# VCS VERIFICATION REPORT

# NANNING LANDFILL GAS POWER GENERATION PROJECT

# (VCS PROJECT ID: 2464)

Document Prepared By

Shenzhen CTI International Certification Co., Ltd

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| Prepared By | Shenzhen CTI International Certification Co., Ltd. |
| Contact | Address: F8-A CTI Building, No.4 LiuXianSan Road, Xin'an Street, Bao'an District, 518101, Shen Zhen, China<br>Tel: +86 10 65580012<br>*Email: linshunrong@cti-cert.com*<br>Website: http://www.cti-cert.org |
| Approved By | Zhou Lu |
| Work Carried Out By | Team Leader: Du Wenjun<br>Technical Reviewer: Zhang Lei |

## Summary:

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions reported for the project activity "Nanning Landfill Gas Power Generation Project" (VCS Project ID: 2464) for the monitoring period 01/07/2021 to 31/12/2021, 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 4.2.

The verification was performed on the basis of VCS Programme Guide version 4.1 and VCS Standard version 4.2 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 CAR, no CL 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 26/01/2022) are fairly stated. The GHG emission reductions of the period were calculated correctly on the basis of approved methodology ACM0001 "Flaring or use of landfill gas" (Version 19.0) and the monitoring plan contained in the VCS PD (version 1.1 dated 22/04/2021).

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 "Nanning Landfill Gas Power Generation Project" during the period amount to 127,862 $tCO_2e$.

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# 1 INTRODUCTION

Swiss Carbon Value Ltd. has commissioned Shenzhen CTI International Certification Co., Ltd (CTI) to carry out the verification and certification of emission reductions reported for the "Nanning Landfill Gas Power Generation Project" (the project) for the period 01/07/2021 to 31/12/2021. 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 "Nanning Landfill Gas Power Generation Project" for the period 01/07/2021 to 31/12/2021.

## 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 4.1) /37/
- VCS Standard (version 4.2) /36/ and other relevant requirements defined by Verra;
- The approved methodology ACM0001 (Version 19.0) /39/ applied by the project;
- All information and references relevant to the project activity's resulting in emission reductions.

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

## 1.3 Level of Assurance

The verification report expresses a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement. CTI applied a materiality threshold of 5% (for projects with ER ≤ 300,000 $tCO_2e$ per year) with respect to emission or misstatements concerning reported quantities as per VCS standard (i.e. para 3.9.1 and 4.1.8(4) of VCS Standard, version 4.2).

## 1.4 Summary Description of the Project

**Sectoral Scope and Project Type**

According to the VCS Program Guide (version 4.1) /37/ 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: | Nanning Landfill Gas Power Generation Project |
| Project proponent: | Guangxi Ruirong Energy Technology Co., Ltd. (China) |
| Project location: | Pingli landfill site in Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, P.R China |
| VCS Project ID: | 2464 |
| Applied methodology: | ACM0001 Version 19.0 |
| VCS project crediting period: | 03/04/2020 to 02/04/2030 (the 10-year fixed VCS crediting period) |
| VCU verification period: | 01/07/2021 to 31/12/2021 |

# 2 VERIFICATION PROCESS

## 2.1 Method and Criteria

The verification was performed through means of the following three phases in accordance with the requirement of the VCS PD (version 1.1 dated 22/04/2021), the applied methodology, and the VCS Standard (version 4.2) and other relevant VCS requirements:

- A desk review of the monitoring report and all support documents;

- Follow-up interviews with project stakeholders and site inspection;
- The resolution of outstanding issues and the issuance of the verification report and statement.

The following sections outline each step in more detail.

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

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

## 2.2 Document Review

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

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

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

In addition to the VER/VCU monitoring report /1/, VCS PD (version 1.1 dated 22/04/2021) /11/ and emission reduction calculation spreadsheet /2/, the following documents also were assessed as a part of the verification audit:

- VCS Validation Report of VCS PD version 01.0 dated 28/04/2021 /12/;
- Monitoring period of 1st monitoring period, version 01.1 dated 16/07/2021 /29/;
- Verification Report of 1st monitoring period, version 01.0 dated 19/07/2021 /30/;
- Baseline and monitoring methodology ACM0001 applied by the project /39/;
- Relevant decisions, clarifications and guidance from the Verra /36/-/38/; 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 24/01/2022 and 25/01/2022, CTI visited Guangxi Ruirong Energy Technology Co., Ltd. performed on-site assessment. The key personnel of the project were interviewed or assisted the verification team /40/. 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 /40/ are summarized in the table below:

| Interviewed personnel | Role | Organization | Subject |
|---|---|---|---|
| Mr. Chen Anjiang | General Manager | Guangxi Ruirong Energy Technology Co., Ltd. | Operation of the project activity;<br>Implementation of the monitor plan of the project activity;<br>Data collection and data achievement;<br>Calibration of meters and equipment maintenance; |
| Mr. ChenHongtao | Administrative Staff | | |
| Mr. Li Chaoshen | Director of Production Department | | |
| Ms. Yang Ruyi | Staff | Pingli Landfill Site | Status of Pingli Landfill Site;<br>Management of Pingli Landfill Site. |
| Mr. Li Xianwen | Staff | Nanning City Xingning District Environmental Protection Bureau | The impact of the project activity;<br>The complaint by local stakeholders;<br>The stakeholder consultation during the operation of the project activity. |
| Ms. Chen Yi | Villager | Naxinpo Village | |
| Mr. Chen Tao | Villager | Dongzhipo Village | |
| Ms. Yang Sui | Project Manager | Swiss Carbon Value Ltd. | Data collection and ER calculation. |

## 2.4 Site Inspections

The verification team performed the on-site verification (Pingli landfill site in Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, P.R China) on 24/01/2022 and 25/01/2022. The interviewed personnel and objective are listed in above table. During the on-site assessment, CTI has applied standard auditing techniques to assess the quality of information provided. The following aspects of the project activity have been verified:

- An assessment of the implementation and operation of the registered project activity is as per the VCS PD;
- An assessment of the status and management of the landfill site is as per the VCS PD;

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

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

In addition, all parameters required by the monitoring methodology ACM0001 (Version 19.0), methodological tool, ie. "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 CAR and no CL in this monitoring period.

#### 2.5.1 Forward Action Requests

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

CTI confirmed that there was no FAR identified in validation /12//17/, and no FAR was raised during this verification.

## 2.6 Eligibility for Validation Activities

The VCS PD of the project activity was validated by LGAI Technological Center, S.A. (Applus+ Certification) on 28/04/2021 /12//13/. The proposed monitoring period 01/07/2021 to 31/12/2021 is the 2nd VCS verification, and CTI just undertook verification activities for the project according to the VCS Program Guide under scope 1 and 13. This section is thus not applicable.

# 3 VALIDATION FINDINGS

## 3.1 Participation under Other GHG Programs

The project was validated by LGAI Technological Center, S.A. (Applus+ Certification) on 28/04/2021 for registration of VCS PD (https://registry.verra.org/app/projectDetail/VCS/2464). The project does not participate in the other emissions trading program by checking public information on Internet, interviewing with project owner and statement issued by project owner.

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

## 3.2 Methodology Deviations

The validation process /12/ /13/ has assessed all factors and issues that constitute the basis for emission reductions from the project according to the applicable CDM methodology ACM0001 (Version 19.0) /36//39/. There was not any methodology deviation applied to this project. Details refer to section 4.1.

## 3.3 Project Description Deviations

By checking the registered VCS PD /12/ and site visit interview with project owner, it is confirmed that there were no project description deviations identified by CTI to this monitoring period.

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 VCS PD (version 1.1 dated 22/04/2021) /12/. Details refer to section 4.1.

## 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 Pingli landfill site in Xingning District, Nanning City, Guangxi Zhuang Autonomous Region, P.R China. The installed capacity of the project activity is 5.8 MW, consisting of 6 sets with each capacity of 0.966 MW. The landfill where the project located will process 1,135 tons of MSW each day. The feed-in electricity is estimated to be 365,083 MWh during the fixed 10 years crediting period. The actual implementation of the project during this verification period was verified in terms of name plate capacities of each gas-fired Engine / generator and monitoring equipment. The details of gas-fired Engine / generator with respect to installation and capacity have been verified to be consistent with description indicated in the VCS PD. The project activity started construction on 30/09/2019, which has been verified through checking Construction Contract of Power Distribution Project /20/. The gas-fired Engine / generator put into operation on 03/04/2020, which has been verified by site visit interview and checking validation report /12/, Operation and Maintenance Record /6/ and Completion Inspection Opinion of Power Receiving Project /23/. The electricity generated by the project activity was supplied to the South China Power Grid (SCPG), which can be confirmed by the Power Purchase Agreement (PPA) signed between the project owner and Guangxi Power Grid Co., Ltd. /3/. The project start date was identified as 03/04/2020 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 VCS PD. 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 /6/, CTI can confirm 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 /40/ 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 VCS PD (version 1.1 dated 22/04/2021). 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 VCS PD (version 1.1 dated 22/04/2021).

**Compliance of monitoring plan with monitoring methodology**

CTI is able to confirm that the monitoring plan in the VCS PD (version 1.1 dated 22/04/2021) is in accordance with the approved methodology applied by the project activity, i.e. ACM0001 (Version 19.0).

**Compliance of monitoring with the monitoring plan**

The monitoring has been carried out in accordance with the monitoring plan contained in the VCS PD (version 1.1 dated 22/04/2021). CTI confirms that all parameters stated in the monitoring plan are monitored and reported appropriately. All parameters required to be monitored by the monitoring plan as per the monitoring methodology ACM0001 (Version 19.0) and the management system were assessed during the site visit. The monitoring report lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, recording, calculation and reporting) for these parameters is provided. The information flow for the each parameter 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 PD /3/.

The parameter $BE_{CH4,SWDS,y}$ - methane generation from the landfill in the absence of the project activity, is only used for ex-ante estimation the parameter $F_{CH4,PJ,y}$. In this monitoring period, the parameter $F_{CH4,PJ,y}$ was ex post determined through monitoring parameters, which is consistent with the approved methodology ACM0001. Thus, the parameters, including $\varphi_y$, OX, F, $DOC_f$, $MCF_y$, $k_j$, $W_{j,x}$, $DOC_j$, $f_y$, $\eta_{PJ}$, which determined $BE_{CH4,SWDS,y}$ and $F_{CH4,PJ,y}$ ex-ante are not included in this report.

<u>Parameter monitored ex ante</u>

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

| Parameter title | Description | Data | Unit | Source |
|---|---|---|---|---|
| $OX_{top_layer}$ | Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline | 0.1 | / | Consistent with how oxidation is accounted for in the methodological tool "Emissions from solid waste disposal sites" |
| $GWP_{CH4}$ | Global warming potential of $CH_4$ | 28 | / | IPCC Fifth Assessment Report (AR5) |
| $EF_{grid,OM,y}$ | Operating margin $CO_2$ | 0.8042 | $tCO_2/MWh$ | 2019 Baseline Emission |

| | | | | |
|---|---|---|---|---|
| | emission factor in year y | | | Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA /17/ |
| $EF_{grid,BM,y}$ | Build margin $CO_2$ emission factor in year y | 0.2135 | $tCO_2/MWh$ | 2019 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA /17/ |
| $EF_{grid,CM,y}$ | Combined margin $CO_2$ emission factor in year y | 0.50885 | $tCO_2/MWh$ | 2019 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA /17/ |
| $R_u$ | Universal ideal gases constant | 8,314 | $Pa.m^3/kmol.K$ | Tool to determine the mass flow of a greenhouse gas in a gaseous stream |
| $MM_i$ | Molecular mass of greenhouse gas i | 16.04 | kg/kmol | Tool to determine the mass flow of a greenhouse gas in a gaseous stream |
| $P_n$ | Total pressure at normal conditions | 101,325 | Pa | Tool to determine the mass flow of a greenhouse gas in a gaseous stream |
| $T_n$ | Temperature at normal conditions | 273.15 | K | Tool to determine the mass flow of a greenhouse gas in a gaseous stream |

<u>Parameter monitored ex post</u>

By checking Monitor System Display Screen during site visit /21/, it is confirm by the verification team that the parameter $V_{t,wb}$ have been converted automatically into normal condition (0℃and 101,325Pa) during the monitoring process, therefore, $P_t$ and $T_t$ are not included as separate parameters according to the registered PD.

For all rest parameters, including Management of SWDS, $Op_{j,h}$, $EG_{PJ,y}$, $TDL_{k,y}$, $EC_{PJ,y}$, $TDL_{j,y}$, f, $v_{i,t,wb}$, $V_{t,wb}$, CAPEX and OPEX, Tariff of electricity exported were monitored and determined as per the monitoring plan which is listed as follows:

- **Management of SWDS**

This parameter was monitored annually by the project owner through following up with any changes in the management of Pingli landfill site. Through interview with staff from Pingli Landfill Site and by checking the Operation Management Manual of Pingli Landfill Site /11/, the verification team confirmed that there was no changes in the management of the SWDS after the implementation of the project activity, which is consistent with that in the registered PD and MR.

Staff from Pingli landfill site was interviewed, the Operation Management Manual of Pingli Landfill Site was checked, and on-site inspection was conducted by the verification team, all monitoring method and frequency meets the description in the PD.

- **Operation of the electricity generators that consume the LFG ($O_{pj,h}$)**

The methane was destructed through using for electricity generation. The project activity was in normal operational condition, while the operation hours of generators were monitored by the project owner. By checking Monitor System Display Screen during site visit /21/, 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 PD. The value of $O_{pj,h}$ is sourced from Operating Time Statistics of Generator Units /7/ which was generated by the project owner regularly.

The unit downtime is recorded in the Operation and Maintenance Record /6/. Data recorded in the Operating Time Statistics of Generator Units /7/ was crosschecked with that recorded in Daily Operation Report /8/ and verified to be consistent. By checking the same, the verification team confirmed the operational hours of generators in this monitoring period were:

| | |
|---|---|
| Generator 1# | 4,088 h |
| Generator 2# | 4,227 h |
| Generator 3# | 3,763 h |
| Generator 4# | 4,198 h |
| Generator 5# | 4,171 h |
| Generator 6# | 3,947 h |

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

2 bi-directional electricity meters were 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 hr of last day of each month, the staff from project owner will record the electricity meter readings and generate Monthly Reading Records (MRRs) /18/. At the same cut-off time, main meter readings will be recorded remotely and digitally by local power grid company and the data will be downloaded and transcribed into Electricity Transaction Notes (ETNs) /10/. After confirmation of transacted data, the project owner will issue the electricity invoice /9/.

Value of $EG_{PJ,y}$ was sourced from Monthly Reading Records /18/ issued by the project owner and ETNs /10/ issued by power grid company covering monitoring period. By checking the same, the verification team confirmed that the amount of electricity generated using LFG by the project activity in this monitoring period were 21,683.10 MWh.

- **Average technical transmission and distribution losses for providing electricity to source k in year y ($TD_{Lk,y}$)**

The default value (3%) from methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" was adopted for this parameter to calculate the baseline emissions, which is consistent with the registered VCS PD.

- **Amount of electricity consumed by the project activity in year y ($EC_{PJ,y}$)**

One main electricity meter and its backup meter were 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 hr of last day of each month, the staff from project owner will record the electricity meter readings and generate Monthly Electricity Meter Reading Records /18/. At the same cut-off time, main meter readings will be recorded remotely and digitally by local power grid company and the data will be downloaded and transcribed into Electricity Transaction Notes (ETNs) /26/.

Value of $EC_{PJ,y}$ was sourced from Monthly Reading Records /18/ from the project owner and ETNs of electricity consumed from the grid /26/ issued by the power grid company covering monitoring period. By checking the same, the verification team confirmed that the amount of electricity consumed by the project activity in this monitoring period were 0.9 MWh.

- **Average technical transmission and distribution losses for providing electricity to source j in year y ($TDL_{j,y}$)**

The default value (20%) from methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" was adopted for this parameter to calculate the project emissions, which is consistent with the registered VCS PD.

- **Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y (f)**

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

In the absence of the project, LFG from Pingli landfill site is emitted directly into atmosphere. Through interview with staff from Pingli Landfill Site and by checking the Operation Management Manual of Pingli landfill site /11/, the verification team confirmed that the methane was not captured at SWDS or not flare, combusted. And no other measures that prevents the emissions of methane to the atmosphere are taken. Therefore, the verification team confirmed the baseline scenario or monitoring plan will not change accordingly.

- **Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a wet basis ($v_{i,t,wb}$)**

The volumetric fraction of methane in the gaseous stream was measured by a continuous in-situ gas analyzer. By checking Monitor System Display Screen of Pretreatment control system during site visit /21/, the verification team confirmed that the readings of the gas analyzer was continuously monitored and hourly recorded by Online Monitoring System /21/ through recordable electronic signal, and was manually recorded in Pretreatment Monitoring Records /19/, which is consistent with methodology and registered PD.

Data recorded in Pretreatment Monitoring Records /19/ has been crosschecked with that in daily monitoring data of LFG Volumetric fraction recorded in Daily Operation Report /8/, which is verified to be consistent. By checking the same, it is confirmed value of $v_{i,t,wb}$ was 49.66% (hourly average value) for this monitoring period.

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

The volumetric flow of methane in the gaseous stream was measured by a continuous flow meter. By checking Monitor System Display Screen during site visit /21/, the verification team confirmed that the readings of the flow meter was continuously monitored and hourly recorded /21/ by Online Monitoring System through recordable electronic signal, and was manually recorded in Pretreatment Monitoring Records /19/, which is consistent with the registered PD.

By checking Monitor System Display Screen during site visit /21/, It is confirm by the verification team that the parameter $V_{t,wb}$ have been converted automatically into normal condition (0℃ and 101,325Pa) during the monitoring process. The readings of temperature transducer and pressure transducer measuring $T_t$ and $P_t$ was monitored automatically by Online Monitoring System through recordable electronic signal.

Data recorded in Pretreatment Monitoring Records /19/ has been crosschecked with that in daily monitoring data of LFG Volumetric fraction recorded in Daily Operation Report /8/, which is verified to be consistent. By checking the same, it is confirmed value of $V_{t,wb}$ was 3,016.31 $m^3$ wet gas/h (hourly average value at normal conditions) for this monitoring period.

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

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

By checking validation report /12/, Operation and Maintenance Record /6/ and Completion Inspection Opinion of Power Receiving Project /23/, as well as checking through site visit, it is confirmed all 6 gas-fired Engine / generators of the project activity put into operation on 03/04/2020 and the project activity does not involve any other phases, i.e. the project activity was fully implemented since 03/04/2020. Furthermore, by checking the monitoring report and verification report of previous monitoring period (the first issuance request) /29/ /30/, it is confirmed that this parameter has been justified at the first issuance request after full implementation and thereby consistent with the registered VCS PD and ACM 0001.

- **Tariff of the electricity exported**

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

By checking validation report /12/, Operation and Maintenance Record /6/ and Completion Inspection Opinion of Power Receiving Project /23/, as well as checking through site visit, it is confirmed all 6 gas-fired Engine / generators of the project activity put into operation on 03/04/2020 and the project activity does not involve any other phases, i.e. the project activity was fully implemented since 03/04/2020. Furthermore, by checking the the monitoring report and verification report of previous monitoring period (the first issuance request) /29/ /30/, it is confirmed that this parameter has been justified at the first issuance request after full implementation and thereby consistent with the registered VCS PD and ACM 0001.

In conclusion, the monitoring equipment have been installed in accordance with the monitoring plan of VCS PD (version 1.1 dated 22/04/2021). CTI has on-site checked the location of the monitoring equipment against the diagram of monitoring system and found them to be consistent. The data reported in the monitoring report and ERs calculation spreadsheet has been verified by the verification team. Supporting references and data required to determine the parameters for calculating emission reductions are found to be complete and transparent.

**Monitoring equipment and calibration**

The monitoring equipments /21/ have been calibrated periodically as per the relevant industrial standard by the qualified third party to ensure the monitoring equipments' accuracy and in good conditions. The relevant information of monitoring equipments' calibration /14//32//34/ is listed as below.

| Monitoring parameter | Monitoring equipment | Serial Number | Model | Accuracy Class | Calibration Date | Validity |
|---|---|---|---|---|---|---|
| $EG_{PJ,y}$<br>$EC_{PJ,y}$ | Electricity meter (main)<br>Electricity meter (backup) | 001700006603<br>001700007636 | DSSD718 | 0.5S | 15/03/2021 | 14/03/2022 |
| $v_{i,t,wb}$ | Gas analyzer | 63523/5 | GTR 196 | 2% | 06/02/2021 | 05/02/2022 |
| $V_{t,wb}$ | Flow meter | 19122401 | KZV | 0.5% | 08/12/2020 | 07/12/2021 |
| | | | | | 07/12/2021 | 06/12/2022 |
| | Temperature transducer | 19120776 | KZW/P-240E | 0.2 | 08/12/2020 | 07/12/2021 |
| | | | | | 07/12/2021 | 06/12/2022 |
| | Pressure transducer | 19120342 | KZY-KB-P | 0.25 | 09/06/2021 | 08/07/2021 |
| | | | | | 09/07/2021 | 08/08/2021 |
| | | | | | 09/08/2021 | 08/09/2021 |
| | | | | | 09/09/2021 | 08/10/2021 |
| | | | | | 09/10/2021 | 08/11/2021 |
| | | | | | 09/11/2021 | 08/12/2021 |
| | | | | | 09/12/2021 | 08/01/2022 |

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

The Gas analyzer was calibrated by a qualified third party, Shenzhen Academy of Metrology and Quality Inspection. Calibration records and accreditation certificates /32//33/ have been verified by the verification team. As per the calibration certificate, the zero verification with an inert gas ($N_2$) and one reading verification with a standard gas (single calibration gas, $CH_4$) was included. All calibration gases have been certified and were under their validity period. In the monitoring plan of the VCS PD, it stated that the gas analyzer will be calibrated and checked for accuracy. By checking the calibration reports, CTI found the calibration frequency of the gas analyzer is annual, which is in line with the monitoring plan of the VCS PD and the calibrations of meters are verified to be valid for the whole reporting period.

The flow meter, temperature transducer and Pressure transducer were calibrated by a qualified third party, Aviation Industry Corporation of China Beijing Great Wall Metrology and Testing Technology Research Institute. Calibration records and accreditation certificates /34//35/ have been verified by the verification team. In the monitoring plan of the VCS PD, it stated that these monitoring instruments will be calibrated and checked for accuracy. By checking the calibration reports, CTI found the calibration frequency of the flow meter and temperature transducer is annual, while the calibration frequency of Pressure transducer is monthly, which is in line with the monitoring plan of the VCS PD and the calibrations of these monitoring instruments are verified to be valid for the whole reporting period.

**Data management and control**

The project owner is responsible for operation and routine maintenance of power plant under the project activity. The quality assurance and quality control procedures have been addressed in the VER project management and monitoring manual /4/, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. By interview with the staff /40/ 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 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 under VCS, and no rejection from VCS 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 registered VCS PD version 1.1 dated 22/04/2021, Staff roster /31/, China's National Plan on Implementation of the 2030 Agenda for Sustainable Development and 17 SDGs defined by UNDP, interviewing with stakeholders during site visit, the verification team confirmed that the project activity would contribute sustainable development in the region and China's Sustainable Development Goals (SDG). The specific sustainable development goals that the project activity could achieve have been listed as follows:

- SDG13 "Take urgent action to combat climate change and its impacts": the project will utilize and destroy landfill gas that would otherwise be released directly into the atmosphere, effectively reducing GHG emissions and air pollution in the surrounding area and decreasing odour nuisance and minimizing health risks of local residents. Meanwhile, the project activity is able to increase the safety on the landfill through Proper extraction and utilization of the landfill gas, which minimizes the potential for LFG migration on site and reduce the explosion risks of landfill gas. This contributes to achieve one of China's stated sustainable development priorities "Actively adapt to climate change and strengthen resistance capacity to climate risks in agriculture, forestry, water resources and other key fields, as well as cities, coastal regions and ecologically vulnerable areas". During this monitoring period, total GHG emission reductions were 127,862 $tCO_2e$. By checking emission reductions of previous monitoring period through VERRA website, it is confirmed that the cumulative emission reductions were 374,794 $tCO_2e$ since operation of the project activity.

- SDG7 "Ensure access to affordable, reliable, sustainable and modern energy for all": the project activity will provide clean and renewable energy source through making use of landfill gas, displacing the power generation of fossil fuel power plants by using renewable energy sources, reducing fossil fuel consumption in SCPG. This contributes to one of the China's actions for promoting sustainable developing, "By 2030, increase the share of non-fossil fuels in primary energy consumption to about 20 percent". During this monitoring period, 21,683.10 MWh of net electricity generated using LFG and 21,682.20 MWh of renewable electricity was delivered to SCPG. By checking net electricity delivered to SCPG of previous monitoring period from VERRA website, it is confirmed that the cumulative renewable electricity delivered to SCPG was 57,759.61 MWh since operation of the project activity.

- SDG 8 “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”: the project activity increases 12 long term employment opportunities for the management, operation and maintenance of the power plant. This contributes to one of the China’s actions for promoting sustainable developing, “Increase labor force participation rate through implementation of the classification policy. Vigorously enforce the Law on Promotion of Employment”.

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

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

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

## 4.2 Safeguards

### 4.2.1 No Net Harm

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

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

### 4.2.2 Local Stakeholder Consultation

By checking the attendance list /25/, the verification team confirmed that a local stakeholder consultation meeting was held on 15/05/2020 by the project owner. Before the stakeholder consultation meeting, the project information with contact information and the stakeholder meeting notice /27/ were published on the bulletins at and nearby the project site on 15/04/2020 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 30 out of 30 questionnaires were returned with a 100% response rate.

The stakeholder meeting and the survey showed that the project receives no negative comments on its the construction and operation. All such conclusion has been verified through site visit and check registered VCS PD.

Through interviewing with local residents and checking the grievance book during site visit, it is confirmed that a grievance book is put at the project owner office. The local stakeholders can provide feedbacks on the grievance book. Via interviewing with staff from local environmental protection bureau during the site visit, it is confirmed by the assessment 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, there were no negative comments or issues from the local stakeholders during this monitoring period, 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 VCS PD, baseline reductions are determined as:

$BE_y = BE_{CH4,y} + BE_{EC,y}$

**Baseline emissions of methane from the SWDS ($BE_{CH4,y}$)**

As per ACM0001 and registered PD, $BE_{CH4} = \left(\left(1 - OX_{top_layer}\right) \times F_{CH4,PJ,y} - F_{CH,BL,y}\right) \times \mathrm{GWP_{CH4}}$. The calculation process has been included in the ER calculation spreadsheet and confirmed by the verification team to be correct. The value of parameters in the equation are listed as follows:

| Parameter | Description | 2021 | Total |
|---|---|---|---|
| $OX_{top_layer}$ | Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless) | 0.1 | 0.1 |
| $F_{CH4,PJ,y}$ ($tCH_4$) | Amount of methane in the LFG which is flared and/or used in the project activity | 4,623 | 4,623 |
| $F_{CH4,BL,y}$ ($tCH_4$) | Amount of methane in the LFG that would be flared in the baseline. No requirement in the baseline,therefore, it is 0. | 0 | 0 |
| $GWP_{CH4}$ ($tCO_{2e}/tCH_4$) | Global warming potential of $CH_4$ | 28 | 28 |
| $BE_{CH4,y}$ ($tCO_{2e}$) | Baseline emissions of methane from the SWDS | 116,499 | 116,499 |

As per registered VCS PD, for the project activity, $F_{CH4,\,PJ,y} = F_{CH4,\,EL,\,y}$, which is calculated using equation below:

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

With:

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

Where:

$F_{i,t}$ = Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h)

$V_{t,wb,n}$ = Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions ($m^3$ wet gas/h)

$v_{i,t,wb}$ = Volumetric fraction of greenhouse gas i in the gaseous stream in time interval t on a wet basis ($m^3$ gas i/$m^3$ wet gas)

$\rho_{i,n}$ = Density of greenhouse gas i in the gaseous stream at normal conditions (kg gas

i/m³ wet gas i)

$P_n$ = Absolute pressure at normal conditions (Pa)

$T_n$ = Temperature at normal conditions (K)

$MM_i$ = Molecular mass of greenhouse gas i (kg/kmol)

$R_u$ = Universal ideal gases constant (Pa.m³/kmol.K)

The detailed calculation process of $F_{CH4,PJ,y}$ has been included in the ER calculation spreadsheet and confirmed by the verification team to be correct. The value of $F_{CH4,PJ,y}$ during this monitoring period are as follows:

| Parameter | Description | 2021 | Total |
|---|---|---|---|
| $F_{CH4,PJ,y}$ ($tCH_4$) | Amount of methane in the LFG which is flared and/or used in the project activity | 4,623 | 4,623 |
| $F_{CH4,EL,y}$ ($tCH_4$) | Amount of methane in the LFG which is used for electricity generation | 4,623 | 4,623 |

<u>Baseline emissions associated with electricity generation ($BE_{EC,y}$)</u>

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

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

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

| Parameter | Description | 2021 | Total |
|---|---|---|---|
| $EC_{BL,k,y}$ (MWh) | Quantity of electricity that would be consumed by the baseline electricity consumption source k. In this project, the equivalent electricity is from SCPG. | 21,683.10 | 21,683.10 |
| $EF_{EL,k,y}$ ($tCO_2$/MWh) | Emission factor for electricity generation for source k ($tCO_2$/MWh). In this project, it is EF of SCPG. $EF_{EL,k,y}=EF_{grid,CM,y}$ | 0.50885 | 0.50885 |
| $TDL_{k,y}$ | Average technical transmission and distribution losses for providing electricity | 3% | 3% |

| | | | |
|---|---|---|---|
| | to source k | | |
| $BE_{EC,y}$ ($tCO_2$) | Baseline emissions associated with electricity generation | 11,364 | 11,364 |

Hence, the corresponding baseline emission reductions are calculated as:

| Parameter | Description | 2021 | Total |
|---|---|---|---|
| $BE_y$ ($tCO_{2e}$) | Baseline emissions | 127,863 | 127,863 |
| $BE_{EC,y}$ ($tCO_{2e}$) | Baseline emissions associated with electricity generation | 11,364 | 11,364 |
| $BE_{CH4,y}$ ($tCO_{2e}$) | Baseline emissions of methane from the SWDS | 116,499 | 116,499 |

**Project emissions**

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

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

In which

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

| Parameter | Description | 2021 | Total |
|---|---|---|---|
| $EC_{PJ,j,y}$ (MWh) | Quantity of electricity consumed by the project electricity consumption source j | 0.9 | 0.9 |
| $EF_{EL,j,y}$ ($tCO_2$/MWh) | Emission factor for electricity generation for source j | 0.50885 | 0.50885 |
| $TDL_{j,y}$ | Average technical transmission and distribution losses for providing electricity to source j | 20% | 20% |
| $PE_{EC,y}$ ($tCO_2$) | Emissions from consumption of electricity due to the project activity | 1 | 1 |

Hence, the corresponding project emissions are calculated as:

| Parameter | Description | 2021 | Total |
|---|---|---|---|
| $PE_y$ ($tCO_2$) | Project emissions | 1 | 1 |
| $PE_{EC,y}$ ($tCO_2$) | Emissions from consumption of electricity due to the project activity | 1 | 1 |

**Leakages**

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

**Emission reductions**

The emission reductions for this monitoring period was calculated as:

| Year | Baseline emissions or removals ($tCO_2e$) | Project emissions or removals ($tCO_2e$) | Leakage emissions ($tCO_2e$) | Net GHG emission reductions or removals ($tCO_2e$) |
|---|---|---|---|---|
| 01/07/2021-31/12/2021 | 127,863 | 1 | 0 | 127,862 |
| **Total** | **127,863** | **1** | **0** | **127,862** |

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

The emission reductions claimed are 127,862 $tCO_2e$ in this monitoring period (i.e. 184 days). Compared with yearly expected emission reductions 128,189 $tCO_2e$ (calculated as 254,289*184/365) in the VCS PD, the reported emission reductions in this monitoring period are 0.26% less than that estimated in the registered VCS PD, not leading to overestimation of VERs.

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 "Nanning Landfill Gas Power Generation Project" in China (VCS Project ID: 2464) for the period 01/07/2021 to 31/12/2021.

The verification is based on the baseline and monitoring methodology ACM0001 (Version 19.0), VCS PD (version 1.1 dated 22/04/2021) and the monitoring report (version 02 dated 26/01/2022). The verification consisted of the following three phases:

i) desk review of the project design and the baseline and monitoring plan;

ii) follow-up interviews with project stakeholders;

iii) resolution of outstanding issues and the issuance of the final verification and certification report.

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

Our verification approach was based on the requirements as defined under the applicable VCS Standard Version 4.2 and relevant UNFCCC requirements. Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is implemented and operated as per the VCS PD;
- the monitoring plan in VCS PD is as per the applied methodology;
- the monitoring complies with the monitoring plan in the VCS PD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS Standard Version 4.2 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 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.

In CTI's opinion the GHG emissions reductions of the "Nanning Landfill Gas Power Generation Project" for the period 01/07/2021 to 31/12/2021 are fairly stated in the monitoring report (version 02 dated 26/01/2022). The GHG emission reductions were calculated correctly on the basis of the approved methodology ACM0001 (Version 19.0) and the monitoring plan contained in the VCS PD (version 1.1 dated 22/04/2021).

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 01/07/2021 to 31/12/2021

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

| Year | Baseline emissions or removals ($tCO_2e$) | Project emissions or removals ($tCO_2e$) | Leakage emissions ($tCO_2e$) | Net GHG emission reductions or removals ($tCO_2e$) |
|---|---|---|---|---|
| 01/07/2021-31/12/2021 | 127,863 | 1 | 0 | 127,862 |
| **Total** | **127,863** | **1** | **0** | **127,862** |

Du wenjun

Mr. Du Wenjun

Team Leader

09/02/2022

Zhang Lei

Mr. Zhang Lei

Technical Reviewer

09/02/2022

# APPENDIX A: ABBREVIATIONS

| | |
|---|---|
| CAR | Corrective Action Request |
| CER | Certified Emission Reduction(s) |
| CL | Clarification request |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide Equivalent |
| CTI | Shenzhen CTI International Certification Co., Ltd |
| DOE | Designated Operational Entity |
| EF | Emission Factor |
| ER | Emission Reduction |
| FAR | Forward Action Request |
| GHG | Greenhouse Gas(es) |
| MP | MONITORING REPORT |
| MR | Monitoring Report |
| MRRs | Meter Reading Records |
| SCPG | South China Power Grid |
| PD | Project Description |
| PP | Project Proponent |
| VCS | Verified Carbon Standard |
| VCU | Verified Carbon Unit |

# APPENDIX B: REFERENCES

Documentation used to verify the information provided by the project proponents


/1/ Swiss Carbon Value Ltd.: VER/VCU Monitoring Report for Nanning Landfill Gas Power Generation Project, version 01 dated 14/01/2022 and version 02 dated 26/01/2022.

/2/ Swiss Carbon Value Ltd.: Emission reduction calculation spreadsheet for Nanning Landfill Gas Power Generation Project

/3/ Guangxi Ruirong Energy Technology Co., Ltd. and Guangxi Power Grid Co., Ltd.: Power Purchase Agreement for Nanning Landfill Gas Power Generation Project.

/4/ Guangxi Ruirong Energy Technology Co., Ltd.: VER monitoring manual and management procedure.

/5/ Guangxi Ruirong Energy Technology Co., Ltd.: Records of training for on-site staff.

/6/ Guangxi Ruirong Energy Technology Co., Ltd.: Operation and Maintenance Record, from 01/07/2021 to 31/12/2021.

/7/ Guangxi Ruirong Energy Technology Co., Ltd.: Operating Time Statistics of Generator Units, from 01/07/2021 to 31/12/2021.

/8/ Guangxi Ruirong Energy Technology Co., Ltd.: Daily Operation Report, from 01/07/2021 to 31/12/2021.

/9/ Guangxi Power Grid Co., Ltd.: Monthly electricity invoices of amount of electricity generated using LFG by the project activity in year y measured by electricity meter, from 01/07/2021 to 31/12/2021.

/10/ Electricity Transaction Notes (ETNs) - amount of electricity generated using LFG by the project activity in year y, issued by local power grid company, from 01/07/2021 to 31/12/2021.

/11/ Pingli Landfill site: Operation Management Manual of Pingli Landfill Site, issued on 01/01/2021.

/12/ Registered VCS PD version 1.1 dated 22/04/2021.

/13/ Shenzhen CTI International Certification Co., Ltd. (CTI): VCS Validation Report of VCS PD version 01.0 dated 28/04/2021

/14/ Guangxi Electric Energy Measurement and Testing Center: Calibration certificates for electricity meter covering this monitoring period.

/15/ General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China: Metrological Authorization Certification of Guangxi Electric Energy Measurement and Testing Center, issued on 06/11/2017 valid till 05/11/2022.

/16/ State Economic and Trade Commission: Technical administrative code of electric energy metering (DL/T 448-2016).

/17/ 2019 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020 published by China DNA

/18/ Guangxi Ruirong Energy Technology Co., Ltd.: Montly Reading Records - amount of electricity generated using LFG and amount of electricity consumed by the project activity in year y, from 01/07/2021 to 31/12/2021.

/19/ Guangxi Ruirong Energy Technology Co., Ltd.: Pretreatment Monitoring Records, from 01/07/2021 to 31/12/2021.

/20/ Construction Contract of Power Distribution Project signed between Guangxi Ruirong Energy Technology Co., Ltd. and Guangdong Nanchao Power Construction Co.,Ltd.

/21/ Photos of Monitoring System Display Screen, electricity meter, gas analyzer, flow meter, Temperature transducer and Pressure transducer.

/22/ Guangxi Ruirong Energy Technology Co., Ltd.: nameplate of the equipment

/23/ Completion Inspection Opinion of Power Receiving Project, issued by local power grid company on 03/04/2020

/24/ Guangxi Ruirong Energy Technology Co., Ltd.: Operation Management Manual of the project activity

/25/ Guangxi Ruirong Energy Technology Co., Ltd.: The attendance list of stakeholder consultation meeting

/26/ Electricity Transaction Notes (ETNs) - Amount of electricity consumed by the project activity in year y, from 01/07/2021 to 31/12/2021.

/27/ Guangxi Ruirong Energy Technology Co., Ltd.: Notice on project owner's contact information and the stakeholder meeting

/28/ Guangxi Ruirong Energy Technology Co., Ltd.: The filled questionnaires from local stakeholders

/29/ VERRA Website: Monitoring period of 1st monitoring period, version 01.1 dated 16/07/2021

/30/ VERRA Website: Verification Report of 1st monitoring period, version 01.0 dated 19/07/2021

/31/ Staff roster provided by the project owner

/32/ Shenzhen Academy of Metrology and Quality Inspection: Calibration certificates of gas analyzer, covering this monitoring period

/33/ Guangdong Provincial Market Supervision Administration: Metrological Authorization Certification of Shenzhen Academy of Metrology and Quality Inspection, issued on 30/07/2014 valid till 29/07/2019, issued on 30/07/2019 valid till 29/07/2024.

/34/ Aviation Industry Corporation of China Beijing Great Wall Metrology and Testing Technology Research Institute: Calibration certificates of flow meter, temperature transducer and pressure transducer covering the whole monitoring period.

/35/ General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China: Metrological Authorization Certification of Aviation Industry Corporation of China Beijing Great Wall Metrology and Testing Technology Research Institute, valid from 29/12/2015 to 28/12/2020, from 29/12/2020 to 29/12/2025

Methodologies, tools and other guidance

/36/ Verified Carbon Standard: VCS Standard, version 4.2.

/37/ Verified Carbon Standard: VCS Program Guide, version 4.1.

/38/ Verified Carbon Standard: Registration and Issuance Process, version 4.1.

/39/ UNFCCC EB: Approved methodology, ACM0001, Version 19.0

Persons interviewed

/40/ Mr. Chen Anjiang, General Manager, Guangxi Ruirong Energy Technology Co., Ltd.

Mr. ChenHongtao, Administrative Staff, Guangxi Ruirong Energy Technology Co., Ltd.

Mr. Li Chaoshen, Director of Production Department, Guangxi Ruirong Energy Technology Co., Ltd.

Ms. Yang Ruyi, Staff, Pingli Landfill Site

Mr. Li Xianwen, Staff, Nanning City Xingning District Environmental Protection Bureau

Ms. Chen Yi, Villager, Naxingpo Village

Mr. Chen Tao, Villager, Dongzhipo Village

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

Table 1: Corrective Action Requests

| CAR ID | Corrective Action Request | Response by Project Proponent | Verification Team Assessment |
|---|---|---|---|
| 01 | Please update MR as per "VCS-Monitoring-Report-Template-v4.1" that issued by VERRA on 20/01/2022 and supplement more detailed SD contributions, eg. SDG targets and indicators, cumulative SD contributions over project lifetime. | The MR has been updated as per "VCS-Monitoring-Report-Template-v4.1" that issued by VERRA on 20/01/2022 and more detailed SD contributions, eg. SDG targets and indicators, cumulative SD contributions over project lifetime have been supplemented in the updated MR. | By checking MR (Version 02 dated 26/01/2022), it is confirmed that"VCS-Monitoring-Report-Template-v4.1" that issued by VERRA on 20/01/2022 has been applied. Furthermore, the detailed SD contributions, eg. SDG targets and indicators, cumulative SD contributions over project lifetime, have been supplemented and confirmed by the assessment team to be correct.<br>Therefore, CAR 01 was closed. |

Table 2: Clarification Requests

| CL ID | Clarification Request | Response by Project Proponent | Verification Team Assessment |
|---|---|---|---|
| NA | NA | NA | NA |

Table 3: Forward Action Requests

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