation and maintenance of the power plant. This contributes to one of the China's actions for promoting sustainable developing through women equality in China.

The verification team confirmed that there is no proposed or actual change to the VCS PD /12/ during this monitoring period. All required equipments and procedures are available and implemented in an appropriate manner. All necessary monitoring instruments are installed. All required instruments including standby and operating procedures for the same have been implemented in an appropriate manner. The project is completely operational and the same has been confirmed on-site. Neither mistakes nor malfunction on main meters have been observed during this monitoring period

4.2 Safeguards

4.2.1 No Net Harm

By checking the EIA summary and conclusion provided in the VCS PD, it is confirmed that the impact caused by LFG power generation on the surrounding ecosystem and residents, water, and atmosphere etc. is very little, there would be no net harm caused due to the project activity. Also, the EIA of the project are approved by the government.

Furthermore, the project activity helps to improve local socio-economic development through creating employment opportunities. No potential environment or social economic matter was found during the site visit. The project is renewable energy project and thus no net harm observed in air or water quality on-site.

4.2.2 Local Stakeholder Consultation

By checking VCS PD /12/, the verification team confirmed that a local stakeholder survey was held on 20/12/2018 by the project owner. The survey was conducted through distributing and collecting responses to a questionnaire. In total 40 out of 40 questionnaires were returned with a 100% response rate. The opinions expressed by the stakeholders were recorded and are available on request. The stakeholder meeting and the survey showed that the project receives no negative comments on its the construction and operation. All such conclusion has been verified through site visit and check registered VCS PD /12/.

Communications with local stakeholders are being carried out at periodic intervals. During this monitoring period, a local stakeholder consultation was conducted by PP in 15/03/2021 and 15/03/2022 through distributing questionnaires /25/. 30 questionnaires were distributed each time and in total 60 questionnaires were distributed, and 57 out of 60 questionnaires were collected. By checking the same, it is confirmed that no negative comments were received. Via interviewing with staff from local environmental protection bureau during the site visit, it is confirmed by the verification team that there were no negative comments or issues from the local stakeholders during this monitoring period.

4.3 AFOLU-Specific Safeguards

For non-AFOLU projects, this section is not required.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The monitoring has been carried out in accordance with the monitoring plan contained in the VCS PD (version 2.0 dated 26/12/2020) /12/. CTI confirms that all parameters stated in the monitoring plan are monitored and reported appropriately. All parameters required to be monitored by the monitoring plan as per the monitoring methodology ACM0001 (Version 19.0) and the management system were assessed during the site visit. The monitoring report lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, recording, calculation and reporting) for these parameters is provided. The information flow for the each parameter is further verified in the following sections.

◆ Parameters monitored

The monitoring has been carried out in accordance with the monitoring plan contained in the VCS PD (version 2.0 dated 26/12/2020) /12/.

The parameter $BE_{CH_4,SWDS,y}$ - methane generation from the landfill in the absence of the project activity, is only used for ex-ante estimation the parameter $F_{CH_4,PJ,y}$. In this monitoring period, the parameter $F_{CH_4,PJ,y}$ was ex post determined through monitoring parameters, which is consistent with the approved methodology ACM0001. Thus, the parameters, including ϕ_y , OX , F , $DOC_{f,y}$, MCF_y , k_j , $W_{j,x}$, DOC_j , η_{PJ} , which determined $BE_{CH_4,SWDS,y}$ and $F_{CH_4,PJ,y}$ ex-ante are not included in this report.

Parameter monitored ex ante

The data in table below has been verified against the data sources and the registered PD.

Parameter title	Description	Data	Unit	Source
OX_{top_layer}	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline	0.1	/	Consistent with how oxidation is accounted for in the methodological tool "Emissions from solid waste disposal sites"
GWP_{CH_4}	Global warming potential of CH_4	28	$tCO_2e/t\ CH_4$	IPCC Fifth Assessment Report (AR5)
NCV_{CH_4}	Net calorific value of methane at reference conditions	0.0504	$TJ/t\ CH_4$	ACM0001 version 19.0
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year y	0.9014	tCO_2/MWh	2017 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA /17/
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y	0.3112	tCO_2/MWh	2017 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA /17/
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor in year y	0.6063	tCO_2/MWh	2017 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA /17/
R_u	Universal ideal gases constant	8,314	$Pa.m^3/kmol.K$	Tool to determine the mass flow of a greenhouse gas in a gaseous stream
MM_i	Molecular mass of greenhouse gas i	16.04	$kg/kmol$	Tool to determine the mass flow of a greenhouse gas in a gaseous stream
P_n	Total pressure at normal conditions	101,325	Pa	Tool to determine the mass flow of a greenhouse gas in a gaseous stream
T_n	Temperature at normal conditions	273.15	K	Tool to determine the mass flow of a greenhouse gas in a gaseous stream
$\rho_{i,n}$	Density of greenhouse gas CH_4 in the gaseous stream at normal conditions	0.71566	$kg\ gas\ i/m^3\ gas\ i$	Calculated via equation (9) and (10) in "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", $\rho_{i,n} = 101,325Pa \times 16.04kg/$

				$\text{kmol}/(8314\text{Pa} \cdot \text{m}^3/\text{kmol} \cdot \text{K} \times 273.15\text{K}) = 0.71566 \text{ kg gas i} / \text{m}^3 \text{ gas i}$
$\text{TDL}_{j,y}$ and $\text{TDL}_{k,y}$	Average technical transmission and distribution losses for providing electricity to source j or k in year y	$\text{TDL}_{j,y}$: 20% $\text{TDL}_{k,y}$: 3%	/	Methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0)

Parameter monitored ex post

The parameters monitored ex post were monitored and determined as per the monitoring plan which is listed as follows:

- **Management of SWDS**

This parameter was monitored annually by the project owner through following up with any changes in the management of Nanchang Maiyuan landfill Site. Through interview with staff from Nanchang Maiyuan landfill Site and by checking the Statement about technical management of Nanchang Maiyuan landfill Site /11/, the verification team confirmed that there was no changes in the management of the SWDS after the implementation of the project activity, which is consistent with that in the VCS PD (version 2.0 dated 26/12/2020) /12/. Furthermore, by checking "Overview of the Development of China's Municipal Solid Waste Treatment Industry in 2012" /31/, it is confirmed that 648 landfill sites in China have been constructed by the end of 2012. However, only 50 of the 648 landfill sites were equipped to utilize and collect or combust landfill gases. by checking "2019 Statistical Yearbook of Urban and Rural Construction" /29/ and "2020 China Biomass Power Generation Industry Development Report" /30/, it is confirmed that up to 2019, there were 1,885 sanitary landfills in cities and counties across China. Only 216 biogas power generation projects were installed and connected to the grid. The coverage is less than 12%.

Through interviewing with Staff from Nanchang Maiyuan landfill Site, checking the Statement about technical management of Nanchang Maiyuan landfill Site, and via on-site inspection, it is confirmed that all monitoring method and frequency meets the description in the VCS PD (version 2.0 dated 26/12/2020) /12/.

- **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 (f_y)**

This parameter is Historic data from SWDS which was followed up by the project owner and was determined **once for the crediting period**.

In the absence of the project, LFG from Nanchang Maiyuan landfill Site is emitted directly into atmosphere. By checking the Statement about technical management of Nanchang Maiyuan landfill Site /11/, the verification team confirmed that 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. The same has been confirmed through interviewing with staff from Nanchang Maiyuan landfill

Site. Therefore, the verification team confirmed the baseline scenario or monitoring plan will not change accordingly.

- **Amount of methane in the LFG which is flared due to a requirement in year y ($F_{CH4, BL, R, y}$)**

As per registered VCS PD, this parameter is calculated via equation: $F_{CH4, BL, y} = \max \{F_{CH4, BL, R, y}; F_{CH4, BL, sys, y}\} = \rho_{reg, y} \times F_{CH4, PJ, y} = 0.2 \times F_{CH4, PJ, y}$

Parameter $\rho_{reg, y}$ is justified in section below. Parameter $F_{CH4, PJ, y}$ is calculated via equation: $F_{CH4, PJ, y} = V_{t, wb} \times v_{i, t, wb} \times \rho_{i, n} \times O_{P, j, h}$. Parameter $\rho_{i, n}$ was determined ex ante and has been justified in “Parameter monitored ex ante” section. Parameter $V_{t, wb}$, $v_{i, t, wb}$ and $O_{P, j, h}$ will be justified in section below. It is confirmed that the value of $F_{CH4, BL, R, y}$ of this monitoring period were:

Monitoring period	Value
01/03/2021~31/12/2021	1,902
01/01/2022~30/04/2022	503
Total	2,405

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

As per registered VCS PD and 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% is assumed.

Currently China has regulations in place to deal with the management of landfills and to encourage utilization of LFG. Those regulations are: “Standard for Pollution Control on the Landfill Site of Municipal Solid Waste” (GB 16889-2008), which became effective in 2008, issued by the Environment Protection Administration and “Technical Code for Municipal Solid Waste Sanitary Landfill” (GB 50869-2013), issued by the Ministry of Construction in 2013. GB16889-2008 and GB50869-2013 stated that landfill gas should be utilized (for gas that can be utilized) or flared (for gas that cannot be utilized).

Although China government encouraged the collection and utilization of LFG from landfill site in the past few years, due to financial and technological difficulties, most of the landfills just release LFG directly into the atmosphere without any recovery and flaring system. By checking Statement about technical management of Nanchang Maiyuan landfill Site /11/, the verification team confirmed that there was no changes in the management of the SWDS after the implementation of the project activity.

Therefore, $\rho_{reg, y} = 20\%$.

- **Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions ($V_{t, wb, n}$)**

During site visit, it is confirmed that this parameter was continuously measured by a flow meter (with accuracy of 0.5) and daily recorded by PP. The monthly value was aggregated manually in Monthly Report /18/, which is in compliance with the registered PD.

Furthermore, It is confirm during site investigation that the readings of temperature transducer and pressure transducer measuring temperature and pressure was monitored automatically and the parameter $V_{t,wb,n}$ have been converted automatically into normal condition (0°C and 101,325Pa) during the monitoring process.

Value of $V_{t,wb,n}$ was sourced from Monthly Report /18/ and has been crosschecked with that in daily monitoring data of LFG Volumetric fraction recorded in Daily Operation Report /32/, which is verified to be consistent. Also, the values have been verified by CTI to be reasonable through comparing with the calculated recovered methane based on the amount of monitored electricity generation via equation (6) of methodology AMS-III.G., Landfill methane recovery. By checking the same, the verification team confirmed that value of $V_{t,wb,n}$ of this monitoring period were:

Monitoring period	Value (m ³ wet gas/h)
01/03/2021~31/12/2021	3,998
01/01/2022~30/04/2022	3,060
Average	3,529

The flow meter will be calibrated annually. Please refer to “Monitoring equipment and calibration” section below of this report for the detailed calibration information. As confirmed with PP during site visit, it is confirmed that Daily Operation Report /32/ and Monthly Report /18/ will be archived two years after the crediting period.

▪ **Volumetric fraction of greenhouse gas CH₄ in a time interval t on a wet basis ($V_{i,t,wb}$)**

During site visit, it is confirmed that this parameter was continuously measured by a gas analyzer (with accuracy of 2%) and and daily recorded by PP. The monthly value was aggregated manually in Monthly Report /18/, which is in compliance with the registered PD.

Data recorded in Monthly Report /18/ has been crosschecked with that in daily monitoring data of LFG Volumetric fraction recorded in Daily Operation Report /32/, which is verified to be consistent. Also, the values have been verified by CTI to be reasonable through comparing with the calculated recovered methane based on the amount of monitored electricity generation via equation (6) of methodology AMS-III.G., Landfill methane recovery. By checking the same, the verification team confirmed that value of $V_{i,t,wb}$ of this monitoring period were:

Monitoring period	Value
01/03/2021~31/12/2021	52.93%
01/01/2022~30/04/2022	47.77%
Average	50.35%

The gas analyzer will be calibrated annually. Please refer to “Monitoring equipment and calibration” section below of this report for the detailed calibration information. As confirmed with PP during site

visit, it is confirmed that Daily Operation Report /32/ and Monthly Report /18/ will be archived two years after the crediting period.

▪ **Operation hours of the equipment that consumes the LFG ($Op_{j,h}$)**

The methane was destructed through using for electricity generation. The project activity was in normal operational condition, while the operation hours of generators were monitored by the project owner. By checking on-line operation system during site visit, the verification team confirmed that the operating hours of each gas engine are automatically monitored and recorded every hour by on-line operation system, which is in compliance with methodology and registered PD. The value of $Op_{j,h}$ is sourced from Monthly Report /18/ which was aggregated manually by the project owner daily.

Data recorded in Monthly Report /18/ has been crosschecked with that in Daily Operation Report /32/, which is verified to be consistent. By checking the same, the verification team confirmed the operational hours of generators in this monitoring period were:

Monitoring period	Value (hr)
01/03/2021~31/12/2021	6,158
01/01/2022~30/04/2022	2,400
Total	8,558

As confirmed with PP during site visit, it is confirmed that Daily Operation Report /32/ and Monthly Report /18/ will be archived two years after the crediting period.

▪ **Amount of electricity generated using LFG by the project activity in year y ($EG_{PJ,y}$)**

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 /18/. 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) /7/.

Value of $EG_{PJ,y}$ was sourced from Monthly Report /18/ issued by the project owner and ETNs /7/ issued by power grid company covering monitoring period. The conservative value between Monthly Report /18/ and ETNs /7/ will be used to calculate emission reductions. By checking the same, the verification team confirmed that the amount of electricity generated using LFG by the project activity in this monitoring period were verified to be:

Monitoring period	Value (MWh)
01/03/2021~31/12/2021	36,702.244
01/01/2022~30/04/2022	11,084.000

Total	47,786.244
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The electricity meter will be calibrated annually. Please refer to “Monitoring equipment and calibration” section below of this report for the detailed calibration information. As confirmed with PP during site visit, it is confirmed that Monthly Report /18/ and ETNs /7/ will be archived two years after the crediting period.

▪ **Amount of electricity consumed by the project activity in year y ($EG_{EC,y}$)**

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 /18/. 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) /8/.

Value of $EG_{EC,y}$ was sourced from Monthly Report /18/ issued by the project owner and ETNs /8/ issued by power grid company covering monitoring period. The conservative value between Monthly Report /18/ and ETNs /7/ will be used to calculate emission reductions. By checking the same, the verification team confirmed that the amount of electricity consumed by the project activity in this monitoring period were verified to be:

Monitoring period	Value (MWh)
01/03/2021~31/12/2021	2.714
01/01/2022~30/04/2022	6.700
Total	9.414

The electricity meter will be calibrated annually. Please refer to “Monitoring equipment and calibration” section below of this report for the detailed calibration information. As confirmed with PP during site visit, it is confirmed that Monthly Report /18/ and ETNs /7/ will be archived two years after the crediting period.

▪ **Total investment to implement the project and total cost to operate the project (CAPEX and OPEX)**

As the project activity applied the simplified procedures to identify the baseline scenario and demonstrate additionality in the registration stage, the monitoring of this parameter is required as per ACM0001. By checking registered VCS PD and ACM 0001, this parameter was monitored at the first issuance request after each phase of the project is fully implemented.

By checking Validation Report /13/ and Verification Report of previous VCS monitoring period /28/, Operation and Maintenance Record /6/ and Completion Acceptance Form and Project Settlement Confirmation Form /20/, as well as checking through site visit, it is confirmed all 6 sets of gas-fired Engine / generators of the project activity put into operation on 01/01/2019 and the project activity

does not involve any other phases, i.e. the project activity was fully implemented since 01/01/2019. Furthermore, by checking Validation Report /13/ and Verification Report of previous monitoring period (the first issuance request) /28/, it is confirmed that this parameter has been justified at the first issuance request after full implementation and and thereby consistent with the registered VCS PD and ACM 0001.

▪ Tariff of the electricity exported

As the project activity applied the simplified procedures to identify the baseline scenario and demonstrate additionality in the registration stage, the monitoring of this parameter is required as per ACM0001. By checking registered VCS PD and ACM 0001, this parameter was monitored at the first issuance request after each phase of the project is fully implemented.

By checking Validation Report and Verification Report of previous VCS monitoring period /28/, Operation and Maintenance Record /6/ and Completion Acceptance Form and Project Settlement Confirmation Form /20/, as well as checking through site visit, it is confirmed all 6 sets of gas-fired Engine / generators of the project activity put into operation on 01/01/2019 and the project activity does not involve any other phases, i.e. the project activity was fully implemented since 01/01/2019. Furthermore, by checking Validation Report /13/ and Verification Report of previous monitoring period (the first issuance request) /28/, it is confirmed that this parameter has been justified at the first issuance request after full implementation and and thereby consistent with the registered VCS PD and ACM 0001.

In conclusion, the monitoring equipment have been installed in accordance with the monitoring plan of VCS PD (version 2.0 dated 26/12/2020). CTI has on-site checked the location of the monitoring equipment against the diagram of monitoring system and found them to be consistent. The data reported in the monitoring report and ERs calculation spreadsheet has been verified by the verification team. Supporting references and data required to determine the parameters for calculating emission reductions are found to be complete and transparent.

Monitoring equipment and calibration

The monitoring equipments /21/ have been calibrated periodically as per the relevant industrial standard by the qualified third party to ensure the monitoring equipments' accuracy and in good conditions. The relevant information of monitoring equipments' calibration /14//15//19//26/ is listed as below.

Monitoring parameter	Monitoring equipment	Serial Number	Model	Accuracy Class	Calibration Date	Validity
EG _{PJ,y} EG _{EC,y}	Electricity meter	363000120180 0010936364	DTZ1296	0.5S	01/02/2021	30/04/2022
					01/02/2022	31/01/2023
V _{i,t,wb}	Gas analyzer	1803020	GFA800-MOH	2%	18/12/2020	17/12/2021
					18/12/2021	17/12/2022

$V_{t,wb,n}$	Flow meter	18081001	RVM- VS14IJJF6 3N2	0.5	18/12/2020	17/12/2021
					18/12/2021	17/12/2022

The electricity meter was calibrated by a qualified third party, Jiangxi Institute of Metrology & Testing. Calibration records and accreditation certificates /14//15/ have been verified by the verification team. The accuracy of meters complies with that in the VCS PD. By checking the industrial metering configuration standard "Technical Administrative Code of Electric Energy Metering (DL/T 448-2016)" /16/, CTI can confirm that the accuracy level of all meters meets the requirement stipulated in this standard. CTI can thus confirm that the accuracy of the meters is in line with the VCS PD and relevant industry standard. In the monitoring plan of the VCS PD, it stated that the meters will be calibrated and checked regularly for accuracy. By checking the calibration reports, CTI found the calibration frequency of these meters is annual, which is in line with the calibrating standard "Technical Administrative Code of Electric Energy Metering (DL/T 448-2016)" /16/. Hence, CTI can confirm that the meters' calibration frequency is in line with the monitoring plan of the VCS PD and relevant industry standard, and the calibrations of meters are verified to be valid for the whole reporting period.

The Gas analyzer was calibrated by a qualified third party, Jiangxi Institute of Metrology & Testing. Calibration records and accreditation certificates /19//15/ have been verified by the verification team. As per the calibration certificate, the zero verification with an inert gas (N_2) and one reading verification with a standard gas (single calibration gas, CH_4) was included. All calibration gases have been certified and were under their validity period. In the monitoring plan of the VCS PD, it stated that the gas analyzer will be calibrated and checked regularly for accuracy. By checking the calibration reports, CTI found the calibration frequency of the gas analyzer is annual, which is in line with the monitoring plan of the VCS PD and the calibrations of meters are verified to be valid for the whole reporting period.

The flow meter was calibrated by a qualified third party, Jiangxi Institute of Metrology & Testing. Calibration records and accreditation certificates /15//26/ have been verified by the verification team. In the monitoring plan of the VCS PD, it stated that these monitoring instruments will be calibrated and checked regularly for accuracy. By checking the calibration reports, CTI found the calibration frequency of the flow meter is annual, which is in line with the monitoring plan of the VCS PD and the calibrations of these monitoring instruments are verified to be valid for the whole reporting period.

Data management and control

The project owner is responsible for operation and routine maintenance of power plant under the project activity. The quality assurance and quality control procedures have been addressed in the VER project management and monitoring manual /4/, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. By interview with the staff and check records /4/-/6/ during on-site visit, it can be confirmed that the monitoring management system is implemented following the project management and monitoring manual.

All monitoring devices have been calibrated and maintained periodically to ensure the accuracy of measurement. Calibration records of instruments used in measurements were made available during

the verification visit and found to be valid for the entire period of the verification. Competence and training records of in-plant personnel engaged in measurement of plant parameters were presented during verification and found to be in order.

CTI confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

◆ Emission reduction calculation

CTI confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

According to the applied methodology, the emission reductions are determined as the difference between the baseline emissions, project emissions and leakage:

$$ER_y = BE_y - PE_y - LE_y$$

Baseline emissions

As per registered VCS PD, baseline reductions are determined as:

$$BE_y = BE_{CH_4,y} + BE_{EC,y}$$

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

As per registered VCS PD, for the project activity,

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

$$F_{CH_4,PJ,y} = F_{CH_4,EL,y}$$

$F_{CH_4,EL,y}$ 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), so that no emission reduction is 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 $F_{CH_4,EL,y} = F_{i,t} \times Op_{j,h,y}$ and the mass flow of greenhouse gas i ($F_{i,t}$) is determined as follows:

$$F_{i,t} = V_{t,wb,n} \times v_{i,t,wb} \times \rho_{i,n}$$

With:

$$\rho_{i,n} = \frac{P_n \times MM_i}{R_u \times T_n}$$

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 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)

As per registered VCS PD, the project activity belongs to case 4 for determining methane captured and destroyed in the baseline defined in section 5.4.1.3 of ACM 0001, i.e. Requirement to destroy methane exists and LFG capture system exists. And as per ACM 0001, 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. In this situation:

$$F_{CH_4, BL, y} = \max \{F_{CH_4, BL, R, y}; F_{CH_4, BL, sys, y}\} = 0.2 \times F_{CH_4, PJ, y}$$

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

The detailed calculation process of $F_{CH_4, PJ, y}$ has been included in the ER calculation spreadsheet and confirmed by the verification team to be correct. The value of $F_{CH_4, PJ, y}$ during this monitoring period are as follows:

Monitoring period		$V_{t,wb,n}$	$v_{i,t,wb}$	$Op_{j,h,y}$	$\rho_{i,n}$	$F_{CH_4, PJ, y}$	$F_{CH_4, BL, y}$
		m ³ wet gas/h	m ³ CH ₄ /m ³ wet gas	h	kg/m ³	t CH ₄	t CH ₄
01/03/2021	31/03/2021	2,268	44.17%	588	0.71566	422	84.4
01/04/2021	30/04/2021	3,721	53.18%	614	0.71566	870	174
01/05/2021	31/05/2021	4,738	54.02%	628	0.71566	1150	230
01/06/2021	30/06/2021	5,077	55.08%	630	0.71566	1261	252.2
01/07/2021	31/07/2021	5,232	57.46%	632	0.71566	1360	272
01/08/2021	31/08/2021	4,418	56.84%	624	0.71566	1121	224.2
01/09/2021	30/09/2021	4,124	56.03%	620	0.71566	1025	205
01/10/2021	31/10/2021	3,500	51.02%	610	0.71566	780	156
01/11/2021	30/11/2021	3,518	51.38%	610	0.71566	789	157.8
01/12/2021	31/12/2021	3,384	50.15%	602	0.71566	731	146.2

Average/Subtotal 2021		3,998	52.93%	6,158	0.71566	9,509	1,902
01/01/2022	31/01/2022	3,310	49.03%	608	0.71566	706	141.2
01/02/2022	28/02/2022	3,072	47.52%	598	0.71566	625	125
01/03/2022	31/03/2022	2,909	47.38%	598	0.71566	590	118
01/04/2022	30/04/2022	2,948	47.15%	596	0.71566	593	118.6
Average/Subtotal 2022		3,060	47.77%	2,400	0.71566	2,514	503
Average/Total		3,529	50.35%	8,558	0.71566	12,023	2,405

The calculation process has been included in the ER calculation spreadsheet and confirmed by the verification team to be correct. The value of parameters in the equation are listed as follows:

Parameter	Description	01/03/2021~ 31/12/2021	01/01/2022~ 30/04/2022	Total
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
$F_{CH_4,PJ,y}$ (tCH ₄)	Amount of methane in the LFG which is flared and/or used in the project activity in year y	9,509	2,514	12,023
$F_{CH_4,BL,y}$ (tCH ₄)	Amount of methane in the LFG which is used for electricity generation in year y	1,902	503	2,405
GWP_{CH_4} (tCO _{2e} /tCH ₄)	Global warming potential of CH ₄	28	28	28
$BE_{CH_4,y}$ (tCO _{2e})	Baseline emissions of methane from the SWDS	186,376	49,274	235,650

▪ **Baseline emissions associated with electricity generation ($BE_{EC,y}$)**

As per registered VCS PD, this parameter is calculated as:

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

The detailed calculation process of $BE_{EC,y}$ has been included in the ER calculation spreadsheet and confirmed by the verification team to be correct. The parameters determining $BE_{EC,y}$ during this monitoring period are as follows:

Parameter	Description	01/03/2021~ 31/12/2021	01/01/2022~ 30/04/2022	Total
$EC_{BL,k,y}$ (MWh)	Quantity of electricity that would be consumed by the baseline electricity consumer k in year y, $EC_{BL,k,y} = EG_{PJ,y}$.	36,702.244	11,084.000	47,786.244
$EF_{EL,k,y}$ (tCO ₂ /MWh)	Emission factor for electricity generation for source k in year y. $EF_{EL,k,y} = EF_{grid,CM,y}$	0.6063	0.6063	0.6063

$TDL_{k,y}$	Average technical transmission and distribution losses for providing electricity to source k in year y	3%	3%	3%
$BE_{EC,y}$ (tCO ₂)	Baseline emissions from electricity consumption in year y	22,920	6,921	29,841

Hence, the corresponding baseline emission reductions are calculated as:

Parameter	Description	01/03/2021~31/12/2021	01/01/2022~30/04/2022	Total
$BE_{CH_4,y}$ (tCO _{2e})	Baseline emissions of methane from the SWDS	186,376	49,274	235,650
$BE_{EC,y}$ (tCO _{2e})	Baseline emissions associated with electricity generation	22,920	6,921	29,841
BE_y (tCO _{2e})	Baseline emissions	209,296	56,195	265,491

Project emissions

As per the registered VCS PD, Project emissions are calculated as follows: $PE_y = PE_{EC,y}$

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

In which

The detailed calculation process of $PE_{EC,y}$ has been included in the ER calculation spreadsheet and confirmed by the verification team to be correct. The parameters determining $PE_{EC,y}$ during this monitoring period are as follows:

Parameter	Description	01/03/2021~31/12/2021	01/01/2022~30/04/2022	Total
$EC_{PJ,j,y}$ (MWh)	Quantity of electricity consumed by the project electricity consumption source j in year y	2.714	6.700	9.414
$EF_{EL,j,y}$ (tCO ₂ /MWh)	Emission factor for electricity generation for source j in year y	0.6063	0.6063	0.6063
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y	20%	20%	20%
$PE_{EC,y}$ (tCO ₂)	Project emissions from electricity consumption in year y	2	5	7

Hence, the corresponding project emissions are calculated as:

Parameter	Description	01/03/2021~ 31/12/2021	01/01/2022~ 30/04/2022	Total
PE _y (tCO ₂)	Project emissions	2	5	7
PE _{EC,y} (tCO ₂)	Project emissions from electricity consumption in year y	2	5	7

Leakages

Leakage does not need to be accounted for this project as per the VCS PD.

Emission reductions

The emission reductions for this monitoring period was calculated as:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/03/2021- 31/12/2021	209,296	2	0	209,294
01/01/2022- 30/04/2022	56,195	5	0	56,190
Total	265,491	7	0	265,484

Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in validated VCS PD

The emission reductions claimed are 265,484 tCO₂e in this monitoring period (i.e. 426 days). Compared with yearly expected emission reductions 239,051 tCO₂e (calculated as 209,723 tCO₂e/365d*306d +192,321 tCO₂e/365d*120d) in the VCS PD, the reported emission reductions in this monitoring period are 11.06% higher than that estimated in the registered VCS PD. The main reason is because GWP_{CH4} is changed from 25 tCO₂e/tCH₄ to 28 tCO₂e/tCH₄. When 25 tCO₂e/tCH₄ is applied, the emission reductions will be 240,236 tCO₂e, 0.5% higher than that estimated in the registered VCS PD.

Therefore, CTI is able to confirm that the emission reductions reported in this monitoring period are reasonable and appropriate. CTI verified the input data for calculating emission reductions and the calculating process, and confirmed the result were complete and transparent.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

All necessary documentations are collected, referenced and aggregated, which is easily accessible in hard-copy or electronic format. Measurements are performed by calibrated equipment, and the key data can also be cross-checked via other sources, such as records, receipts and inventory data. No assumptions are used that have any material influence on reported emission reductions.

CTI concludes that during this monitoring period, the evidences for determination of emission reductions are sufficient and reasonable, and the calculation of emission reductions is reliable.

4.6 Non-Permanence Risk Analysis

The project is not AFOLU project, and thus non-permanence risk analysis is not applicable for the project.

5 VERIFICATION CONCLUSION

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions that have been reported for the project activity "Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project" in China (VCS Project ID: 2358) for the period 01/03/2021 to 30/04/2022.

The verification is based on the baseline and monitoring methodology ACM0001 (Version 19.0), VCS PD (version 2.0 dated 26/12/2020). The verification consisted of the following three phases:

- i) desk review of the project design and the baseline and monitoring plan;
- ii) follow-up interviews with project stakeholders;
- iii) resolution of outstanding issues and the issuance of the final verification and certification report.

The project proponents are responsible for the collection, calculation and determination of the GHG data in accordance with the monitoring plan and the reporting of GHG emission reductions on the basis set out within the project monitoring report.

Our verification approach was based on the requirements as defined under the applicable VCS Standard Version 4.3 and relevant UNFCCC requirements. Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is implemented and operated as per the VCS PD;
- the monitoring plan in VCS PD is as per the applied methodology;

- the monitoring complies with the monitoring plan in the VCS PD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS Standard Version 4.3 and CDM requirements;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

It is CTI's responsibility to provide an independent verification statement on the reported GHG emission reductions for the project. Based on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these, CTI planned and performed our work to obtain the information and explanations that we considered necessary to provide reasonable assurance that reported GHG emission reductions are fairly stated.

CTI does not assume any responsibility towards the issuance and utilization of the VCU's hereby verified and certified. Request for issuance of VCU's shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to CTI and the engagement conditions detailed in this report. CTI cannot be held liable by any party for decisions made or not made based on this report.

In CTI's opinion the GHG emissions reductions of the "Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project" for the period 01/03/2021 to 30/04/2022 are fairly stated in the monitoring report (version 3.0 dated 04/11/2022). The GHG emission reductions were calculated correctly on the basis of the approved methodology ACM0001 (Version 19.0) and the monitoring plan contained in the VCS PD (version 2.0 dated 26/12/2020).

CTI can confirm that the GHG emission reductions are calculated without material misstatements. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, CTI confirms the following statement:

Verification period: From 01/03/2021 to 30/04/2022

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/03/2021-31/12/2021	209,296	2	0	209,294
01/01/2022-30/04/2022	56,195	5	0	56,190
Total	265,491	7	0	265,484

Du wenjun

Mr. Du Wenjun

Team Leader

07/11/2022

Zhang Lei

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Technical Reviewer

07/11/2022

APPENDIX A: ABBREVIATIONS

CAR	Corrective Action Request
CER	Certified Emission Reduction(s)
CL	Clarification request
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
CTI	Shenzhen CTI International Certification Co., Ltd
DOE	Designated Operational Entity
EF	Emission Factor
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
MP	MONITORING REPORT
MR	Monitoring Report
MRRs	Meter Reading Records
CCPG	Central China Power Grid
PD	Project Description
PP	Project Proponent
VCS	Verified Carbon Standard
VCU	Verified Carbon Unit

APPENDIX B: REFERENCES

Documentation used to verify the information provided by the project proponents

- /1/ Climate Bridge (Shanghai) Ltd.: VER/VCU Monitoring Report for Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project, version 1.0 dated 13/07/2022, version 2.0 dated 05/09/2022 and version 3.0 dated 04/11/2022.
- /2/ Climate Bridge (Shanghai) Ltd.: Emission reduction calculation spreadsheet for Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project
- /3/ Nanchang Zhonglan Huanneng Technical Service Co. Ltd. and State Grid Jiangxi Electric Power Company: Power Purchase Agreement for Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project.
- /4/ Nanchang Zhonglan Huanneng Technical Service Co. Ltd.: VER monitoring manual and management procedure.
- /5/ Nanchang Zhonglan Huanneng Technical Service Co. Ltd.: Records of training for on-site staff.
- /6/ Nanchang Zhonglan Huanneng Technical Service Co. Ltd.: Operation and Maintenance Record, from 01/03/2021 to 30/04/2022.
- /7/ Electricity Transaction Notes (ETNs) - amount of electricity generated using LFG by the project activity, from 01/03/2021 to 30/04/2022.
- /8/ Electricity Transaction Notes (ETNs) - Amount of electricity consumed by the project activity in year y, from 01/03/2021 to 30/04/2022.
- /9/ Staff roster provided by the project owner
- /10/ "List of key emissions in the national carbon emissions transaction quota management in 2019-2020" issued by Ministry of Ecology and Environment of P.R.China
- /11/ Nanchang City Administration Bureau: Statement about technical management of Nanchang Maiyuan landfill Site, issued on 24/03/2021.
- /12/ Registered VCS PD version 2.0 dated 26/12/2020.
- /13/ LGAI Technological Center, S.A. (Applus+ Certification): Validation Report version 01.0 dated 27/12/2020
- /14/ Jiangxi Institute of Metrology & Testing: Calibration certificates for electricity meter covering this monitoring period.
- /15/ General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China: Metrological Authorization Certification of Jiangxi Institute of Metrology & Testing, issued on 01/11/2017 valid till 31/10/2022.
- /16/ State Economic and Trade Commission: Technical administrative code of electric energy

- metering (DL/T 448-2016).
- /17/ 2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA
 - /18/ Nanchang Zhonglan Huanneng Technical Service Co. Ltd.: Monthly Report, from 01/03/2021 to 30/04/2022.
 - /19/ Jiangxi Institute of Metrology & Testing.: Calibration certificates of gas analyzer, covering this monitoring period
 - /20/ Completion Acceptance Form and Project Settlement Confirmation Form issued by Nanchang Zhonglan Huanneng Technical Service Co., Ltd and Beijing Zhonglan Environmental Engineering Co., Ltd.
 - /21/ Photos of Monitoring System Display Screen, electricity meter, gas analyzer, flow meter, Temperature transducer and Pressure transducer.
 - /22/ Nanchang Zhonglan Huanneng Technical Service Co. Ltd.: nameplate of the equipment
 - /23/ "Notice on Strengthening Enterprise Greenhouse Gas Emission Report Management" issued by National Development and Reform Committee of P.R.China
 - /24/ Nanchang Zhonglan Huanneng Technical Service Co. Ltd.: Operation Management Manual of the project activity
 - /25/ Nanchang Zhonglan Huanneng Technical Service Co. Ltd.: Questionnaire of local stakeholder survey
 - /26/ Jiangxi Institute of Metrology & Testing.: Calibration certificates of flow meter covering the whole monitoring period.
 - /27/ Climate Bridge (Shanghai) Ltd.: Monitoring Report of 1st VCS monitoring period, version 2.0 dated 20/04/2021
 - /28/ LGAI Technological Center, S.A. (Applus+ Certification): Verification Report of 1st VCS monitoring period, version 01.0 dated 28/04/2021
 - /29/ "2019 Statistical Yearbook of Urban and Rural Construction": <https://www.mohurd.gov.cn/gongkai/fdzdgknr/sjfb/tjxx/jstjnj/index.html>
 - /30/ "2020 China Biomass Power Generation Industry Development Report": <https://www.beipa.org.cn/productinfo/515739.html>
 - /31/ "Overview of the Development of China's Municipal Solid Waste Treatment Industry in 2012": <https://doc.mbalib.com/view/604143e8e7ecadf5b5410f95fee266fc.html>
 - /32/ Daily Operation Report
 - /33/ Samples of Labor contract

Methodologies, tools and other guidance

- /34/ Verified Carbon Standard: VCS Standard, version 4.3.
- /35/ Verified Carbon Standard: VCS Program Guide, version 4.2.
- /35/ Verified Carbon Standard: Registration and Issuance Process, version 4.2.
- /36/ UNFCCC EB: Approved methodology, ACM0001, Version 19.0

APPENDIX C: CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

Table 1: Corrective Action Requests

CAR ID	Corrective Action Request	Response by Project Proponent	Verification Team Assessment
01	Please describe how the project contributes to achieving any nationally stated sustainable development priorities. Furthermore, the Current Project Contributions in section 1.11 of the MR is not correct, please revised accordingly.	Descriptions about how the project contributes to “Chinese Fourteenth-Fives-Years-Plan 2021” were added to section 1.11 of the MR.	The project contributes to achieving China’s nationally stated sustainable development priorities have been supplemented in the updated MR and verified by CTI through checking Chinese Fourteenth-Five-Years-Plan 2021. Also, the Current Project Contributions have been revised and confirmed by CTI to be correct. Therefore, CAR 01 was closed.

CAR ID	Corrective Action Request	Response by Project Proponent	Verification Team Assessment
02	Please describe the on-going stakeholder communication during this monitoring period in section 2.2 of the MR.	Descriptions about the questionnaires collected from stakeholders during this monitoring period were added to section 2.2 of the MR.	The on-going stakeholder communication during this monitoring period has been supplemented in the updated MR and has verified by CTI through checking questionnaires. Therefore, CAR 02 was closed.

Table 2: Clarification Requests

CL ID	Clarification Request	Response by Project Proponent	Verification Team Assessment
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CL ID	Clarification Request	Response by Project Proponent	Verification Team Assessment
01	In the registered VCS PD (version 2.0 dated 26/12/2020) /12/, the value of parameter $\rho_{i,n}$ was 0.71338 kg /m³. However, parameter $\rho_{i,n}$ was calculated via equation (9) and (10) in "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" and was determined to be $\rho_{i,n} = 101,325 \text{ Pa} \times 16.04 \text{ kg/kmol} / (8314 \text{ Pa} \cdot \text{m}^3 / \text{kmol} \cdot \text{K} \times 273.15 \text{ K}) = 0.71566 \text{ kg gas i/m}^3 \text{ gas i}$. Please clarify the value of parameter $\rho_{i,n}$ for calculation of emission reductions.	This is a clerical error in the registered VCS PD. A project deviation has been supplemented in the updated MR and the value of $\rho_{i,n}$ was 0.71566 kg/m³.	As explained by PP, the value in the registered VCS PD was a clerical error. In the updated MR, the value of $\rho_{i,n}$ was revised to 0.71566 kg /m³. CTI confirmed that this deviation will increase the accuracy of emission reductions calculation without affecting the applicability of the methodology, additionality or the appropriateness of the baseline scenario and meet all appropriate rules and requirements of VCS standard. Therefore, CL 01 was closed.

Table 3: Forward Action Requests

FAR ID	Forward Action Request	Response by Project Proponent	Verification Team Assessment
NA	NA	NA	NA