



**Verified Carbon
Standard**

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



Document Prepared By LGAI Technological Center, S.A. (Applus+
Certification)

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Summary:

LGAI Technological Center, S.A. (hereafter referred to as “Applus+ Certification”) has been commissioned by Climate Bridge (Shanghai) Ltd. to perform the verification of greenhouse gas emission reductions of the project activity “Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project” (VCS Ref. No. 2358, hereafter referred to as “the project activity”) reported in the monitoring report /1/ during monitoring period 01/01/2019 to 28/02/2021.

The project activity has been validated by Applus+ Certification based on the VCS PD /3/ version 2.0 dated 26/12/2020 and reported in the validation report A+SH_SYST_VCS_VAL_VER_8120 /4/, version 01.0, completed on 27/12/2020 which is available at <https://registry.verra.org/app/projectDetail/VCS/2358>.

The project activity is a landfill gas recovery and power generation project located at Maiyuan Landfill Site, Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, P. R. China, of which the main purpose is to use landfill gas for electricity generation. The total installed capacity of the project activity is 6.402 MW consisting of 6 set of 1.067 MW generators. The project uses LFG from Maiyuan MSW landfill for power generation. During the 10 years fixed crediting period, the power generated by the project is expected to be 307,882 MWh which will be exported to the grid. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants of Central China Power Grid (CCPG). Meanwhile by utilization the landfill gas recovered by project, the project activity avoids the emission of methane that would be generated under landfill condition. It's estimated that the project activity could achieve GHG emission reductions of 1,556,985 tCO₂e during the whole crediting period.

The purpose and scope of this verification is to ensure that reported emission reductions are complete and accurate in accordance with applicable VCS standards and relevant UNFCCC requirements in order to be certified. A desk review and a site visit have been conducted to verify the data submitted in the monitoring report /1/. Applus+ Certification confirms the following has been reviewed:

- Monitoring plan included in the registered VCS PD /3/, version 2.0, dated 26/12/2020;

- Validation report No. A+SH_SYST_VCS_VAL_VER_8120 /4/, version 01.0, completed on 27/12/2020 by Applus+ Certification;
- Approved methodology, ACM0001 /9/, version 19.0, dated 14/06/2019;
- VCS standards and guidance version 4.1, as well as relevant UNFCCC requirements;
- All information and references relevant to the project activity's resulting in emission reductions.

During this verification, no finding was identified related to the monitoring, implementation or operations of the project activity in relation to relevant VCS standards, guidance and UNFCCC requirements and relevant host party criteria and the applied baseline and monitoring methodology etc.

Applus+ Certification confirms that the project is implemented in accordance with the registered PD /3/. The monitoring plan complies with the applied methodology ACM0001 /7/ version 19.0 and the monitoring has been carried out in accordance with the monitoring plan in the registered PD /3/. The monitoring system is in place and the emission reductions are calculated without material misstatements. The level of assurance of the verification is reasonable. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information reviewed and evaluated Applus+ Certification confirms that the implementation of the project has resulted in 467,671 tCO₂e emission reductions during period 01/01/2019 to 28/02/2021.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center, S.A. (Applus+ Certification) has been commissioned by Climate Bridge (Shanghai) Ltd. to perform the verification of greenhouse gas emission reductions of the project activity “Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project” (VCS Ref. No. 2358) reported in the Monitoring Report /1/ during monitoring period 01/01/2019 to 28/02/2021.

LGAI Technological Center, S.A. (Applus+ Certification) as the verification body of the project activity has been accredited as a DOE by UNFCCC and also meets the competence requirements as set out in ISO 14065:2007.

The objective of verification is to have an independent review and ex post determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registration of VCS project. Certification is the written assurance by the DOE that, during a specific time period, a proposed VCS project activity achieved the reductions in anthropogenic emissions by sources of GHGs as verified.

The objective of this verification/certification is to verify and certify emission reductions, reported for the “Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project” in China for the period 01/01/2019 to 28/02/2021.

1.2 Scope and Criteria

The verification scope is defined as an independent and objective review of the registered PD, the Project’s baseline study and Monitoring Report (MR) and other relevant documents. The information in these documents is reviewed against VCS Version 4.1 requirements, UNFCCC rules and associated interpretations.

The verification is not meant to provide any consulting towards the client. However, stated requests for forward actions and/or corrective actions may provide input for improvement of the Project monitoring towards reductions in the GHG emissions.

1.3 Level of Assurance

The verification report is based on the VCS-PD, the VCS Monitoring Report (MR), supporting evidences made available to the verifier and information collected through performing interviews and during the on-site assessment.

The verification conclusion is assured a reasonable level of assurance.

1.4 Summary Description of the Project

Project title	Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project
VCS reference number	2358
Project Participants	Nanchang Zhonglan Huanneng Technical Service Co. Ltd. (Project Owner, host country, P. R. China)
Location of the project	Maiyuan Landfill Site, Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, People's Republic of China Geographic coordinates: longitude of 115°46' 49" E and latitude of 28° 44' 06" N
Project start date	Construction start date: 14/12/2018 Operation start date: 01/01/2019
Version of PD	Version 2.0, dated 26/12/2020 (VCS PD and basis for verification)
Monitoring period	01/01/2019 to 28/02/2021
First monitoring report	Version 1.0, dated 05/04/2021
Final monitoring report	Version 2.0, dated 20/04/2021
Applied Methodology/Version	ACM0001, version 19.0, dated 14/06/2019
Scope/Technical Area	1/1.1 13/13.1

The project activity is a landfill gas recovery and power generation project located at Maiyuan Landfill Site, Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, P. R. China, of which the main purpose is to use landfill gas for electricity generation. The total installed capacity of the project activity is 6.402 MW consisting of 6 set of 1.067 MW generators. The project uses LFG from Maiyuan MSW landfill for power generation. During the 10 years fixed crediting period, the power generated by the project is expected to be 307,882 MWh which will be exported to the grid. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants of Central China Power Grid (CCPG). Meanwhile by utilization the landfill gas recovered by project, the project activity avoids the emission of methane that would be generated under landfill condition. It's estimated that the project activity could achieve GHG emission reductions of 1,556,985 tCO₂e during the whole crediting period.

The project activity has been validated by Applus+ Certification based on the VCS PD version 2.0 dated 26/12/2020 and reported in the validation report A+SH_SYST_VCS_VAL_VER_8120, version 01.0, completed on 27/12/2020 which is available at <https://registry.terra.org/app/projectDetail/VCS/2358>.

2 VERIFICATION PROCESS

2.1 Method and Criteria

Verification was conducted using Applus+ Certification's procedures in line with the requirements specified in the VCS Standard version 4.1, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant UNFCCC requirements and applying standard auditing techniques.

Applus+ Certification completed a strategic review and risk assessment of the projects activities and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage if relevant;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;
- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the monitoring report.

Applus+ Certification verified the implementation of the monitoring plan and the data presented in the Monitoring Report /1/ for the period in question. This involved a site visit and a desk review of the Monitoring Report. This Verification Report describes the findings of this assessment.

The information of the assessment team is included in below:

Assessment team

According to the sectoral scopes / technical area and experiences in the sectoral or national business environment, Applus+ Certification has composed a project assessment team in accordance with the appointment rules in Applus+ Certification. The composition of assessment team has to be approved by the Applus+ Certification ensuring that the required skills are covered by the team. The four qualification levels for team members that are assigned by formal appointment rules as below:

- Leader Auditor (LA)
- Auditor (A)/ Auditor Trainee (AiT)

- Technical Reviewer (TR)
- Technical Experts (TE)

Name	Qualification	Coverage of scope	Coverage of Technical Area	Host country experience
<i>Denny Xue</i>	<i>LA/TE</i>	<i>Y (1.1/13.1)</i>	<i>Y</i>	<i>Y</i>
<i>Simon Shen</i>	<i>TR</i>	<i>Y (1.1/13.1)</i>	<i>Y</i>	<i>Y</i>

Denny Xue (Master Degree in Environmental Engineering, Bachelor Degree in Thermal Engineering) is a lead auditor appointed by Applus+ Certification for the GHG project assessment. He is based on Shanghai. He has 1.5 years of work experiences in CDM project development. Before he joined Applus+ Certification, he has been worked for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development.

Simon Shen (Master Degree in Thermal Energy Engineering, Bachelor Degree in Environmental Engineering) is a Lead Auditor appointed by Applus+ Certification for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ Certification, he had been worked for TÜV SÜD as a GHG Validator/Assessment team and ISO 9001/14001 Lead Auditor for 3.5 years.

2.2 Document Review

The VCS monitoring report /1/ version 1.0 dated 05/04/2021, version 2.0 dated 20/04/2021 and the emission reduction calculations spreadsheet /2/, were assessed as part of the verification. In addition, the registered PD /3/ version 2.0 dated 26/12/2020 in particular the baseline estimations and the monitoring plan and the validation report /4/ version 01.0 dated 27/12/2020, as well as relevant documents, were reviewed. A detailed documents reviewed are listed in Annex 1 of the report.

2.3 Interviews

The key personnel interviewed are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Zeng Zhihao	Chief	Nanchang Zhonglan Huanneng Technical Service Co. Ltd.	Operation of the project activity; Implementation of the monitor plan of the project activity;
Mr. Liu Huanwen	Manager	Nanchang Zhonglan Huanneng Technical Service Co. Ltd.	Data collection and data achievement; Calibration of meters and equipment maintenance.
Mr. Lin Keming	Project Manager	Climate Bridge (Shanghai) Ltd.	Data collection and ER calculation.

2.4 Site Inspections

The assessment team performed the on-site verification (Maiyuan Landfill Site, Shuangling village, Jiaoqiao town, Nanchang Economic and Technological Development Zone, Nanchang city, Jiangxi province, People's Republic of China) on 19-20/04/2021. The interviewed personnel and objective are listed in above table.

2.5 Resolution of Findings

As an outcome of the verification process, the team can raise different types of findings.

Where a non-conformance arises the assessment team shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

The assessment team shall raise a Clarification Request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

All CARs and CLs raised during verification shall be resolved prior to submitting a request for issuance.

There is no CARs and CLs raised for this monitoring period for the project.

2.5.1 Forward Action Requests

None FAR was raised during the verification process. Also there are no remaining from former verification and validation.

2.6 Eligibility for Validation Activities

Not applicable as LGAI Technological Center, S.A. holds the accreditation for the validation and verification for projects under scope 1 and 13.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

Through reviewing the registered PD /3/ and validation report /4/, it was validated that the project has been registered as a VCS project with reference No. 2358 which is available at <https://registry.terra.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.

During the period from 01/01/2019 to 31/12/2028 as the fixed VCS crediting period, the project would claim only for VCU.

Therefore, Applus+ Certification consider 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

Not applicable as not deviation for methodology.

3.3 Project Description Deviations

Not applicable as not deviation for project description.

3.4 Grouped Project

Not applicable as not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

By means of on-site visit, the assessment team confirms that all physical features of the proposed VCS project activity proposed in the registered VCS PD /3/ are in place and the PP has operated the project as per registered VCS PD /3/. The installed capacity of the project activity is 6.402 MW, consisting of 6 set of 1.067 MW generators. The landfill will process 2,800 tons of MSW each day. The electricity generated is transmitted to the local Jiangxi Power Grid via a newly built transformer station, which was then exported to the CCPG. The average annual power generated by the project is expected to be 307,882 MWh and will be exported to the grid. The construction of the project started on 14/12/2018, the project started operation on 01/01/2019 verified by checking operation log and site visit. There are no changes on the key equipment and technology since the validation of the project. No special event which would affect the monitoring of the project has been observed during the monitoring period.

The project activity would contribute sustainable development in the region in following aspects confirmed by site visit:

- (a) Reduce air pollution. The project will utilize and destroy landfill gas that would otherwise be released directly into the atmosphere, effectively reducing air pollution and improving the environment around landfills;
- (b) Improve the operational safety of the landfills. The project reduces the potential safety hazards of landfill gas explosion by recycling landfill gas and improves the safety of landfill operations;
- (c) The construction and operation of the project will provide new local jobs and increase tax revenue, which will have a positive effect on the local economy.

The technical parameters have been verified with the nameplates /9 / as below:

Main Equipment	Parameter	Value
Generator	Type	JGS 320GS-L.L
	Quantity	6
	Rated capacity	1.067 MW
	Rated power factor	1
	Rated frequency	50 HZ
	Rated Voltage	400 V

	Rated current	1,540 A
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By comparing the actual ER claimed in this monitoring period with the estimate in the registered PD, the actual emission reductions (467,671 tCO₂e) are lower than what is stated in the registered PD (i.e. 472,136 tCO₂e, based on the estimated value of ER indicated in the registered PD) which surely will not lead to the overestimation of VERs.

The assessment team confirmed that there is no proposed or actual change to the project design 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 registered 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.

Also, no potential environment or social economic matter was found during the site visit. The project is LFG power generation project and thus no net harm observed in air or water quality on-site.

4.2.2 Local Stakeholder Consultation

The local stakeholder's meeting was held around project site on 20/12/2018. 40 participants attended the meeting including local residents, builders and members of the local authorities. The project owner introduced the proposed project, and then a survey was arranged through a one-page questionnaire, which was designed to be easily filled in. The opinions expressed by the stakeholders were recorded and are available on request.

The stakeholder meeting and the survey showed that the proposed project receives strong support from the local community. They all believe the proposed project will promote local economic development and agree with the project development and construction.

Communications with Local stakeholders was being carried out at periodic intervals. There are no negative comments received for the project.

All such conclusion has been verified through site visit and check registered PD.

4.3 AFOLU-Specific Safeguards

Not applicable as non-AFOLU project.

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 registered PD /3/.

Data / Parameter:	Management of SWDS
Data unit:	/
Description:	Management of SWDS
Purpose of the data:	Calculation of baseline emissions
Parameter value:	/
Source of data used:	Original design of the landfill
Information flow:	Not applicable
Monitoring method, frequency and equipments:	This parameter was monitored annually by the project owner through following up with any changes in the management of Maiyuan landfill site. Through interview with staff from Maiyuan Landfill site and by checking the Statement of Management Technical /24/, the assessment 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 registered PD and MR.
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Monitoring method was verified by site visit, checking Statement of Management Technical /24/, all monitoring method meets the description in the PD.

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

Purpose of the data:	Calculation of baseline emissions
Parameter value:	0
Source of data used:	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 was confirmed by checking historic data on the amount captured from FSR /20/.
Information flow:	Not applicable
Monitoring method, frequency and equipments:	historic data on the amount captured from FSR /20/ was checked to confirm the value of 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
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking historic data on the amount captured from FSR. All data is in line with historic data on the amount captured from FSR; Monitoring method was verified by site visit, checking historic data on the amount captured from FSR, all monitoring method meets the description in the PD.

Data / Parameter:	$F_{CH4,BL,R,y}$
Data unit:	tCH ₄ /yr
Description:	Amount of methane in the LFG which is flared due to a requirement in year y
Purpose of the data:	Calculation of baseline emissions
Parameter value:	4,678
Source of data used:	This parameter was calculated by Fraction of LFG that is required to be flared due to a requirement in year y ($P_{reg,y}$) and Amount of methane in the LFG which is flared and/or used in the project activity in year y ($F_{CH4,PJ,y}$) as below: $F_{CH4,BL,R,y} = P_{reg,y} * F_{CH4,PJ,y}$ For the monitoring of Fraction of LFG that is required to be flared due to a requirement in year y ($P_{reg,y}$), please refer to below of the report.

	For Amount of methane in the LFG which is flared and/or used in the project activity in year y ($F_{CH_4,PJ,y}$), it is calculated by Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions ($V_{t,wb,n}$), Volumetric fraction of greenhouse gas CH_4 in a time interval t on a wet basis ($V_{i,t,wb}$) and Operation of the electricity generators that consume the LFG ($O_{PJ,h}$). For the monitoring of all these 3 monitoring parameters, please refer to the below of the report.
Information flow:	Not applicable
Monitoring method, frequency and equipments:	This parameter was calculated by Fraction of LFG that is required to be flared due to a requirement in year y ($P_{reg,y}$) and Amount of methane in the LFG which is flared and/or used in the project activity in year y ($F_{CH_4,PJ,y}$) as below: $F_{CH_4,BL,R,y} = P_{reg,y} * F_{CH_4,PJ,y}$ For the monitoring of Fraction of LFG that is required to be flared due to a requirement in year y ($P_{reg,y}$), please refer to below of the report. For Amount of methane in the LFG which is flared and/or used in the project activity in year y ($F_{CH_4,PJ,y}$), it is calculated by Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions ($V_{t,wb,n}$), Volumetric fraction of greenhouse gas CH_4 in a time interval t on a wet basis ($V_{i,t,wb}$) and Operation of the electricity generators that consume the LFG ($O_{PJ,h}$). For the monitoring of all these 3 monitoring parameters, please refer to the below of the report.
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Not applicable

Data / Parameter:	$P_{reg,y}$
Data unit:	Dimensionless
Description:	Operation of the electricity generators that consume the LFG
Purpose of the data:	Calculation of baseline emissions
Parameter value:	20%

Source of data used:	According to the methodology ACM0001 (version 19.0), If the requirement does not specify any amount or percentage of LFG that should be destroyed, but requires the installation of a system to capture and flare the LFG, then a typical destruction rate of 20 per cent is assumed
Information flow:	Not applicable
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking ACM0001. All data is in line with ACM0001.

Data / Parameter:	$V_{t,wb,n}$
Data unit:	m ³ wet gas/h
Description:	Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions
Purpose of the data:	Calculation of baseline emissions
Parameter value:	3,663.62 (average)
Source of data used:	Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions are all sourced from Monthly Report /10/ issued by the project owner.
Information flow:	1 flow meter installed at project site was measured continuously, recorded hourly and archived electronically. Moreover, the value will be converted automatically into standard value $V_{t,wb,n}$ (at the normal condition of 0°C and 101,325 Pa). At 24:00 hr of last day of each month, the monitoring system will automatically calculate the average value of $V_{t,wb,n}$ of each month and the staff from project owner read the average value and fill out Monthly Report. The data for Monthly Report have been sent to the CDM consulting company for reporting of GHG emission reduction.

Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded hourly by 1 flow meter installed at project site. See below for the information of 1 flow meter verified by site visit and checking calibration certificates /12/: <table><tr><th>Equipment</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr><tr><td>Flow meter</td><td>RVM-VS14IIF63N2</td><td>18081001</td><td>0.5</td></tr></table> The type, serial number and accuracy have been confirmed by site visit.	Equipment	Type	Serial Number	Accuracy	Flow meter	RVM-VS14IIF63N2	18081001	0.5		
Equipment	Type	Serial Number	Accuracy								
Flow meter	RVM-VS14IIF63N2	18081001	0.5								
Calibration:	The calibration information are shown as below /12/: <table><tr><th>Equipment</th><th>Calibration date</th><th>Valid until</th></tr><tr><td rowspan="3">Flow meter</td><td>18/12/2018</td><td>17/12/2019</td></tr><tr><td>18/12/2019</td><td>17/12/2020</td></tr><tr><td>18/12/2020</td><td>17/12/2021</td></tr></table> The calibration was conducted by accredited third parties which are Jiangxi Institute of Metrology&Testing /13/ which was accredited by State Administration for Market Regulation.	Equipment	Calibration date	Valid until	Flow meter	18/12/2018	17/12/2019	18/12/2019	17/12/2020	18/12/2020	17/12/2021
Equipment	Calibration date	Valid until									
Flow meter	18/12/2018	17/12/2019									
	18/12/2019	17/12/2020									
	18/12/2020	17/12/2021									
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.										
Means of verification:	Data of the parameter was verified by checking Monthly Report. All data is in line with Monthly Report; Information flow was verified by checking Monthly Report, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD; Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.										

Data / Parameter:	$V_{i,t,wb}$
Data unit:	m^3 gas CH_4/m^3 wet gas
Description:	Volumetric fraction of greenhouse gas CH_4 in a time interval t on a wet basis
Purpose of the data:	Calculation of baseline emissions
Parameter value:	56.23% (average)
Source of data used:	Volumetric fraction of greenhouse gas CH_4 in a time interval t on a wet basis are all sourced from Monthly Report /10/ issued by the project owner.

Information flow:	1 gas analyser installed at project site was measured continuously and archived electronically. At 24:00 hr of last day of each month, the monitoring system will automatically calculate the average value of $V_{i,t,wb}$ of each month and the staff from project owner read the average value and fill out Monthly Report. The data for Monthly Report have been sent to the CDM consulting company for reporting of GHG emission reduction.													
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded hourly by 1 gas analyser installed at project site. See below for the information of 1 gas analyser verified by site visit and checking calibration certificates /12/:													
	<table><tr><th>Equipment</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr><tr><td>Gas analyser</td><td>GFA800-MOH</td><td>1803020</td><td>2%</td></tr></table>				Equipment	Type	Serial Number	Accuracy	Gas analyser	GFA800-MOH	1803020	2%		
	Equipment	Type	Serial Number	Accuracy										
Gas analyser	GFA800-MOH	1803020	2%											
The type, serial number and accuracy have been confirmed by site visit.														
Calibration:	The calibration information are shown as below /12/:													
	<table><tr><th>Equipment</th><th>Calibration date</th><th>Valid until</th></tr><tr><td rowspan="3">Gas analyser</td><td>18/12/2018</td><td>17/12/2019</td></tr><tr><td>18/12/2019</td><td>17/12/2020</td></tr><tr><td>18/12/2020</td><td>17/12/2021</td></tr></table>				Equipment	Calibration date	Valid until	Gas analyser	18/12/2018	17/12/2019	18/12/2019	17/12/2020	18/12/2020	17/12/2021
	Equipment	Calibration date	Valid until											
	Gas analyser	18/12/2018	17/12/2019											
18/12/2019		17/12/2020												
18/12/2020		17/12/2021												
The calibration was conducted by accredited third parties which are Jiangxi Institute of Metrology&Testing /13/ which was accredited by State Administration for Market Regulation.														
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.													
Means of verification:	Data of the parameter was verified by checking Monthly Report. All data is in line with Monthly Report; Information flow was verified by checking Monthly Report, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD; Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.													

Data / Parameter:	$O_{pj,h}$
Data unit:	/

Description:	Operation of the equipment that consumes the LFG
Purpose of the data:	Calculation of baseline emissions
Parameter value:	15,758
Source of data used:	Operation of the equipment that consumes the LFG are all sourced from Monthly Report /10/ issued by the project owner.
Information flow:	The monitoring system will be used to determine the status of Operation of the equipment that consumes the LFG and recorded in the Monthly Report /10/.
Monitoring method, frequency and equipments:	For each equipment unit j using the LFG monitor that the plant is operating in hour h by the monitoring any one or more of the following three parameters: (a) Temperature. Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the burning equipment. Document and justify the location and minimum threshold in the PD; (b) Flame. Flame detection system is used to ensure that the equipment is in operation; (c) Products generated. Monitor the generation of steam for the case of boilers and air-heaters and glass for the case of glass melting furnaces. This option is not applicable to brick kilns. $O_{pj,h} = 0$ when: (a) One of more temperature measurements are missing or below the minimum threshold in hour h (instantaneous measurements are made at least every minute); (b) Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); (c) No products are generated in the hour h. Otherwise, $O_{pj,h} = 1$
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking Monthly Report. All data is in line with Monthly Report; Information flow was verified by checking Monthly Report, and all information are consistent;

	Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD.
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Data / Parameter:	EC _{PJ,y}														
Data unit:	MWh														
Description:	Amount of electricity generated using LFG by the project activity in year y														
Purpose of the data:	Calculation of baseline emissions														
Parameter value:	93,689.600														
Source of data used:	Amount of electricity generated using LFG by the project activity in year y are all sourced from Monthly Report /10/ issued by the project owner, ETNs /11/ issued by power grid company covering monitoring period.														
Information flow:	1 bidirectional electricity meter installed at project site was measured continuously, recorded monthly and archived electronically. At 24:00 hr of last day of each month, the staff from project owner will record 1 electricity meters' readings and fill out Monthly Report. The staff from power grid company will record the meter readings of meter then transcribes the data into Electricity Transaction Notes (ETNs), then after the confirmation of the project owner for the ETNs, the project owner will issue the invoice as sales receipts. The data for Monthly Report and ETNs have been sent to the CDM consulting company for reporting of GHG emission reduction. The conservative one would be used for ER calculation.														
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 1 bidirectional electricity meter installed at project site. See below for the information of 1 bidirectional electricity meter verified by site visit and checking calibration certificates /12/: <table><tr><th>Meter</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr><tr><td>Electricity Meter (old)</td><td>DTZ1296</td><td>3630001201500051161809</td><td>0.5s</td></tr><tr><td>Electricity Meter (new)</td><td>DTZ1296</td><td>3630001201800010936364</td><td>0.5s</td></tr></table> The type, serial number and accuracy have been confirmed by site visit. The electricity meter (old) was replaced by Electricity Meter (new) on 09/02/2021 confirmed by checking meter change record /21/.			Meter	Type	Serial Number	Accuracy	Electricity Meter (old)	DTZ1296	3630001201500051161809	0.5s	Electricity Meter (new)	DTZ1296	3630001201800010936364	0.5s
Meter	Type	Serial Number	Accuracy												
Electricity Meter (old)	DTZ1296	3630001201500051161809	0.5s												
Electricity Meter (new)	DTZ1296	3630001201800010936364	0.5s												

Calibration:	The calibration information are shown as below /12/:		
	Meter	Calibration date	Valid until
	Electricity Meter (old)	21/12/2018	20/12/2019
		21/12/2019	20/12/2020
		21/12/2020	20/12/2021
	Electricity Meter (new)	01/02/2021	31/01/2022
The calibration was conducted by accredited third parties which are Jiangxi Institute of Metrology&Testing /13/ which was accredited by State Administration for Market Regulation.			
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.		
Means of verification:	Data of the parameter was verified by checking Monthly Report and ETNs. All data is in line with Monthly Report and ETNs; Information flow was verified by checking Monthly Report and ETNs, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD; Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.		

Data / Parameter:	EG _{EC,y}
Data unit:	MWh
Description:	Amount of electricity consumed by the project activity in year y
Purpose of the data:	Calculation of project emissions
Parameter value:	34.700
Source of data used:	Amount of electricity consumed by the project activity in year y are all sourced from Monthly Report /10/ issued by the project owner, ETNs /11/ issued by power grid company covering monitoring period.
Information flow:	1 bidirectional electricity meter installed at project site was measured continuously, recorded monthly and archived electronically. At 24:00 hr of last day of each month, the staff from project owner will record 1 electricity meters' readings and fill out Monthly Report. The staff from power grid company will record the meter readings of meter then transcribes the data

	into Electricity Transaction Notes (ETNs), then after the confirmation of the project owner for the ETNs, the power grid company will issue the invoice as sales receipts. The data for Monthly Report and ETNs have been sent to the CDM consulting company for reporting of GHG emission reduction. The conservative one would be used for ER calculation.													
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 1 bidirectional electricity meter installed at project site. See below for the information of 1 bidirectional electricity meter verified by site visit and checking calibration certificates /12/: <table><tr><th>Meter</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr><tr><td>Electricity Meter (old)</td><td>DTZ1296</td><td>3630001201500051161809</td><td>0.5s</td></tr><tr><td>Electricity Meter (new)</td><td>DTZ1296</td><td>3630001201800010936364</td><td>0.5s</td></tr></table> The type, serial number and accuracy have been confirmed by site visit. The electricity meter (old) was replaced by Electricity Meter (new) on 09/02/2021 confirmed by checking meter change record /21/.	Meter	Type	Serial Number	Accuracy	Electricity Meter (old)	DTZ1296	3630001201500051161809	0.5s	Electricity Meter (new)	DTZ1296	3630001201800010936364	0.5s	
Meter	Type	Serial Number	Accuracy											
Electricity Meter (old)	DTZ1296	3630001201500051161809	0.5s											
Electricity Meter (new)	DTZ1296	3630001201800010936364	0.5s											
Calibration:	The calibration information are shown as below /12/: <table><tr><th>Meter</th><th>Calibration date</th><th>Valid until</th></tr><tr><td rowspan="3">Electricity Meter (old)</td><td>21/12/2018</td><td>20/12/2019</td></tr><tr><td>21/12/2019</td><td>20/12/2020</td></tr><tr><td>21/12/2020</td><td>20/12/2021</td></tr><tr><td>Electricity Meter (new)</td><td>01/02/2021</td><td>31/01/2022</td></tr></table> The calibration was conducted by accredited third parties which are Jiangxi Institute of Metrology&Testing /13/ which was accredited by State Administration for Market Regulation.	Meter	Calibration date	Valid until	Electricity Meter (old)	21/12/2018	20/12/2019	21/12/2019	20/12/2020	21/12/2020	20/12/2021	Electricity Meter (new)	01/02/2021	31/01/2022
Meter	Calibration date	Valid until												
Electricity Meter (old)	21/12/2018	20/12/2019												
	21/12/2019	20/12/2020												
	21/12/2020	20/12/2021												
Electricity Meter (new)	01/02/2021	31/01/2022												
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.													
Means of verification:	Data of the parameter was verified by checking Monthly Report and ETNs. All data is in line with Monthly Report and ETNs; Information flow was verified by checking Monthly Report and ETNs, and all information are consistent;													

	Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD; Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.
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Data / Parameter:	CAPEX and OPEX
Data unit:	Currency (RMB)
Description:	Total investment to implement the project and total cost to operate the project
Purpose of the data:	Not applicable
Parameter value:	CAPEX: 62,969,370.54 OPEX: 10,360,000.00
Source of data used:	CAPEX is sourced from completion acceptance form /22/ issued by the construction company. OPEX is sourced from Statement for the operation cost /25/.
Information flow:	Not applicable
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking completion acceptance form and statement for the operation cost. All data is in line with completion acceptance form and statement for the operation cost.

Data / Parameter:	Tariff of electricity exported
Data unit:	RMB/kWh
Description:	Tariff of the electricity exported
Purpose of the data:	Not applicable
Parameter value:	0.58 (including VAT)

Source of data used:	Tariff of electricity exported is sourced from Tariff approval /23/
Information flow:	Not applicable
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking Tariff approval. All data is in line with Tariff approval.

Parameters available at validation stage:

Below data has been verified against the data sources and the PD, for the rest of parameters are not used in the calculation of ER in this monitoring period.

Parameter title	Description	Data	Source
OX _{top_layer}	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline	0.1	Emissions from solid waste disposal sites (version 08.0) /16/
GWP _{CH4}	Global warming potential of CH ₄	25 ¹	IPCC /14/
NCV _{CH4}	Net calorific value of methane at reference conditions	0.0504	Technical literature /19/
EF _{grid,OM,y}	Operating margin CO ₂ emission factor in year y	0.9014	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA /15/

¹ According to VCS Standard Version 4.1, the GWP for CH₄ after 2021 should be 28, however for conservativeness reason, 25 was used in this verification process.

$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y	0.3112	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA /15/
$EF_{grid,CM,y}$	Combined margin emission factor for the grid in year y	0.6063	2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA /15/
R_u	Universal ideal gases constant	8,314	Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0) /17/
MM_i	Molecular mass of greenhouse gas CH ₄	16.04	Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0) /17/
P_n	Total pressure at normal conditions	101,325	Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0) /17/
T_n	Temperature at normal conditions	273.15	Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0) /17/
$\rho_{i,n}$	Density of greenhouse gas CH ₄ in the gaseous stream at normal conditions	0.71388	Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0) /17/
$TDL_{j,y}$ and $TDL_{k,y}$	Average technical transmission and distribution losses for providing electricity to source j, k in year y	3 and 20	Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0) /18/

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PD /3/ version 2.0 dated 26/12/2020.

As a result of verification of the ER calculation process, the assessment team confirmed that all the parameters required for the determination of the emission reductions have been included in the MR Report and ER Calculation Spreadsheet /2/ and are consistent with the applied methodology ACM0001 version 19.0 and the monitoring plan contained in the registered PD. The parameters are complete in this monitoring period.

After verifying the reported figures with the raw data sources, it's confirmed that the values of the parameters from the raw data sources are consistent with those quoted in the ER Calculation Spreadsheet and the MR Report. The verification process for the same has been clearly described above in section 4.4 of the report.

4.6 Non-Permanence Risk Analysis

Not applicable as a renewable project.

5 VERIFICATION CONCLUSION

Applus+ Certification has been commissioned by Climate Bridge (Shanghai) Ltd. to perform the verification of greenhouse gas emission reductions of the project activity “Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project” (VCS Ref. No. 2358).

The management of Nanchang Zhonglan Huanneng Technical Service Co. Ltd. is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project’s Monitoring Plan in the registered PD /3/, version 2.0 dated 26/12/2020.

Our verification approach was based on the requirements as defined under the applicable VCS standards 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 registered PD;
- the monitoring plan in registered PD is as per the applied methodology;
- the monitoring complies with the monitoring plan in the registered PD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS 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.

In our opinion, the GHG emission reductions for “Nanchang Zhonglan Huanneng Technical Service Co. Ltd. Maiyuan LFG Power Generation Project” during the monitoring period 01/01/2019 to 28/02/2021 as reported in Monitoring Report, prepared on the basis of the project’s Monitoring Plan are fairly stated. Based on the information we have seen and evaluated, we confirm the following statement:

Verification period: From 01/01/2019 to 28/02/2021 (divided into 3 vintage periods). Verified GHG emission reductions or removals in the above reporting 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)
2019	217,188	11	0	217,177
2020	216,513	14	0	216,499
2021	33,996	1	0	33,995
Total	467,697	26	0	467,671

APPENDIX 1: REFERENCE LIST

1. Monitoring report, Version 1.0, dated 05/04/2021; version 2.0, dated 20/04/2021
2. ER calculation spreadsheet
3. Registered VCS PD, version 2.0, dated 26/12/2020
4. Validation report, No. A+SH_SYST_VCS_VAL_VER_8120, version 01.0, completed by Applus+ Certification
5. VCS standard version 4.1, dated on 22/04/2021
6. Statement issued by project owner
7. Approved methodology ACM0001, version 19.0, dated 14/06/2019
8. CDM Monitoring procedure
9. Nameplate of the equipment
10. Monthly Record covering the monitoring period
11. ETNs covering the monitoring period
12. Calibration certificates of flow meters and gas analyser covering the whole monitoring period issued by Jiangxi Institute of Metrology&Testing

Calibration certificates of electricity meter covering the whole monitoring period issued by Jiangxi Institute of Metrology&Testing
13. Accreditation certificates for Jiangxi Institute of Metrology&Testing issued by State Administration for Market Regulation
14. IPCC

- 15 2017 Baseline Emission Factors for Regional Power Grids in China dated 20/12/2018 published by China DNA
- 16 Emissions from solid waste disposal sites (version 08.0)
- 17 Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0)
- 18 Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0)
- 19 Technical literature
- 20 FSR
- 21 Meter Change Record
- 22 Completion acceptance form
- 23 Tariff approval
- 24 Statement of Management Technical
- 25 Statement for the operation cost