LIANZHOU LANDFILL GAS POWER GENERATION PROJECT

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

Project Title	*Lianzhou Landfill Gas Power Generation Project*
Version	*01.0*
Report ID	*A+SH_SYST_VCS_VAL_VER_12622*

Report Title	*Lianzhou Landfill Gas Power Generation Project*
Client	*Goldchina Consultancy International Co., Ltd*
Pages	*31*
Date of Issue	*01/08/2023*
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Summary:

LGAI Technological Center, S.A. (hereafter referred to as "Applus+ Certification") has been commissioned by Goldchina Consultancy International Co., Ltd to perform the verification of greenhouse gas emission reductions of the project activity "Lianzhou Landfill Gas Power Generation Project" (VCS Ref. No. 3940, hereafter referred to as "the project activity") reported in the monitoring report /1/ during monitoring period 01/06/2021 to 30/04/2023.

The project activity has been validated by Applus+ Certification based on the VCS PD /3/ version 04 dated 30/03/2023 and reported in the validation report No. A+SH_SYST_VCS_VAL_12622 /4/, version 01.0, completed on 30/03/2023 which is available at https://registry.verra.org/app/projectDetail/VCS/3940.

The project activity is a landfill gas recovery and power generation project located at Jiupo Town, Lianzhou City, Qingyuan City, Guangdong 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 3 MW consisting of 6 sets of 500 kW generators. The project uses LFG from Lianzhou MSW landfill for power generation. During the first 7 years renewable crediting period, the power generated by the project is expected to be 109,379 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 China Southern Power Grid (CSPG). 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 577,253 tCO_2e during the 1st renewable 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 04 dated 30/03/2023;
- Validation report No. A+SH_SYST_VCS_VAL_12622 /4/ version 01.0, dated 30/03/2023;
- ACM0001: Flaring or use of landfill gas, version 19.0 /7/

- VCS standards version 4.4 and guidance version 4.3, 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 registered PD. 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 132,655 tCO_2e emission reductions during period 01/06/2021 to 30/04/2023.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center, S.A. (Applus+ Certification) has been commissioned by Goldchina Consultancy International Co., Ltd to perform the verification of greenhouse gas emission reductions of the project activity "Lianzhou Landfill Gas Power Generation Project" (VCS Ref. No. 3940) reported in the Monitoring Report /1/ during monitoring period 01/06/2021 to 30/04/2023.

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 14065:2020.

The objective of verification is to have an independent review and ex post determination by a Validation and Verification Body (VVB) 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 VVB 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 "Lianzhou Landfill Gas Power Generation Project" in China for the period 01/06/2021 to 30/04/2023.

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 4.4 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, 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	Lianzhou Landfill Gas Power Generation Project
VCS reference number	3940
Project Participants	Lianzhou Dongkang Renewable Energy Technology Co., Ltd. (Project Owner, host country, P. R. China)
Location of the project	Jiupo Town, Lianzhou City, Qingyuan City, Guangdong Province, P. R. China. Geographic coordinates: longitude of 112°20′09.20″ E and latitude of 24°44′27.74″ N
Project start date	Construction start date: 02/06/2020 Operation start date: 01/06/2021
Version of PD	VCS PD Version 04, dated 30/03/2023
Monitoring period	01/06/2021 to 30/04/2023
First monitoring report	Version 2, dated 30/06/2023
Final monitoring report	Version 3, dated 31/07/2023
Applied Methodology/Version	ACM0001, version 19.0
Scope/Technical Area	1/1.1 and 13/13.1 Scope 01: energy industries (renewable-/non-renewable sources) and sectoral scope 13: Waste handling and disposal

The project activity is a landfill gas recovery and power generation project located at Jiupo Town, Lianzhou City, Qingyuan City, Guangdong 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 3 MW consisting of 6 sets of 500 kW generators. The project uses LFG from Lianzhou MSW landfill for power generation. During the first 7 years renewable crediting period, the power generated by the project is expected to be 109,379 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 China Southern Power Grid (CSPG). 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 577,253 tCO_2e during the 1st renewable crediting period.

The project activity has been validated by Applus+ Certification based on the VCS PD /3/ version 04 dated 30/03/2023 and reported in the validation report No. A+SH_SYST_VCS_VAL_12622 /4/, version 01.0, completed on 30/03/2023 which is available at https://registry.verra.org/app/projectDetail/VCS/3940.

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 4.4, 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
Doris Dai	LA/TE	Y (1.1 and 13.1)	Y	Y
Simon Shen	TR	Y (1.1 and 13.1)	Y	Y

Doris Dai (Master's Degree in Environmental Sciences, Bachelor's Degree in Environmental Technology) is an Auditor appointed by Applus+ LGAI for the GHG project assessment and auditing. She has more than 6 years of work experience in CDM/VCS project assessment. Before she joined Applus+ LGAI, she has been working for CTI Certification as senior GHG Auditor for 3.5 years.

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 2 dated 30/06/2023, version 3 dated 31/07/2023 and the emission reduction calculations spreadsheet /2/, were assessed as part of the verification. In addition, the VCS PD /3/ version 04 dated 30/03/2023 in particular the baseline estimations and the monitoring plan, the VCS Validation Report /4/ dated 30/03/2023, as well as relevant documents, were reviewed. A detailed document reviewed are listed in Appendix 1 of the report.

2.3 Interviews

A physical site visit interview was made by the assessment team on 21-22/07/2023, The key personnel interviewed through the sit visit are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Ms. Lu Yongjiao	Operation Director	Lianzhou Dongkang Renewable Energy Technology 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. Zhao Keqiang	Operator	Lianzhou Dongkang Renewable Energy Technology Co., Ltd.	
Mr. Sun Zhiyong	Villager	Jiupo Town	
Mr. Zhao Guojing	Villager	Jiupo Town	
Dr. Zheng Zhaoning	Project Manager	Goldchina Consultancy International Co., Ltd	Data collection and ER calculation.
Mr. Li Wenbin	Project Manager	Goldchina Consultancy International Co., Ltd	

2.4 Site Visits

The assessment team performed the on-site verification (Jiupo Town, Lianzhou City, Qingyuan City, Guangdong Province, P. R. China) on 21-22/07/2023. The interviewed personnel including the role and organization and objective are listed in above table in the section 2.3, please refer to above for details.

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:

a) 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;

b) Modifications to the implementation, operation and monitoring of the project activity has not been sufficiently documented by the project participants;

c) 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 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. 3940 which is available at https://registry.verra.org/app/projectDetail/VCS/3940. The project does not participate in other emissions trading program by checking public information on Internet, interviewing with project owner and statement issued by project owner.

During the period from 01/06/2021 to 31/05/2028 as the VCS crediting period, the project would claim only for VCUs.

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 no deviation for methodology.

3.3 Project Description Deviations

A deviation regarding to the specific information of used electricity meters have been raised. In the original PDD, the information for E2 was not correctly presented as a clerical error and now has been revised in the monitoring report.

The assessment team confirm that the deviation has no impact for the monitoring of the project activity.

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 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 project activity consists of a LFG collection system, a LFG transmission system, a LFG pre-treatment system, an electricity generation system and a grid connection system. The installed capacity of the project is 3 MW, involves the installation of 6 gas generators with a unit capacity of 500 kW. The electricity generated is transmitted to the local Power Grid via a newly built transformer station, which was then exported to the CSPG. The project activity was expected to supply 15,625 MWh (average value) of electricity to the grid annually. The construction of the project started on 02/06/2020, the project has been put into operation on 01/06/2021 verified by checking information on the VCS website 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.

By checking online information and interview with the project owner, it is confirmed that the project was only registered under VCS and won't apply for any carbon credits or environmental credits under any other scheme.

The project has not received or sought any other form of environmental credit or has become eligible to do so since validation or previous verification.

The GHG emission reductions or removals generated by the project have not become included in an emissions trading program or any other mechanism that includes GHG allowance trading.

The project would contribute to sustainable development in as below:

Landfill safety

If methane concentration in the air is in the range of 5-15% in volume within the confined space of a building, the risk of explosion is very high. With the project, a modern gas extraction system has been installed to ensure the effective collection of LFG, and also minimize the risk of landfill explosions.

Odour reduction

Odour from landfill negatively impacts on residents around the landfill. Implementation of the project will reduce odour through LFG collection and will thus mitigate the impact of landfill odour on people's daily lives.

Energy potential

The project makes use of LFG to generate electricity, which will supplement the energy supply of Lianzhou City.

Provide employment

The project was designed and technically supported by experts. Temporary job opportunities were created during the construction period and 12 permanent jobs during the operation time.

Moreover by checking public information, staff roaster of project /16/ and site visit, following information has been confirmed:

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	The project has prevented the release of 132,655 tonnes of CO_2e into the atmosphere during this monitoring period	Prevented the release of 132,655 tonnes CO_2e into the atmosphere during this monitoring period
2	8.5	Total number of job opportunities	Implemented activities to increase	The project creates 12 long-term employment opportunities	The project creates 12 long-term employment opportunities
3	7.2	MWh of renewable energy generated	Implemented activities to increase	During this monitoring period, 17,914.020 MWh of renewable electricity was delivered to CSPG	From the operation start date of the project to the end of this monitoring period, 17,914.020 MWh of renewable electricity was delivered to CSPG

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

Type	Gas-fired Engine and generator	
Manufacture	Shandong Chaji New Energy Technology Co., Ltd	Jinan Qi Neng Power Equipment Co., Ltd
Model	600GF-NK	600QF-NK
Units	2	3
Rated Voltage	400 V	400 V

Rated capacity	600 kW	600 kW
Lifetime	20 years	20 years

By comparing the actual ER claimed in this monitoring period with the estimate in the registered PD, the actual emission reductions (132,655 tCO_2e) are 1.53% higher than what is stated in the registered PD (i.e. 130,659 tCO_2e). The assessment team consider this variation is acceptable as normal variation.

Therefore, the assessment team confirmed the ER in this monitoring period is not overestimated.

The assessment team confirmed that there is no proposed or actual change to the project design during this monitoring period.

The assessment team confirmed the correction of audit history indicated in the PD through checking information on VERRA website and related documents.

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 renewable energy project and thus no net harm observed in air or water quality on-site.

4.2.2 Local Stakeholder Consultation

A survey was carried out through the information publication, distributing and collecting responses to questionnaires targeting on 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 VCS PD /3/. All parameters were monitored and determined as per the monitoring plan which is listed in below table:

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 Lianzhou MSW landfill site. Through interview with staff from Lianzhou MSW landfill site and by checking the Statement of status of landfill /17/, 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 status of landfill /17/, 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:	1,222.92
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 ($F_{CH4,PJ,y}$), it is calculated by Volumetric flow of the gaseous stream in time interval t on a dry basis ($V_{t,db}$), Volumetric fraction of greenhouse gas I in a time interval t on dry basis ($V_{i,t,db}$) 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 ($F_{CH4,PJ,y}$) 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 ($F_{CH4,PJ,y}$), it is calculated by Volumetric flow of the gaseous stream in time interval t on a dry basis ($V_{t,db}$), Volumetric fraction of greenhouse gas I in a time interval t on dry basis ($V_{i,t,db}$) 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:	$V_{t,db}$
Data unit:	m^3 dry gas/h
Description:	Volumetric flow of the gaseous stream in time interval t on a dry basis
Purpose of the data:	Calculation of baseline emissions
Parameter value:	974.66 (average)
Source of data used:	Volumetric flow of the gaseous stream in time interval t on a dry basis are all sourced from Monthly Report /10/ issued by the project owner.

<table>
<tr><td>Information flow:</td><td>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 $V_{t,db}$ (at the normal condition of 0℃ and 101,325 Pa). At 24:00 hr of last day of each month, the monitoring system will automatically calculate the average value of $V_{t,db}$ 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.</td></tr>
<tr><td>Monitoring method, frequency and equipments:</td><td>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>LUGB-2/2/200/Z/DV/E/N(SZ)</td><td>V20016010004</td><td>1.5%</td></tr>
</table>
The type, serial number and accuracy have been confirmed by site visit.</td></tr>
<tr><td>Calibration:</td><td>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="2">Flow meter</td><td>27/05/2021</td><td>26/05/2022</td></tr>
<tr><td>26/05/2022</td><td>25/05/2023</td></tr>
</table>
The calibration was conducted by accredited third parties which are Shenzhen Zhongdian Metrology and Testing Technology Co., Ltd /13/ which was accredited by China National Accreditation Service for Conformity Assessment (CNAS).</td></tr>
<tr><td>QA/QC procedure:</td><td>Data record will be archived for a period of 2 years after the crediting period to which the records pertain.</td></tr>
<tr><td>Means of verification:</td><td>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.</td></tr>
</table>

<table>
<tr><td>Data / Parameter:</td><td>$V_{i,t,db}$</td></tr>
<tr><td>Data unit:</td><td>m^3 dry gas/h</td></tr>
<tr><td>Description:</td><td>Volumetric fraction of greenhouse gas I in a time interval t on dry basis</td></tr>
<tr><td>Purpose of the data:</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Parameter value:</td><td>52.17 (average)</td></tr>
<tr><td>Source of data used:</td><td>Volumetric fraction of greenhouse gas I in a time interval t on dry basis are all sourced from Monthly Report /10/ issued by the project owner.</td></tr>
<tr><td>Information flow:</td><td>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 $V_{i,t,db}$ 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.</td></tr>
<tr><td>Monitoring method, frequency and equipments:</td><td>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>SGA-501-CH4</td><td>201114001</td><td>5%</td></tr>
</table>
The type, serial number and accuracy have been confirmed by site visit.</td></tr>
<tr><td>Calibration:</td><td>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="2">Gas analyser</td><td>27/05/2021</td><td>26/05/2022</td></tr>
<tr><td>26/05/2022</td><td>25/05/2023</td></tr>
</table>
The calibration was conducted by accredited third parties which are Shenzhen Zhongdian Metrology and Testing Technology Co., Ltd /13/ which was accredited by China National Accreditation Service for Conformity Assessment (CNAS).</td></tr>
<tr><td>QA/QC procedure:</td><td>Data record will be archived for a period of 2 years after the crediting period to which the records pertain.</td></tr>
<tr><td>Means of verification:</td><td>Data of the parameter was verified by checking Monthly Report. All data is in line with Monthly Report;</td></tr>
</table>

	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:	7,481.0 h (generator 1#) 5,985.0 h (generator 2#) 6,763.5 h (generator 3#) 6,577.0 h (generator 4#) 6,339.0 h (generator 5#)
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.

Data / Parameter:	$EG_{PJ,y}$
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:	17,914.020
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, Invoices /11/ issued by project owner covering monitoring period.
Information flow:	1 electricity meter installed at project site (E1) 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 (E1) 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 Invoices have been sent to the CDM consulting company for reporting of GHG emission reduction. The conservative one would be used for ER calculation.

<table>
<tr><td>Monitoring method, frequency and equipments:</td><td>The parameter was measured continuously and recorded monthly by 1 electricity meter installed at project site. See below for the information of 1 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>E1
(Main Meter)</td><td>DSSD718</td><td>03001SG00000311700028553</td><td>0.5s</td></tr>
<tr><td>E1 (backup meter)</td><td>DSSD718</td><td>03001SG00000311700028554</td><td>0.5s</td></tr>
</table>
The type, serial number and accuracy have been confirmed by site visit.</td></tr>
<tr><td>Calibration:</td><td>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="2">E1
(Main Meter)</td><td>27/05/2021</td><td>26/05/2022</td></tr>
<tr><td>26/05/2022</td><td>25/05/2023</td></tr>
<tr><td rowspan="2">E1 (backup meter)</td><td>27/05/2021</td><td>26/05/2022</td></tr>
<tr><td>26/05/2022</td><td>25/05/2023</td></tr>
</table>
The calibration was conducted by accredited third parties which are Shenzhen Zhongdian Metrology and Testing Technology Co., Ltd /13/ which was accredited by China National Accreditation Service for Conformity Assessment (CNAS).</td></tr>
<tr><td>QA/QC procedure:</td><td>Data record will be archived for a period of 2 years after the crediting period to which the records pertain.</td></tr>
<tr><td>Means of verification:</td><td>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.</td></tr>
</table>

Data / Parameter:	$EG_{EC,y}$
Data unit:	MWh

<table>
<tr><td>Description:</td><td>Amount of electricity consumed by the project activity in year y</td></tr>
<tr><td>Purpose of the data:</td><td>Calculation of project emissions</td></tr>
<tr><td>Parameter value:</td><td>2.700</td></tr>
<tr><td>Source of data used:</td><td>Amount of electricity consumed by the project activity in year y are all sourced from Monthly Report /10/ issued by the project owner, Invoices /11/ issued by power grid company covering monitoring period.</td></tr>
<tr><td>Information flow:</td><td>1 electricity meter installed at project site (E2) 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 (E2) 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 Invoices have been sent to the CDM consulting company for reporting of GHG emission reduction. The conservative one would be used for ER calculation.</td></tr>
<tr><td>Monitoring method, frequency and equipments:</td><td>The parameter was measured continuously and recorded monthly by 1 electricity meter installed at project site. See below for the information of 1 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>E2
(Main Meter)</td><td>DSSD718</td><td>03001SG00000311700028555</td><td>0.5s</td></tr>
<tr><td>E2 (backup meter)</td><td>DSSD718</td><td>03001SG00000311700028556</td><td>0.5s</td></tr>
</table>
The type, serial number and accuracy have been confirmed by site visit.</td></tr>
<tr><td>Calibration:</td><td>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="2">E2
(Main Meter)</td><td>27/05/2021</td><td>26/05/2022</td></tr>
<tr><td>26/05/2022</td><td>25/05/2023</td></tr>
<tr><td rowspan="2">E2 (backup meter)</td><td>27/05/2021</td><td>26/05/2022</td></tr>
<tr><td>26/05/2022</td><td>25/05/2023</td></tr>
</table>
The calibration was conducted by accredited third parties which are Shenzhen Zhongdian Metrology and Testing Technology Co., Ltd /13/ which</td></tr>
</table>

	was accredited by China National Accreditation Service for Conformity Assessment (CNAS).
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:	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: 23,619,367 OPEX: 6,013,300
Source of data used:	CAPEX is sourced from account audit report /18/ issued by the third-party audit company. OPEX is sourced from sourced from account audit report /18/ issued by the third-party audit company.
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:	0.689 (including VAT)
Source of data used:	Tariff of electricity exported is sourced from Power Purchase Agreement /19/ and Notice on Improving the Management mode of feed-in Price for Renewable energy power Generation Projects /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) /20/
GWP_{CH4}	Global warming potential of CH_4	28	IPCC /15/
ρ_{CH4}	Density of methane gas at Normal Conditions	0.0007168 (Normal conditions: 0 ℃ and	Technical literature /21/

		101.325 kPa)	
$EF_{grid,OM,y}$	Operation margin emission factor of CSPG	0.8042	2019 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA /14/
$EF_{grid,BM,y}$	Build margin emission factor of CSPG	0.2135	2019 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA /14/
$TDL_{j,y}$ and $TDL_{k,y}$	Average technical transmission and distribution losses for providing electricity to source j, k in year y	20 and 3	Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0) /22/

In conclusion, the assessment team confirmed GHG emission reductions and removals have been quantified correctly in accordance with the project description and applied methodology.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The monitoring has been carried out in accordance with VCS PD /3/ dated 30/03/2023.

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. The parameters are complete in this monitoring period.

By checking the original record, crosscheck with the supporting evidence issued from other party than project owner, checking calibration related documents and interview with project owner through the site visit, the VVB is able to confirm there are no transposition errors between data sets. All data are consistent in all data sets.

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 OPINION

Applus+ Certification has been commissioned by Goldchina Consultancy International Co., Ltd to perform the verification of greenhouse gas emission reductions of the project activity "Lianzhou Landfill Gas Power Generation Project" (VCS Ref. No. 3940).

The management of Lianzhou Dongkang Renewable Energy Technology 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 VCS PD /3/ dated 30/03/2023.

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 the registered PD is as per the applied methodology;
- the monitoring complies with 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 "Lianzhou Landfill Gas Power Generation Project" during the monitoring period 01/06/2021 to 30/04/2023 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 01/06/2021 to 30/04/2023 (divided into 3 vintage periods). Verified GHG emission reductions or removals in the above reporting period:

Verification period: From 01/06/2021 to 30/04/2023

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2021 (01/06/2021-31/12/2021)	*34,953*	*1*	*0*	*34,952*

2022 (01/01/2022-31/12/2022)	*73,538*	*1*	*0*	*73,537*
2023 (01/01/2023-30/04/2023)	*24,167*	*1*	*0*	*24,166*
Total	***132,658***	***3***	***0***	***132,655***

Year	*Ex-ante emissions reductions/removals*	*Achieved emissions reductions/removals*	*Percent difference*	*Justification for the difference*
2021 (01/06/2021-31/12/2021)	*37,201*	*34,952*	*-6.05%*	*The difference is in the normal range of fluctuation*
2022 (01/01/2022-31/12/2022)	*68,980*	*73,537*	*6.61%*	*The difference is in the normal range of fluctuation*
2023 (01/01/2023-30/04/2023)	*24,478*	*24,166*	*-1.28%*	*The difference is in the normal range of fluctuation*
Total	***130,659***	***132,655***	***1.53%***	***The difference is in the normal range of fluctuation***

APPENDIX 1: REFERENCE LIST

1. Monitoring report, Version 2, dated 30/06/2023; Version 3, dated 31/07/2023

2. ER calculation spreadsheet

3. VCS PD, version 04, dated 30/03/2023

4. VCS Validation report, No. A+SH_SYST_VCS_VAL_12622, version 01.0, completed by Applus+ Certification

5. VCS standard version 4.4, dated on 17/01/2023

6. Statement issued by project owner

7 Approved methodology ACM0001: Flaring or use of landfill gas, version 19.0

8 CDM Monitoring procedure

9 Nameplate of the equipment

10 Monthly Report

11 Invoices covering the monitoring period

12 Calibration certificates of electricity meter E1 and E2 covering the whole monitoring period issued by Shenzhen Zhongdian Metrology and Testing Technology Co., Ltd;

Calibration certificates of flow meter covering the whole monitoring period issued by Shenzhen Zhongdian Metrology and Testing Technology Co., Ltd;

Calibration certificates of gas analyser covering the whole monitoring period issued by Shenzhen Zhongdian Metrology and Testing Technology Co., Ltd

13 Accreditation certificates for Shenzhen Zhongdian Metrology and Testing Technology Co., Ltd issued by China National Accreditation Service for Conformity Assessment (CNAS);

14 2019 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA

15 IPCC

16 Staff roaster of project

17 Statement of status of landfill

18 Account audit report

19 Power Purchase Agreement

20 Emissions from solid waste disposal sites, version 08.0

21 Technical literature

22 Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0

23 Notice on Improving the Management mode of feed-in Price for Renewable energy power Generation Projects