



VCS VERIFICATION REPORT

FUZHOU HONGMIAOLING LANDFILL GAS
TO ELECTRICITY PROJECT

(VCS PROJECT ID: 253)



Document Prepared By

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Summary:

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions reported for the project activity “Fuzhou Hongmiaoling Landfill Gas to Electricity Project” (VCS Project ID: 253) for the monitoring period 01/07/2011 to 18/11/2017¹, to review and determine the monitored reductions in GHG emissions that have occurred as a result of the project activity. These emission reductions are claimed as Verified Carbon Units (VCU) under the Verified Carbon Standard (VCS) version 4.

The verification was performed on the basis of VCS Programme Guide version 4.0 and VCS Standard version 4.1 for the VCS projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. The verification was conducted by means of document review, follow-up interviews and site inspections, and the resolution of outstanding issues. The verification team identified 1 CL, no CAR or FAR in this monitoring period.

In CTI's opinion, the GHG emission reductions reported for the project in the monitoring report (version 02 dated 10/09/2021) are fairly stated. The GHG emission reductions of the period were calculated correctly on the basis

¹ The monitoring period is over 6 years which is not in line with the requirement of VCS Standard. An Exemption Letter has been provided by VERRA to grant the verification of this monitoring period more than 6 years.

of approved methodology ACM0001 “Flaring or use of landfill gas” (Version 5.0) and the monitoring plan contained in the CDM PDD (Version 5 dated 06/05/2010).

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

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

Hence, CTI is able to certify that the emission reductions from the “Fuzhou Hongmiaoling Landfill Gas to Electricity Project” during the period amount to 231,904 tCO₂e.

CONTENTS

contents	4
1 Introduction.....	6
1.1 Objective	6
1.2 Scope and Criteria	6
1.3 Level of Assurance	7
1.4 Summary Description of the Project	7
2 Verification Process.....	8
2.1 Method and Criteria	8
2.2 Document Review	8
2.3 Interviews	9
2.4 Site Inspections	10
2.5 Resolution of Findings	11
2.6 Eligibility for Validation Activities	12
3 Validation Findings.....	12
3.1 Participation under Other GHG Programs	12
3.2 Methodology Deviations	12
3.3 Project Description Deviations.....	12
3.4 Grouped Project	13
4 Verification Findings	13
4.1 Project Implementation Status	13
4.2 Safeguards	25
4.3 AFOLU-Specific Safeguards	26
4.4 Accuracy of GHG Emission Reduction and Removal Calculations	27
4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals	33
4.6 Non-Permanence Risk Analysis	33
5 Verification conclusion	33
APPENDIX A: Abbreviations	36
APPENDIX B: references	37

APPENDIX C: Corrective Action Requests, clarification requests and Forward Action Requests	40
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1 INTRODUCTION

Climate Bridge (Shanghai) Ltd. has commissioned Shenzhen CTI International Certification Co., Ltd (CTI) to carry out the verification and certification of emission reductions reported for the “Fuzhou Hongmiaoling Landfill Gas to Electricity Project” (the project) for the period 01/07/2011 to 18/11/2017. This report contains the findings from the verification and includes a verification statement for the verified carbon units.

1.1 Objective

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

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

The objective of this verification was to verify and provide a verification statement of emission reductions reported for the “Fuzhou Hongmiaoling Landfill Gas to Electricity Project” for the period 01/07/2011 to 18/11/2017.

1.2 Scope and Criteria

The scope of the verification is:

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

The criteria of the verification are:

- VCS Program Guide (version 4.0) /29/
- VCS Standard (version 4.1) /28/ and other relevant requirements defined by Verra;
- The approved methodology ACM0001 (Version 5.0) /31/ applied by the project;
- All information and references relevant to the project activity’s resulting in emission reductions.

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

1.3 Level of Assurance

The verification report expresses a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement. CTI applied a materiality threshold of 5% with respect to omission or misstatements concerning reported quantities as per VCS standard.

1.4 Summary Description of the Project

Sectoral Scope and Project Type

According to the VCS Program Guide (version 4.0) /29/ and Annex A of the Kyoto Protocol, the project is applicable under the following activity categories:

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

Project Background

Project title:	Fuzhou Hongmiaoling Landfill Gas to Electricity Project
Project proponent:	Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. (China)
Project location:	Hongmiaoling Landfill Site, Jinan District, Fuzhou City, Fujian Province, P.R China
VCS Project ID:	253
Applied methodology:	ACM0001 Version 5.0
VCS project crediting period:	19/11/2007 to 18/11/2017 (the 10-year fixed VCS crediting period)
VCU verification period:	01/07/2011 to 18/11/2017

2 VERIFICATION PROCESS

2.1 Method and Criteria

The verification was performed through means of the following three phases in accordance with the requirement of the CDM PDD (version 5 dated 06/05/2010), the applied methodology, and the VCS Standard (version 4.1) and other relevant VCS requirements:

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

The following sections outline each step in more detail.

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

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

2.2 Document Review

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

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

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

In addition to the VER/VCU monitoring report /1/, CDM PDD (version 5 dated 06/05/2010) /9/ and emission reduction calculation spreadsheet /2/, the following documents also were assessed as a part of the verification audit:

- VCS Validation Report dated 18/11/2009 /10/;
- Baseline and monitoring methodology ACM0001 applied by the project /31/;
- Relevant decisions, clarifications and guidance from the Verra /28/-/30/; and
- Other information and references relevant to the project activity.

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

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

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

2.3 Interviews

On 20/07/2021 and 21/07/2021, CTI visited Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. performed on-site assessment. The key personnel of the project were interviewed or assisted the verification team /48/. Main topics of the interview cover implementation of the project construction, applicability of selected methodology, implementation of project monitoring, emission reduction calculation, etc.

The key personnel interviewed /32/ are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Qiu Zonghong	General Manager	Fujian Tianyi Renewable Energy Technology & Utilization 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; Status of Hongmiaoling landfill; Management of Hongmiaoling landfill.
Ms. Lin Chunzhen	Assistant of manager		
Mr. Chen Qinjin	Chief		
Mr. Lin Hong	Staff		
Mr. Chen Hao	Staff		
Mr. Luo Bin	Staff	Local Environment Protection Bureau	The impact of the project activity; The complaint by local stakeholders; The stakeholder consultation during the operation of the project activity.
Mr. Zhang Jianguo	Villager	Local resident	
Mr. Ren Hai	Villager	Local resident	
Ms. Zhu Lijuan	Villager	Local resident	
Mr. Liu Yanyu	Project Manager	Climate Bridge (Shanghai) Ltd.	Data collection and ER calculation.

2.4 Site Inspections

The verification team performed the on-site verification (Hongmiaoling Landfill Site, Jinan District, Fuzhou City, Fujian Province, P.R China) on 20/07/2021 and 21/07/2021. The interviewed personnel and objective are listed in above table. During the on-site assessment, CTI has applied standard auditing techniques to assess the quality of information provided. The following aspects of the project activity have been verified:

- An assessment of the implementation and operation of the registered project activity is as per the CDM PDD;
- An assessment of the status and management of the landfill site is as per the CDM PDD;
- A review of information flows for generating, aggregating and reporting the monitoring parameters; and
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the CDM PDD;
- A cross-check between information provided in the monitoring report and data from other sources such as plant logbooks and electricity sale receipts;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the CDM PDD and the selected methodology;

- A review of calculations and assumptions made in determining the GHG data and emission reductions; and
- An identification that quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

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

In addition, all parameters required by the monitoring methodology ACM0001 (Version 5.0), methodological tool, ie. "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation", "Emissions from solid waste disposal sites", "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", and the management system were assessed during the site visit.

2.5 Resolution of Findings

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

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

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

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

2.5.1 Forward Action Requests

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

CTI confirmed that there was no FAR identified in validation /10/, and no FAR was raised during this verification.

2.6 Eligibility for Validation Activities

The CDM PDD of the project activity was validated by DET NORSKE VERITAS (DNV) on 06/05/2010 /9/. The proposed monitoring period 01/07/2011 to 18/11/2017 is the 2nd VCS verification, and CTI just undertook verification activities for the project according to the VCS Program Guide under scope 1 and 13. This section is thus not applicable.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

First the project was validated by DET NORSKE VERITAS (DNV) as CDM project with reference No. of 1732, then the project was validated by Germanischer Lloyd Certification GmbH (GL) for registration of VCS (<https://registry.verra.org/app/projectDetail/VCS/253>). 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. And the VCU and CERs would not be issued in the same period.

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

3.2 Methodology Deviations

The validation process /10/ has assessed all factors and issues that constitute the basis for emission reductions from the project according to the applicable CDM methodology ACM0001 (Version 5.0) /31/. There was not any methodology deviation applied to this project. Details refer to section 4.1.

3.3 Project Description Deviations

According to the monitoring plan in the registered PDD, the meter that measures the amount of electricity exported and imported $EL_{EX,LFG}$ and EL_{IMP} should have an accuracy level of 0.2s. However, the accuracy of the meter actually installed is 0.5s, lower than the described one in the registered PDD. To address this non-compliance, a deviation description was submitted to the CDM EB on 01/02/2010 (reference: I-DEV0291) for the verification of the first CDM monitoring period from 17/11/2008 to 31/05/2009. The correction of the metered data was considered necessary for the calculation of baseline emissions. A conservative solution to address the noncompliance was proposed and approved:

- the amount of electricity exported out of the project boundary $EL_{EX,LFG}$ must be decreased by 0.5% of the meter readings;

- the amount of electricity imported to meet project requirements EL_{IMP} must be increased by 0.5% of the meter readings.

Refer to the link below for more detailed information about this deviation and the associated solution: <https://cdm.unfccc.int/Projects/deviations/03324>.

During this monitoring period, the old meter was replaced by a new one with an accuracy of 0.2s on 15/02/2012. The accuracy of the new meter is 0.2s, no lower than the described one in the registered PDD. Therefore, the same solution is applied to calculate the corrected values of $EL_{EX,LFG}$ and EL_{IMP} from 01/07/2011 to 29/02/2012. From 01/03/2012 onwards, the correction solution was no longer applied.

The verification team assessed through visual inspection and document review that all physical features of the proposed project activity including data monitoring, reporting and collecting systems have been implemented in accordance with the monitoring plan included in the registered CDM PDD (version 5 dated 06/05/2010) /9/.

3.4 Grouped Project

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

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

Project Implementation in accordance with the registered project design document

The project is a landfill gas recovery and power generation project, which is located in Hongmiaoling Landfill Site, Jinan District, Fuzhou City, Fujian Province, P.R China. The designed installed capacity of the project activity is 2.5 MW, but only two GE gas engines, each with 834 kW, were installed with a total capacity of 1.668 MW. The feed-in electricity is estimated to be 95,100 MWh during the fixed 10 years crediting period. The actual implementation of the project during this verification period was verified in terms of name plate capacities of each gas-fired Engine / generator and monitoring equipment. The details of gas-fired Engine / generator with respect to installation and capacity have been verified to be consistent with description indicated in the CDM PDD. The gas-fired Engine / generator put into operation on 19/11/2007, which has been verified by site visit interview and checking validation report /10/, operation log /6/ and evidence of project construction progress /22/. The electricity generated by the project activity was supplied to the East China Power Grid (ECPG), which can be confirmed by the Power Purchase Agreement (PPA) signed between the project owner and State Grid Fujian Electric Power Company Fuzhou Power Supply Company /3/. The project start date was identified as 19/11/2007 when the gas-fired Engine / generator started to operate and began generating GHG emission reductions.

All the monitoring system in operation period is consistent with the description and monitoring plan in the CDM PDD. The control system at the power plant is automated and assures continuous operation, including monitoring on malfunction of equipment. By checking the daily operation and maintenance records /7/, CTI can confirm that during period from 01/07/2011 to 18/11/2017, the project went through a 16-month shut down from 10 a.m. 19/12/2012 to 06 a.m. 31/03/2014, during which the 1# generator was switched on and operated for a short timeslot from 4 a.m. to 5 a.m. 15/10/2013 due to the expansion activity on the landfill. Except that, no serious malfunction happened, and the plant was under a normal operation as expected in this monitoring period.

On-site training for the related procedures including monitoring, recording and reporting was verified to be in place /5/ and their implementation was confirmed by interview with the key operators /32/ and observing the operation.

As part of the site visit, CTI confirms that the project implementation is in accordance with the project description and monitoring plan contained in the the CDM PDD (version 5 dated 06/05/2010). The verification team confirmed through visual inspection and document review that all physical features of the proposed project activity including data collection systems and storage systems have been implemented in accordance with monitoring plan contained in the CDM PDD (version 5 dated 06/05/2010).

Compliance of monitoring plan with monitoring methodology

CTI is able to confirm that the monitoring plan in the CDM PDD (version 5 dated 06/05/2010) is in accordance with the approved methodology applied by the project activity, i.e. ACM0001 (Version 5.0).

Compliance of monitoring with the monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the CDM PDD (version 5 dated 06/05/2010). CTI confirms that all parameters stated in the monitoring plan are monitored and reported appropriately. All parameters required to be monitored by the monitoring plan as per the monitoring methodology ACM0001 (Version 5.0) and the management system were assessed during the site visit. The monitoring report lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, recording, calculation and reporting) for these parameters is provided. The information flow for the each parameter in further verified in the following sections.

Parameters monitored

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD /9/.

The parameter $CEF_{\text{electricity},y}$ - CO₂ emission intensity of the electricity displaced during year y are calculated by following parameter indicated in the monitoring plan: EF_{OM} , EF_{BM} , NCV_i , $EF_{CO2,i}$ and Carbon Oxidation Factor. And for rest of parameters such as L_0 and k are not used in calculation of ERs in this monitoring period.

Thus, the parameters, including EF_{OM} , EF_{BM} , NCV_i , $EF_{CO_2,i}$, Carbon Oxidation Factor, L_0 and k are not included in this report.

Parameter monitored ex ante

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

Parameter title	Description	Data	Unit	Source
$CEF_{electricity,y}$	CO ₂ emission intensity of the electricity displaced during year y	0.8541	tCO ₂ /MW _h	China Energy Statistical Yearbook 2003~2005 /15/ China Power Electric Power Yearbooks 2003~2005 /16/

Parameter monitored ex post

For Following parameters were monitored and determined as per the monitoring plan which is listed as follows:

- **Total amount of LFG captured ($LFG_{total,y}$)**

Total amount of LFG captured ($LFG_{total,y}$) was measured by a continuous flow meter and have been automatically converted to standard condition based on T and P monitored. By checking Monitor System Display Screen during site visit /20/, the verification team confirmed that the readings of the flow meter was continuously monitored and hourly recorded /20/ by Online Monitoring System through recordable electronic signal, which is consistent with the registered PDD.

The total amount of LFG captured was manually recorded in Monthly Report /17/ by project owner. At the 24:00 of last day of each month, the staff of project owner would record the data in the Monthly Report /17/. The verification team confirmed that the value of this parameter was 23,758,019.464 m³ for this monitoring period.

- **The total quantity of LFG for power generation ($LFG_{electricity,y}$)**

The total quantity of LFG for power generation ($LFG_{electricity,y}$) was measured by a continuous flow meter and have been automatically converted to standard condition based on T and P monitored. By checking Monitor System Display Screen during site visit /20/, the verification team confirmed that the readings of the flow meter was continuously monitored and hourly recorded /20/ by Online Monitoring System through recordable electronic signal, which is consistent with the registered PDD.

The total quantity of LFG for power generation was manually recorded in Monthly Report /17/ by project owner. At the 24:00 of last day of each month, the staff of project owner would record the data in the Monthly Report /17/. The verification team confirmed that the value of this parameter was 23,621,743.900 m³ for this monitoring period.

- **The total quantity of LFG for flaring ($LFG_{flare,y}$)**

The total quantity of LFG for flaring ($LFG_{flare,y}$) was measured by a continuous flow meter and have been automatically converted to standard condition based on T and P monitored. By checking Monitor System Display Screen during site visit /20/, the verification team confirmed that the readings of the flow meter was continuously monitored and hourly recorded /20/ by Online Monitoring System through recordable electronic signal, which is consistent with the registered PDD.

The total quantity of LFG for flaring was manually recorded in Monthly Report /17/ by project owner. At the 24:00 of last day of each month, the staff of project owner would record the data in the Monthly Report /17/. The verification team confirmed that the value of this parameter was 136,243.995 m³ for this monitoring period.

- **Project emissions from flaring of the residual gas stream during the year y ($PE_{flare,y}$)**

Project emissions from flaring of the residual gas stream during the year y ($PE_{flare,y}$) was calculated by following formula:

$$PE_{flare,y} = \sum TM_{RG,h} * (1 - \eta_{flare,h}) * GWP_{CH4} / 1,000$$

And for mass flow rate of methane in the residual gas in the hour h ($TM_{RG,h}$) was calculated by following formula:

$$TM_{RG,h} = FV_{RG,h} * f_{VCH4, RG,h} * \rho_{CH4,h}$$

Then for the monitoring of $\eta_{flare,h}$, $FV_{RG,h}$, and ρ_{CH4} , please refer to the report as below.

The verification team confirmed that the value of this parameter was 1,199.520 tCO_{2e} for this monitoring period.

- **Methane fraction in the LFG (w_{CH4})**

The Methane fraction in the LFG (w_{CH4}) was measured by a continuous gas analyzer. By checking Monitor System Display Screen of Pretreatment control system during site visit /20/, the verification team confirmed that the readings of the gas analyzer was continuously monitored and hourly recorded by Online Monitoring System /20/ through recordable electronic signal, which is consistent with methodology and registered PDD.

The methane fraction in the LFG was manually recorded in Monthly Report /17/ by project owner. At the 24:00 of last day of each month, the staff of project owner would record the average data of this month in the Monthly Report /17/. The verification team confirmed that the value of this parameter was varied from 39% ~ 49% for this monitoring period.

- **Temperature of the landfill gas (Degree)**

The temperature of the landfill gas (Degree) was measured by 3 thermometers. By checking Monitor System Display Screen of Pretreatment control system during site visit /20/, the verification team confirmed that the readings of the thermometers were continuously monitored and hourly recorded by Online Monitoring System /20/ through recordable electronic signal, which is consistent with methodology and registered PDD.

The temperature of the landfill gas was manually recorded in Monthly Report /17/ by project owner. At the 24:00 of last day of each month, the staff of project owner would record the average data of this month in the Monthly Report /17/. The verification team confirmed that the value of this parameter was varied from -10.12°C ~ 49.65°C for this monitoring period.

- **The pressure of landfill gas (P)**

The pressure of landfill gas was measured by 3 manometers. By checking Monitor System Display Screen of Pretreatment control system during site visit /20/, the verification team confirmed that the readings of the manometers were continuously monitored and hourly recorded by Online Monitoring System /20/ through recordable electronic signal, which is consistent with methodology and registered PDD.

The pressure of landfill gas was manually recorded in Monthly Report /19/ by project owner. At the 24:00 of last day of each month, the staff of project owner would record the average data of this month in the Monthly Report /17/. The verification team confirmed that the value of this parameter was varied from 0 Pa ~ 40,11 Pa for this monitoring period.

- **Total amount of electricity exported out of the project ($EL_{EX,LFG}$)**

1 bi-directional electricity meter installed by local grid company at the transformer substation located at the project site to monitor continuously and the meter reading was recorded monthly. At 24:00 of last day of each month, the staff from project owner will record the electricity meter readings and fill out Monthly Report /17/. The staff from power grid company will record the meter readings and issue the ETNs /8/.

$EL_{EX,LFG}$ was sourced from Monthly Report /17/ and ETNs /9/ issued by power grid company covering monitoring period. By checking the same, the verification team confirmed that the amount of electricity exported out of the project in this monitoring period were 29,571.557 MWh.

- **Total amount of electricity imported to meet project requirements (EL_{IMP})**

1 bi-directional electricity meter installed by local grid company at the transformer substation located at the project site to monitor continuously and the meter reading was recorded monthly. At 24:00 of last day of each month, the staff from project owner will record the electricity meter readings and fill out Monthly Report /19/. The staff from power grid company will record the meter readings and issue the ETNs /8/.

EL_{IMP} was sourced from Monthly Report /19/ and ETNs /8/ issued by power grid company covering monitoring period. By checking the same, the verification team confirmed that the amount of electricity exported out of the project in this monitoring period were 205.025 MWh.

- **Temperature of the exhaust gas in the flare (T_{flare})**

The temperature of the exhaust gas in the flare was measured by a Type N thermocouple. By checking Monitor System Display Screen of Pretreatment control system during site visit /20/, the verification team confirmed that the readings of the thermocouple was continuously monitored and hourly recorded

by Online Monitoring System /20/ through recordable electronic signal, which is consistent with methodology and registered PDD.

The pressure of landfill gas was manually recorded in Monthly Report /17/ by project owner. At the 24:00 of last day of each month, the staff of project owner would record the average data of this month in the Monthly Report /17/. However, according to the registered PDD, the thermocouple should be calibrated or replace annually and the project owner failed to achieve the same. The verification team confirmed that the value of this parameter was considered as 0 for this monitoring period, which is most conservative.

▪ Operation hours of the power plant

The methane was destructed through using for electricity generation and flare. The project activity was in normal operational condition besides the shutdown period, while the operation hours of the power plant were monitored by the project owner.

By checking Daily Operation Records of Generator Units /7/ issued by the project owner, the verification team confirmed the operational hours of generators in this monitoring period were:

Generator 1#	43,340 h
Generator 2#	43,312 h

By checking Monitor System Display Screen during site visit /20/, the verification team confirmed that the operating hours of each gas engine are automatically monitored and recorded every hour by an integrated monitoring device in the engine system, which is consistent with methodology and registered PDD. The Daily Operation Records of Generator Units /7/ was generated by the project owner on a daily basis.

▪ Volumetric fraction of methane in the residual gas on dry basis in hour h ($f_{V_{CH_4,RG,h}}$)

The volumetric fraction of methane in the residual gas on dry basis in hour h ($f_{V_{CH_4,RG,h}}$) was measured by a continuous gas analyzer. By checking Monitor System Display Screen of Pretreatment control system during site visit /20/, the verification team confirmed that the readings of the gas analyzer was continuously monitored and hourly recorded by Online Monitoring System /20/ through recordable electronic signal, which is consistent with methodology and registered PDD.

The methane fraction in the LFG was manually recorded in Monthly Report /17/ by project owner. At the 24:00 of last day of each month, the staff of project owner would record the average data of this month in the Monthly Report /17/. The verification team confirmed that the value of this parameter was varied from 39% ~ 49% for this monitoring period.

▪ Volumetric flow rate of the residual gas in day basis at normal conditions in the hour h ($FV_{RG,h}$)

Volumetric flow rate of the residual gas in day basis at normal conditions in the hour h ($FV_{RG,h}$) was measured by a continuous flow meter and have been automatically converted to standard condition based on T and P monitored. By checking Monitor System Display Screen during site visit /20/, the verification team confirmed that the readings of the flow meter was continuously monitored and hourly

recorded /20/ by Online Monitoring System through recordable electronic signal, which is consistent with the registered PDD.

The volumetric flow rate of the residual gas in day basis at normal conditions in the hour h was manually recorded in Monthly Report /17/ by project owner. At the 24:00 of last day of each month, the staff of project owner would record the data in the Monthly Report /17/. The verification team confirmed that the value of this parameter was 511.08 m³/h (average) for this monitoring period.

- **Regulatory requirements relating to landfill gas projects**

By checking public information regarding to regulatory requirements relating to landfill gas project such as 2019 China Urban-Rural Construction Statistical Yearbook and 2020 Development Report on China's Biomass Power Industry and professional experience of the verification team, there are no there is no enforced regulation in China on the LFG collection and utilization.

The verification team confirmed that the value of this parameter was 0% for this monitoring period.

- **Other flare operation parameters**

By on-site visit and interview with the project owner, there are no other flare operation parameters required for monitoring. Moreover, the emission reduction due to the flare of CH₄ has been considered as zero which is conservative.

The verification team confirmed that the value of this parameter was not applicable for this monitoring period.

In conclusion, the monitoring equipment have been installed in accordance with the monitoring plan of CDM PDD (version 5 dated 06/05/2010). CTI has on-site checked the location of the monitoring equipment against the diagram of monitoring system and found them to be consistent. The data reported in the monitoring report and ERs calculation spreadsheet has been verified by the verification team. Supporting references and data required to determine the parameters for calculating emission reductions are found to be complete and transparent.

Monitoring equipment and calibration

The monitoring equipments /24/ have been calibrated periodically as per the relevant industrial standard by the qualified third party to ensure the monitoring equipments' accuracy and in good conditions. The relevant information of monitoring equipments' calibration /11//18/ is listed as below.

Monitoring parameter	Monitoring equipment	Serial Number	Type	Accuracy Class	Calibration Date	Validity
EL _{EX,LFG} EL _{IMP}	Electricity meter ²	10048065	DSSD132	0.5s	18/05/2011	17/05/2012
		010087263770	DSZ331	0.2s	15/02/2012	14/02/2013
					10/02/2013	09/02/2014
					08/02/2014	07/02/2015
					05/02/2015	04/02/2016
					01/02/2016	31/01/2017
					30/01/2017	29/01/2018
WCH ₄ fV _{CH₄,RG,h}	Gas analyzer	/	Polytron IR EX	4%	05/06/2011	/
					06/12/2017 ³	/
LFG _{total,y}	Flow meter	X6126012	TBQ-15012 DN150	2.0% for Q _{min} ~0.2Q _{max} ; 1.0% for 0.2Q _{max} ~Q _{max}	20/07/2010	19/07/2012
					10/07/2012	09/07/2014
					02/07/2014	01/07/2016
					22/06/2016	21/06/2018
LFG _{electricity,y}	Flow meter	X6126011	TBQ-15012 DN150	2.0% for Q _{min} ~0.2Q _{max} ; 1.0% for 0.2Q _{max} ~Q _{max}	01/11/2010	31/10/2012
					10/10/2012	09/10/2014
					07/09/2014	06/09/2016
					04/09/2016	03/09/2018
LFG _{flare,y} FV _{RG,h}	Flow meter	X6126013	TBQ-15012 DN150	2.0% for Q _{min} ~0.2Q _{max} ;	28/09/2010	27/09/2012
					22/09/2012	21/09/2014

² By checking meter change record //, the verification team confirm the old meter (10048065) was replaced by a new meter (010087263770) on 15/02/2012.

³ The calibration of the gas analyzer was carried out on a monthly basis, the verification checked the calibration record and confirm the first calibration was performed before the monitoring period and last calibration was after the monitoring period.

				1.0% for $0.2Q_{\max} \sim Q_{\max}$	19/09/2014	18/09/2016
					04/09/2016	03/09/2018
Degree	Thermometers	11	SBWZ-2480-236	0.25%	25/11/2010	24/11/2011
					25/11/2011	24/11/2012
					25/11/2012	24/11/2013 ⁴
					25/11/2014	24/11/2015
					25/11/2015	24/11/2016
					25/11/2016	24/11/2017
	Thermometers	8	SBWZ-2480-236	0.25%	25/11/2010	24/11/2011
					25/11/2011	24/11/2012
					25/11/2012	24/11/2013 ⁵
					25/11/2014	24/11/2015
					25/11/2015	24/11/2016
					25/11/2016	24/11/2017
	Thermometers	7	SBWZ-2480-236	0.25%	25/11/2010	24/11/2011
					25/11/2011	24/11/2012
					25/11/2012	24/11/2013 ⁶
					25/11/2014	24/11/2015
					25/11/2015	24/11/2016
					25/11/2016	24/11/2017

⁴ No calibration was made in 2013 due to the shut down of the project.

⁵ No calibration was made in 2013 due to the shut down of the project.

⁶ No calibration was made in 2013 due to the shut down of the project.

P	Manometer	77601	ST200 A143M	0.2%	03/12/2010	02/12/2011
					03/12/2011	02/12/2012
					03/12/2012	02/12/2013 ⁷
					03/12/2014	02/12/2015
					03/12/2015	02/12/2016
					03/12/2016	02/12/2017
	Manometer	77603	ST200 A143M	0.2%	03/12/2010	02/12/2011
					03/12/2011	02/12/2012
					03/12/2012	02/12/2013 ⁸
					03/12/2014	02/12/2015
					03/12/2015	02/12/2016
					03/12/2016	02/12/2017
	Manometer	77604	ST200 A143M	0.2%	03/12/2010	02/12/2011
					03/12/2011	02/12/2012
					03/12/2012	02/12/2013 ⁹
					03/12/2014	02/12/2015
					03/12/2015	02/12/2016
					03/12/2016	02/12/2017
T _{flare}	Thermocouple	/	Type N	-40 °C ~ 1,000 °C	No calibration was made during the monitoring period	

⁷ No calibration was made in 2013 due to the shut down of the project.

⁸ No calibration was made in 2013 due to the shut down of the project.

⁹ No calibration was made in 2013 due to the shut down of the project.

The electricity meter was calibrated by a qualified third party, State Grid Fujian Electric Power Company Measurement Center. Calibration records and accreditation certificates /14//15/ have been verified by the verification team. The accuracy of meters complies with that in the CDM PDD. By checking the industrial metering configuration standard “Technical Administrative Code of Electric Energy Metering (DL/T 448-2000)” ¹⁰/14/, CTI can confirm that the accuracy level of all meters meets the requirement stipulated in this standard. CTI can thus confirm that the accuracy of the meters is in line with the CDM PDD and relevant industry standard. In the monitoring plan of the CDM PDD, it stated that the meters will be calibrated and checked for accuracy. By checking the calibration reports, CTI found the calibration frequency of these meters is annual, which is in line with the calibrating standard “Technical Administrative Code of Electric Energy Metering (DL/T 448-2000)” /14/. Hence, CTI can confirm that the meters’ calibration frequency is in line with the monitoring plan of the CDM PDD and relevant industry standard, and the calibrations of meters are verified to be valid for the whole reporting period.

The Gas analyzer was calibrated by project owner, based on the on-site visit, the verification team confirmed the analyzer was calibrated using standard gases containing methane in N₂ for 20%, 50% and 80% level and ambient air for zero level. The standard gases are purchased from gas suppliers who provide their gas products contained in gas cylinders as well as Reference Material Certificate. The gas analyzer measures the ambient air (which contains 0% methane) to return the reading to 0; and then the gas tube of the gas analyzer is inserted into the cylinder containing the standard gas, wait until the reading stabilizes and wait for another 30 seconds, adjust the reading to the actual concentration of the standard gas; the same procedures are repeated for the standard gases with 20%, 50% and 80% of methane in N₂. CTI found the calibration frequency of the gas analyzer is monthly, which is in line with the monitoring plan of the CDM PDD and the calibrations of meters are verified to be valid for the whole reporting period.

The flow meter, thermometer and manometer were calibrated by a qualified third party, Shanghai Inspection and Testing Institute of Instruments and Automatic Systems Co., Ltd. Calibration records and accreditation certificates /18//19/ have been verified by the verification team. In the monitoring plan of the CDM PDD, it stated that these monitoring instruments will be calibrated and checked for accuracy. By checking the calibration reports, CTI found the calibration frequency of the flow meter once 2 years, while the calibration frequency of thermometer and manometer is annually¹¹ except for the period 31/03/2014 to 25/11/2014 for thermometers and period 31/03/2014 to 03/12/2014 for manometers. There were lack of calibration during these periods for monitoring equipments. Therefore, for conservative manner, the data from 31/03/2014 to 31/12/2014 has been calculated in most conservative manner. Because the volume under the standard condition was calculated based on measured volume, temperature and pressure: $V_{standard} = (V_{measured} T_{standard} P_{measured}) / (P_{standard} T_{measured})$. Considering the accuracy of monitoring equipments, the margins of error of the thermometers and the

¹⁰ Replaced by “Technical Administrative Code of Electric Energy Metering (DL/T 448-2016)” valid since 01/05/2017.

¹¹ No calibration was made in 2013 due to the shut down of the project.

manometers are $\pm 0.25\%$ and $\pm 0.2\%$ respectively. For conservativeness, the volume during the period when calibration was lack was calculated as:

$$V_{standard, conserv} = (V_{measured} T_{standard} P_{measured}(1-0.2\%))/(P_{standard} T_{measured}(1+0.25\%)) = 0.9955 \cdot V_{standard}.$$

Therefore, the assessment team confirmed that this is in line with the monitoring plan of the CDM PDD and the calibrations of these monitoring instruments are verified to be valid for the whole reporting period except for certain period.

Data management and control

The project owner is responsible for operation and routine maintenance of power plant under the project activity. The quality assurance and quality control procedures have been addressed in the VER project management and monitoring manual /4/, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. By interview with the staff /32/ and check records /4/-/6/ during on-site visit, it can be confirmed that the monitoring management system is implemented following the project management and monitoring manual.

All monitoring devices have been calibrated and maintained periodically to ensure the accuracy of measurement. Calibration records of instruments used in measurements were made available during the verification visit and found to be valid for the entire period of the verification. Competence and training records of in-plant personnel engaged in measurement of plant parameters were presented during verification and found to be in order.

CTI checked public information from the UNFCCC website, REC Mechanism database of China, Chinese Emission Trading System, Gold Standard Registry and interviewed with project owner during site visit, it is confirmed that except VCS and CDM scheme, the project has not been participated or been rejected under any other GHG programs since validation. Therefore, the verification team confirmed that the project only applies VCUs or CERs under VCS or CDM, and no rejection from VCS or CDM occurs, there are no other forms of environmental credits applied or issued for the project activity, the emission reduction resulted from the project during this monitoring period would only apply for VCUs.

By checking the registered CDM PDD version 5 dated 06/05/2010, and interviewing with stakeholders during site visit, the verification team confirmed that the project would contribute to sustainable development in as below:

GHG emission reductions

The project utilizes methane for electricity; during the reported monitoring period, it destroyed 7,386 tons of CH₄ which would have been released into the atmosphere, and exported a net quantity of 29,366 MWh electricity to the Fujian Provincial Power Grid that is a part of the East China Power Grid, displacing part of the fossil fuel power generation.

Contribution to environment protection

The project activity has a positive effect on local people's health. Contaminated leachate and surface run-off from landfills can affect the quality of underground and surface water, consequently polluting the

local environment and harming the health of local population. The uncontrolled release of landfill gas can also lead to risk of explosions. By managing this landfill properly, the environmental health risks and the possibility of explosions are significantly reduced, ensuring healthy lives and promoting well-being for all at all ages.

Clean energy demonstration

The project is the first LFG to electricity project in the province and one of the first projects around China. Advanced international technology is employed, which helps the technology transfer. The project provides an example that can be used by others that may want to develop modern and more efficient clean generation of electricity using landfill gas throughout China. Therefore, the project ensures access to affordable, reliable, sustainable and modern energy for all.

Providing job opportunities

By directly creating new jobs and helping residents get rid of poverty, the project promotes sustained, inclusive and sustainable economic growth, full and production employment and decent work for all.

The technical parameters have been verified with the nameplates /21/ as below:

GE model	JGS 316 GS-L.L
Electric power output	834 kW
Electricity efficiency	39.8%
Total efficiency	39.8%
Methane number (Mz)	100
Calorific value (Hu)	4 kWh/Nm ³
Fuel gas volume	524 ± 5% Nm ³ /h

The verification team confirmed that there is no proposed or actual change to the CDM PDD 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 CDM PDD, 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

By checking the attendance list /25/, the verification team confirmed that a local stakeholder consultation meeting was held in 2005 by the project owner. Before the stakeholder consultation meeting, the project information with contact information and the stakeholder meeting notice /26/ were published on the bulletins at and nearby the project site in 2005 to invite Local stakeholders.

During the meeting, the project information and the continuous input / grievance mechanism have been introduced to the local stakeholders. The project information with contact information has also been posted on the bulletins at and nearby the project site.

During the meeting, a survey was carried out on the local residents and comments received from the survey are summarized as follows. The survey was conducted through distributing and collecting responses to a questionnaire. In total 47 out of 50 questionnaires were returned with a 94% response rate.

The opinions expressed by the stakeholders were recorded and are available on request. The stakeholder meeting and the survey showed that the project receives no negative comments on its the construction and operation.

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

By checking the filled questionnaires from local stakeholders /27/, it is confirmed by the verification team that communications with local stakeholders was being carried out in 2005 by the project owner. There are no negative comments received for the project.

Via checking questionnaires from local stakeholders and interviewing with staff from local environmental protection bureau and local residents during the site visit, it is confirmed by the verification team that during the implementation stage of this monitoring period, local authority has conducted spot checks on the implementation of the project periodically as per the request from the local governments' regulations. And it is confirmed by the verification team that there were no negative comments and issues from the local stakeholders during this monitoring period and the project passed all the periodic spot checks by local government.

4.3 AFOLU-Specific Safeguards

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

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

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

Baseline emissions

As per registered CDM PDD, baseline reductions are determined as:

$$BE_y = (MD_{project,y} - MD_{reg,y}) * GWP_{CH_4} + EG_y * CEF_{electricity,y}$$

Where:

- $MD_{project,y}$ amount of methane actually destroyed/combusted during the year y (tCH₄)
- $MD_{reg,y}$ amount of methane that would have been destroyed/combusted during the year “y” in the absence of the project activity (tCH₄).
- GWP_{CH_4} approved Global Warming Potential value for methane (28 tCO₂e/tCH₄)
- EG_y net quantity of electricity displaced during the year y (MWh)
- $CEF_{electricity,y}$ CO₂ emissions intensity of the electricity displaced during year y (tCO₂e/MWh)

$$MD_{project,y} = MD_{flare,y} + MD_{electricity,y}$$

Where:

- $MD_{flare,y}$ amount of methane destruction in flares during the year y (tCH₄)
- $MD_{electricity,y}$ amount of methane destruction in power plant during the year y (tCH₄).

$$MD_{flare,y} = (LFG_{flare,y} * w_{CH_4} * D_{CH_4}) - (PE_{flare,y} / GWP_{CH_4})$$

Where:

- $LFG_{flare,y}$ the quantity of landfill gas fed to the flare during the year measured in cubic meters (m³)
- w_{CH_4} average methane fraction of the landfill gas as measured during the year and expressed as a fraction (m³CH₄/m³LFG);
- D_{CH_4} methane density (tCH₄/m³CH₄)
- $PE_{flare,y}$ the project emissions from flaring of the residual gas stream in year y (tCO₂e)

$$PE_{flare,y} = \sum TM_{RG,h} * (1 - \eta_{flare,h}) * GWP_{CH_4} / 1,000$$

Where:

- $TM_{RG,h}$ mass flow rate of methane in the residual gas in the hour h (kg/h)

$\eta_{\text{flare},h}$ Flare efficiency in hour h (%)

$$TM_{RG,h} = FV_{RG,h} * fv_{CH4,RG,h} * \rho_{CH4,h}$$

Where:

$FV_{RG,h}$ volumetric flow rate of the residual gas in dry basis at normal conditions in hour h (m^3/h)

$fv_{CH4,RG,h}$ volumetric fraction of methane in the residual gas on dry basis in hour h (%)

$\rho_{CH4,h}$ density of methane at normal conditions (kg/m^3)

$$MD_{\text{electricity},y} = LFG_{\text{electricity},y} * w_{CH4} * D_{CH4}$$

Where:

$LFG_{\text{electricity},y}$ amount of landfill gas destruction in power plant (m^3)

$$EG_y = EL_y = EL_{EX,LFG} - EL_{IMP}$$

Where:

$EL_{EX,LFG}$ total amount of electricity exported out of the project boundary (MWh)

EL_{IMP} total amount of electricity imported to meet project requirement (MWh)

The data used for baseline emission calculations are presented as below:

Parameter	Description	2011	2012	2013	2014	2015	2016	2017	Total
LFG _{electricity,y}	The total quantity of LFG for power generation (m ³)	2,257,503.578	2,214,626.019	0	2,417,105.869	4,501,916.765	6,342,877.554	5,887,714.115	23,621,743.900
LFG _{flare,y}	The total quantity of LFG for flaring (m ³)	10,245.706	15,450.150	0	13,720.994	30,867.416	42,525.108	23,434.620	136,243.995
W _{CH4}	Methane fraction in the LFG (%)	44.84	43.48	0	43.36	43.00	43.86	43.55	43.62
f _{VCH4,RG,h}	Volumetric fraction of methane in the residual gas on dry basis in hour h (%)	44.84	43.48	0	43.36	43.00	43.86	43.55	43.62
FV _{RG,h}	Volumetric flow rate of the residual gas in day basis at normal conditions in the hour h (m ³ /h)	507.21	520.21	0	516.22	517.91	505.049	506.15	511.08
η _{flare,h}	Flare efficiency in hour h (%)	0	0	0	0	0	0	0	0
GWP _{CH4} (tCO _{2e} /tCH ₄)	Global warming potential of CH ₄	28	28	28	28	28	28	28	28
PE _{flare,y}	Project emissions from flaring of the	90.566	138.281	0	122.182	268.501	373.342	206.648	1,199.520

	residual gas stream in year y ((tCO ₂ e)								
MD _{electricity,y}	Amount of methane destruction in power plant during the year y (tCH ₄)	725.581	690.166	0	751.334	1,387.477	1,994.023	1,838.050	7,386.631
MD _{flare,y}	Amount of methane destruction in flares during the year y (tCH ₄)	0	0	0	0	0	0	0	0
MD _{project,y}	Amount of methane actually destroyed/combust ed during the year y (tCH ₄)	725.581	690.166	0	751.334	1,387.477	1,994.023	1,838.050	7,386.631
EL _{EX,LFG}	Total amount of electricity exported out of the project (MWh)	2,960.643	2,628.692	5.220	2,997.404	5,945.659	7,625.816	7,408.123	29,571.557
EL _{IMP}	Total amount of electricity imported to meet project requirements (MWh)	2.410	55.026	78.21 0	49.220	11.190	5.850	3.120	205.025
EL _y	Net quantity of electricity displaced during the year y (MWh)	2,958.234	2,573.666	72.99 0	2,948.184	5,934.469	7,619.966	7,405.003	29,366.532

BE _y	Baseline emission (tCO ₂ e)	22,842	21,522	0 ¹²	23,493	43,917	62,340	57,790	231,904
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¹² When calculating the emission reductions separately for the year 2013 and the year 2014, the emission reductions achieved in 2013 would have been -62, while the emission reductions in 2014 would have been 23,555. To avoid the negative value in 2013, the emission reductions in that year are modified to 0, and integrated into the year 2014, making the emission reductions in 2014 become 23,493.

Project emissions

As per the registered CDM PDD, Project emissions are considered as zero as no other fuels are used within the project boundary.

Leakages

Leakage does not need to be accounted for this project as per the CDM PDD.

Emission reductions

The emission reductions for this monitoring period was calculated as:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/07/2011 – 31/12/2011	22,842	0	0	22,842
01/01/2012 – 31/12/2012	21,522	0	0	21,522
01/01/2013 – 31/12/2013	0	0	0	0 ¹³
01/01/2014 – 31/12/2014	23,493	0	0	23,493
01/01/2015 – 31/12/2015	43,917	0	0	43,917
01/01/2016 – 31/12/2016	62,340	0	0	62,340
01/01/2017 – 18/11/2017	57,790	0	0	57,790
Total	231,904	0	0	231,904

¹³ When calculating the emission reductions separately for the year 2013 and the year 2014, the emission reductions achieved in 2013 would have been -62, while the emission reductions in 2014 would have been 23,555. To avoid the negative value in 2013, the emission reductions in that year are modified to 0, and integrated into the year 2014, making the emission reductions in 2014 become 23,493.

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

The emission reductions claimed are 231,904 tCO₂e in this monitoring period (i.e. 2,333 days). Compared with yearly expected emission reductions 137,914 tCO₂e in the CDM PDD, the reported emission reductions in this monitoring period are 73.7% less than that estimated in the registered CDM PDD, not leading to overestimation of VERs. Even considering the influence factor of 16 months shut-down, the decrease of installed capacity and the change of GWP_{CH4} from 21 to 28, the actual ER is still lower than the estimated value.

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

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

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

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

4.6 Non-Permanence Risk Analysis

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

5 VERIFICATION CONCLUSION

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions that have been reported for the project activity “Fuzhou Hongmiaoling Landfill Gas to Electricity Project” in China (VCS Project ID: 253) for the period 01/07/2011 to 18/11/2017.

The verification is based on the baseline and monitoring methodology ACM0001 (Version 5.0), CDM PDD (version 5 dated 06/05/2010) and the monitoring report (version 02 dated 10/09/2021). The verification consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification and certification report.

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

Our verification approach was based on the requirements as defined under the applicable VCS Version 4 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 CDM PDD;
- the monitoring plan in CDM PDD is as per the applied methodology;
- the monitoring complies with the monitoring plan in the CDM PDD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS Version 4 and CDM requirements;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

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

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

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

In CTI's opinion the GHG emissions reductions of the "Fuzhou Hongmiaoling Landfill Gas to Electricity Project" for the period 01/07/2011 to 18/11/2017 are fairly stated in the monitoring report (version 02 dated 10/09/2021). The GHG emission reductions were calculated correctly on the basis of the approved methodology ACM0001 (Version 5.0) and the monitoring plan contained in the CDM PDD (version 5 dated 06/05/2010).

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

Verification period: From 01/07/2011 to 18/11/2017

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

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/07/2011 – 31/12/2011	22,842	0	0	22,842
01/01/2012 – 31/12/2012	21,522	0	0	21,522
01/01/2013 – 31/12/2013	0	0	0	0 ¹⁴
01/01/2014 – 31/12/2014	23,493	0	0	23,493
01/01/2015 – 31/12/2015	43,917	0	0	43,917
01/01/2016 – 31/12/2016	62,340	0	0	62,340
01/01/2017 – 18/11/2017	57,790	0	0	57,790
Total	231,904	0	0	231,904

Li Ziqi

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Team Leader

13/09/2021

Zhang Lei

Mr. Zhang Lei

Technical Reviewer

13/09/2021

¹⁴ When calculating the emission reductions separately for the year 2013 and the year 2014, the emission reductions achieved in 2013 would have been -62, while the emission reductions in 2014 would have been 23,555. To avoid the negative value in 2013, the emission reductions in that year are modified to 0, and integrated into the year 2014, making the emission reductions in 2014 become 23,493.

APPENDIX A: ABBREVIATIONS

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

APPENDIX B: REFERENCES

Documentation used to verify the information provided by the project proponents

- /1/ Climate Bridge (Shanghai) Ltd.: VER/VCU Monitoring Report for Fuzhou Hongmiaoling Landfill Gas to Electricity Project, version 01 dated 10/07/2021, version 01.1 dated 22/07/2021, version 02 dated 10/09/2021.
- /2/ Climate Bridge (Shanghai) Ltd.: Emission reduction calculation spreadsheet for Fuzhou Hongmiaoling Landfill Gas to Electricity Project, version 01.1 dated 22/07/2021, version 02 dated 10/09/2021.
- /3/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd. and State Grid Fujian Electric Power Company Fuzhou Power Supply Company: Power Purchase Agreement for Fuzhou Hongmiaoling Landfill Gas to Electricity Project.
- /4/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: VER monitoring manual and management procedure.
- /5/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: Records of training for on-site staff.
- /6/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: Operation log, from 01/07/2011 to 18/11/2017.
- /7/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: Daily Operation Records, from 01/07/2011 to 18/11/2017.
- /8/ State Grid Fujian Electric Power Company Fuzhou Power Supply Company: ETNs, from 01/07/2011 to 18/11/2017.
- /9/ Registered CDM PDD version 5 dated 06/05/2010.
- /10/ Germanischer Lloyd Certification GmbH (GL): VCS Validation Report dated 18/11/2009;
DET NORSKE VERITAS (DNV): CDM Validation Report dated 17/11/2008.
- /11/ State Grid Fujian Electric Power Company Measurement Center: Calibration certificates for electricity meter covering this monitoring period.
- /12/ Shandong Provincial Quality and Technical Supervision Bureau: Metrological Authorization Certification of State Grid Fujian Electric Power Company Measurement Center, issued on 18/09/2009 valid till 07/09/2018.
- /13/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: Meter change record dated 15/02/2012
- /14/ State Economic and Trade Commission: Technical administrative code of electric energy metering (DL/T 448-2000).

- /15/ China Energy Statistical Yearbook 2003~2005
- /16/ China Power Electric Power Yearbooks 2003~2005
- /17/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: Monthly Report, from 01/07/2011 to 18/11/2017.
- /18/ Shanghai Inspection and Testing Institute of Instruments and Automatic Systems: Calibration certificates of flow meter, temperature transducer and pressure transducer covering the whole monitoring period.
- /19/ Shanghai Municipal Administration of Market Supervision: Metrological Authorization Certification of Shanghai Inspection and Testing Institute of Instruments and Automatic Systems, issued on 27/04/2015 valid till 27/04/2020, issued on 28/04/2020 valid till 28/04/2025.
- /20/ Photos of Monitoring System Display Screen
- /21/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: nameplate of the equipment
- /22/ Project construction progress of the project activity issued by the project owner
- /23/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: Operation Management Manual of the project activity
- /24/ Photos of electricity meter, gas analyzer, flow meter, Temperature transducer and Pressure transducer.
- /25/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: The attendance list of stakeholder consultation meeting
- /26/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: Notice on project owner's contact information and the stakeholder meeting
- /27/ Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.: The filled questionnaires from local stakeholders

Methodologies, tools and other guidance

- /28/ Verified Carbon Standard: VCS Standard, version 4.1.
- /29/ Verified Carbon Standard: VCS Program Guide, version 4.0.
- /30/ Verified Carbon Standard: Registration and Issuance Process, version 4.0.
- /31/ UNFCCC EB: Approved methodology, ACM0001, Version 5.0

Persons interviewed

- /32/ Mr. Qiu Zonghong, General Manager, Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.
- Ms. Lin Chunzhen, Assistant of manager, Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.
- Mr. Chen Qinjin, Chief, Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.
- Mr. Lin Hong, Staff, Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.
- Mr. Chen Hao, Staff, Fujian Tianyi Renewable Energy Technology & Utilization Co., Ltd.
- Mr. Luo Bin, Staff, Laizhou Local Environment Protection Bureau
- Mr. Zhang Jianguo, Villager, local resident
- Mr. Ren Hai, Villager, local resident
- Ms. Zhu Lijuan, Villager, local resident
- Mr. Liu Yanyu, Project Manager, Climate Bridge (Shanghai) Ltd.

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

Table 1: Corrective Action Requests

CAR ID	Corrective Action Request	Response by Project Proponent	Verification Team Assessment
01	The monitoring of parameter is not consistent with the same in the registered PDD.	The monitoring parameters have been revised in line with the requirement of registered PDD. And the reason why some ex-ante parameters are not included in the MR has been presented.	The verification team has checked updated MR and confirmed that the monitoring of parameter is now in line with the requirement of registered PDD. Therefore, CAR 01 was closed.

Table 2: Clarification Requests

CL ID	Clarification Request	Response by Project Proponent	Verification Team Assessment
01	Please clarify why the comparison of estimated ER and actual ER is not considering the shut-down of project and change of installed capacity.	In the updated MR, the comparison has been made considering the shut-down of project and change of installed capacity, and still the actual ER is lower than estimated value.	By checking updated MR , the verification team confirmed even considering shut-down of project and change of installed capacity, the actual ER is still lower than estimated value which will not lead to the overestimation of ER. Therefore, CL 01 was closed.

Table 3: Forward Action Requests

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