VCS Verification Report

Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project

(VCS Project ID: 2880)

Document Prepared By CTI Certification Co., Ltd.

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Summary:

CTI Certification Co., Ltd. (CTI Certification) has performed the verification of the emission reductions reported for the project activity "Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project" (VCS Project ID: 2880) for the monitoring period 05/08/2020 to 31/05/2023, 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 (VCUs) under the Verified Carbon Standard (VCS) version 4.5.

The verification was performed on the basis of VCS Programme Guide version 4.4 and VCS Standard version 4.5 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 4 CARs, 0 CL and 0 FAR in this monitoring period.

In CTI's opinion, the GHG emission reductions reported for the project in the monitoring report (version 2.4 dated 08/09/2023) are fairly stated. The GHG emission reductions of the period were calculated correctly on the basis of approved methodology AMS-III.D: Methane recovery in animal manure management systems, version 21.0 and the monitoring plan contained in the VCS PD (version 3.0 dated 06/12/2022).

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 "Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project" during the period amount to 20,326 tCO_2e.

Contents

1 INTRODUCTION

Climate Bridge (Shanghai) Ltd. has commissioned CTI Certification Co., Ltd. (CTI Certification) to carry out the verification and certification of emission reductions reported for the "Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project" (the project) for the period 05/08/2020 to 31/05/2023. 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 "Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project" for the period 05/08/2020 to 31/05/2023.

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 4.4) /43/
- VCS Standard (version 4.5) /42/ and other relevant requirements defined by Verra;
- The approved methodology AMS-III.D: Methane recovery in animal manure management systems, version 21.0 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 3.10.1 and 4.1.10 (4) of VCS Standard, version 4.5).

1.4 Summary Description of the Project

Sectoral Scope and Project Type

According to the VCS Program Guide (version 4.4) /43/ and Annex A of the Kyoto Protocol, the project is applicable under the following activity categories:

- Sectoral Scope 1: Energy (renewable/non-renewable)
- Sectoral scope 13: Waste handling and disposal
- VCS Scope 15: Livestock and manure management
- Project type: animal manure management project

Project Background

Project title:	Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project
Project proponent:	Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Branch (Project Owner, host country, P. R. China) Climate Bridge (Shanghai) Ltd. (Consultancy)
Project location:	Binhai Breeding Swine Farm, Zhanhua District, Binzhou City, Shandong Province, P.R China. Geographic coordinates: East longitude 118°10'54" and North latitude 37°52'43"
VCS Project ID:	2880
Applied methodology:	AMS-III.D, version 21.0
VCS project crediting period:	05/08/2020 to 04/08/2027 (first crediting period and 3*7 renewal crediting period)
VCU verification period:	05/08/2020 to 31/05/2023

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 3.0 dated 06/12/2022), the applied methodology, and the VCS Standard (version 4.5) 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	Shunrong LIN	1, 3, 13, 14, 15	☒ DR ☒ SV ☒ RP ☐ TR
Technical Reviewer	Lei ZHANG	1, 4, 13	☒ DR ☐ SV ☐ RP ☒ TR
TR Expert	Qinghua DAI	13, 15	☒ 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 3.0 dated 06/12/2022) /3/ and emission reduction calculation spreadsheet /2/, the following documents also were assessed as a part of the verification audit:

- VCS Validation Report, version 02.0 dated 09/12/2022 /4/;
- Baseline and monitoring methodology AMS-III.D applied by the project /45/;
- Relevant decisions, clarifications and guidance from the Verra /42/-/43/; 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 26/07/2023-27/07/2023, CTI visited Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Branch performed on-site assessment of the project activity (Huaquan Village, Binhai Town, Zhanhua District, Binzhou City, Shandong Province, People's Republic of China). The key personnel of the project were interviewed or assisted the verification team. Main topics of the interview cover implementation of the project construction, applicability of selected methodology, implementation of project monitoring, emission reduction calculation, etc.

The key personnel interviewed are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Li Caizhi	Plant Manager	Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Branch	Operation of the project activity; Implementation of the monitor plan of the project activity; Data collection and data achievement;
Ms. Wang Xiaoqian	Financial Manager		Data collection, QA/QC and data achievement; Calibration of meters and equipment maintenance; No net harm assessment; SDG contribution of the project activity.
Mr. Xu Bin	Staff	Zhanhua Environmental Protection Bureau	The impact of the project activity; The complaint by local stakeholders; The stakeholder consultation during the operation of the project activity; SDG contribution of the project activity.
Mr. Guo Jinzhen	Local resident		
Mr. Zhou Yuncang			
Ms. Wang Tingting			

Ms. Dou Jinhua			
Ms. Chen Yujie	Project Manager	Climate Bridge (Shanghai) Ltd.	Data collection and ER calculation.

2.4 Site Inspections

The verification team performed the on-site verification (Huaquan Village, Binhai Town, Zhanhua District, Binzhou City, Shandong Province, People's Republic of China) on 26/07/2023-27/07/2023. 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;
- 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;
- 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 Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Branch 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 AMS-III.D: Methane recovery in animal manure management systems, version 21.0, methodological tool, ie. Tool 14: Project and leakage emissions from anaerobic digesters, version 02.0; Tool 06: Project emissions from flaring, Version 03.0 and the management system were assessed during the site visit.

2.5 Resolution of Findings

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

i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;

ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;

iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project proponents.

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

The verification team identified 4 CARs and 0 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 /4/, and no FAR was raised during this verification.

2.6 Eligibility for Validation Activities

The VCS PD of the project activity was validated by CTI Certification Co., Ltd. on 09/12/2022 /4/ (https://registry.verra.org/app/projectDetail/VCS/2880). The proposed monitoring period 05/08/2020 to 31/05/2023 is the 1st VCS verification.

As per 4.1.27(2) of VCS Standard version 4.5, Validation (including project crediting period renewal validation) and the first verification of a project (in a given project crediting period) may be undertaken by the same validation/verification body and a validation/verification body shall not verify more than six consecutive years of a project's GHG emission reductions or removals. CTI conducted validation and first verification (with monitoring period less than 6 years) of the project activity and therefore it is confirmed that 4.1.23 of VCS Standard version 4.5 have been met.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The project was validated by CTI Certification Co., Ltd. on 09/12/2022 for registration of VCS PD (https://registry.verra.org/app/projectDetail/VCS/2880). 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 and CTI conducted verification not more than six consecutive years of this project's GHG emission reductions or removals.

3.2 Methodology Deviations

The validation process /4/ has assessed all factors and issues that constitute the basis for emission reductions from the project according to the applicable CDM methodology AMS-III.D: Methane recovery in animal manure management systems, version 21.0 /45/. 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 /3/ and site visit interview with project owner, it is confirmed that there is no major changes to project design, but there were some project description deviations identified by CTI to this monitoring period.

Deviation 1 (project implementation):

As per registered VCS PD, the biogas will be utilized by the biogas heating system for heat generation during the heating period (October to April next year) and will be destroyed in the biogas flaring system during the rest of the months (May to September). The emission reductions generated by displacing fossil-fuel based heat supply during heating period will not be claimed by PP.

However, during site interview and inspection, it was identified the biogas heating system was not put into operation during this monitoring period. The biogas produced during the heating period (October to April next year) has also been destroyed in the biogas flaring system, i.e. all biogas produced has been destroyed in the biogas flaring system during this monitoring period. Since the destroy of biogas by using biogas flaring system has been described in the registered VCS PD, validated in the Validation Report and approved by Verra, CTI deemed the deviation identified do not impact the applicability of the methodology or the appropriateness of the baseline scenario.

Besides, As per AMS-III.D, project activities may demonstrate the additionality by showing that there is no regulation in the host country, applicable to the project site, that requires the collection and destruction of methane from livestock manure. If so, it is not required to apply the "Guidelines on the demonstration of additionality of small-scale project activities". This additionality condition also applies to Greenfield project activities.

CTI confirmed that there is no regulation in China, applicable to the project site, that requires the collection and destruction of methane from livestock manure. Therefore, it is confirmed the project activity is still deemed automatically additional and the deviation does not impact the additionality of the project activity. Besides, since the flare efficiency is 90% when the biogas was flared and the methane destruction efficiency is 100% when the biogas is combusted for energy, the assessment team confirmed that the emission reductions resulted by the deviation will be conservative.

Deviation 2 (monitoring plan):

In the registered VCS PD, the parameter $BG_{burnt,y}$ was described as "Biogas flared in year y" and was measured by flow meter installed at the inlet of the flaring system. In the MR, the description of parameter $BG_{burnt,y}$ has been revised to "Biogas volume in year y", which is fully consistent with that in AMS-III.D (version 21.0). The location of the flow meter has been revised to "at the outlet of the biogas pre-treatment system". The assessment team confirmed the change of flow meter location will not lower the accuracy of monitoring, the calculation of emission reductions and is in compliance with AMS-III.D (version 21.0).

In conclusion, CTI confirmed the deviations identified do not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario, and do not impact the monitoring activities or calculation of emission reductions. The deviation has been appropriately described and justified in the Monitoring Report, and the project remains in conformance with the VCS rules.

Except the above deviations, 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 3.0 dated 06/12/2022) /3/. Details refer to section 4.1.

3.4 grouped project

The project is not a grouped project activity, therefore, this section is not applicable.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

Project Implementation in accordance with the registered project design document

The project activity uses an anaerobic animal manure management system to treat manure waste (Breeding swine) from Binhai Breeding Swine Farm, which is located in Binhai Breeding Swine Farm, Zhanhua District, Binzhou City, Shandong Province, P.R China, of which the main purpose is to use HDPE membrane enclosed anaerobic digesters to treat animal manure waste and collect the generated biogas, avoiding methane emissions. During this monitoring period, the biogas has been destroyed in the biogas flaring system. The residual waste from the HDPE membrane enclosed anaerobic digesters will be handled aerobically to produce organic fertilizer at the project site.

During the 3*7 renewable crediting period, the project activity avoids the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. It's estimated that the project activity could achieve average annual GHG emission reductions of 11,795 tCO_2e and total GHG emission reductions of 82,563 tCO_2e during the first 7-year crediting period.

By checking the Construction contract /8/ signed between the project owner and construction party (Binzhou Hongda Construction and Installation Engineering Co., Ltd.) and Construction Start Confirmation Letter issued by the construction party and supervision party, the assessment team

confirmed that the project started construction on 16/10/2019. By checking Operation Log /6/, as well as through site interview, it is confirmed that the anaerobic animal manure treatment system started operation on 05/08/2020, i.e. GHG emission reductions generated since 05/08/2020.

The details of HDPE membrane enclosed anaerobic digesters with respect to installation and capacity have been verified to be consistent with description indicated in the registered VCS PD (version 3.0 dated 06/12/2022). The first VCS crediting period of the project is determined as from 05/08/2020 to 04/08/2027. The technical parameters of biogas flaring system (type: HJ-200 and rated capacity: 2.2KW/H) utilized by the project activity have been verified by checking the nameplate /17/.

Via checking daily operation and maintenance records /6/ of the project activity, onsite investigation and through interviewing with the project owner, the verification team confirmed that:

- there is no major changes to project design, but some minor deviations have been identified when compared with the registered VCS PD /3/ during this monitoring period, refer to section 3.3 of this report for detailed assessment;

- all required equipments and procedures are available and implemented in an appropriate manner;

- the project activity are completely operational and all necessary monitoring instruments are installed;

- all required instruments including standby and operating procedures for the same have been implemented in an appropriate manner;

- neither mistakes nor malfunction on main meters have been observed during this monitoring period.

- the control system at the plant is automated and assures continuous operation, including monitoring on malfunction of equipment;

- no serious malfunction happened and the plant was under a normal operation as expected in this monitoring period.

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

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

- the monitoring plan contained in the VCS PD (version 3.0 dated 06/12/2022) is in accordance with the approved methodology applied by the project activity, i.e. AMS-III.D: Methane recovery in animal manure management systems, version 21.0;

- the implementation of the project is basically in accordance with the VCS PD (version 3.0 dated 06/12/2022) /3/, one deviation has been identified (refer to section 3.3 of this report for detailed assessment);

- all the monitoring system in operation period is basically in accordance with the VCS PD (version 3.0 dated 06/12/2022), one deviation has been identified (refer to section 3.3 of this report for detailed assessment);

- all physical features of the proposed project activity including data collection systems and storage systems have been implemented in accordance with the VCS PD (version 3.0 dated 06/12/2022) through visual inspection and document review.

Participation or any rejection under any other GHG programs

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. The same has been confirmed through interviewing with project owner and statement issued by project owner.

Other Forms of Credit and Supply Chain (Scope 3) Emissions

- ✓ Emission Trading Programs and Other Binding Limits: The verification team checked the REC Mechanism database of China, Chinese Emission Trading System (Chinese ETS) and Chinese Certified Emission Reduction Mechanism, and found that the project activity is not accredited / registered under REC mechanism, Chinese ETS, or CCER mechanism. Also, CCER mechanism is currently suspended by Chinese government, the project activity will not and is not allowed to registered under CCER mechanism. Thus, the assessment team concluded that the project activity did not involved on other emissions trading programs and other binding limits.
- ✓ Other Forms of Environmental Credit: The verification team checked the REC Mechanism database of China, I-REC database and confirmed that 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.
- ✓ Supply Chain (Scope 3) Emissions: the project is a manure management project, of which the main purpose is to use HDPE membrane enclosed anaerobic digesters to treat animal manure waste and collect the generated biogas, avoiding methane emissions. During this monitoring period, the biogas has been destroyed in the biogas flaring system. As per Clarification to VCS program rules and requirements issued on 31/05/2023, projects are not required to complete the sections in the affected VCS project templates that relate to Scope 3 emissions double claiming until the effective date of the revised requirements of 1 January 2024.

In conclusion, 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.

SD contributions resulted by implementation of the project activity

By checking registered VCS PD (version 3.0 dated 06/12/2022), EIA Report /15/, HR Records /12/, 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 uses HDPE membrane enclosed anaerobic digesters to treat animal manure, collect and destroy the generated biogas, avoiding methane emissions. 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 reduction was 20,326 tCO_2e and the cumulative Contributions Over Project Lifetime were 20,326 tCO_2e achieved emission reductions.

- **SDG 8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all"**: the project activity increases 30 employment opportunities. This contributes to one of China's actions for promoting sustainable developing: "by 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value".

- **SDG 6 "Ensure availability and sustainable management of water and sanitation for all"**: the project activity will enhance the quality of the water, decrease odour nuisance, improve the working environment of the workers of the livestock farm, and minimize health risks of local residents. This contributes to one of China's actions for promoting sustainable developing: "Continue to implement water pollution prevention and control. Coordinate the development of high quality protection and high levels of development and continuously improve the ecological environment of the basin. During this monitoring period, at least 4,639.0882 tons of livestock manure has been prevented from discharging into the farm and groundwater system.

4.2 Safeguards

4.2.1 No Net Harm

The Environmental Impact Assessment (EIA) Report of the project activity was approved by the Environmental Protection Bureau of Zhanhua District, Binzhou City on 29/11/2018 (Approval No. "Zhanhuanzi [2018] No.76") /16/. By checking the Environmental Impact Assessment (EIA) summary /15/ and conclusion provided in the VCS PD, it is confirmed that the impact caused by making use of biogas generated from anaerobic digestion of animal manure waste for heat 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.

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

4.2.2 Local Stakeholder Consultation

As per the registered VCS PD (version 3.0 dated 06/12/2022), the local stakeholder's consultation was conducted on 06/05/2019 through distributing a questionnaire which was designed to be easily

filled in. 30 copies of questionnaire were distributed. The participants filled in the questionnaires included local residents, builders and members of the local authorities. The opinions expressed by the stakeholders were recorded and are available on request. The survey showed that the project receives strong support from the local community. They all believe the project will provide job opportunities and promote local economic development and agree with the project development and construction.

Via checking questionnaires from local stakeholders /13/, it was verified stakeholder consultation survey has been conducted in November 2020 and October 2022 during this monitoring period. It is confirmed by the verification team that there were no negative comments have been identified from the questionnaires. Via interviewing with staff from local environmental protection bureau and local residents during the site visit, it is confirmed by the verification team that local authority has conducted spot checks on the implementation of the project periodically as per the request from the local governments' regulations during this monitoring period. 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

The monitoring has been carried out in accordance with the monitoring plan contained in the VCS PD (version 3.0 dated 06/12/2022). 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 AMS-III.D, version 21.0 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 VCS PD (version 3.0 dated 06/12/2022) /3/.

Parameter monitored ex ante

The data in table below has been verified against the data sources and the registered VCS PD (version 3.0 dated 06/12/2022) /3/.

Parameter	Description	Data	Unit	Source
GWP_{CH4}	Global Warming Potential of CH_4	28	tCO_2e/tCH_4	The value of this parameter is ex-ante determined in VCS PD (version 3.0 dated 06/12/2022), which is sourced from IPCC Fifth Assessment Report (AR5).

D_{CH4}	CH_4 density	0.00067 (at 20°C and 1 atm pressure)	$kgCH_4/Nm^3$ CH_4	The value of this parameter is ex-ante determined in VCS PD (version 3.0 dated 06/12/2022), which is sourced from AMS-III.D version 21.0.
UF_b	Model correction factor to account for model uncertainties	0.94	/	The value of this parameter is ex-ante determined in VCS PD (version 3.0 dated 06/12/2022), which is sourced from AMS-III.D version 21.0.
MCF_j	Annual methane conversion factor (MCF) for the baseline animal manure management system j	73%	/	As per Section 1.1 of the latest released VCS Standard (version 4.5), when external documents are referenced, and when such documents are updated, the most recent version of the document shall be used. Value of this parameter is ex-ante determined in VCS PD (version 3.0 dated 06/12/2022), which is sourced from Table 10.17, chapter 10, volume 4, IPCC 2006 Guidelines. In this monitoring report, value of this parameter was sourced from 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories. By checking public information (http://www.weather.com.cn/cityintro/101121101.shtml), it is confirmed the climate zone of project site belongs to Warm Temperate Moist. Therefore, default value of Warm Temperate Moist, i.e. 73%, sourced from Table 10.17 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 10 was applied. MCF_j value of the project activity is determined based on average annual local temperature.
$B_{0,LT}$	Maximum methane producing potential of the volatile solid generated for animal type LT	0.45 for Western European Adult Breeding Swine	m^3 CH_4/kg-VS	As per Section 1.1 of the latest released VCS Standard (version 4.5), when external documents are referenced, and when such documents are updated, the most recent version of the document shall be used. Value of this parameter is ex-ante determined in VCS PD (version 3.0 dated 06/12/2022), which is sourced from Tables 10 A-4 to 10 A-9 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10. In this monitoring report, value of this parameter was sourced from 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories. During site visit and via checking EIA Approval /40/, it was verified the project is located in Shandong Province, China, Asia. By checking EIA Report /41/, it was verified the swine farm is with High Productivity Systems. Therefore, IPCC default values from Table 10.16 of Volume 4 Chapter 10 of 2019 Refinement to the 2006 IPCC Guidelines for swine in Other Region with High Productivity Systems, i.e. 0.45 m^3CH_4/kg-VS was applied.
$MS\%_{BL,j}$	Fraction of manure	100%	/	The value of this parameter is ex-ante

	handled in baseline animal manure management system j			determined in VCS PD (version 3.0 dated 06/12/2022), which is sourced from EIA Report /15/ and FSR /11/ of the project activity. This parameter was also monitored expost. Via on site investigation, it was verified 100% of manure are handled in baseline animal manure management system, i.e. the anaerobic treatment system (open lagoon).
$VS_{default}$	Default value for the volatile solid excretion per day on a dry-matter basis for a defined livestock population	0.456	kg-dm/hd/day	As per Section 1.1 of the latest released VCS Standard (version 4.5), when external documents are referenced, and when such documents are updated, the most recent version of the document shall be used. Value of this parameter is ex-ante determined in VCS PD (version 3.0 dated 06/12/2022), which is sourced from Table 10A-8 of IPCC 2006 Guidelines for National Greenhouse Gas Inventories volume 4, chapter10. In this monitoring report, value of this parameter was sourced from 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories. As per Table 10.13A of Chapter 10, Volume 4, 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, the default value for volatile solid excretion rate ($VS_{default}$) is 2.4kg/1000kg animal mass/day. As per Table 10A.5, the default value for live weights for adult breeding swine in Western Europe is 190kg. Therefore, $VS_{default}$ is calculated to be 190kg animal mass/hd * 2.4kg/1000kg animal mass/day = 0.456kg/hd/day.
$f_{CH4,default}$	Default value for the fraction of methane in the biogas	0.6	/	As per registered VCS PD (version 3.0 dated 06/12/2022), option 2 (Procedure using a default value) of the step "Determination of the quantity of methane produced in the digester" in Tool 14 was applied.

Parameter monitored ex post

- **Fraction of manure handled in system i in project activity in year y ($MS\%_{i,y}$)**

By checking Operation log /6/ of the project activity, as well as on site investigation, it is confirmed that 100% of the animal manure has been handled in the anaerobic manure management system. Therefore, 100% has been used in calculation of emission reductions and the monitoring of this parameter is in compliance with the registered VCS PD.

- **Number of animals produced annually of type LT for the year y ($N_{p,y}$)**

As per registered VCS PD, "the number of breeding swine on the farm will be recorded monthly in the operation records". By checking Monthly Production Report /18/, it is confirmed that the number of animals sold, i.e. number of animals produced during this monitoring period has been monthly recorded, which is in compliance with the registered VCS PD. By checking Operation Log /6/, it was verified no adult breeding swine appeared on-site during 01/07/2021 to 31/01/2022. As confirmed with PP, this is because all adult breeding swine was transferred out due to swine fever. For year 2021

and 2022, the annual number of animals produced is therefore calculated based on month weighted mean of the first 6 months of 2021 and the last 11 months of 2022.

Data used for ER calculation was sourced from Monthly Production Report /18/, which has been crosschecked with that in Breeding Archives Report issued by Binzhou Animal Husbandry and Veterinary Bureau /19/. Besides, number of animals produced during this monitoring period that recorded in Monthly Production Report /18/ has been checked with the amount of food purchased in Breeding Archives Report issued by Binzhou Animal Husbandry and Veterinary Bureau /19/ and it is verified that number of animals produced during this monitoring period in Monthly Production Report /18/ is reasonable. It is confirmed that the value of $N_{p,y}$ of this monitoring period was:

Monitoring period	$N_{p,y}$
05/08/2020 - 31/12/2020	13,243
01/01/2021 - 31/12/2021	8,280
01/01/2022 - 31/12/2022	12,595
01/01/2023 - 31/05/2023	16,522

- **Number of days animal is alive in the farm in the year y ($N_{da,y}$)**

As per registered VCS PD, "the number of alive days of swine on the livestock farm will be recorded monthly in the operation records". By checking Monthly Production Report /18/, it is confirmed that the number of days animal is alive in the farm during this monitoring period has been monthly recorded, which is in compliance with the registered VCS PD. By checking Operation Log /6/, it was verified no adult breeding swine appeared on-site during 01/07/2021 to 31/01/2022. As confirmed with PP, this is because all adult breeding swine was transferred out due to swine fever. For year 2021 and 2022, the number of days animal is alive in the farm is therefore determined based on the days of the first 6 months of 2021 and the last 11 months of 2022.

Data used for ER calculation was sourced from Monthly Production Report /18/ and has been crosschecked with that in the Breeding Archives Report issued by Binzhou Animal Husbandry and Veterinary Bureau /19/. All the data have been verified by CTI to be consistent. It is confirmed that the value of $N_{da,y}$ of this monitoring period was:

Monitoring period	$N_{da,y}$
05/08/2020 - 31/12/2020	365
01/01/2021 - 31/12/2021	181
01/01/2022 - 31/12/2022	334
01/01/2023 - 31/05/2023	365

- **The number of days the treatment plant was operational in year y (nd_y)**

As per registered VCS PD, "the actual number of days the treatment plant was operationally used in the monitoring periods will be monitored and recorded by staff". By checking Monthly Biogas Recovery Operation Report /9/, it was verified the number of days the treatment plant was operational has been monitored and recorded by staff. Besides, it was confirmed that the number of days the treatment plant was operational during this monitoring period has been daily recorded and monthly aggregated, which is in compliance with the registered VCS PD.

Data used for ER calculation was sourced from Monthly Biogas Recovery Operation Report /9/ and was verified by CTI to be consistent. It is confirmed that the value of nd_y of this monitoring period was:

Monitoring period	nd_y
05/08/2020 - 31/12/2020	149
01/01/2021 - 31/12/2021	365
01/01/2022 - 31/12/2022	365
01/01/2023 - 31/05/2023	151

- **The flare efficiency for the minute m (FE ($\eta_{flare,m}$))**

As justified in "Project Description Deviations" section, the biogas heating system was not put into operation during this monitoring period. The biogas produced during the heating period (October to April next year) has also been destroyed in the biogas flaring system, i.e. all biogas produced has been destroyed in the biogas flaring system during this monitoring period.

As per registered VCS PD, as for flaring, the project uses enclosed flares, and the project chose option A of Project emissions from flaring (version 04.0) for the determination of flare efficiency. The flare efficiency of the project is determined as 90% since the project meets the following two conditions when in operating: (i)The temperature of the flare ($T_{EG.m}$) and the flow rate of the residual gas to the flare ($F_{RG,m}$) is within the manufacturer's specification for the flare; and (ii)The flame is detected in minute m. And the PP chooses 90% the for flare efficiency of biogas flaring system. $T_{EG.m}$, $F_{RG,m}$ and $Flame_m$ has been monitored ex post. Please refer to "$T_{EG.m}$", "$F_{RG,m}$" and "$Flame_m$" section below. It was verified the biogas flaring system meets the two conditions when in operating: (i)The temperature of the flare ($T_{EG.m}$) and the flow rate of the residual gas to the flare ($F_{RG,m}$) is within the manufacturer's specification for the flare; and (ii)The flame is detected in minute m.

- **Biogas volume in year y ($BG_{burnt,y}$)**

As justified in "Project Description Deviations" section, the parameter $BG_{burnt,y}$ was described as "Biogas flared in year y" and was measured by flow meter installed at the inlet of the flaring system in the registered VCS PD, while this parameter was revised to "Biogas volume in year y" and was measured by flow meter installed at the outlet of the biogas pre-treatment system in the MR.

During site visit, it was verified the biogas flow from anaerobic digester system was continuously measured by flow meter installed at the outlet of the biogas pre-treatment system during this monitoring period.

By checking Monthly Biogas Recovery Operation Report /9/ and via onsite inspection, the verification team confirmed that the readings of the flow meters were monthly recorded based on daily accumulated readings. The meter readings have been automatically converted to value at room temperature (20°C) and 1 atm pressure. It is confirmed that the monitoring of this parameter is in compliance with methodology.

Data used for ER calculation was sourced from Monthly Biogas Recovery Operation Report /9/ and was verified by CTI to be consistent. All the data have been verified by CTI to be consistent. It is confirmed that the value of $BG_{burnt,y}$ was:

Monitoring period	$BG_{burnt,y}$ (Nm^3)
05/08/2020 - 31/12/2020	399,255
01/01/2021 - 31/12/2021	508,968
01/01/2022 - 31/12/2022	924,411
01/01/2023 - 31/05/2023	500,425

- **Temperature in the exhaust gas of the enclosed flare in the minute m ($T_{EG.m}$)**

During this monitoring period, the flaring system has been used to destroy the recovered biogas. As per registered VCS PD, "the temperature in the exhaust gas of the enclosed flare shall be monitored ex post, using monitoring port in the flare to ensure that the flare is functioning correctly".

As verified during site visit, it is confirmed thermocouple has been installed to monitor once per minute the temperature in the exhaust gas of the enclosed flare. Besides, an online monitoring system has been installed to record automatically the monitoring data from thermocouple. By checking Monthly Flaring System Operation Report /10/, it was verified the monthly average value of readings of thermocouple has been recorded.

Data used for ER calculation was sourced from Monthly Flaring System Operation Report /10/ and was verified by CTI to be consistent. It is confirmed that the value of $T_{EG.m}$ of this monitoring period was:

Monitoring period	$T_{EG.m}$ (℃)
05/08/2020 - 31/12/2020	699
01/01/2021 - 31/12/2021	695
01/01/2022 - 31/12/2022	707
01/01/2023 - 31/05/2023	708

By checking manufacturer's operating specification /21/, it was verified the temperature in the exhaust gas of the enclosed flare is no less than 600 degrees Celsius, which is in compliance with "Flare for biogas engineering" (GB/T 41191-2021). Therefore, it is confirmed the flare is operated within the manufacturer's operating specification and is in compliance with national standard during this monitoring period.

- **Flow rate of the residual gas on a dry basis at reference conditions in the minute m ($F_{RG,m}$)**

During this monitoring period, the flaring system has been used to destroy the recovered biogas. As per registered VCS PD, "the flow rate of the residual gas to the flare shall be monitored ex post, using flow meters. Continuously measured by flow meter with temperature sensor and pressure sensor at the inlet of the flare system. The meter readings will be automatically converted to value at room temperature (20°C) and 1 atm pressure".

As verified during site visit, it is confirmed the flow meter with temperature sensor and pressure sensor at the inlet of the flare system has been installed to monitor continuously the flow rate of the residual gas to the flare. The meter readings have been automatically converted to value at room temperature (20°C) and 1 atm pressure. By checking Monthly Flaring System Operation Report /10/, it was verified the values has been monthly recorded.

Data used for ER calculation was sourced from Monthly Flaring System Operation Report /10/ and was verified by CTI to be consistent. It is confirmed that the value of $F_{RG,m}$ of this monitoring period was:

Monitoring period	$F_{RG,m}$ (m^3)
05/08/2020 - 31/12/2020	399,255
01/01/2021 - 31/12/2021	508,968
01/01/2022 - 31/12/2022	924,411
01/01/2023 - 31/05/2023	500,425

By checking manufacturer's operating specification /21/, it was verified the temperature in the exhaust gas of the enclosed flare is no more than 1,752,000 m^3/year (200m^3/h). Therefore, it is confirmed the flare is operated within the manufacturer's operating specification during this monitoring period.

- **Flame detection of flare in the minute m ($Flame_m$)**

During this monitoring period, the flaring system has been used to destroy the recovered biogas. As per registered VCS PD, "measure using a fixed installation optical flame detector". As verified during site visit, it is confirmed thermocouple has been installed to monitor once per minute the temperature and also flame detection in the exhaust gas of the enclosed flare. Besides, an online monitoring system has been installed to record automatically the monitoring data from thermocouple. When high temperature was detected, the parameter $Flame_m$ was recorded as "ON" by the online monitoring system.

By checking raw data in the online monitoring system during site visit, it was verified the flame has been detected to be "ON" in the enclosed flare during this monitoring period.

- **Soil application of residual waste (Soil Application)**

As per registered VCS PD, "project participants should refer to the original design of the soil application to ensure that the residual waste from the animal manure management system is handled aerobically". By checking irrigation network during site visit, checking Intent Letter for Land Irrigation and Utilization Agreement /22/ and via site inspection, it was verified the residual waste and wastewater from the animal manure management system has been handled aerobically to product organic fertilizer at the project site during this monitoring period, which is in compliance with the registered VCS PD.

- **Genetic source of the production operations swine (Genetic Source of Swine)**

As per registered VCS PD, "Project participants should ensure that genetic source of production operations swine originates from Annex I Party". By checking Breeding Swine Purchase Contract /20/ and Breeding Swine Acceptance Confirmation /14/, the genetic source of the livestock originates from UK and Denmark, which are Annex I Party, which is in compliance with that in the registered VCS PD.

- **Formulated feed rations (Formulated Feed Rations (FFR)**

As per registered VCS PD, "project participants should use FFR for the production operations swine, stage of growth, category, weight gain/productivity and/or genetics". By checking Feed Processing Contract /34/ and sample of Breeding Swine Standard Ration Delivery Note /35/, it was verified FFR has been used by PP for the production operations swine, stage of growth, category, weight gain/productivity and/or genetics, the same has been confirmed through checking Breeding Archives Report issued by Binzhou Animal Husbandry and Veterinary Bureau /19/.

- **The project specific animal weights at project site (Swine Weight)**

As per registered VCS PD, "project participants should record the project specific animal weights to ensure that they are similar to developed country IPCC default values". The target population was the 15,000 adult breeding swine expected to be in the farm as described in the registered VCS PD. PP determine the sample size by using simple random sampling (SRS) procedures as per the "Standard for sampling and surveys for CDM project activities and Programmes of Activities" (Version 09.0) and by using CDM sample size calculator (Version 03.1). The Predicted sample size was calculated to be 266 and finally determined to be 300, which is conservative.

By checking Sampling Record Form of Breeding Swine /36/, it was verified 300 adult breeding swine has been randomly selected every month during this monitoring period. The weight of the swine has been measured monthly by scale and recorded monthly in Sampling Record Form of Breeding Swine /36/.

By checking the sampling result in the ER calculation sheet, it is confirmed the achieved precision (reliability) of samples taken each month is less than 1%, which means the sample estimate of swine weight meets the required specification, i.e., 90/10 confidence/precision. Besides, the value of swine weight of this monitoring period is close to IPCC default value of live weights for adult breeding swine in Western Europe in 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, which is 190kg. It is confirmed that the value of swine weight of this monitoring period was:

Monitoring period	swine weight (kg)
05/08/2020 - 31/12/2020	192
01/01/2021 - 31/12/2021	195
01/01/2022 - 31/12/2022	197
01/01/2023 - 31/05/2023	196

Monitoring equipment and calibration

The monitoring equipments /39/ 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 /24//25//26//27//28/ is listed as below.

Monitoring parameter	Monitoring equipment	Serial Number	Type	Accuracy Class	Calibration Date	Validity
$BG_{burnt,y}$	Flow meter (previous)	18103217	KQ-HGM100C	1.5S	30/05/2020 31/12/2020 30/12/2021	29/05/2021 30/12/2021 29/12/2022
	Flow meter (new)	22093327	KQ-HGM100C	1.5S	05/10/2022	04/10/2023
$F_{RG,m}$	Flow meter	20123710	KQ-HGM100C	1.5S	30/05/2020 31/12/2020 30/12/2021 05/10/2022	29/05/2021 30/12/2021 29/12/2022 04/10/2023
$T_{EG.m}$	Thermocouple (previous)	20-05	WRMK-331	II	09/07/2020	08/07/2021
$Flame_m$	Thermocouple (previous)	21-09	WRMK-331	II	03/07/2021	02/07/2022

	Thermocouple (new)	22-16	WRMK-331	II	02/07/2022	01/07/2023
Swine Weight	Scale	2010200852	XK3190-A12+E	III	28/08/2020 28/08/2021 28/08/2022	27/08/2021 27/08/2022 27/08/2023

By checking meter change record /37/, it was verified flow meter measuring $BG_{burnt,y}$ has been changed by a new one on 05/10/2022. The previous one was calibrated by a qualified third party - Binzhou Zhanhua Institute of Metrology and Testing /24/. The new one was calibrated by a qualified third party - Shandong Zhengyuan Safety Technology Consulting Co., Ltd /25/. Calibration records and accreditation certificates /24//25//26//27/ have been verified by the verification team. In the monitoring plan of the registered VCS PD, it stated that these monitoring instruments will be installed and calibrated as per national or industry regulations and standards. By checking the calibration reports, CTI found the flow meters have been calibrated annually as per national or industry regulations and standards (i.e. Verification Regulation of Mass Flow Meters (JJG 897-1995) /32/), which is in line with the monitoring plan of the registered VCS PD. Furthermore, the calibrations of these monitoring instruments are verified to be valid for the whole reporting period.

The flow meter measuring $F_{RG,m}$ was calibrated by qualified third parties - Binzhou Zhanhua Institute of Metrology and Testing and Shandong Zhengyuan Safety Technology Consulting Co., Ltd /24//25/, Calibration records and accreditation certificates /24//25//28/ have been verified by the verification team. In the monitoring plan of the registered VCS PD, it stated that these monitoring instruments will be installed and calibrated as per national or industry regulations and standards. By checking the calibration reports, CTI found the flow meters have been calibrated annually as per national or industry regulations and standards (i.e. Verification Regulation of Mass Flow Meters (JJG 897-1995) /32/), which is in line with the monitoring plan of the registered VCS PD. Furthermore, the calibrations of these monitoring instruments are verified to be valid for the whole reporting period.

By checking thermocouple change record /38/, it was verified thermocouple has been changed by a new one in 03/07/2021 and 02/07/2022. The previous ones were calibrated by a qualified third party - Binzhou Zhanhua Institute of Metrology and Testing /24/. The new one was calibrated by a qualified third party - Shandong Zhengyuan Safety Technology Consulting Co., Ltd /25/. Calibration records and accreditation certificates /24//25//31/ have been verified by the verification team. In the monitoring plan of the registered VCS PD, it stated that these monitoring instruments will be installed and calibrated as per national or industry regulations and standards. By checking the calibration reports, CTI found the flow meters have been calibrated annually as per national or industry regulations and standards (i.e. Verification Regulation of Working Base Metal Thermocouple (JJG 351-1996) /33/), which is in line with the monitoring plan of the registered VCS PD. Furthermore, the calibrations of these monitoring instruments are verified to be valid for the whole reporting period.

The scale was calibrated by qualified third parties - Binzhou Zhanhua Institute of Metrology and Testing and Shandong Zhengyuan Safety Technology Consulting Co., Ltd /24//25/. Calibration records and accreditation certificates /24//25//29/ have been verified by the verification team. In the monitoring plan of the registered VCS PD, it stated that these monitoring instruments will be installed and calibrated as per national or industry regulations and standards. By checking the calibration reports,

CTI found the installed scale has been calibrated annually as per national or industry regulations and standards (i.e. Verification Regulation of Digital Indicating Weighing Instrument (JJG 539-2016) /30/), which is in line with the monitoring plan of the registered VCS PD. Furthermore, 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 /7/, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. By interview with the staff and check records /5/-/7/ 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.

- **Emission reduction calculation**

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

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

Baseline emissions

As per registered VCS PD,

$$BE_y = GWP_{CH4} \times D_{CH4} \times UF_b \times \sum_{j,LT} MCF_j \times B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{Bl,j} \qquad \text{Equation (1)}$$

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2e)
GWP_{CH4}	=	Global Warming Potential (GWP) of CH_4 applicable to the crediting period (t CO2e/t CH_4)
D_{CH4}	=	CH_4 density (0.00067 t/m^3 at room temperature (20 °C) and 1 atm pressure)
LT	=	Index for all types of livestock
j	=	Index for animal manure management system
MCF_j	=	Annual methane conversion factor (*MCF*) for the baseline animal manure

management system j

$B_{0,LT}$ = Maximum methane producing potential of the volatile solid generated for animal type *LT* (m^3 CH_4/kg-dm)

$N_{LT,y}$ = Annual average number of animals of type *LT* in year *y* (numbers)

$VS_{LT,y}$ = Volatile solids production/excretion per animal of livestock *LT* in year *y* (on a dry matter weight basis, kg-dm/animal/year)

$MS\%_{Bl,j}$ = Fraction of manure handled in baseline animal manure management system *j*

UF_b = Model correction factor to account for model uncertainties (0.94)[1]

The annual average number of animals ($N_{LT,y}$) is determined as follows:

$$N_{LT,y} = N_{da,y} \times \left(\frac{N_{p,y}}{365}\right) \quad \text{Equation (2)}$$

Where:

$N_{da,y}$ = Number of days animal is alive in the farm in the year *y* (numbers)

$N_{p,y}$ = Number of animals produced annually of type *LT* for the year *y* (numbers)

The ER calculation sheet has been verified and confirmed to be correct. Based on parameters justified in section 4.4 in this report and equation (1) - (2), it is confirmed that $BE_{y,ex,post}$ was calculated as follows.

Parameter	Unit	Vintage			
		2020	2021	2022	2023
GWP_{CH4}	tCO_2e/tCH_4	28	28	28	28
D_{CH4}	$kgCH_4/Nm^3CH_4$	0.67	0.67	0.67	0.67
UF_b	/	0.94	0.94	0.94	0.94
MCF_j	/	73%	73%	73%	73%
$B_{0,LT}$	$m^3CH_4/kg\text{-}VS$	0.45	0.45	0.45	0.45
$VS_{default}$	kg-dm/hd/day	0.456	0.456	0.456	0.456
$MS\%_{Bl,j}$	/	100%	100%	100%	100%
nd_y	day	149	365	365	151
$N_{da,y}$	day	365	181	334	365
$N_{p,y}$	hd	13,243	8,280	12,595	16,522
$N_{LT,y}$	hd	13,243	4,106	11,525	16,522
$VS_{LT,y}$	kg-dm/hd/day	67.94	166.44	166.44	68.86
$BE_{y,ex,post}$	**tCO_2e**	**5,212**	**3,958**	**11,112**	**6,590**
Total $BE_{y,ex,post}$	**tCO_2e**	**26,872**			

Project emissions

[1]Reference: FC2CC/SBSTA/2003/10/Add.2, page 25.

According to the applied methodology, registered VCS PD, project emissions of the project are calculated as follows:

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y}$$ Equation (3)

Where:

PE_y = Project emissions in year *y* (t CO_2e)

$PE_{PL,y}$ = Emissions due to physical leakage of biogas in year *y* (t CO_2e)

$PE_{flare,y}$ = Emissions from flaring or combustion of the biogas stream in the year *y* (t CO_2e)

$PE_{power,y}$ = Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year *y* (t CO_2e)

$PE_{transp,y}$ = Emissions from incremental transportation in the year *y* (t CO_2e), as per relevant paragraph in AMS-III.AO

$PE_{storage,y}$ = Emissions from the storage of manure (t CO_2e)

1. Emissions due to physical leakage of biogas in year y ($\mathbf{PE_{PL,y}}$)

$$PE_{PL,y} = 0.10 \times GWP_{CH4} \times D_{CH4} \times \sum_{i,LT} B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{i,y}$$ Equation (4)

The ER calculation sheet has been verified and confirmed to be correct. Based on parameters justified in section 4.4 in this report and equation (2) and (4), it is confirmed that $PE_{PL,y}$ was calculated as follows:

Parameter	Unit	Vintage			
		2020	2021	2022	2023
GWP_{CH4}	tCO_2e/tCH_4	28	28	28	28
D_{CH4}	$kgCH_4/Nm^3CH_4$	0.67	0.67	0.67	0.67
$B_{0,LT}$	$m^3CH_4/kg\text{-}VS$	0.45	0.45	0.45	0.45
$N_{LT,y}$	hd	13,243	4,106	11,525	16,522
$VS_{LT,y}$	kg-dm/hd/day	67.94	166.44	166.44	68.86
$MS\%_{BI,j}$	/	100%	100%	100%	100%
$PE_{PL,y}$	**tCO_2e**	**760**	**577**	**1,620**	**961**
Total $PE_{PL,y}$	**tCO_2e**	**3,918**			

2. Emissions from flaring or combustion of the biogas stream in the year y ($\mathbf{PE_{flare,y}}$)

$$PE_{flare,y} = GWP_{CH4} \times \sum_{m=1}^{525600} F_{CH4,RG,m} \times (1 - \eta_{flare,m}) \times 10^{-3}$$ Equation (5)

Where:

GWP_{CH4} = Global warming potential of methane valid for the commitment period (tCO_2e/tCH_4)

$F_{CH4,RG,m}$ = Mass flow of methane in the residual gas in the minute m (kg)

$\eta_{flare,m}$ = Flare efficiency in minute m

$F_{CH4,RG,m}$ is mass flow of methane in the residual gas in the minute m (kg), which is calculated as follows:

$$\sum_{m=1}^{525600} F_{CH4,RG,m} = Q_{CH4,y} = Q_{biogas,y} \times f_{CH4,default} \times \rho_{CH4} \quad \text{Equation (6)}$$

The ER calculation sheet has been verified and confirmed to be correct. Based on parameters justified in section 4.4 in this report and equation (5) and (6) above, it is confirmed that $PE_{flare,y}$ was calculated as follows:

Parameter	Unit	Year (y)			
		2020	2021	2022	2023
GWP_{CH4}	tCO_2e/tCH_4	28			
$F_{CH4,RG,m}$	$kgCH_4$	160,501	204,605	371,613	201,171
FE ($\eta_{flare,m}$)	/	90%	90%	90%	90%
$Q_{CH4,y}$	tCH_4	160,501	204,605	371,613	201,171
$Q_{biogas,y}$	$Nm^3biogas$	399,255	508,968	924,411	500,425
$f_{CH4,default}$	$m_3CH_4/m^3biogas$	0.6			
D_{CH4}	tCH_4/Nm^3CH_4	0.67			
$PE_{flare,y}$	**tCO_2e**	**450**	**573**	**1,041**	**564**
Total $PE_{flare,y}$	**tCO_2e**	**2,628**			

3. Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y ($PE_{power,y}$)

By checking registered VCS PD and through site inspection, it is confirmed that the project use no electricity or fossil fuel for operation of the installed facilities, therefore, the emissions from the use of electricity and fossil fuel are not considered. Therefore, PE_{power} = 0.

4. Emissions from incremental transportation in the year y ($PE_{transp,y}$)

By checking registered VCS PD, as well as through site inspection, it is confirmed that the HDPE membrane enclosed anaerobic digesters is installed within the geographic boundary of the breeding swine farm (project site), therefore, the project activity does not involve incremental transportation and emissions from incremental transportation is 0.

5. Emissions from the storage of manure ($PE_{storage,y}$)

By checking registered VCS PD, as well as through site inspection, it is confirmed that the storage of manure before being fed into the anaerobic digester is 12 hours. Hence, project emissions on account of storage of manure before being fed into the anaerobic digester are not accounted for, i.e. $PE_{storage,y}$ = 0.

Therefore, PE_y, i.e. $PE_{y,ex,post}$ is calculated to be:

Parameter	Unit	Vintage			
		2020	2021	2022	2023
$PE_{PL,y}$	tCO_2e	760	577	1,620	961
$PE_{flare,y}$	tCO_2e	450	573	1,041	564
$PE_{power,y}$	tCO_2e	-	-	-	-
$PE_{transp,y}$	tCO_2e	-	-	-	-
$PE_{storage,y}$	tCO_2e	-	-	-	-
$PE_{y,ex,post}$	tCO_2e	1,210	1,150	2,661	1,525
Total $PE_{y,ex,post}$	tCO_2e	6,546			

Leakages

According to registered VCS PD and through site inspection, it was verified the digested liquid from anaerobic digesters is collected and transported to an on-site workshop for aerobic fermentation. Besides, the project activity does not involve the anaerobic decay of digestate disposed in a SWDS or subjected to anaerobic storage, such as in a stabilization pond. Therefore, leakage emissions associated with the anaerobic digester is not accounted for.

Emission reductions

According to registered VCS PD and AMS-III.D, version 21.0, emission reductions are determined ex-post via equation below:

$$ER_{y,ex\ post} = min\left[\left(BE_{y,ex\ post} - PE_{y,ex\ post}\right), \left(MD_y - PE_{power,y,ex\ post}\right)\right] \quad \text{Equation (7)}$$

Where:

$ER_{y,ex\ post}$ = Emission reductions achieved by the project activity based on monitored values for year y (t CO_2e)

$BE_{y,ex\ post}$ = Baseline emissions calculated using equation 1 (for projects using option in paragraph 17(a) of ACM-III.D) using ex post monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$. For projects using option in paragraph 17(b) of ACM-III.D, the ex post monitored values for $Q_{manure,j,LT,y}$ and $SVS_{j,LT,y}$ are used

$PE_{y,ex\ post}$ = Project emissions calculated using equation 6 of AMS-III.D using ex post monitored values of $N_{LT,y,}MS\%_{i,y,}$ $MS\%_{l,}$ $AI_{l,}$ $Q_{res\ waste,y}$ and if applicable $VS_{LT,y}$

MD_y = Methane captured and destroyed or used gainfully by the project activity in year y (t CO_2e)

$PE_{power,y,ex\ post}$ = Emissions from the use of fossil fuel or electricity for the operation of the installed facilities based on monitored values in the year y (t CO_2e)

$$MD_y = BG_{burnt,y} \times w_{CH4,y} \times D_{CH4} \times FE \times GWP_{CH4} \quad \text{Equation (8)}$$

Where:

$BG_{burnt,y}$ = Biogas flared or combusted in year y (m^3)

$w_{CH4,y}$ = Methane content in biogas in the year y (volume fraction)

FE = Flare efficiency in the year y (fraction)

The ER calculation sheet has been verified and confirmed to be correct. Based on parameters justified in section 4.4 in this report and equation (8), it is confirmed that MD_y was calculated as follows:

Vintage	$BG_{burnt,y}$	w_{CH4}	D_{CH4}	GWP_{CH4}	FE	MD_y
	m^3	/	$kgCH_4/Nm^3CH_4$	tCO_2/tCH_4	/	tCO_2e
2020	399,255	0.6	0.67	28	90%	4,044
2021	508,968	0.6	0.67	28	90%	5,156
2022	924,411	0.6	0.67	28	90%	9,364
2023	500,425	0.6	0.67	28	90%	5,069
Total	2,333,059	0.6	0.67	28	90%	23,633

The ER calculation sheet has been verified and confirmed to be correct. Based on parameters justified in section 4.4 in this report and equation (7) and (8), it is confirmed that $ER_{y,ex\ post}$ was calculated as follows:

Period	$BE_{y,ex\ post}$	$PE_{y,ex\ post}$	$BE_{y,ex\ post} - PE_{y,ex\ post}$	MD_y	$PE_{power,\ ex\ post}$	$MD_y - PE_{power,\ ex\ post}$	$ER_{y,ex\ post}$
	A	B	C=A-B	D	E	F=D-E	G=min(C,F)
05/08/2020 to 31/12/2020	5,212	1,210	4,002	4,044	-	4,044	4,002
01/01/2021 to 31/12/2021	3,958	1,150	2,808	5,156	-	5,156	2,808
01/01/2022 to 31/2022	11,112	2,661	8,451	9,364	-	9,364	8,451
01/01/2023 to 31/05/2023	6,590	1,525	5,065	5,069	-	5,069	5,065
Total							20,326

Therefore, the emission reductions for this monitoring period was calculated to be:

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)
Year 2020 (05/08/2020 to 31/12/2020)	5,212	1,210	0	4,002
Year 2021 (01/01/2021 to 31/12/2021)	3,958	1,150	0	2,808
Year 2022 (01/01/2022	11,112	2,661	0	8,451

to 31/2022)				
Year 2023 (01/01/2023 to 31/05/2023)	6,590	1,525	0	5,065
Total	**26,872**	**6,546**	**0**	**20,326**

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

Year	Ex-ante emissions reductions/removals	Achieved emissions reductions/removals	Percent difference	Justification for the difference
05/08/2020 – 31/05/2023	33,284	20,326	-38.93%	The main reasons of decreased emission reductions is that the number of animals in the farms of the project activity is less than that estimated in the registered PD.

The emission reductions claimed are 20,326 tCO_2e in this monitoring period. Compared with expected emission reductions 33,284 tCO_2e (calculated as 11,795 tCO_2e / 365d * 1030 d) in the registered VCS PD, the reported emission reductions in this monitoring period are 38.93% less than that estimated.

In conclusion, 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 OPINION

CTI Certification Co., Ltd. (CTI Certification) has performed the verification of the emission reductions that have been reported for the project "Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project" in China (VCS Project ID: 2880) for the period 05/08/2020 to 31/05/2023.

The verification is based on the baseline and monitoring methodology AMS-III.D (version 21.0), VCS PD (version 3.0 dated 06/12/2022) and the monitoring report (version 2.4 dated 08/09/2023). 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 4.5 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 activity are basically implemented and operated as per the registered VCS PD, one deviation to project implementation have been identified, which do not impact the applicability of AMS-III.D (version 21.0), additionality or the appropriateness of the baseline scenario;

- the monitoring plan in registered VCS PD is as per the applied methodology;

- the monitoring is basically complies with the monitoring plan in the registered VCS PD, one deviation to monitoring plan have been identified, which do not impact the monitoring activities or calculation of emission reductions, and is still in compliance with AMS-III.D (version 21.0) ;

- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS Standard version 4.5 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.

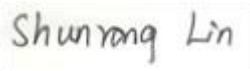
In CTI's opinion the GHG emissions reductions of the "Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project" for the period 05/08/2020 to 31/05/2023 are fairly stated in the monitoring report (version 2.4 dated 08/09/2023). The GHG emission reductions were calculated correctly on the basis of the approved methodology AMS-III.D (version 21.0) and the monitoring plan contained in the registered VCS PD (version 3.0 dated 06/12/2022).

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 05/08/2020 to 31/05/2023

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)
Year 2020 (05/08/2020 to 31/12/2020)	5,212	1,210	0	4,002
Year 2021 (01/01/2021 to 31/12/2021)	3,958	1,150	0	2,808
Year 2022 (01/01/2022 to 31/2022)	11,112	2,661	0	8,451
Year 2023 (01/01/2023 to 31/05/2023)	6,590	1,525	0	5,065
Total	**26,872**	**6,546**	**0**	**20,326**



Ms. Shunrong LIN

Team Leader

08/09/2023

Mr. Lei ZHANG

Technical Reviewer

08/09/2023

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	CTI 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
PD	Project Description
PP	Project Proponent
VCS	Verified Carbon Standard
VCU	Verified Carbon Unit

APPENDIX B: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS

CTI 华测认证 CTI CERTIFICATION

CERTIFICATE OF APPOINTMENT

Mr. Lei ZHANG

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	√	√	√	√	√	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.1: Thermal energy generation
	TA 1.2: Energy generation from renewable energy sources
SS 3: Energy demand	TA 3.1: Energy demand
SS 4: Manufacturing industries	TA 4.1: Cement and lime production
SS 13: Waste handling and disposal	TA 13.1: Solid waste and wastewater
	TA 13.2: Manure

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:
Wu LIN Wu Lin
Technical Competent Manager
Shenzhen, 25/10/2022

CTI 华测认证 CTI CERTIFICATION

CERTIFICATE OF APPOINTMENT

Ms. Shunrong LIN

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	√	√	√	√	√	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources
SS 3: Energy demand	TA 3.1: Energy demand
SS 13: Waste handling and disposal	TA 13.1: Solid waste and wastewater
	TA 13.2: Manure
SS 14: Afforestation and reforestation	TA 14.1: Afforestation and reforestation
SS 15: Agriculture	TA 15.1: Agriculture

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Wu LIN Wu Lin

Technical Competent Manager

Shenzhen, 25/10/2022

CTI 华测认证 CTI CERTIFICATION

CERTIFICATE OF APPOINTMENT

Mr. Qinghua DAI

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	-	-	-	-	-	√

Scope	Technical Area
SS 13: Waste handling and disposal	TA 13.2: Manure
SS 15: Agriculture	TA 15.1: Agriculture

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Wu LIN Wu Lin

Technical Competent Manager

Shenzhen, 01/01/2021

APPENDIX C: REFERENCES

Documentation used to verify the information provided by the project proponents

/1/ Climate Bridge (Shanghai) Ltd.: Monitoring Report for Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project, version 1.0 dated 20/07/2023, version 2.1 dated 29/08/2023 and version 2.4 dated 08/09/2023.

/2/ Climate Bridge (Shanghai) Ltd.: Emission reduction calculation spreadsheet for Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Swine Farm Biogas Recovery and Utilization Project

/3/ VERRA Website: Registered VCS PD, version 3.0 dated 06/12/2022

/4/ VERRA Website: VCS Validation Report, version 02.0 dated 09/12/2022

/5/ Records of training for on-site staff

/6/ Operation log, covering 05/08/2020 to 31/05/2023.

/7/ VER monitoring manual and management procedure

/8/ Construction contract signed between the project owner and Binzhou Hongda Construction and Installation Engineering Co., Ltd.

/9/ Monthly Biogas Recovery Operation Report covering 05/08/2020 to 31/05/2023.

/10/ Monthly Flaring System Operation Report covering 05/08/2020 to 31/05/2023.

/11/ 2019 Baseline Emission Factors for Regional Power Grids in China issued on 29/12/2020 by China DNA

/12/ HR Records (staff roaster)

/13/ Questionnaires from local stakeholders

/14/ Breeding Swine Acceptance Confirmation, issued by Binzhou Topigs Norsvin Breeding Swine Co., Ltd. Binhai Branch

/15/ Environmental Impact Assessment (EIA) Report of the project activity

/16/ Environmental Impact Assessment (EIA) approval issued by Environmental Protection Bureau of Zhanhua District on 29/11/2018

/17/ Nameplate of the equipment

/18/ Monthly Production Report covering 05/08/2020 to 31/05/2023

/19/ Breeding Archives Report issued by Binzhou Animal Husbandry and Veterinary Bureau covering 05/08/2020 to 31/05/2023

/20/ Breeding Swine Purchase Contract signed between the project owner and Tielijin Xinnong

Ecological Agriculture and Animal Husbandry Co., Ltd.

/21/ Manufacturer's operating specification of enclosed flare

/22/ Intent Letter for Land Irrigation and Utilization Agreement signed bwteeen the project owner and nearby villagers committee

/23/ Operation Management Manual

/24/ State Administration for Market Regulation: Qualification of Binzhou Zhanhua Institute of Metrology and Testing, Lu Fa Ji (2020) No. 372306, valid till 30/03/2025

/25/ Shandong Provincial Market Supervision Administration: Qualification of Shandong Zhengyuan Safety Technology Consulting Co., Ltd, issued on 08/03/2022, valid till 07/03/2028

/26/ Binzhou Zhanhua Institute of Metrology and Testing: Calibration Certificates of flow meter (previous) measuring $BG_{burnt,y}$ covering this monitoring period

/27/ Shandong Zhengyuan Safety Technology Consulting Co., Ltd: Calibration Certificates of flow meter (new) measuring $BG_{burnt,y}$ covering this monitoring period

/28/ Binzhou Zhanhua Institute of Metrology and Testing and Shandong Zhengyuan Safety Technology Consulting Co., Ltd: Calibration Certificates of flow meter measuing $F_{RG,m}$ covering this monitoring period

/29/ Binzhou Zhanhua Institute of Metrology and Testing and Shandong Zhengyuan Safety Technology Consulting Co., Ltd: Calibration Certificates of scale covering this monitoring period

/30/ Verification Regulation of Digital Indicating Weighing Instrument

/31/ Binzhou Zhanhua Institute of Metrology and Testing and Shandong Zhengyuan Safety Technology Consulting Co., Ltd: Calibration Certificates of thermocouple covering this monitoring period

/32/ Verification Regulation of Mass Flow Meters (JJG 897-1995)

/33/ Verification Regulation of Working Base Metal Thermocouple (JJG 351-1996)

/34/ Feed Processing Contract signed between the project owner and Binzhou Huanshan Feed Co., Ltd

/35/ Sample of Breeding Swine Standard Ration Delivery Note

/36/ Sampling Record Form of Breeding Swine covering 05/08/2020 to 31/05/2023

/37/ Flow meter change record

/38/ Thermocouple change record

/39/ Photos of Flow meters, Thermocouple, and Scale

/40/ EIA Approval issued by Environmental Protection Bureau of Zhanhua District on 29/11/2018

/41/ Environmental Impact Assessment (EIA) Report of the project activity

Methodologies, tools and other guidance

/42/ Verified Carbon Standard: VCS Standard, version 4.5.

/43/ Verified Carbon Standard: VCS Program Guide, version 4.4.

/44/ Verified Carbon Standard: Registration and Issuance Process, version 4.4.

/45/ Approved methodology AMS-III.D: Methane recovery in animal manure management systems, version 21.0

/46/ Guideline - Sampling and surveys for CDM project activities and programmes of activities (version 04.0)

/47/ Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, Version 03.0

/48/ Tool 07: Tool to calculate the emission factor for an electricity system, Version 07.0

/49/ Tool 14: Project and leakage emissions from anaerobic digesters, version 02.0

APPENDIX D: 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 supplement the monitoring information, including but not limited to type, serial number, accuracy, calibration and validity date, of Thermocouple that measuring $T_{EG.m}$ and $Flame_m$.	The monitoring information of thermocouple including type, serial number, accuracy, calibration and validity dates has been added in the revised MR (Version 2.0); Relevant supplementary documents have also been summitted to VVB for further review.	The monitoring information, including type, serial number, accuracy, calibration and validity date, of Thermocouple that measuring $T_{EG.m}$ and $Flame_m$ has been supplemented in the MR and has been verified by the assessment team. Therefore, CAR 01 was closed.

CAR ID	Corrective Action Request	Response by Project Proponent	Verification Team Assessment
02	Please supplement the monitoring value of $F_{RG,m}$ that applied for this monitoring period.	The monitoring values of $F_{RG,m}$ have been added in the revised MR (Version 2.0); Relevant supplementary documents have also been submitted to VVB for further review.	The monitoring value of $F_{RG,m}$ that applied for this monitoring period has been supplemented in the MR. Therefore, CAR 02 was closed.

CAR ID	Corrective Action Request	Response by Project Proponent	Verification Team Assessment

CAR ID	Corrective Action Request	Response by Project Proponent	Verification Team Assessment
03	In the Monitoring Report, it was identified 300 adult breeding swine have been randomly selected with 90/10 confidence/precision level. Please provide sampling results and supplement monitoring value of Swine Weight that applied for this monitoring period.	The sampling results and monitoring values of Swine Weight have been added in the revised MR (Version 2.0); Relevant supplementary documents have also been summitted to VVB for further review.	The determination of sampling size has been supplemented in the MR. The sampling results has been provided. The monitoring value of Swine Weight that applied for this monitoring period has been supplemented in the MR and has been verified by the assessment team. Therefore, CAR 03 was closed.

CAR ID	Corrective Action Request	Response by Project Proponent	Verification Team Assessment
04	During site visit, it was identified the biogas heating system was not put into operation during this monitoring period. The biogas produced during the heating period (October to April next year) has also been destroyed in the biogas flaring system, which is not consistent with the registered VCS PD. Please supplement project description deviations in the MR and discuss the impacts to additionality, calculation of emission reductions.	Two project description deviations have been added in the revised MR (Version 2.0). The impacts of deviations to additionality, calculation of emission reductions have been added in the revised MR (Version 2.0).	Two project description deviations have been supplemented in the MR. The deviations will not impact the additionality or calculation of emission reductions of the project activity. The detailed assessment has been included in section 3.3 of this report. Therefore, CAR 04 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

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