



HENAN ZHUMADIAN YOURAN XIPING DAIRY FARM BIOGAS UTILIZATION PROJECT



Document Prepared by CTI Certification Co., Ltd.

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Summary:

CTI Certification Co., Ltd. (hereafter referred to as "CTI") has been commissioned by Climate Bridge (Shanghai) Ltd. to perform the validation and verification of project activity "Henan Zhumadian Youran Xiping Dairy Farm Biogas Utilization Project" (hereafter referred to as "the project activity") and reported in the joint Validation & Verification Report.

A description of the project

The project activity, located in Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province, P.R China, uses 6 anaerobic digesters, i.e. Completely Stirred Tank Reactors (CSTRs), to treat the manure of dairy cattle, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. The manure of dairy cattle was collected from Zhumadian Youran Xiping Dairy Farm, which is estimated to produce 14,400 adult dairy cattle and 3,100 breeding cattle annually. The total effective volume of 4 high concentration CSTRs installed and utilized is 28,000 m³ (7,000m³*4), while the total effective volume of 2 low concentration CSTRs installed and utilized is 14,000 m³ (7,000m³*2). The project activity is expected to produce 11,000,000 Nm³ biogas annually. The generated biogas will be captured and sent for energy (electricity and heat) generation. The installed capacity of the project activity is 1MW (one set of generator with installed capacity of 1MW). Electricity generated from biogas combustion is used internally in the farm. A biogas heat boiler is installed to generate heat from recovered biogas, and used to warm the anaerobic digesters. The excess biogas will be flared. In the future, the biogas is planned to be sold for natural gas upgrading. The digestate from the CSTR will be directly returned to nearby farm as fertilizer. It's estimated that the project activity could achieve GHG emission reductions of 596,100 tCO₂e during the fixed 10-year crediting period.

A description of the validation and verification

The approved CDM methodology AMS-III.D "Methane recovery in animal manure management systems" (version 21.0) is applied to quantify the GHG removals achieved in this project. The calculation of the GHG emission reductions is carried out in a transparent and conservative manner. This project is being developed in conjunction with the validation and 1st periodic of verification.

The purpose and scope of validation and verification

The validation objective is an independent assessment by a Third Party of a proposed project activity against all defined criteria set for the registration under the VCS. In order to confirm that the project activity, as documented, is sound reasonable and meets the identified criteria, the validation involves the assessment of: project conformance to VCS standards/programs, project conformance to the applied methodology, including the procedure for the demonstration of additionality specified in the methodology; and likelihood that methods a procedures set out in the project description will generate verifiable GHG data and information when implemented. Validation is a requirement and is seen as necessary to provide assurance to stakeholders of the quality of project and its intended generation of VCU. Validation is part of the VCS project cycle and will finally

result in a conclusion by the executing VVB whether a project activity is valid to be submitted for registration to VCS registry.

The objective of the verification is to have an independent review ex post determination by a VVB (Validation and Verification Body) of the monitored GHG emission reductions that have occurred as a result of the implementation of the project activity during a defined monitoring period.

The method and criteria used for validation and verification

Validation and Verification is conducted using CTI Certification Co., Ltd (CTI) procedures in line with the requirements specified in the latest version of the VCS Validation and Verification Manual and applying auditing techniques. The validation/verification team assessed the project activity's compliance against the VCS Standard Version 4.7, the selected CDM methodologies and the joint project description and monitoring report. The project is eligible under VCS Sectoral Scopes 1, 13 and 15. The validation/verification criteria followed the guidance documents provided by VCS included the following:

VCS Standard Version 4.7, VCS Program Guide Version 4.4 and the applied CDM methodologies AMSIII.D. "Methane recovery in animal manure management systems" (version 21.0).

The number of findings raised during validation and verification

In the course of the validation and verification, 3 Clarification Requests (CLs) and 3 Corrective Action Requests (CARs) was raised and successfully closed. No Forwarded Action Requests (FARs) was raised.

Any uncertainties associated with the validation and verification

There are no restrictions of uncertainty for both validation and verification.

Summary of the validation and verification conclusions

CTI concludes that the project activity "Henan Zhumadian Youran Xiping Dairy Farm Biogas Utilization Project" in China, as described in the final version of Joint-Project-Description-Monitoring-Report, meets all relevant requirements for VCS validation and verification activity and correctly applied the methodology AMSIII.D. Version 21.0. Hence CTI is able to provide positive validation opinion as per the requirement of VCS and further certify that the GHG emission reduction from the project during the monitoring period from 15-04-2023 to 31-12-2024 amount to 91,275 tCO₂e VCU.

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1 INTRODUCTION

1.1 Objective

Climate Bridge (Shanghai) Ltd. has commissioned the CTI to carry out the Verified Carbon Standard (VCS) validation joint with 1st periodical verification of the project "Henan Zhumadian Youran Xiping Dairy Farm Biogas Utilization Project" (VCS ID 5366) for the for the monitoring period from 15-04-2023 to 31-12-2024 (both days included).

The objective of validation is an independent assessment by a Third Party of a proposed project activity against all defined criteria set for the registration under the VCS. In order to confirm that the project activity, as documented, is sound reasonable and meets the identified criteria, the validation involves the assessment of: project conformance to VCS standards/programs, project conformance to the applied methodology, including the procedure for the demonstration of additionality specified in the methodology; and likelihood that methods and procedures set out in the project description will generate verifiable GHG data and information when implemented. Validation is a requirement and is seen as necessary to provide assurance to stakeholders of the quality of project and its intended generation of VCUs. Validation is part of the VCS project cycle and will finally result in a conclusion by the executing VVB whether a project activity is valid to be submitted for registration to Verra registry.

The objective of verification is to have an independent review ex-post determination by a VVB of the monitored GHG emission reductions that have occurred as a result of the project activity implemented during a defined monitoring period. The evaluation is done against the requirements of the VCS Standard Version 4.7 based on the monitoring report. In order to confirm that the GHG emission reductions sound reasonable and meet the identified criteria, the verification involves the assessment of monitoring plan conformance to VCS rules and applied methodology. Verification is a requirement and is seen as necessary to provide assurance on the generation of VCUs.

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the Joint PD&MR to validate that (a) the project design is actual, (b) the baseline scenario is correctly defined as per the applied methodology and relate tools, (c) the project is additional, (d) the monitoring plan can be implemented and is transparent and adequate and (e) all data and information used for ex-ante calculation of emission reductions is of projected and/or hypothetical nature. The joint PD & MR is reviewed against the criteria stated in VCS standard Version 4.7 /3/ and the approved baseline and monitoring methodology AMS-III.D, Version 21.0. The validation was based on the requirements VCS Validation and Verification Manual and VCS Program Guide version 4.4 /4/ and VCS standards Version 4.7 /3/ applying auditing techniques. The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

The scope of the verification is to verify that: (a) the actual monitoring system and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan; (b) the GHG emission reductions data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reductions data are free from material misstatement; (c) the reported GHG emissions data is sufficiently supported by evidence. Verification shall ensure that the reported GHG emission reductions are complete and accurate in accordance with the applicable VCS criteria in order to be certified. Verification is conducted using CTI procedures in line with the requirements specified in the VCS Program and ISO14064-3 requirements and applying auditing techniques. The assessment team assessed and determined that the implementation and operation of the project activity, and steps to report GHG emission reductions comply with the VCS rules. The verification involved a document review of relevant documentation and interview with the project participants. Verification is not meant to provide any consultancy towards the project participants; however, stated request for clarifications and/or corrective actions may have provided input for improvement of the monitoring.

1.3 Reasonableness of Assumptions and Level of Assurance

CTI has assessed the claims and assumptions made in the joint Project Description & Monitoring Report, i.e., assumptions regarding the determination of baseline scenario, and additionality assessment, as well as validated the assumptions, limitations, and methods used for determining parameters and calculation of baseline emission, project emission and leakage, against the VCS Standard Version 4.7, applied methodology. It is confirmed that the assumptions made in the joint Project Description & Monitoring Report are reasonable which are in line with the applied methodology and tools as well as the requirement of VCS. Based on the validated assumptions, limitations, and methods used during the validation (see section 3.4.6 for ex ante ER calculation result), the project is expected to generate average GHG emission removal of 59,610 tCO₂e per year, and it is confirmed that outcome of future activities will be achieved as the assumptions and limitations are reasonable.

The joint validation and verification report expresses a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement. CTI applied a materiality threshold of 5% with respect to omission or misstatements concerning reported quantities as per para 3.10.1 and 4.1.10 (4) of VCS Standard Version 4.7.

The assessment was conducted to provide a reasonable level of assurance of compliance against the defined audit criteria and materiality threshold within the audit scope. Based on the audit findings the validation and verification statement reasonably assure that the GHG assertion is materially correct and is a fair representation of the GHG data and information.

1.4 Summary Description of the Project

Project title	Henan Zhumadian Youran Xiping Dairy Farm Biogas Utilization Project
Project Participants	Zhumadian Youran Animal Husbandry Co., Ltd. (Project Owner, host country, P. R. China)
Other entities	Climate Bridge (Shanghai) Ltd. (China)
Location of the project	Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province, P.R China. Geographic coordinates: longitude of 33°25'0"N, 113°42'6"E
Project start date	15-04-2023, the operation start date
Applied Methodology/Version	AMS-III.D, Version 21.0
Scope/Technical Area	Sectoral scope 1: Energy (renewable/non-renewable) Sectoral scope 13: Waste handling and disposal Sectoral scope 15: Livestock and manure management
VCS crediting period	15-04-2023 to 14-04-2033 (10-year fixed)

The project activity, located in Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province, P.R China, uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. The manure of dairy cattle was collected from Zhumadian Youran Xiping Dairy Farm, which is estimated to produce 14,400 adult dairy cattle and 3,100 breeding cattle annually. The total effective volume of 4 high concentration CSTRs installed and utilized is 28,000m³ (7,000m³*4), while the total effective volume of 2 low concentration CSTRs installed and utilized is 14,000m³ (7,000m³*2). The project activity is expected to produce 11,000,000 Nm³ biogas annually. The generated biogas will be captured and sent for energy (electricity and heat) generation. The installed capacity of the project activity is 1MW (one set of generator with installed capacity of 1MW). Electricity generated from biogas combustion is used internally in the farm. A biogas heat boiler is installed to generate heat from recovered biogas, and used to warm the anaerobic digesters. The excess biogas will be flared. In the future, the biogas is planned to be sold for natural gas upgrading. The digestate from the CSTR will be directly returned to nearby farm as fertilizer. It's estimated that the project activity could achieve GHG emission reductions of 596,100 tCO₂e during the fixed 10-year crediting period.

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

A project specific validation and verification plan was developed to guide the validation and verification auditing process to ensure efficiency and effectiveness.

The purpose of the validation and verification is to present a risk assessment for determining the nature and extent of validation and verification procedures necessary to ensure the risk of auditing error is reduced to a reasonable level. According to the ISO14064-3, the criteria are the policy, procedure or requirement used as reference against which evidence is compared. The validation and verification were performed through means of the following three phases in accordance with the requirement of the applied methodology, and the VCS Standard (Version 4.7) and other relevant VCS requirements.

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

CTI completed a strategic review and risk assessment of the project's activities and processes in order to gain a full understanding of (if applicable) project details; application of methodology; estimated GHG emission reduction and removals; monitoring; safeguards; SDG contributions etc.

CTI also verified the emission reductions through assessing all factors and issues that constitute the basis for emission reductions from the project, including:

- 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.

CTI assessed that the reported information in the joint PD & MR are complete and accurate in question. This joint validation and verification report describes the findings of this assessment. The information of the assessment team has been included in below of this report.

2.2 Document Review

The joint PD & MR /1/ and supporting background documents related to the project implementation were reviewed. Documents review was conducted to ensure consistency with and identify any deviation from VCS program requirements. Desk review included an examination of the project design details,

baseline scenario, additionality, ex ante and monitoring data and parameters, and ex ante quantification of GHG emission reductions. The assessment team also used additional documentation by third parties like host party legislation, technical reports referring to the project design details, baseline scenario, additionality, monitoring or to the basic conditions and technical data.

Furthermore, the joint PD & MR /1/ and emission reduction calculation spreadsheet of monitoring period from 15-04-2023 to 31-12-2024, relevant decisions, clarifications and guidance from the Verra, other information and references relevant to the project activity have also been assessed. During the desk review,

CTI has applied standard auditing techniques to assess the quality of information provided, including 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.

The references used in the course of this validation and verification are summarized in Appendix 3. The validation and verification were performed basing on the documents check and site inspection/measurements, refer to the section 3 of this report for the validation process detail, section 3 of this report for the verification process detail, and Appendix 3 for corresponding documents review.

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

Function	Name	Technical competence	Task Performance*
Team Leader/Technical Expert	Li Ziqi	1, 3, 4, 5, 11, 12, 13	☒ DR ☒ SV ☒ RP ☐ TR
Team Member	Zhang Qixin	1, 13	☒ DR ☒ SV ☒ RP ☐ TR
Technical Reviewer/Technical Expert	Lin Shunrong	1, 3, 13, 14, 15	☒ DR ☐ SV ☐ RP ☒ TR

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

2.3 Interviews

The objective of the interview process was to solicit important information from personnel related to project and relevant to the validation and verification process. Onsite interviews and information discussions were conducted with PP. The key personnel interviewed are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Niu Ying	Vice Manager Plant	Zhumadian Youran Animal Husbandry Co., Ltd.	Project design and operation of the project activity;
Mr. Chen Junhuan	Vice Manager Plant		Status of the project (including PPs);
Mr. Tong Yanzhao	Environmental Protection Group Leader		Project proponent and ownership;
Ms. Tian Yanfeng	Advance Project Manager	Inner Mongolia Youran Animal Husbandry Co., Ltd.	Applicability of selected methodology;
Mr. Li Rongqi	Staff	Local Ecological Environment Bureau	Applicable laws, statutes and other regulatory frameworks and any change;
Mr. Du Shiwei	Villager	Shaozhuang Village	Baseline of the project;
Ms. Shao Huanli	Villager	Hongcunpu Village	Emission factors of the project;
Ms. Li Ermei	Villager	Zhangtai Village	Monitoring plan;
Mr. Zhao Weile	Villager	Nanzhao Village	Stakeholder consultation process and its outcomes;
Mr. Du Zhixian	Villager	Shaozhuang Village	Sustainable development contributions;
Ms. Chen Genrong	Project Manager	Climate Bridge (Shanghai) Ltd.	Management of Zhumadian Youran Xiping Dairy Farm
Ms. Li Mingqian	Business Manager		

2.4 Site Visits

The assessment team performed the on-site validation and verification (Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province, P.R China) on 10-02-2025 ~ 11-02-2025. The interviewed personnel and objective are listed in above table.

Duration of on-site inspection: 10-02-2025 ~ 11-02-2025				
No.	Activity performed on-site	Site location	Date	Team member
1.	Opening meeting Interview with PP Representative, local officers, local residents and Operation Staff	project proponent's office in the project site	10-02-2025	Li Ziqi Zhang Qixin
2.	On-site inspection Project site, farms, composting workshops, equipments etc., interviewing stakeholders	project site	10-02-2025	Li Ziqi Zhang Qixin
3.	Documents check	project proponent's office in the project site	10-02-2025	Li Ziqi Zhang Qixin
4.	Finding Summary	project proponent's office in the project site	11-02-2025	Li Ziqi Zhang Qixin
5.	Close Meeting	project proponent's office in the project site	11-02-2025	Li Ziqi Zhang Qixin

The opening meeting of the joint validation and verification process started on 10-02-2025 at project proponent's office in the project site (Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province, P.R China), as confirmed by the assessment team the project is listed on the project pipeline with a status of under validation before the opening meeting representing the beginning of the validation process.

Furthermore, the validation and verification took place after the 30-day public comment period which begun on 19-12-2024, and CTI completed the validation and verification until after the 30-day public comment period has ended.

During the on-site visit, CTI has applied standard auditing techniques to assess the quality of information provided, the implementation and current situation of the project activity, evaluate data management, QA/QC system, project technology and equipment, training provided, and monitoring etc.

2.5 Resolution of Findings

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

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

a) Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

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

c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

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

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

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

The objective of this phase of the validation was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for CTI's positive conclusion on the joint PD & MR /1/. 3 Clarification Requests (CLs), 3 Corrective Action requests (CARs) and no Forward action request (FAR) raised by CTI. And communications were made between the Client and CTI to guarantee the transparency of the validation and verification process, the concerns raised, and responses given are summarized below in the appendix 4.

The final joint PD & MR (version 4.0 dated 17-09-2025) serves as the basis for the final assessment presented. Additional changes to the project during the validation and verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Areas of validation and verification findings	No. of CL	No. of CAR	No. of FAR
Project Description and monitoring report	00	00	00
Description of project activity	00	00	00
Application of selected baseline and monitoring methodology and selected standardized baseline			
- Applicability of methodology and standardized baseline	00	00	00
- Deviation from methodology	00	1	00
- Clarification on applicability of methodology, tool and/or standardized baseline	2	00	00
- Demonstration of additionality	00	00	00
- SDG or Environmental issues	00	1	00
- Project boundary	00	00	00
- Emission reductions	1	00	00

- Monitoring plan	00	00	00
- Stakeholders consultation process	1	00	00
- Public comments	00	00	00
Others (please specify) - Matter related to double counting - for validation	00	00	00
Others (please specify) - Matter related to ex post monitoring - for verification	00	1	00
ER achieved, Matter related to feeder details, breakdown and Calibration - for verification	00	00	00
Total	4	3	00

2.5.1 Forward Action Requests

None FAR was raised during the validation process.

3 VALIDATION FINDINGS

3.1 Project Details

The project activity, located in Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province, P.R China, uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. The manure of dairy cattle was collected from Zhumadian Youran Xiping Dairy Farm, which is estimated to produce 14,400 adult dairy cattle and 3,100 breeding cattle annually. The total effective volume of 4 high concentration CSTRs installed and utilized is 28,000m³ (7,000m³*4), while the total effective volume of 2 low concentration CSTRs installed and utilized is 14,000m³ (7,000m³*2). The project activity is expected to produce 11,000,000 Nm³ biogas annually. The generated biogas will be captured and sent for energy (electricity and heat) generation. The installed capacity of the project activity is 1MW (one set of generator with installed capacity of 1MW). Electricity generated from biogas combustion is used internally in the farm. A biogas heat boiler is installed to generate heat from recovered biogas, and used to warm the anaerobic digesters, and used to warm the anaerobic digesters. The excess biogas will be flared. In the future, the biogas is planned to be sold for natural gas upgrading. The digestate from the CSTR will be directly returned to nearby farm as fertilizer.

As per the Project Approval /11/ and EIA Approval /13/, the farm is designed to accommodate 24,000 head of dairy cattle, comprising 14,400 adult dairy cattle, 3,100 breeding cattle and 6,500 calves per year. For emission-reduction calculations the project considers 17,500 head (adult dairy cattle and breeding cattle) and excludes calves. The assessment team confirms that the exclusion is conservative and has a negligible impact on the overall estimate of emission reductions.

During the 10-year fixed 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 59,610 tCO₂e and total GHG emission reductions of 596,100 tCO₂e during the fixed 10-year crediting period.

The project activity is located at Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province, P.R China. The project activity has been developed by Zhumadian Youran Animal Husbandry Co., Ltd. The geographic coordinates of the project activity are 33°25'0"N, 113°42'6"E which is confirmed by site visit.

By checking the Project Approval /11/, the assessment team confirmed that the project activity has been approved on 25-09-2020. By checking Environmental Impact Assessment (EIA) Approval /13/, the assessment team confirmed that the project activity has been approved by the Ecological Environment Bureau of Zhumadian City, Henan Province on 12-01-2021. By checking Acceptance Report of the project activity /30/, the assessment team confirmed that the project started construction on 25-11-2021. By checking Operation Logbook /57/ and onsite interview, the assessment team confirmed that the project activity started operation on 15-04-2023.

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Audit history	This is joint validation and the 1 st verification of the project activity. No previous audit. The verification period is from 15-04-2023 to 31-12-2024, i.e. 627 days (1.72 years).
Sectoral scope	As per Standard - Applicability of sectoral scopes (https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20160314113213746/accr_stan03.pdf), if the recovered biogas from the manure treatment plant is only flared and not used for any other purposes then sectoral scope 13 alone applies. If the recovered biogas is used for any other purposes then sectoral scope 13 and 1 apply. The main purpose of the project activity is to avoid methane emissions through collecting and destroying the biogas generated from the anaerobic digester for energy (electricity and heat) generation. Therefore, it is confirmed the project activity applies sectoral scope 1 and sectoral scope 13, which is equivalent to VCS sectoral scope 1 Energy (renewable/non-renewable) (TA 1.1 Thermal energy (electricity and heat) generation from fossil fuels and biomass including thermal electricity from solar) and 13 Waste Handling and Disposal (TA 13.2 Animal Waste Management) . The above sectoral scope and technical area is sourced from IAF MD14:2014 Table 1.2 for ISO 14064-2 (Projects), which is equivalent to VCS sectoral scope 1 (Energy (renewable/non-renewable)), 13 (waste handling and disposal) and 15 (livestock and manure management). (https://verra.org/programs/verified-carbon-standard/vcs-

	program-details/#sectoral-scopes).												
AFOLU project category, if applicable	N/A												
Project activity type	By checking FSR /10/ and on-site inspection against the applied technology by the project, it was confirmed the project collects and destroys the biogas generated from the anaerobic digester for energy (electricity and heat) generation, and one set of 1MW biogas generator has been installed. Therefore, the assessment team can confirm that the project activity type is biogas utilization for energy (electricity and heat) generation.												
General eligibility of the project to participate in the VCS Program	For the project activity, the applicability of VCS program as required in para 2.1 of VCS Standard (Version 4.7) is justified as below: <table border="1"> <thead> <tr> <th>Criteria</th><th>Justification</th></tr> </thead> <tbody> <tr> <td>The scope of the VCS Program includes: 1) The seven Kyoto Protocol greenhouse gases.</td><td>During the 10-year fixed crediting period, the Project can reduce CO₂ emissions by avoiding methane emissions through collecting and destroying the biogas generated from the anaerobic digester for energy (electricity and heat) generation. Therefore, this criteria is applicable.</td></tr> <tr> <td>2) Ozone-depleting substances.</td><td>This criteria is not applicable for the project activity.</td></tr> <tr> <td>3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process.</td><td>This criteria is not applicable for the project activity.</td></tr> <tr> <td>4) Project activities supported by a methodology approved under an approved GHG program, unless explicitly excluded (see the Verra website for exclusions).</td><td>The project activity applies methodology AMS-III.D (Version 21.0), the methodologies approved under CDM Program, which is a VCS approved GHG program.</td></tr> <tr> <td>5) Jurisdictional REDD+ programs and nested REDD+ projects as set out</td><td>This criteria is not applicable for the project activity.</td></tr> </tbody> </table>	Criteria	Justification	The scope of the VCS Program includes: 1) The seven Kyoto Protocol greenhouse gases.	During the 10-year fixed crediting period, the Project can reduce CO ₂ emissions by avoiding methane emissions through collecting and destroying the biogas generated from the anaerobic digester for energy (electricity and heat) generation. Therefore, this criteria is applicable.	2) Ozone-depleting substances.	This criteria is not applicable for the project activity.	3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process.	This criteria is not applicable for the project activity.	4) Project activities supported by a methodology approved under an approved GHG program, unless explicitly excluded (see the Verra website for exclusions).	The project activity applies methodology AMS-III.D (Version 21.0), the methodologies approved under CDM Program, which is a VCS approved GHG program.	5) Jurisdictional REDD+ programs and nested REDD+ projects as set out	This criteria is not applicable for the project activity.
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5) Jurisdictional REDD+ programs and nested REDD+ projects as set out	This criteria is not applicable for the project activity.												

	in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements.	
	The scope of the VCS Program excludes projects that can reasonably be assumed to have generated GHG emissions primarily for the purpose of their subsequent reduction, removal, or destruction. The VCS Program also excludes the following project activities under the circumstances indicated in Table 1 of VCS Standard (version 4.7).	The project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle collected from Zhumadian Youran Xiping Dairy Farm, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. The project activity is not excluded under the circumstances indicated in Table 1 of VCS Standard (version 4.7).

For the project activity, the applicability of VCS program as required in para 3.1 of VCS Standard (Version 4.7) is justified as below:

Criteria	Justification
3.1.1 Projects shall meet all applicable rules and requirements set out under the VCS Program, including this document. Projects shall be guided by the principles set out in Section 2.2.1.	As justified in the above table, the project meets all applicable rules and requirements set out under the VCS program, including this document. The project has been guided by the principles set out in section 2.2.1 of VCS Standard (Version 4.7), i.e. principles taken from ISO-14064-2, including relevance, completeness, consistency, accuracy, transparency and conservativeness. Therefore, this criteria is applicable.

	3.1.2 Projects shall apply methodologies eligible under the VCS Program. Methodologies shall be applied in full, including the full application of any tools or modules referred to by a methodology, noting the exception set out in Section 3.14.1. The list of methodologies and their validity periods is available on the Verra website.	The project applies methodology AMS-III.D (Version 21.0), the methodologies approved under CDM Program, which is a VCS approved GHG program. Methodologies shall be applied in full, including the full application of any tools or modules referred to by a methodology. Please refer to section 3.4 of this report for detailed assessment on the application of methodology. Therefore, this criteria is applicable.
	3.1.3 Projects shall apply the latest version of the applicable methodology in all cases unless a grace period applies to the project as set out in 3.22 below. Projects shall update to the latest version of the methodology when reassessing the baseline or renewing a crediting period.	This is joint validation and the 1st verification of the project activity. The project applies methodology AMS-III.D (Version 21.0), which is the latest version of the applicable methodology available at UNFCCC website. Therefore, this criteria is applicable.
	3.1.4 Projects and the implementation of project activities shall not lead to the violation of any applicable law, regardless of whether or not the law is enforced.	By checking public information, the assessment team can confirm that the project meets the policies including Environmental Protection Law of the People's Republic of China /23/, Environmental Impact Assessment Law of the People's Republic of China /24/, Animal Husbandry Law of the People's Republic of China /25/, Law of the People's Republic of China on the Prevention and Control of Solid Waste Pollution /26/, Catalogue for the Guidance of Industrial Structure Adjustment (2019 version) /27/, Regulations on prevention and control of pollution from intensive

		livestock and poultry breeding /28/, Renewable Energy Law of the People's Republic of China /29/. All these policies have been included in the joint PD & MR and verified to be correct. Besides, the project obtained all the compulsory approvals from the local governments, i.e. Project Approval /11/ and EIA Approval /13/, which means that the project is in line with the national and local laws and regulations based on the local expertise of the assessment team. Therefore, this criteria is applicable.
	3.1.5 Where projects apply methodologies that permit the project proponent its own choice of model (see the VCS Program Definitions for the definition of model), the model shall meet the requirements set out in the VCS Methodology Requirements, and it shall be demonstrated at validation that the model is appropriate to the project circumstances (i.e., use of the model will lead to an appropriate quantification of GHG emission reductions or carbon dioxide removals).	As per VCS Program Definitions version 4.5, model means “a formula or set of formulae that uses parameters and input values to establish the value of one or more output variables”. The project activity has applied formulae in methodology AMS-III.D (Version 21.0), tools referenced, 2006 IPCC Guidelines for National Greenhouse Gas Inventories and its 2019 Refinement to calculate emission reductions, which is verified to be reasonable and reliable. Therefore, this criteria is applicable.
	3.1.6 Where projects apply methodologies that permit the project proponent to choose a third-party default factor or standard to ascertain GHG emission data and any supporting data for establishing baseline scenarios and	All default values applied by the project activity have been verified to be sourced from either methodology AMS-III.D (Version 21.0) or tools referenced, which meet the requirements set out in the VCS Methodology Requirements. Therefore, this criteria is

	demonstrating additionality, such default factor or standard shall meet the requirements set out in the VCS Methodology Requirements.	applicable.
	3.1.7 Where the rules and requirements under an approved GHG program conflict with the rules and requirements of the VCS Program, the rules and requirements of the VCS Program shall take precedence.	This is joint validation and the 1st verification of the project activity. The Project is not rejected by other GHG programs. A declaration /41/ for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows: - http://cdm.unfccc.int/ - http://www.goldstandard.org/ - http://verra.org/ As verified, the project activity is in compliance with the rules and requirements in the VCS Program. Therefore, this criteria is applicable.
	3.1.8 Where projects apply methodologies from approved GHG programs, they shall conform with any specified capacity limits (see the VCS Program Definitions for the definition of capacity limit) and any other relevant requirements set out with respect to the application of the methodology and/or tools referenced by the methodology under those programs.	This is joint validation and the 1st verification of the project activity. The Project is not rejected by other GHG programs. A declaration /41/ for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows: - http://cdm.unfccc.int/ - http://www.goldstandard.org/ - http://verra.org/

		Besides, as per methodology AMS-III.D (Version 21.0), the aggregate emission reductions of the project activity should be less than or equal to 60kt CO₂ equivalent annually. Therefore, this criteria is applicable.
	3.1.9 Where Verra issues new VCS Program rules, the effective dates of these requirements are set out in Appendix 3 Document History and Effective Dates or equivalent for other program documents, and are listed in a companion Summary of Effective Dates document which corresponds with each update.	As verified, all updates in VCS Standard version 4.7 has been applied. Therefore, this criteria is applicable.
AFOLU project eligibility, if applicable	N/A as this is not a AFOLU project.	
Transfer project eligibility, if applicable	N/A as this is not a Transfer project.	
Project design	N/A as this is not a grouped project.	
Project ownership	Via checking the Business License /12/, Project Approval /11/, EIA Approval /13/, it is confirmed the Project Proponent has the ownership of the project, and they have the legal right to control and operate project activity. The VVB has elected to satisfy Verra's evidence requirement under Option 1 by contacting the relevant government authorities through the governmental website. Via the Xiping County People's Government website, CTI contacted two government departments to verify the commissioning certificate/operation approval and latest pollution clearances. On 22-09-2025, CTI submitted the following queries regarding the project's operation: - The project construction site is located at Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province; - Whether "Zhumadian Youran Animal Husbandry Co., Ltd." is responsible for project construction and operation; - Project construction was completed and full operations began	

on 15-04-2023.

On the same day, the Xiping County Agriculture and Rural Bureau responded: Zhumadian Youran Farm is located in Hongcunpu Village, Leizhu Town, within our jurisdiction. The biogas utilization project was developed and is operated by the farm, achieving full operational status in 2023 after completing all commissioning activities.

Xiping County Agriculture and Rural Bureau confirmed the operation date in their response and stated that the biogas project is developed and run by Zhumadian Youran Farm; it therefore follows that the project and the farm share the same owner—Zhumadian Youran Animal Husbandry Co., Ltd..

Regarding the latest pollution clearances of the project, CTI also queried on 22-09-2025 as following:

Whether the company ("Zhumadian Youran Animal Husbandry Co., Ltd.) has filed a pollution registration. If registered, please verify the registration date of 22-08-2022, with a validity period from 22-08-2022 to 21-08-2027, registration number 91411721MA9FQMQX46001X, and the registration date of 01-07-2024, with a validity period from 01-07-2024 to 30-06-2029, registration number 91411721MA9FQMQX46001X.

On 26-09-2025, the Zhumadian City Ecological Environment Bureau Xiping Branch responded: After checking the pollutant-discharge registration database, the pollution registration number for Zhumadian Youran Animal Husbandry Co., Ltd. is 91411721MA9FQMQX46001X, with validity period from 02-04-2025 to 01-04-2030.

Given that the government's response timeline differed from CTI's inquiry date, CTI conducted additional verification through the public information on the pollutant-discharge registration database¹. This supplementary check confirmed the presence of three registration records under number 91411721MA9FQMQX46001X:

- version 1: Valid from 22-08-2022 to 21-08-2027 (application)
- version 2: Valid from 07-05-2024 to 06-05-2029 (modification)
- version 3: Cancellation
- Version 4: Valid from 01-07-2024 to 30-06-2029 (application)
- version 5: valid from 05-09-2024 to 04-09-2029 (modification)
- version 6: Valid from 02-04-2025 to 01-04-2030 (modification)

Although the authority's reply only confirmed the current

¹ <https://permit.mee.gov.cn/register/library/registerShow.vm?enterid=a5004c00-92af-4070-ac38-110e1b7ab02d>

	registration (02-04-2025 – 01-04-2030), the pollutant-discharge registration database shows a continuous history under number 91411721MA9FQMQX46001X, including the two earlier periods queried by CTI (22-08-2022 – 21-08-2027 and 01-07-2024 – 30-06-2029), thereby the assessment team confirmed that both the historical records and the latest validity period are accurate. The screenshots of the queries and responses from the government website /82/, as well as the screenshots of the publicly available pollution discharge information /83/, have been translated by Shanghai Linyue Translation Service Co., Ltd., a qualified translation service provider holding ISO 17100 certification /84//85/. The translated screenshots, certified English translations /82//83/, and the translator's credentials have been submitted for review.																										
Project start date	By checking Operation Logbook /57/ and on-site interview, the assessment team confirmed that the project activity started operation on 15-04-2023. Therefore, the assessment team confirmed that the project start date was 15-04-2023.																										
Project crediting period	PP has chosen the fixed ten years of crediting period, 15-04-2023 to 14-04-2033, which is in line with the concept for crediting period in section 3.9.1 of the VCS Standard version 4.7.																										
Project scale	As the estimated annual average GHG emission reductions per year is 59,610 tCO ₂ e, which is lower than 300,000 tCO ₂ e, the project classified as “Project” under VCS standard version 4.7.																										
Likelihood of achieving estimated GHG emission reduction or removals	The estimated annual average GHG emission reductions per year is 59,610 tCO₂e. <table border="1"> <thead> <tr> <th>Year</th><th>Estimated GHG emission reductions or removals (tCO₂e)</th></tr> </thead> <tbody> <tr> <td>15-04-2023 - 31-12-2023</td><td>42,625</td></tr> <tr> <td>2024</td><td>59,610</td></tr> <tr> <td>2025</td><td>59,610</td></tr> <tr> <td>2026</td><td>59,610</td></tr> <tr> <td>2027</td><td>59,610</td></tr> <tr> <td>2028</td><td>59,610</td></tr> <tr> <td>2029</td><td>59,610</td></tr> <tr> <td>2030</td><td>59,610</td></tr> <tr> <td>2031</td><td>59,610</td></tr> <tr> <td>2032</td><td>59,610</td></tr> <tr> <td>01-01-2033 - 14-04-2033</td><td>16,985</td></tr> <tr> <td>Total estimated ERs</td><td>596,100</td></tr> </tbody> </table>	Year	Estimated GHG emission reductions or removals (tCO ₂ e)	15-04-2023 - 31-12-2023	42,625	2024	59,610	2025	59,610	2026	59,610	2027	59,610	2028	59,610	2029	59,610	2030	59,610	2031	59,610	2032	59,610	01-01-2033 - 14-04-2033	16,985	Total estimated ERs	596,100
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	Through checking emission reductions calculation spreadsheets /2/ provided by PP, the assessment team confirmed the calculation of the estimated GHG emission reductions of the project activity is correct.																																														
Technologies and measures implemented by the project activity	By checking Feasibility Study Report (FSR) /10/ and on-site inspection against the applied technology by the project, it was confirmed the project uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle collected from Zhumadian Youran Xiping Dairy Farm, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation.																																														
	Through site visit, checking nameplate of the equipments /17/, Supply and Installation Contract of Manure Treatment System /31/ and Biogas System Equipment Sales and Installation Contract /32/, the assessment team confirmed that the project activity installs anaerobic animal manure management system, biogas pre-treatment system, digestate advanced treatment unit, biogas energy (electricity and heat) generation system and emergency flare system. The main technical parameters were confirmed as follows:																																														
	<table><tr><th colspan="3">Biogas Generator</th></tr><tr><td>Parameter</td><td>Value</td><td>Unit</td></tr><tr><td>Model</td><td>LSA50.2VL10C6S/4</td><td>-</td></tr><tr><td>Quantity</td><td>1</td><td>-</td></tr><tr><td>Rated capacity</td><td>1</td><td>MW</td></tr><tr><td>Speed</td><td>1500</td><td>rpm</td></tr><tr><td>Manufacturer</td><td>Hangzhou Energy and Environmental Engineering Co., Ltd</td><td>/</td></tr><tr><th colspan="3">Enclosed flare</th></tr><tr><td>Power rate</td><td>2</td><td>kW</td></tr><tr><td>Design discharge</td><td>1,900</td><td>m³/h</td></tr><tr><th colspan="3">Completely Stirred Tank Reactor (CSTR) Type Anaerobic Digester</th></tr><tr><td>Number</td><td>6</td><td>-</td></tr><tr><td>Effective Volume</td><td>7,000</td><td>m³</td></tr><tr><td>Manufacturer</td><td>Hangzhou Energy and Environmental Engineering Co., Ltd</td><td>/</td></tr><tr><th colspan="3">Double membrane dry gas holder</th></tr></table>		Biogas Generator			Parameter	Value	Unit	Model	LSA50.2VL10C6S/4	-	Quantity	1	-	Rated capacity	1	MW	Speed	1500	rpm	Manufacturer	Hangzhou Energy and Environmental Engineering Co., Ltd	/	Enclosed flare			Power rate	2	kW	Design discharge	1,900	m³/h	Completely Stirred Tank Reactor (CSTR) Type Anaerobic Digester			Number	6	-	Effective Volume	7,000	m³	Manufacturer	Hangzhou Energy and Environmental Engineering Co., Ltd	/	Double membrane dry gas holder		
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	Number	2	-
	Effective Volume	4,000	m ³
	Manufacturer	Hangzhou Energy and Environmental Engineering Co., Ltd	
	During site visit, it was verified the total installed capacity of the project activity is 1 MW, consisting of 1MW×1 generator.		
Implementation schedule of the project activity or activities	Via checking Operation Logbook /57/ and on-site interview, the assessment team confirmed that the project activity started operation on 15-04-2023 and the project activity kept in good running during this monitoring period from 15-04-2023 to 31-12-2024, and all the production instruments and monitoring equipment are well operated.		
Project location	The project is located in Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province, P.R. China. The geographical coordinates are 33°25'0"N, 113°42'6"E. The location of the project site was validated through on-site inspection and the coordinates were validated on-site by online GPS map.		
Conditions prior to project initiation	Before the implementation of the project activity, the animal manure is left to decay anaerobically in open lagoon within the project boundary and methane is emitted to the atmosphere. This has been confirmed by reviewing Statement from Xiping County Agricultural and Rural Bureau issued on 20-01-2025 /14/.		
Project compliance with applicable laws, statutes and other regulatory frameworks	By checking laws and regulations, i.e. Environmental Protection Law of the People's Republic of China /23/, Environmental Impact Assessment Law of the People's Republic of China /24/, Animal Husbandry Law of the People's Republic of China /25/, Law of the People's Republic of China on the Prevention and Control of Solid Waste Pollution /26/, Catalogue for the Guidance of Industrial Structure Adjustment (2019 version) /27/, Regulations on prevention and control of pollution from intensive livestock and poultry breeding /28/, Renewable Energy Law of the People's Republic of China /29/. All these policies have been included in the joint PD & MR and verified to be correct. Besides, the project obtained all the compulsory approvals from the local governments, i.e. Project Approval /11/ and EIA Approval /13/, which means that the project is in line with the national and local laws and regulations based on the local expertise of the assessment team.		
Double counting and participation under other GHG programs	Projects registered (or seeking registration) under other GHG program(s) The project has neither been registered nor seeking		

	registration under any other GHG programs. The project is seeking registration only in VCS program. The declaration /41/ for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows: - http://cdm.unfccc.int/ - http://www.goldstandard.org/ Rejection by other GHG programs The project is not rejected by other GHG programs. A declaration /41/ for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows: - http://cdm.unfccc.int/ - http://www.goldstandard.org/ - http://verra.org/
No double claiming with emissions trading programs or binding emission limits	China has a national emissions trading scheme only cover the high-emission industries, such as energy (electricity and heat) generation sector that emitted at least 26,000 tons of CO₂e/year which has been validated by checking "Notice on Strengthening Enterprise Greenhouse Gas Emission Report Management" /38/ issued by National Development and Reform Committee of P. R. China. By checking "Notice on Key Work Related to the Management of Greenhouse Gas Emission Reports for Enterprises in 2022" /39/ issued by Ministry of Ecology and Environment of P.R.China, it was confirmed China has a national emissions trading scheme only covering thermal energy (electricity and heat) generation industry. In addition, there are 7+1 Pilot ETSS in China, which include Beijing city, Shanghai city, Tianjin city, Chongqing city, Shenzhen city, Guangdong province, Hubei province and Fujian province. Hence, Shaanxi Province is not a Pilot ETS, Therefore, it is confirmed the project activity is not included in the mandatory emission control scheme and thus no emission cap was enforced for the project activity and it is confirmed that the emission reductions will not be double counted. The declaration regarding the project /41/ is submitted by PP which is acceptable to the assessment team. The assessment team confirms that the net GHG emission reductions or removals generated by the project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits. The assessment team checked the relevant laws, statutes, and other regulatory, and found that there is no market-based tool like ETS in the European Union aiming at GHG emission reductions in China. Thus, the assessment team concluded that the project activity will not be involved on other Emissions trading programs and other

	binding limits.
No double claiming with other forms of environmental credit	The project has no intention to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program. The declaration regarding the project /41/ is submitted by PP which is acceptable to the assessment team.
Supply chain (Scope 3) emissions double claiming	As verified, the project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. The generated electricity is only for internal use, not supplied to local power grid, which does not happen in a supply chain. Therefore, it is confirmed the Supply Chain (Scope 3) Emissions are not applicable for the project activity.
Sustainable development contributions	By checking China's National Plan on Implementation of the 2030 Agenda for Sustainable Development and 17 SDGs defined by UNDP, and interviewing with stakeholders during site visit, it is confirmed that the project activity would contribute sustainable development in the region in following aspects, which has been confirmed by site visit: • SDG 13: the project will achieve GHG emission reductions of approximately 59,610 tCO₂e/year during the whole crediting period. Thus, the project will achieve Target 13.0 (Indicator: 13.2.2 Total greenhouse gas emissions per year) under SDG 13 "Take urgent action to combat climate change and its impacts". The ER calculation sheet of this monitoring period has been confirmed to be correct, the emission reductions achieved during this monitoring period were verified to be 91,275 tCO₂e and the cumulative achieved emission reductions were verified to be 91,275 tCO₂e since project start date. • SDG7: The project activity, located in Hongcunpu Village, Leizu Town, Xiping County, Zhumadian City, Henan Province, P.R China, uses anaerobic digesters, i.e. Completely Stirred Tank Reactor (CSTR), to treat the dairy cattle manure, of which the main purpose is to avoid methane emissions through collecting and destroying the biogas generated from the anaerobic digester for power generation and natural gas upgrading (in the future), displacing fossil fuel-based electricity generation and natural gas with renewable energy sources. This contributes to one of China's actions for promoting sustainable developing: "By 2030, increase the share of non-fossil fuels in primary energy consumption to about 20 percent". As verified (refer to section 4.2 of this report for details), it was verified 7,198,080 MWh of renewable energy was generated during this monitoring period and the cumulative Contributions Over Project Lifetime was 7,198,080

	MWh of renewable energy. • SDG 8: the project activity increases long term employment opportunities for the management, operation and maintenance of the power plant. Thus, the project will achieve Target 8.5 (Indicator 8.5.1: Average hourly earnings of employees, by sex, occupation and persons with disabilities) under SDG 8 “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”. By checking Employee Roster /21/, it was confirmed the project activity increases 21 (including 17 male and 4 female) long term employment opportunities for the management, operation and maintenance of the power plant since the project start date.
Additional information relevant to the project	• Leakage management for AFOLU projects According to the methodology, the leakage of the project is zero, thus the leakage management is not applicable to the project. • Commercially sensitive information No commercially sensitive information has been excluded from the public version of the project description. • No additional relevant information that may have a bearing on the eligibility of the project, the reductions or removals, or the quantification of the project’s reductions or removals.

3.2 Project Activity Instances in Grouped Projects

Not applicable since the project activity was not a grouped project.

3.3 Safeguards

3.1.1 Stakeholder Engagement and Consultation

3.1.1.1 Stakeholder Identification

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder identification	The assessment team has checked the joint PD & MR and confirm that the stakeholder identification has been conducted as per the VCS standard version 4.7. People or groups who might be impacted by a project, including residents mainly in nearby village, staff from Zhumadian Youran Xiping Dairy Farm and the project activity. Therefore, people within 2 km far away from the project boundary, all staff (e.g. workers, farmers, experts and management personnel, unspecified) including males and females worked for Zhumadian Youran Xiping Dairy Farm and the project activity, and local authorities (government), are identified as stakeholders of this

	project activity.
Legal or customary tenure/access rights	By checking EIA Approval /13/ and Project Approval /11/, it is confirmed the project activity has been approved by local government. The assessment team confirm that as per Measures for Public Participation in Environmental Impact Assessment /24/, the government gives the legal right to the project proponent to access the stakeholders and consider their advice. On the other hand, people are voluntary to participate the consultation. By checking Business License /12/, EIA Report /12/ and EIA Approval /13/, and via onsite interviews, it was verified the project and Zhumadian Youran Xiping Dairy Farm where the animal manure was collected belongs to the same party. Therefore, the assessment team deemed the project activity has the access right of land and resource, i.e. manure of dairy cattle. Therefore, it was verified the project activity does not violate any legal or customary tenure/access rights to territories and resources, including collective and conflicting rights, held by stakeholders, indigenous people (IPs), local communities (LCs), and customary rights holders.
Stakeholder diversity and changes over time	As justified above, the stakeholders identified by PP includes people within 2 km far away from the project boundary, all staff (e.g. workers, farmers, experts and management personnel, unspecified) including males and females worked for Zhumadian Youran Xiping Dairy Farm and the project activity, and local authorities. The same has been confirmed through checking Local Stakeholder Consultation Questionnaires /36/ distributed on 11-05-2021 and 23-08-2023. Therefore, the assessment team deemed stakeholder diversity in the aspects of culture, society, economy has been considered by PP. Also, considering the identification of stakeholders by PP are very comprehensive, the assessment team deemed the make-up of stakeholders would not change overtime.
Expected changes in well-being	Following expected changes in well-being has been identified and confirmed to be correct through the site visit: Economic well-being – the project activity will increase employment opportunities for the operation of the project activity. Environmental well-being – the project activity uses anaerobic digesters, i.e. Completely Stirred Tank Reactor (CSTR), to treat the dairy manure, of which the main purpose is to avoid methane emissions through collecting and destroying the biogas generated from the anaerobic digester for energy (electricity and heat) generation. The excess biogas from anaerobic digesters will be flared. In the future, the biogas is planned to be sold for natural gas upgrading. The project activity avoided animal manure waste from being left to decay in anaerobic manure management system (uncovered open lagoon) at the livestock farm, avoiding methane emissions that would otherwise be released directly into the atmosphere. thus, the assessment team confirmed the project

	activity effectively utilizes renewable energy and reduces GHG emissions and air pollution. In conclusion, the assessment team confirmed the project contributes to improve the economic and environmental well-being of local communities, which has been correctly described in the joint PD & MR.
Location of stakeholders	As justified above, people within 2 km far away from the project boundary, all staff worked for (in the location of) Zhumadian Youran Xiping Dairy Farm and the project activity, and local authorities, are identified as stakeholders of this project activity, which is considered to be reasonable by the assessment team.
Location of resources	By checking EIA Approval /13/ and Project Approval /11/, it is confirmed the project activity has been approved by local government. By checking Business License /12/, EIA Report /12/ and EIA Approval /13/, and via onsite interviews, it was verified the project and Zhumadian Youran Xiping Dairy Farm where the animal manure was collected belongs to the same party. Therefore, the assessment team deemed the project activity has the access right of land and resource, i.e. manure of dairy cattle. Therefore, it is confirmed that territories and resources occupied by the project does not affect those of stakeholders own or to which they have customary access.

3.1.1.2 Stakeholder Consultation and Ongoing Communication

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder engagement process	Via interviewing stakeholders during site visit, it was verified communications with local stakeholders are being carried out at periodic intervals; key implementation schedules or changes of the project will be communicated to the local authority, who will inform the neighborhood committee and the local residents, the comments and suggestions from residents will be collected by the local authority meanwhile; and the local government agencies and competent authorities will conduct spot checks on the implementation of the project from time to time and give suggestions on the involved rectification problems. In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals. Via interviewing stakeholders during site visit and by checking Brochures and Leaflets /35/, it was verified the project information with contact information were published on the bulletins at and nearby the project site on 04-05-2021 to invite local stakeholders. 30 survey questionnaires has been distributed to relevant personnel including staff from Zhumadian Youran Xiping Dairy Farm, local

	villagers and government officials on 11-05-2021. The survey questionnaire was designed to assess the project impacts on the local environment and social economic development.
Consultation outcome	30 questionnaires has been distributed to collect the relevant comments and suggestions on 11-05-2021. By checking Local Stakeholder Consultation Questionnaires /36/, it is confirmed that no negative comments have been received for the project and local stakeholders are supportive of the project construction.
Ongoing communication	It is appropriate that the project proponent will set up an on-going communication mechanism to regularly holds stakeholder meetings every year to issue questionnaires and to answer the questions from various stakeholders in order to understand the opinions of various stakeholders during the project operation period. By checking Local Stakeholder Consultation Questionnaires /36/, it was verified stakeholders consultation has been conducted on 23-08-2023 to introduce implementation of the project activity for this monitoring period.
Stakeholder input	By checking Local Stakeholder Consultation Questionnaires /36/ conducted on 11-05-2021 and 23-08-2023, it is confirmed that there are no negative comments received for the project and there are no ongoing or unresolved conflicts.

3.1.1.3 Free, Prior, and Informed Consent

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Obtaining consent	The assessment team has checked the EIA Report /12/ and EIA Approval /13/ from local government, and can confirm that every aspect of environmental impact has been considered in the Environmental Impact Assessment with corresponding measures during project development, and no net harm has been detected. By checking Business License /12/, EIA Report /12/ and EIA Approval /13/, and via onsite interviews, it was verified the project and Zhumadian Youran Xiping Dairy Farm where the animal manure was collected belongs to the same party. Therefore, the assessment team deemed the project activity has the access right of land and resource, i.e. manure of dairy cattle. Besides, the assessment team interviewed the local stakeholders, and confirms that there do not exist any ongoing or unresolved conflicts.
Outcome of FPIC discussion	By checking the evidence /10//11//12//13/ and interviewing the local stakeholders, the assessment team can confirm that the project obtained the approval letters from governmental authorities and there do not exist any ongoing or unresolved conflicts. By checking Business License /12/, EIA Report /12/ and EIA Approval /13/, and via onsite interviews, it was verified the project

	and Zhumadian Youran Xiping Dairy Farm where the animal manure was collected belongs to the same party. Therefore, the assessment team deemed the project activity has the access right of resource, i.e. manure of dairy cattle. By checking Employee Roster /21/, it was confirmed the project activity increases 21 long term employment opportunities for the management, operation and maintenance of the power plant. In conclusion, the assessment team confirmed the project has not encroached on land, relocated people without consent, and forced physical or economic displacement.
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3.1.1.4 Grievance Redress Procedure

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Development process	Development process of the grievance redress procedure described in the joint PD & MR has been checked and confirmed via onsite interview: Stakeholders can access the official website of Zhumadian Ecological Environment Bureau (https://sthjj.zhumadian.gov.cn/), Department of Ecology and Environment of Henan Province (https://sthjt.henan.gov.cn/) or directly call to reflect, report any problems or give their advice anytime. The project proponent has nominated a staff in charge of recording and collecting conflicts and grievances of local communities, and the relevant solution process is as follows.
Grievance redress procedure	During site visit, it was verified a Opinion Book with PP's phone number and email address has been allocated at the entrance of the project proponent's company. Grievance redress procedure described in the joint PD & MR has been checked and confirmed via onsite interview: Stakeholder can contact with PP at any time if any grievance happened. After receiving comments and suggestions, the project proponent will give feedback within 3 days. Then the specific staff of project owner should propose a solution and mediation which is performed by relevant government agency within a week based on all collected information. Thirdly, the project owner will address their complaints or grievances by relevant legal method such as arbitration and courts if necessary. Finally, the entire complaints or grievances redress process shall be dealt within 30 days. The above grievance redress procedures are included in the VCS Monitoring Manual /54/, which was checked and confirmed by the assessment team. Via interviewing the staff in charge of recording and collecting conflicts and grievances of local communities during site visit, it was verified no grievance has been received for the operation of this project activity.

3.1.1.5 Public Comments

Comments received	Actions taken by the project proponent	Evidence gathering activities, evidence checked, and assessment conclusion
No comment has been received	N/A	N/A

3.1.2 Risks to Local Stakeholders and the Environment

3.1.2.1 Management Experience

As confirmed with the project proponent during site visit, no new entity is involved in project design or implementation. By checking Business License /12/, it was verified the PP was established on 18-09-2020. Besides, PP belongs to Inner Mongolia Youran Animal Husbandry Co., Ltd., which oversees several animal husbandry farms spread across multiple locations in China and utilize anaerobic manure fermentation and biogas utilization technology /18/. Therefore, the audit team deemed PP has expertise or experience in implementing similar project activities and engaging communities. By checking VERRA website, it was verified the other subsidy of Inner Mongolia Youran Animal Husbandry Co., Ltd., i.e. Jlnan Youran Animal Husbandry Co., Ltd., operates the other VCS registered project (VCS 4443).

On-site training for the related procedures including monitoring, recording and reporting was verified to be in place and their implementation was confirmed by interview with the key operators and observing the operation. Competence and training records /22/ of on-site personnel engaged in measurement of parameters were presented during verification and found to be in order.

Besides, the consultancy party, i.e. Climate Bridge (Shanghai) Ltd., has successfully developed emission reductions and/or removals projects under the VCS program and fully understands the requirements of the standard as well as the validation and verification process.

Therefore, the assessment team deemed PP has expertise or experience in implementing the project activity and engaging communities.

3.1.2.2 Risk Assessment

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Natural and human-induced risks to stakeholders' wellbeing	By checking EIA Approval /13/ and Project Approval /11/ issued by government, it is confirmed the project has been approved by Chinese government, in this sense, the project meets all the requirement of regulation and laws set up by Chinese government in aspect of environment, health and safety. The project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the

	main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. Therefore, the assessment team deemed the project activity minimizes odour at the livestock farm, which improves the working environment of the workers. By checking Employee Roster /21/, it was verified the project offers job opportunities for local residents. Therefore, it was verified no natural or human induced risks to stakeholders' well being have been identified.
Risks to stakeholder participation	As mentioned above, the project has been approved by Chinese government. In this sense, the project meets all the requirement of regulation and laws set up by Chinese government in aspect of environment, health and safety. The assessment team confirmed that as per Measures for Public Participation in Environmental Impact Assessment /24/, the government gives the legal right to the project proponent to access the stakeholders and consider their advice. Therefore, it is confirmed no risks has been identified to stakeholder participation.
Working conditions	As mentioned above, the project has been approved by Chinese government. In this sense, the project meets all the requirement of regulation and laws set up by Chinese government in aspect of environment, health and safety. The project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. Therefore, the assessment team deemed the project activity minimizes odour at the livestock farm, which improves the working environment of the workers. By checking EIA Report /12/, it was confirmed the project proponent has established and improved the safety production responsibility system; formulated safety production rules and regulations and operating procedures; formulated and implemented the safety production education and training plan. These measures ensure the effective implementation of safety production investment, eliminate safety hazards in time, and carry out the standardization construction of safety production. The same has been confirmed during site visit. Therefore, the assessment team deemed the staff from the project are working in safety working environment. And no risks identified for working conditions.
Safety of women and girls	As mentioned above, the project has been approved by Chinese government. In this sense, the project meets all the requirement of

	regulation and laws set up by Chinese government in aspect of environment, health and safety. In order to protect the physical and mental health of minors, China issued "Prohibition of Child Labor Regulations" /48/, prohibiting employers from recruiting minors under the age of 16. Also, China published "Law of the People's Republic of China on the Protection of Women's Rights and Interests" /43/ and "Law of the People's Republic of China on the Protection of Minors" /44/. Therefore, the Project will not expose women and girls to further risks or hazards. By checking Employee Roster /21/ and interviewing staff from PP, it was verified no girls have been recruited, also equal payment has been made to women and men. Therefore, it is confirmed no risks has been exposed to safety of women and girls.
Safety of minority and marginalized groups, including children	China has strict prohibition for child labour. Thus, the project does not involve child labour neither in construction nor at operation of project activity. In the HR policy is also mentioned that no child labour will be entertained. The same was confirmed by the assessment team through checking Employee Roster /21/ and on site interview. Besides, in order to protect the physical and mental health of minors, the State Council promulgated the "Prohibition of Child Labor Regulations" /48/, prohibiting employers from recruiting minors under the age of 16. By checking Employee Roster /21/ and on site interview, the assessment team was able to confirmed that no Minors under the age of 16 were employed.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials, and chemical pesticides and fertilizers)	The air pollution, noise, wastewater and solid wastes caused by project construction have been treated according to the measures in EIA Report /12/. The EIA Report has been approved by local government /13/. Via site investigation, interviewing stakeholders, as well as checking EIA Report /12/ and EIA Approval /13/, it was verified the following key aspects have been addressed: Air Quality During the operation period, the air pollution mainly includes the exhaust gas from the anaerobic fermentation system, biogas generator, biogas heat boiler, the emergency flare. The exhaust gas is to be treated through 2 stage purification equipment before being discharged through exhaust funnels with a height of 15 m. The H₂S, NH₃ and odorous substance in all the exhaust gas by the project can meet the requirements of Table 2 standard limit of the "Odorous Pollutant Emission Standard" (GB14554-1993). The SO₂, NO_x, and particulate matter in all the exhaust gas by the project meets Grade 2 emission standard of "Integrated Emission Standard of Air Pollutants" (GB16297-1996). Therefore, the emission of exhaust gas and dust has little impact on surrounding environment. Wastewater

During the operation period, the wastewater is mainly domestic sewage and biogas slurry from anaerobic digesters. The domestic sewage of the project is pre-treated in a septic tank and reused in anaerobic digesters. During onsite inspection, it was confirmed the biogas slurry will be directly returned to nearby farmland as fertilizer. No wastewater will be discharged to the environment.

Noise

During the operation period, the high noise equipment of the project mainly consists of various mechanical operation and vibration. All production equipment has been placed in the workshop or steel container, and measures i.e. sound insulation, vibration reduction, noise elimination, greening and distance attenuation, have been taken to reduce the noises to acceptable range. The noise at the plant boundary can meet the requirements of Class II standard of the "Emission Standard for Industrial Enterprises Noise at Boundary" (GB12348-2008).

Solid Waste

During the operation period, the solid waste of the project is mainly domestic garbage and filtered dust. Domestic waste will be collected, cleaned and disposed by the local sanitation department. The other general industrial solid wastes are regularly removed by the qualified company, the storage of general industrial solid wastes can meet the requirements of "Standard for pollution on the storage and disposal site for general industrial solid wastes" (GB18599-2001).

The project site has set up a hazardous waste collection site, and by checking Hazardous Waste Transfer Records /37/, it was verified the hazardous waste collected is disposed by the qualified company. Therefore, it was confirmed the storage and disposal of hazardous waste meet the requirements of "Standard for pollution control on hazardous waste storage" (GB18597-2001/2013 version).

In conclusion, after the above measures are performed, the negative impacts on environment will be minimized below the requirements of laws and regulations during the construction and operational period.

3.1.3 Respect for Human Rights and Equity

3.1.3.1 Labor and Work

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Discrimination	China has published "Labor Law" /45/ and "Law of the People's Republic of China on the Protection of Women's Rights and Interests" /43/ and "the Special Provisions on Labor Protection for Women Workers" /49/, which could prohibit such phenomena. It has been confirmed during onsite inspection and interviews that project proponent strictly obeys the anti-discrimination rules set out in the law. No discrimination has occurred or will occur.

Sexual harassment	It has been confirmed during onsite inspection and interviews that project proponent strictly obeys the anti-discrimination rules set out in the law. No sexual harassment has occurred or will occur.
Equal pay for equal work	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. "Law of the People's Republic of China on the Protection of Women's Rights and Interests" /43/, "Labor Law" /45/, "Labor Contract Law of the People's Republic of China" /46/ and "the Special Provisions on Labor Protection for Women Workers" /49/. Besides, China also ratified relevant ILO core conventions on equality, namely Equal Remuneration Convention (Convention No 100) /42/. In total 21 employees (including 17 male and 4 female) are hired working for the project. The PP employed 4 female staff responsible for project management. By checking Employee Roster /21/ and interviewing staff from the project proponent during site visit, it was validated male and female employees enjoy equal pay for equal work.
Gender equity in labor and work	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. "Law of the People's Republic of China on the Protection of Women's Rights and Interests" /43/, "Labor Contract Law of the People's Republic of China" /46/ and "the Special Provisions on Labor Protection for Women Workers" /49/. Besides, China also ratified relevant ILO core conventions on equality, namely Equal Remuneration Convention (Convention No 100) /42/. In total 21 employees (including 17 male and 4 female) are hired working for the project. By interviewing staff from the project proponent during site visit, it was validated male and female employees enjoy equity in labor and work.
Forced labor	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. Labor Law of the People's Republic of China /45/, and there is no forced labor.
Child labor	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. Labor Law of the People's Republic of China /45/, "Law of the People's Republic of China on the Protection of Minors" /44/ and "Prohibition of Child Labor Regulations" /48/. Besides, no child labor was identified from the Employee Roster /21/.
Human trafficking,	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. Labor Law of the People's Republic of China /45/, and there is no human trafficking.

3.1.3.2 Human Rights

Risks identified	Evidence gathering activities, evidence checked, and assessment conclusion
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N.A.	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. Labour Law of in line with People's Republic of China /45/ and the legal rights and interests of all employees are protected. No indigenous peoples or tribal peoples are treated differently from the majority of local people. As justified above, stakeholders have been consulted for construction and operation of the project activity. Besides, PP has set up grievance redress procedure to solve any grievance from local stakeholders. Besides, China also ratified international human right laws, i.e. 1989 Indigenous and Tribal Peoples Convention (No. 169); 1992 Declaration on the Rights of Persons Belonging to National or Ethnic, Religious and Linguistic Minorities; and 2007 Declaration on the Rights of Indigenous Peoples/52/. Therefore, the assessment team deemed PP respects human rights of stakeholders.
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3.1.3.3 Indigenous Peoples and Cultural Heritage

Risk identified	Evidence gathering activities, evidence checked, and assessment conclusion
N.A.	It has been confirmed during onsite inspect and interviews that no cultural heritage involved. Therefore, preservation and protection of cultural heritage is not applicable.

3.1.3.4 Property Rights

Risks identified	Evidence gathering activities, evidence checked, and assessment conclusion
N.A.	It has been confirmed during onsite inspect and interviews that there does not exist no identified stakeholders legally own or use Zhumadian Youran Xiping Dairy Farm. By checking Business License /12/, EIA Report /12/ and EIA Approval /13/, and via onsite interviews, it was verified the project and Zhumadian Youran Xiping Dairy Farm where the animal manure was collected belongs to the same party. Therefore, the assessment team deemed the project activity has the access right of land and resource, i.e. manure of dairy cattle. Therefore, the project activity does not violate rights to territories and resources and respect proper rights.

3.1.3.5 Benefit Sharing

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Process used to	Not applicable as the no benefit sharing event is involved in the

design the benefit sharing plan	project, which has been confirmed during onsite interviews.
Summary of the benefit sharing plan	Not applicable as the no benefit sharing event is involved in the project, which has been confirmed during onsite interviews.
Approval and dissemination of benefit sharing plan	Not applicable as the no benefit sharing event is involved in the project, which has been confirmed during onsite interviews.
Benefit sharing during the monitoring period	Not applicable as the no benefit sharing event is involved in the project, which has been confirmed during onsite interviews.

3.1.4 Ecosystem Health

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Impacts on biodiversity and ecosystems	The project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. By checking EIA Report /12/ approved by government and via on site investigation, it is confirmed the project does not alter biodiversity and is not located in high conservation value areas, and there are no rare and valuable plant and animal species. Therefore, it is confirmed the project activity does not adversely impacted habitats for rare, threatened, or endangered species during the monitoring period.
Soil degradation and soil erosion	The project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. During site visit, it is confirmed the CSTR applied by the project activity is designed closed, no directly contact with soil. By checking EIA Report /10/ approved by government, it is confirmed the project will not cause soil degradation and soil erosion during its lifetime. By checking public reporting /15/, it was identified in traditional agricultural production, livestock and poultry manure is the best natural fertilizer, which can be directly absorbed by crops through anaerobic fermentation and harmless treatment, and also has a good effect on improving land fertility. Therefore, it is confirmed the project does not adversely impacted soil

	during the monitoring period.
Water consumption and stress	The project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. By checking EIA Report /10/ approved by government and via site investigation, it is confirmed the project will use less water in the CSTR, biogas pre-treatment system. Circulating water would be used by biogas combustion facility for cooling, which will not cause water consumption stress. Therefore, it is confirmed the project activity will not cause water consumption stress.

3.1.4.1 Rare, Threatened, and Endangered species

Risk identified	Evidence gathering activities, evidence checked, and assessment conclusion
Species and habitat	Not applicable. By checking EIA Report /12//13/ approved by government and via interviewing with stakeholders, it is confirmed that the project does not involve habitats for rare, threatened, or endangered species.
Areas needed for habitat connectivity	Not applicable. By checking EIA Report /12//13/ approved by government and via interviewing with stakeholders, it is confirmed the project does not involve habitats for rare, threatened, or endangered species and will not impact areas needed for habitat connectivity.

3.1.4.2 Introduction of Species

Species introduced	Evidence gathering activities, evidence checked, and assessment conclusion
N/A	Not applicable. By checking EIA Report /12//13/ approved by government and via interviewing with stakeholders, it is confirmed that the project does not involve any existing invasive species.

Existing invasive species	Evidence gathering activities, evidence checked, and assessment conclusion
N/A	Not applicable. By checking EIA Report /12//13/ approved by government and via interviewing with stakeholders, it is confirmed that the project does not involve any existing invasive species.

	Evidence gathering activities, evidence checked, and assessment conclusion
Invasive species	Not applicable. By checking EIA Report /12//13/ approved by government and via interviewing with stakeholders, it is confirmed the project does not involve existing invasive species.

3.1.4.3 Ecosystem conversion

Risks Identified	Evidence gathering activities and evidence checked
Ecosystem conversion	Not applicable as the project is not a ARR, ALM, WRC or ACoGS project.

3.4 Application of Methodology

3.4.1 Title and Reference

The assessment team checked that following methodology and tools are applicable for the project activity as below:

Title	Methane recovery in animal manure management systems, AMS-III.D., version 21.0
Reference	As per AMS-III.D., version 21.0, this methodology covers project activities involving the replacement or modification of anaerobic animal manure management systems in livestock farms to achieve methane recovery and destruction by flaring/combustion or gainful use of the recovered methane. The project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for energy (electricity and heat) generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. Therefore, AMS-III.D., version 21.0 is applicable to the project activity.
Methodology	Methane recovery in animal manure management systems, AMS-III.D., version 21.0
Sectoral scope(s)	1, 13, 15
Category	Approved Consolidated Methodology
Tools	Tools referred with above methodology and applicable for project activity are: - Tool 06: Project emissions from flaring version 04.0 - Tool 14: Project and leakage emissions from anaerobic digesters, version 03.0

3.4.2 Applicability

The applied baseline methodology is justified as it has been demonstrated that the proposed project activity is:

Applicability conditions of "Methane recovery in animal manure management systems"

Applicability criteria	Justification of the project situation
This methodology covers project activities involving the replacement or modification of anaerobic animal manure management systems in livestock farms to achieve methane recovery and destruction by flaring/combustion or gainful use of the recovered methane. It also covers treatment of manure collected from several farms in a centralized plant.	By checking Statement from Xiping County Agriculture and Rural Bureau /14/, it was verified there are 8 large-scale livestock farms in Xiping County, Zhumadian City, and more than 80% of them use open anaerobic lagoon to treat animal manure, resulting in large-scale methane release. By checking FSR /10/ and interviewing staff from PP during site visit, the assessment team confirmed the project replaces existing anaerobic animal manure management systems (open lagoon) in Zhumadian Youran Xiping Dairy Farm. By checking EIA Report /12/ and through on-site interview, the assessment team confirmed that the project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle, of which the main purpose is to avoid methane emissions that would be emitted to the atmosphere directly from open lagoon through collecting and destroying the biogas generated from the anaerobic digester by flaring/combustion and gainful use (electricity, heat and natural gas upgraded for combustion in the future) of the recovered methane. Therefore, it is confirmed that this criteria is applicable.
This methodology is only applicable under the following conditions: (a)The livestock population in the farm is managed under confined conditions; (b)Manure or the streams obtained after treatment are not discharged into natural water resources (e.g. river or estuaries), otherwise "AMS-III.H Methane recovery in wastewater treatment" shall be applied; (c)The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C; (d)In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than one month, and if anaerobic lagoons are used in the baseline, their depths are at least 1 m;	By checking the EIA Report /12/ and through on-site inspection, it is confirmed that all the livestock population in Zhumadian Youran Xiping Dairy farm is managed under confined conditions. Therefore, condition (a) is applicable. By checking the EIA Report /12/ and FSR /10/, EIA Approval /13/ and through on-site inspection, it is confirmed that manure or the streams obtained after treatment are not discharged into natural water resources, including river and estuaries. As verified during site visit, the dried biogas residue from the CSTR digesters is reused as cattle bedding material, while the liquid digestate is pumped directly to adjacent fields via a lift pump station and a pipeline network. Therefore, condition (b) is applicable. By checking public information /20/, it is confirmed the annual average temperature of

(e) No methane recovery and destruction by flaring or combustion for gainful use takes place in the baseline scenario.	baseline site (Zhumadian City) where anaerobic manure treatment facility is located, i.e. the project location, is about 15.0 °C, which is higher than 5°C. Therefore, condition (c) is applicable. By checking FSR /10/ and interviewing PP during site visit, it is confirmed that the retention time of manure waste in the anaerobic treatment system (open lagoon) is 45 days and the depth of the open lagoon is 3m under the baseline scenario. Therefore, condition (d) is applicable. By checking Statement from Xiping County Agriculture and Rural Bureau /14/, it was verified there are 8 large-scale livestock farms in Xiping County, Zhumadian City, and more than 80% of them use open anaerobic lagoon to treat animal manure, resulting in large-scale methane release. Therefore, condition (e) is applicable.
The project activity shall satisfy the following conditions: (a) The residual waste from the animal manure management system shall be handled aerobically, otherwise the related emissions shall be taken into account as per relevant procedures of "AMS-III.AO Methane recovery through controlled anaerobic digestion". In the case of soil application, proper conditions and procedures (not resulting in methane emissions) must be ensured; (b) Technical measures shall be used (including a flare for exigencies) to ensure that all biogas produced by the digester is used or flared; (c) The storage time of the manure after removal from the animal barns, including transportation, should not exceed 45 days before being fed into the anaerobic digester. If the project proponent can demonstrate that the dry matter content of the manure when removed from the animal barns is larger than 20%, this time constraint will not apply.	By checking the EIA Report /12/, FSR /10/, interviewing with PP during site visit, and via site inspection, it is confirmed the residual waste (dried part) from the animal manure management system of the project activity will be used as cattle bedding material, while the biogas slurry (liquid part) will be directly returned to nearby farm as organic fertilizer, through a lifting pump and a pipeline network, which will not store in aerobic conditions. During onsite inspection, it was verified the cattle bedding material (dried solid part of digestate) is stored in biogas residue storage room. Via checking usage records of cattle bedding material /79/ and interviewing staff from PP, the assessment team confirmed the bedding material will be used within one day. Via onsite inspection and interview, the assessment team deemed the storage room is a dry and ventilated environment that does not produce anaerobic conditions and thus will not generate emissions. Therefore, condition (a) is applicable. By checking EIA Report /12/, FSR /10/ and EIA Approval /13/, as well as site inspection, it is confirmed that the project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle. All the biogas generated from CSTR is for gainful use (electricity, heat or natural gas upgraded for combustion in the future). Furthermore, an emergency flare was installed to ensure that biogas are combusted when exigencies happened, ensuring that no biogas can be released uncombusted to the atmosphere under any operating condition. Therefore, condition (b) is fully

	satisfied and applicable. By checking EIA Report /12/, it is confirmed that the storage time of the manure after removal from the animal barns, including transportation, is about 7 hours, not exceed 45 days before being fed into the anaerobic digester. Therefore, condition (c) is applicable.
Projects that recover methane from landfills shall use "AMS-III.G Methane recovery in animal manure management systems" and projects for wastewater treatment shall use AMS-III.H. Projects for composting of animal manure shall use "AMS-III.F Avoidance of methane emissions through composting". Project activities involving co-digestion of animal manure and other organic matters shall use the methodology "AMS-III.AO Methane recovery through controlled anaerobic digestion".	By checking EIA Report /12/, FSR /10/and EIA Approval /13/, as well as onsite investigation, it is confirmed that the project recovers methane from an anaerobic animal manure management system, not from landfills, or wastewater treatment, or composting of animal manure, or co-digestion of animal manure and other organic matters. Therefore, this criteria is not applicable.
Utilization of the recovered biogas in one of the options detailed in AMS-III.H is also eligible under this methodology. The respective procedures in AMS-III.H shall be followed in this regard. If the recovered biogas is used to power auxiliary equipment of the project activity, it should be taken into account accordingly, using zero as its emission factor; however, energy used for such purposes is not eligible as an SSC CDM Type I project component.	By checking EIA Report /12/ and EIA Approval /13/, as well as through on-site interview, it is confirmed that the project activity uses an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle. The biogas generated from CSTR is for gainful use (electricity, heat and natural gas upgraded for combustion in the future), which is applicable under para 4 (a) of AMS-III.H, i.e. the recovered biogas are utilized for the thermal or mechanical, electrical energy generation directly instead of combustion/flaring. As confirmed with PP and through on site inspection, it is confirmed that the electricity and heat generated from biogas combustion is used in auxiliary equipment of the project activity and as confirmed with PP, no emission reductions will be claimed for electricity generation. As confirmed with PP, the excess biogas is planned to be sold for natural gas upgrading in the future. The upgrading natural gas production (NG_y) has been monitored. The relevant emission reductions from the displacement of the use of natural gas shall be considered in the future. Therefore, this criteria is applicable.
New facilities (Greenfield projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the "General guidelines for SSC	The project is a greenfield project, which recovers methane from an anaerobic digester, i.e. Completely Stirred Tank Reactor (CSTR), for energy (electricity and heat) generation. The project activity meets the eligibility criteria of

CDM methodologies".	small scale project, i.e. "General guidelines for SSC CDM methodologies", as the estimated annual average GHG emission reductions or removal per year is 59,610 tCO ₂ e which is less than 60,000 tonnes of CO ₂ e per year. Therefore, it is confirmed that this criteria is applicable.
The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the "General guidelines for SSC CDM methodologies".	By checking EIA Report /12/, FSR /10/ and interviewing with PP during site visit and through site inspection, it is confirmed the project activity replaced existing anaerobic animal manure management systems (open lagoon), and no equipment was replaced by the project activity. Therefore, this criteria is not applicable.
Measures are limited to those that result in aggregate emission reductions of less than or equal to 60 kt CO ₂ equivalent annually from all Type III components of the project activity.	All Type III components of the project activity recovered and destroyed an estimated annual average GHG (methane) emission of 59,610 tCO ₂ e which is less than 60,000 tonnes of CO ₂ e per year. Therefore, this criteria is applicable.

Applicability conditions of "Tool 06: Project emissions from flaring (version 04.0)"

Applicability criteria	Justification of the project situation
The tool is applicable to enclosed or open flares and project participants should document in the CDM-PDD the type of flare used in the project activity.	By checking FSR /10/ and EIA Report /12/, as well as onsite inspection, it is confirmed that enclosed flare system will be used by the project activity for combustion of excess biogas. Therefore, this criteria is applicable.
This tool is applicable to the flaring of flammable greenhouse gases where: (a) Methane is the component with the highest concentration in the flammable residual gas; and (b) The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g. biogas, landfill gas or wastewater treatment gas).	By checking EIA Report /12/ and EIA Approval /13/, as well as onsite inspection, it is confirmed that the residue biogas with high methane concentration and the source of the residue gas is biogas. Therefore, this criteria is applicable.
The tool is not applicable to the use of auxiliary fuels and therefore the residual gas must have sufficient flammable gas present to sustain combustion. For the case of an enclosed flare, there shall be operating specifications provided by the manufacturer of the flare.	By checking EIA Report /12/ and on site inspection, it is confirmed that the project activity uses a new anaerobic animal manure management system to treat manure waste without utilize of auxiliary fuels. The residual gas contains high concentration methane and therefore have sufficient flammable gas present to sustain combustion. The operation specifications have been provided by the manufacturer of the flare /64/ and has been validated by CTI. Therefore, this criteria is applicable.

Applicability conditions of "Tool 14: Project and leakage emissions from anaerobic digesters (version 03.0)"

Applicability criteria	Justification of the project situation
This tool provides procedures to calculate project and leakage emissions associated with anaerobic digestion in anaerobic digesters. The tool is not applicable to other systems where waste may be decomposed anaerobically, for instances stockpiles, SWDS or unaerated lagoons.	By checking EIA Report /12/, FSR /10/, as well as onsite inspection, it is confirmed that the project activity uses anaerobic digesters, i.e. Completely Stirred Tank Reactor (CSTR), to treat the manure of dairy cattle. The biogas generated from CSTR is used for energy (electricity and heat) generation. And the residual waste from the animal manure management system of the project activity will be used to produce organic fertilizer, which is handled aerobically. Via onsite investigation, it is confirmed the project activity does not involve in other systems where waste may be decomposed anaerobically, for instances stockpiles, SWDS or unaerated lagoons. Therefore, this criteria is applicable.
The following sources of project emissions are accounted for in this tool: (a) CO₂ emissions from consumption of electricity associated with the operation of the anaerobic digester; (b) CO₂ emissions from consumption of fossil fuels associated with the operation of the anaerobic digester; (c) CH₄ emissions from the digester (emissions during maintenance of the digester, physical leaks through the roof and side walls, and release through safety valves due to excess pressure in the digester); and (d) CH₄ emissions from flaring of biogas.	By checking EIA Report /12/, FSR /10/, and during on site inspection, it is confirmed that the project emissions include CO₂ emissions from consumption of electricity associated with the operation of the anaerobic digester (a); CH₄ emissions from the digester (c); and CH₄ emissions from flaring of biogas (d). The project does not involve fossil fuel consumption, and therefore the CO₂ emission from use of fossil fuels (b) is not included.
The following sources of leakage emissions are accounted for in this tool: (a) CH₄ and N₂O emission from composting of digestate; (b) CH₄ emissions from the anaerobic decay of digestate disposed in a SWDS or subjected to anaerobic storage, such as in a stabilization pond.	Not applicable. By checking EIA Report /12/, FSR /10/ and onsite inspection, it is confirmed that residual waste (dried part) from the animal manure management system of the project activity will be used as cattle bedding material, while the biogas slurry (liquid part) will be directly returned to nearby farm as organic fertilizer, through a lifting pump and a pipeline network, which will not store in anaerobic conditions. During onsite inspection, it was verified the cattle bedding material (dried solid part of digestate) is stored in biogas residue storage room. Via checking usage records of cattle bedding material /79/ and interviewing staff from PP, the assessment team confirmed the bedding material will be used within one day. Via onsite

	inspection and interview, the assessment team deemed the storage room is a dry and ventilated environment that does not produce anaerobic conditions and thus will not generate emissions. Therefore, the project activity does not involve composting of digestate or anaerobic decay of digestate disposed in a SWDS or subjected to anaerobic storage, such as in a stabilization pond.
Emission sources associated with N₂O emissions from physical leakages from the digester, transportation of feed material and digestate or any other on-site transportation, piped distribution of the biogas, aerobic treatment of liquid digestate and land application of the digestate are neglected because these are minor emission sources or because they are accounted in the methodologies referring to this tool.	Applicable, as per AMSIII.D., N₂O are minor emission sources and therefore was neglected.

The assessment team confirmed that the application of the baseline methodology is transparent and conservative and confirms that the chosen baseline and monitoring methodology i.e. AMS-III.D., version 21.0 is applicable to the project activity.

3.4.3 Project Boundary

As per AMS-III.D., the project boundary includes the physical, geographical site(s) of:

- (a) The livestock;
- (b) Animal manure management systems (including centralised manure treatment plant where applicable);
- (c) Facilities which recover and flare/combust or use methane.

Therefore, the assessment team confirmed that the project boundary of the project activity includes the physical and geographical sites of Zhumadian Youran Xiping Dairy Farm, the animal manure management system, biogas generator and boiler, and the emergency flare.

The sources and GHG gases involved for the Project activity are verified to be:

Source		Gas	Included?	Justification/Explanation
Baseline	Direct emissions from the manure treatment processes	CO ₂	No	Excluded for simplification. This is conservative.
		CH ₄	Yes	By checking FSR /10/, it is confirmed this is the major emission source.
		N ₂ O	No	Excluded for simplification. This is conservative.
Project	Physical leakage of biogas in the	CO ₂	No	Excluded for simplification. This emission source is assumed to be very small.

Source		Gas	Included?	Justification/Explanation
	manure management systems	CH ₄	Yes	By checking FSR /10/, it is confirmed this is the major emission source.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from flaring or combustion of the gas stream	CO ₂	No	Excluded for simplification. This emission source is assumed to be very small.
		CH ₄	Yes	As justified above, an emergency flare was installed to ensure that excess biogas are combusted when exigencies happened. Therefore, the emission from flaring is included.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from use of fossil fuels or electricity	CO ₂	Yes	CO ₂ emissions from use of electricity is maybe the main emission source. By checking FSR /10/ and through on site inspection, it is confirmed the project does not involve fossil fuel consumption, and therefore the CO ₂ emission from use of fossil fuels is not included.
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from incremental transportation distances	CO ₂	No	By checking FSR /10/ and through onsite inspection, it is confirmed CSTR was installed within Zhumadian Youran Xiping Dairy Farm, no incremental transportation distances will be resulted in.
		CH ₄	No	
		N ₂ O	No	
	Emissions from the storage of manure	CO ₂	No	Excluded for simplification. This emission source is assumed to be very small.
		CH ₄	No	By checking EIA Report /12/ and interviewed with PP during site visit, it is confirmed the storage time of the manure after removal from the animal barns is about 7 hours, which is within 24 hours before being fed into the anaerobic digester, therefore emissions from the storage of manure is excluded.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.

3.4.4 Baseline Scenario

By checking Environmental Impact Assessment (EIA) Approval /13/ and Project Approval /11/, the assessment team confirms that the Project has been approved by Chinese government. By checking laws and regulations, i.e. Environmental Protection Law of the People's Republic of China /23/, Environmental Impact Assessment Law of the People's Republic of China /24/, Animal Husbandry Law of the People's Republic of China /25/, Law of the People's Republic of China on the Prevention and Control of Solid Waste Pollution /26/, Catalogue for the Guidance of Industrial Structure Adjustment (2019 version) /27/, Regulations on prevention and control of pollution from intensive livestock and poultry breeding /28/, Renewable Energy Law of the People's Republic of China /29/, it is confirmed that the project activity is in complicate with all laws and regulations in China.

As per AMS-III.D., the baseline scenario is the situation where, in the absence of the project activity, animal manure is left to decay anaerobically within the project boundary and methane is emitted to the atmosphere.

As per CDM Validation and Verification Standard for project activities version 03.0, "where the baseline scenario is not prescribed in the approved methodology, the DOE shall assess the list of identified credible alternatives to the project activity in the VCS PD selected to determine the most realistic baseline scenario." As the selected small scale methodology clearly mention the baseline scenario and the same has been opted in this project, therefore, no further analysis on baseline is required.

Therefore, the assessment team confirms that the baseline scenario of the project activity is:

The animal manure waste was left to decay in anaerobic manure management system (lagoon) at the livestock farms and methane is emitted to the atmosphere directly without any methane recovery and destruction facility.

Baseline scenario of the project activity has been confirmed through checking Statement from Xiping County Agriculture and Rural Bureau /14/, which mentioned "there are 8 large-scale livestock farms in Xiping County, Zhumadian City, and more than 80% of them use open anaerobic lagoon to treat animal manure, resulting in large-scale methane release".

In conclusion, the assessment team confirms that the joint PD & MR conforms to the guidances, i.e. CDM Validation and Verification Standard for project activities version 03.0 and VCS standard version 4.7.

3.4.5 Additionality

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 through checking relevant laws and regulations, i.e., Environmental Protection Law of the People's Republic of China /23/, Environmental Impact Assessment Law of the People's Republic of China /24/, Animal Husbandry Law of the People's Republic of China /25/, Law of the People's Republic of China on the Prevention and Control of Solid Waste Pollution /26/, Catalogue for the Guidance of Industrial Structure Adjustment (2019 version) /27/, Regulations on prevention and control of pollution from intensive livestock and poultry breeding /28/, Renewable Energy Law of the People's Republic of China /29/, Discharge standard of pollutants for livestock and poultry breeding (GB/T 18596-2001) /33/ and Technical standard of pollution prevention for livestock and poultry breeding (HJ/T 81-2001) /34/.

Therefore, the descriptions in Joint PD & MR was verified to be reasonable and it was confirmed the project activity is deemed automatically additional, which is in line with AMS-III.D and the project activity satisfies the requirements of VCS Standard regulatory surplus.

3.4.6 Quantification of GHG Emission Reductions and Removals

As per AMS-III.D., the baseline scenario is the situation where, in the absence of the project activity, animal manure is left to decay anaerobically within the project boundary and methane is emitted to the atmosphere. Baseline emissions (BE_y) are calculated by using one of the following two options:

(a) Using the amount of the waste or raw material that would decay anaerobically in the absence of the project activity, with the most recent IPCC Tier 2 approach (please refer to the chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories). For this calculation, information about the characteristics of the manure and of the management systems in the baseline is required. Manure characteristics include the amount of volatile solids (VS) produced by the livestock and the maximum amount of methane that can be potentially produced from that manure (B_0);

(b) Using the amount of manure that would decay anaerobically in the absence of the project activity based on direct measurement of the quantity of manure treated together with its specific volatile solids (SVS) content.

PP selected option (a) to calculate baseline emissions for the project activity. As per AMS-III.D., the baseline emissions are calculated as:

$$BE_y = GWP_{CH_4} \times D_{CH_4} \times UF_b \times \sum_{j,LT} MCF_j \times B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{BLj} \quad \text{Equation (1)}$$

Where:

BE_y	=	Baseline emissions in year y (t CO ₂ e)
GWP_{CH_4}	=	Global Warming Potential (GWP) of CH ₄ applicable to the crediting period (t CO ₂ e/t CH ₄)
D_{CH_4}	=	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 ($m^3 CH_4/kg\text{-dm}$)
$N_{LT,y}$	=	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, $kg\text{-dm}/animal/year$)
$MS\%_{BL,j}$	=	Fraction of manure handled in baseline animal manure management system j
UF_b	=	Model correction factor to account for model uncertainties $(0.94)^2$

As per AMS-III.D., for option

(a), the maximum methane-producing capacity of the manure (B_0) varies by species and diet. The preferred method to obtain B_0 measurement values is to use data from country-specific published sources, measured with a standardised method (B_0 shall be based on total as-excreted VS). These values shall be compared to IPCC default values and any significant differences shall be explained. If country specific B_0 values are not available, default values from Table 10.16A (UPDATED) of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10 can be used, provided that the project participants assess the suitability of those data to the specific situation of the treatment site;

(b) VS are the organic material in livestock manure and consist of both biodegradable and non-biodegradable fractions. For the calculations the total VS excreted by each animal species is required.

(i) The preferred method to obtain VS is to use data from nationally published sources. These values shall be compared with IPCC default values and any significant differences shall be explained;

(ii) If data from nationally published sources are not available, country-specific VS excretion rates can be estimated from feed intake levels, via the enhanced characterisation method (tier 2) described in section 10.2 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10;

(iii) if country specific VS values are not available, IPCC default values from 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10 table 10 A- 4 to 10 A- 9 can be used provided that the project participants assess the suitability of those data to the specific situation of the treatment site particularly with reference to feed intake levels.

According to the scientific publication database, i.e. www.cnki.net, it was verified no specific country or regional specific value in China are available. PP selected option (iii), which is in compliance with AMS-III.D. By checking FSR /10/, Project Approval /11/, EIA Report /12/, and EIA Approval /13/ and through

² Reference: FCCC/SBSTA/2003/10/Add.2, page 25.

onsite inspection, it was verified the dairy cattle farm is 100 percent market oriented, requires high level capital inputs and shows high level overall herd (flock) performance.

During onsite investigation, it was verified feed is intensively produced on farm, and dairy cattle are genetically improved through breeding practices for commercial production, which has been cross checked against Import Cattle Agency Agreement /71/, Feed Source Statistics Record for Livestock Cattle /72/ and the Livestock Frozen Semen Supply Contract /73/, and Customs Declaration and Quarantine Certificate of imported Bovine Semen /81/.

Besides, as verified in section 4.1.2 of this report, the monitoring value of W_{site} of both vintages in this monitoring period was 520 kg and 513 kg respectively, which is verified to higher to IPCC default value of live weights for finishing dairy cattle in high productivity systems (PS) in Asia sourced from 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10A.5, i.e. 485kg.

Therefore, the assessment team deemed the dairy cattle farm fulfills the definition of High Productivity Systems and IPCC default value from Table 10.13A (new) of Volume 4, Chapter 10 of 2019 Refinement to the 2006 IPCC Guidelines for dairy cattle in Asia Region with High Productivity Systems, i.e. 8.1 kg-VS/1000kg-mass/day, was applied for volatile solid excretion rate ($VS_{rate(T,P)}$) of the project activity.

According to the scientific publication database, i.e. www.cnki.net, it was verified no specific country or regional specific value in China are available. During site visit and via checking Project Approval /14/ and EIA Approval /16/, it was verified the project is located in Shandong Province, China, Asia. By checking FSR /13/ and through onsite inspection, it was verified the dairy cattle 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 dairy cattle in Other Region with High Productivity Systems, i.e. 0.24 m³CH₄/kg-VS was applied for B_0 .

According to the scientific publication database, i.e. www.cnki.net, it was verified no specific country or regional specific value in China are available. Therefore, option (iii) is selected by PP which is in compliance with AMS-III.D. (version 21.0). $VS_{LT,y}$ is calculated via equation 10.22A (updated) in 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

$$VS_{LT,y} = VS_{(T,P)} = VS_{rate(T,P)} \times \left(\frac{TAM_{T,P}}{1000} \right) \times 365 \quad \text{Equation (2)}$$

Where:

$VS_{(T,P)}$	=	annual VS excretion for livestock category T, for productivity system P (when applicable), kg-VS/animal/yr
$VS_{rate(T,P)}$	=	default VS excretion rate, for productivity system P (when applicable), kg-VS/1000 kg animal-mass/day
$TAM_{(T,P)}$	=	typical animal mass for livestock category T, for productivity system P (when applicable), kg/animal

As justified above, the dairy cattle farm is with High Productivity Systems. PP adopts high PS value of TAM for dairy cattle in Region "Asia" from Table 10A.5 (new) of Volume 4, Chapter 10 of 2019

Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, i.e. 485kg animal⁻¹ for TAM_(T,P), which is verified to be reasonable.

Project participants may adjust default IPCC values for VS for a site-specific average animal weight. If so, it shall be well explained and documented.

$$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}} \right) \times VS_{default} \times nd_y \quad \text{Equation (3)}$$

Where:

- W_{site} = Average animal weight of a defined livestock population at the project site (kg)
- $W_{default}$ = Default average animal weight of a defined population, this data is sourced from IPCC 2006 (kg)
- $VS_{default}$ = Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population (kg-dm/animal/day)
- nd_y = Number of days treatment plant was operational in year y

By checking Dairy Weight Record Table /55/, it was verified the average weight of dairy cattle of this project in 2023 and 2024 is respectively 520 kg and 513kg, more than the default IPCC value, i.e. 485kg animal⁻¹. Therefore, the assessment team confirmed that it was very conservative to apply directly IPCC default value of dairy cattle weight in calculating $VS_{LT,y}$, other than adjusting default IPCC values for VS for a site-specific average animal weight using equation (3) above. Based on equation (2), the default VS value of a dairy cattle is equal to 1,433.90 kg-dm/animal/year.

Methane Conversion Factors (MCF) values are determined for a specific manure management system and represent the degree to which B_o is achieved. Where available country-specific MCF values that reflect the specific management systems used in particular countries or regions shall be used. Alternatively, the IPCC default values provided in table 10.17 (updated) of Chapter 10, Volume 4 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories can be used. The site annual average temperature is taken from official data at the nearest meteorological station, or from data available from historical on site observations;

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

$$N_{LT,y} = N_{da,y} \times \left(\frac{N_{p,y}}{365} \right) \quad \text{Equation (4)}$$

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 parameters used to calculate BE_y ex-ante is determined and justified as below:

Parameter	Value	Data sources
GWP_{CH_4}	28 tCO ₂ e/tCH ₄	IPCC Fifth Assessment Report (AR5)
D_{CH_4}	0.67 kg/m ³	As per AMS-III.D, CH ₄ density is 0.00067 t/m ³ at room temperature (20 °C) and 1 atm pressure.
UF_b	0.94	As per AMS-III.D, the value of this parameter is 0.94, which is sourced from FCCC/SBSTA/2003/10/Add.2, page 25.
MCF_j	76%	By checking public information /19//20/, it is confirmed the climate zone of project site belongs to Warm Temperate Dry. Therefore, default value of Warm Temperate Dry, i.e. 76%, sourced from Table 10.17(UPDATED) of Chapter 10, Volume 4 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories was applied.
$B_{o,LT}$	0.24 m ³ CH ₄ /kg-VS	During site visit and via checking Project Approval /11/ and EIA Approval /13/, it was verified the project is located in Henan Province, China, Asia. By checking FSR /10/, it was verified the dairy cattle farm is with High Productivity Systems. Therefore, IPCC default values for dairy cattle in Other Region with High Productivity Systems, i.e. 0.24 m ³ CH ₄ /kg-VS, from Table 10.16A(UPDATED) of Volume 4, Chapter 10 of 2019 Refinement to the 2006 IPCC Guidelines was applied.
$VS_{LT,y}$	1,433.90 kg-dm/animal/year	According to the scientific publication database, i.e. www.cnki.net, it was verified no specific country or regional specific value in China are available. $VS_{LT,y}$ is calculated via equation 10.22A in 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, i.e. equation (2) of this report. During site visit and via checking Project Approval /11/ and EIA Approval /13/, it was verified the project is located in Henan Province, China, Asia. By checking FSR /10/, it was verified the dairy cattle farm is with High Productivity Systems. Therefore, PP applied high PS value for dairy cattle in Asia from Table 10.13A(NEW) of volume 4, Chapter 10 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, i.e. 8.1kg-VS/1000kg-mass/day, for $VS_{rate(T,P)}$, which is verified to be reasonable. And PP adopts high PS value of TAM for dairy cattle in Region "Asia" from Table 10A.5(NEW) of Chapter 10, Volume 4 of 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, i.e. 485kg animal⁻¹ for $TAM_{(T,P)}$, which is verified to be reasonable. By checking Dairy Weight Record Table /55/, it was verified the average weight of dairy cattle of this project in 2023 and 2024 is respectively 520 kg and 513kg, higher than the default value in 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Therefore, the assessment team confirmed the application of default TAM value from IPCC is conservative.

		Therefore, $VS_{LT,y}$ is calculated to be: $8.1\text{kgVS}(1000\text{kg animal mass})/\text{day} * 485/1000*365 = 1,433.90 \text{ kg-dm/animal/year}$.
$MS\%_{BI,j}$	100%	As per FSR /10/, as well as interview with PP and stakeholders during site visit, it is confirmed all manure were handled in open lagoon under baseline scenario, therefore, value of this parameter is 100%.
nd_y	365 days	As per FSR /10/, as well as interview with PP during site visit, it is confirmed that treatment plant was operational the whole year, which is 365 days.
$N_{LT,y}$	17,500	Calculated via equation (3)
$N_{da,y}$	365 days	As per EIA Report /12/, as well as interview with PP during site visit, it is confirmed that animal is alive 365 days in the dairy cattle farm.
$N_{p,y}$	17,500	By checking FSR /10/ and Project Approval /11/, it is confirmed that the number of animals produced annually is 17,500.
BE_y	80,712 tCO ₂ e	Calculated via equation (1)

Project emissions

As per the Project Approval and EIA Approval, the farm is designed to accommodate 24,000 head of dairy cattle, comprising 14,400 adult dairy cattle, 3,100 breeding cattle and 6,500 calves per year. For emission-reduction calculations the project considers 17,500 head (adult dairy cattle and breeding cattle) and excludes calves. The assessment team confirms that the exclusion is conservative and has a negligible impact on the overall estimate of emission reductions. For conservativeness, the project will therefore apply the full measured biogas quantities directly when calculating project emissions.

As per AMS-III.D. (Version 21.0), project activity emissions consist of:

- Physical leakage of biogas in the manure management systems which includes production, collection and transport of biogas to the point of flaring/combustion or gainful use ($PE_{PL,y}$);
- Emissions from flaring or combustion of the gas stream ($PE_{flare,y}$);
- CO₂ emissions from use of fossil fuels or electricity for the operation of all the installed facilities ($PE_{power,y}$);
- CO₂ emissions from incremental transportation distances;
- Emissions from the storage of manure before being fed into the anaerobic digester ($PE_{storage,y}$).

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y} \quad \text{Equation (5)}$$

Where:

PE_y	=	Project emissions in year y (t CO ₂ e)
$PE_{PL,y}$	=	Emissions due to physical leakage of biogas in year y (t CO ₂ e)
$PE_{flare,y}$	=	Emissions from flaring or combustion of the biogas stream in the year y (t CO ₂ e)
$PE_{power,y}$	=	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (t CO ₂ e)
$PE_{transp,y}$	=	Emissions from incremental transportation in the year y (t CO ₂ e), as per relevant paragraph in AMS-III.AO
$PE_{storage,y}$	=	Emissions from the storage of manure (t CO ₂ e)

- Emissions due to physical leakage of biogas in year y

Project emissions due to physical leakage of biogas from the animal manure management systems used to produce, collect and transport the biogas to the point of flaring or gainful use are estimated as:

(a) 10% of the maximum methane producing potential of the manure fed into the management systems implemented by the project activity:³

PP selected para 17(a) from AMS-III.D., as per AMS-III.D., if the option in paragraph 17(a) is chosen, it is determined as:

$$PE_{PL,y} = 0.10 \times GWP_{CH_4} \times D_{CH_4} \times \sum_{i,LT} B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{i,y} \quad \text{Equation (6)}$$

Where:

GWP_{CH_4}	=	Global Warming Potential (GWP) of CH ₄ applicable to the crediting period (t CO ₂ e/t CH ₄)
D_{CH_4}	=	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
$N_{LT,y}$	=	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)
$B_{0,LT}$	=	Maximum methane producing potential of the volatile solid generated for animal type LT (m ³ CH ₄ /kg-VS), as per paragraph 18 of AMS-III.D
$MS\%_{i,y}$	=	Fraction of manure handled in system i in year y. If the project activity involves sequential manure management systems, the procedure specified in paragraph 18(e)

³ 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 10 guidelines specify a default value of 10% of the maximum methane producing potential (Bo) for the physical leakages from anaerobic digesters.

shall be used to estimate the project emissions due to physical leakage of biogas in each stage.

(b) Optionally, the relevant procedure in the methodological tool “Project and leakage emissions from anaerobic digesters” may be followed. In such a case, $PE_{PL,y}$ is equivalent to $PE_{CH_4,y}$ in the tool.

PP selected option (a) when calculating $PE_{PL,y}$, which is in compliance with AMS-III.D.

Parameter	Value	Data sources
GWP_{CH_4}	28 tCO ₂ e/tCH ₄	IPCC Fifth Assessment Report (AR5)
D_{CH_4}	0.67 kg/m ³	As per AMS-III.D, CH ₄ density is 0.00067 t/m ³ at room temperature (20 °C) and 1 atm pressure.
$B_{o,LT}$	0.24 m ³ CH ₄ /kg-VS	During site visit and via checking Project Approval /11/ and EIA Approval /13/, it was verified the project is located in Henan Province, China, Asia. By checking FSR /10/, it was verified the dairy cattle farm is with High Productivity Systems. Therefore, IPCC default values for dairy cattle in Other Region with High Productivity Systems, i.e. 0.24 m ³ CH ₄ /kg-VS, from Table 10.16A (UPDATED) of Volume 4, Chapter 10 of 2019 Refinement to the 2006 IPCC Guidelines was applied.
$N_{LT,y}$	17,500	Calculated via equation (3)
$VS_{LT,y}$	1,433.90 kg-dm/animal/year	Refer to justification in table above.
$MS\%_{BI,j}$	100%	As per FSR /10/, as well as interview with PP and stakeholders during site visit, it is confirmed all manure were handled in open lagoon under baseline scenario, therefore, value of this parameter is 100%.
$PE_{PL,y}$	11,298 tCO ₂ e	Calculated via equation (5) using parameters justified above.

- Emissions from flaring or combustion of the biogas stream in the year y

As per para 22 of AMS-III.D, in the case of flaring of the recovered biogas, project emissions are estimated using the procedures described in the methodological tool “Project emissions from flaring”. However, this use of the recovered biogas shall be included in the project boundary and its output shall be monitored in order to ensure that the recovered biogas is actually destroyed, even if the emission reductions from this component are not claimed.

$$PE_{flare,y} = GWP_{CH_4} \times \sum_{m=1}^{525600} F_{CH_4,RG,m} \times (1 - \eta_{flare,m}) \times 10^{-3} \quad \text{Equation (7)}$$

Where:

$F_{CH_4,RG,m}$ = Mass flow of methane in the residual gas in the minute m (kg)

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

As justified above, an emergency flare was installed to ensure that biogas are combusted when exigencies happened. For ex-ante estimation, it is assumed PE_{flare} is 0. The value of parameter $\eta_{flare,m}$ was ex-ante assumed to be 90% (default value for enclosed flares in "Project emissions from flaring (version 04.0)"). The parameters $T_{EG,m}$, $F_{RG,m}$ and $Flame_m$ will be monitored ex-post to determine whether the 90% default value can be applied for $\eta_{flare,m}$ (refer to "Parameters determined ex-post" for details).

For the project activity, the mass flow of CH_4 in the residual gas ($F_{CH_4,RG,m}$), i.e. $Q_{biogas,flare,y}$ is determined using equation (2) in Tool 14 "Project and leakage emissions from anaerobic digesters" (version 03.0).

$$\sum_{m=1}^{525600} F_{CH_4,RG,m} = Q_{biogas,flare,y} \times f_{CH_4,default} \times \rho_{CH_4} \quad \text{Equation (8)}$$

Where,

- $Q_{biogas,flare,y}$ = Biogas flared in year y (Amount of biogas monitored at the inlet of the flaring system in year y) (Nm^3)
- $f_{CH_4,default}$ = Fraction of methane in the biogas ($m^3CH_4/m^3biogas$), equals to parameter w_{CH_4}
- ρ_{CH_4} = Density of methane at normal conditions ($kgCH_4/Nm^3CH_4$), equals to parameter D_{CH_4}

The parameters used to calculate $PE_{flare,y}$ ex-ante is determined and justified as below:

Parameter	Value	Data sources
$F_{CH_4,RG,m} = Q_{biogas,flare,y}$	3,500,000 Nm^3	For ex ante calculation, the estimated amount of biogas to be flared has been confirmed through checking FSR /10/.
FE ($\eta_{flare,m}$)	100% (biogas used for electricity generation and natural gas upgrading)	As per AMS-III.D. (Version 21.0), if the recovered biogas is combusted for electrical/thermal energy production or for other gainful use, the methane destruction efficiency can be considered as 100%. However, this use of the recovered biogas shall be included in the project boundary and its output shall be monitored in order to ensure that the recovered biogas is actually destroyed, even if the emission reductions from this component are not claimed. Therefore, the assessment team confirmed value of this parameter was correct and reasonable. Besides, the output, i.e. total electricity generated from the recovered biogas in year y (EG_y) and upgrading natural gas production (NG_y), which is in compliance with AMS-III.D. (Version 21.0).
	90% (biogas used for enclosed flare system and heat generation)	As per Tool 06 "Project emissions from flaring (version 04.0)", the flare efficiency for the minute m ($\eta_{flare,m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating: (a) The temperature of the flare ($T_{EG,m}$) and the flow rate of the residual gas to the flare ($FR_{G,m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute

		m; and (b) The flame is detected in minute m ($Flame_m$). Otherwise $\eta_{flare,m}$ is 0%. For the project activity, PP selected 90% default value for the flare efficiency, meanwhile parameters $T_{EG,m}$, $FR_{G,m}$ and $Flame_m$ have been monitored by PP to determine whether the requirement for 90% default value can be met. Besides, during site visit, it was verified a biogas heat boiler is installed to generate heat from recovered biogas, and used to warm the anaerobic digesters, and used to warm the anaerobic digesters. Since no monitoring equipment has been installed to monitor the amount of heat generated by recovered biogas, PP assumed these amount of biogas used for heat generated were flared and included these amount of biogas when calculating $PE_{flare,y}$, which is verified to be conservative. Therefore, the efficiency of biogas boiler is selected to be 90% (the same as flare efficiency), which is verified to be reasonable and thus accepted. Therefore, the assessment team confirmed the selection of 90% default value is correct and reasonable. Parameters have been monitored for ex post determination.
$f_{CH_4, default}$	0.6 m ³ CH ₄ /m ³ biogas	This is the default value for the fraction of methane in the biogas sourced from Tool 14 "Project and leakage emissions from anaerobic digesters" (version 03.0), which is verified to be correct and reasonable.
$EF_{EL, default}$	1.3 tCO ₂ /MWh	This is the default emission factor for the electricity consumed in year y sourced from Tool 14 "Project and leakage emissions from anaerobic digesters" (version 03.0), which is verified to be correct and reasonable.
$F_{EC, default}$	1.02 MWh/t CH ₄	This is the default factor for the electricity consumption associated with the anaerobic digester per ton of CH ₄ generated sourced from Tool 14 "Project and leakage emissions from anaerobic digesters" (version 03.0), which is verified to be correct and reasonable.
$PE_{flare,y}$	3,940 tCO ₂ e	Calculated via equation (6) - (7) using parameters justified above.

- Emissions from the use of fossil fuel or electricity for the operation of the installed facilities

Project emissions from electricity and fossil fuel consumption are determined by following the methodological tool "Project and leakage emissions from anaerobic digesters", where $PE_{Power,y}$ is the sum of $PE_{EC,y}$ and $PE_{FC,y}$ in the tool.

$$PE_{power,y} = PE_{EC,y} + PE_{FC,y} \quad \text{Equation (9)}$$

Where:

$PE_{EC,y}$ = Project emissions from electricity consumption associated with the anaerobic digester in year y (tCO₂)

$PE_{FC,y}$ = Project emissions from fossil fuel consumption associated with the anaerobic digester in year y (tCO₂)

By checking FSR /10/ and through on site inspection, it is confirmed the project does not involve fossil fuel consumption, and therefore the CO₂ emission from use of fossil fuels is not included. Therefore,

$$PE_{power} = PE_{EC,y}$$

According to methodological tool “Project and leakage emissions from anaerobic digesters (version 03.0)”, there are 2 options for calculating of $PE_{EC,y}$. PP selected option 2, using default value to calculate $PE_{EC,y}$, which is in compliance with the tool and accepted by the assessment team.

$$PE_{EC,y} = Q_{CH_4,y} \times F_{EC,default} \times EF_{EL,default} \quad \text{Equation (10)}$$

Where:

$PE_{EC,y}$ = Project emissions from electricity consumption associated with the anaerobic digester in year y (t CO₂/ yr)

$Q_{CH_4,y}$ = Quantity of methane produced in the anaerobic digester in year y (t CH₄)

$F_{EC,default}$ = Default factor for the electricity consumption associated with the anaerobic digester per ton of methane generated (MWh/t CH₄) (use default value: 1.02 MWh/t CH₄)

$EF_{EL,default}$ = Default emission factor for the electricity consumed in year y (t CO₂/MWh) (use default value: 1.3 t CO₂/MWh)

As per para 17 of tool “Project and leakage emissions from anaerobic digesters (version 03.0)”, quantity of methane produced in the anaerobic digester in year y ($Q_{CH_4,y}$) is calculated as follows:

$$Q_{CH_4,y} = Q_{biogas,y} \times f_{CH_4,default} \times \rho_{CH_4} \quad \text{Equation (11)}$$

Where:

$Q_{CH_4,y}$ = Quantity of methane produced in the digester in year y (t CH₄)

$Q_{biogas,y}$ = Amount of biogas collected at the digester outlet in year y (Nm³ biogas)

$f_{CH_4,default}$ = Default value for the fraction of methane in the biogas (m³ CH₄/m³ biogas) (use default value: 0.6 m³ CH₄/m³ biogas)

ρ_{CH_4} = Density of methane at normal conditions (t CH₄/Nm³ CH₄) (0.00067t CH₄/m³ CH₄ at room temperature (20°C) and 1 atm pressure)

By checking FSR /10/, it was verified $Q_{biogas,y}$ was ex-ante determined to be 11,000,000 Nm³. Therefore, $PE_{EC,y} = 11,000,000 \text{ Nm}^3 \times 0.6 \text{ m}^3 \text{ CH}_4/\text{m}^3 \text{ biogas} \times 0.00067 \text{ t CH}_4/\text{m}^3 \text{ CH}_4 \times 1.02 \text{ MWh/t CH}_4 \times 1.3 \text{ t CO}_2/\text{MWh} = 5,864 \text{ tCO}_2\text{e}$

- Emissions from incremental transportation in the year y

By checking FSR /10/ and through on site interview, it was verified the anaerobic digester under project scenario is within Zhumadian Youran Xiping Dairy Farm. Therefore, it was verified no incremental distances of transportation of animal manure and no emissions from incremental transportation distances will be resulted in.

- Emissions from the storage of manure

As per AMS-III.D., project emissions on account of storage of manure before being fed into the anaerobic digester shall be accounted for if **both** condition (a) and condition (b) below are satisfied:

- The storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester;
- The dry matter content of the manure when removed from the animal barns is less than 20%.

By checking FSR /10/ and interview with PP during site visit, it is confirmed that the storage of manure before being fed into the anaerobic digester is about 7 hours. Therefore, condition (a) is not satisfied and project emissions of storage of manure are not considered.

In conclusion, $PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y} = 21,102 \text{ tCO}_2\text{e}$

Leakage

As per Tool 14 "Project and leakage emissions from anaerobic digesters" (version 03.0), the leakage emissions associated with the anaerobic digester depend on how the digestate is managed. They include emissions associated with storage and composting of the digestate.

By checking EIA Report /12/, FSR /10/, and through on site inspection, it is confirmed that residual waste (dried part) from the animal manure management system of the project activity will be used as cattle bedding material, while the biogas slurry (liquid part) will be directly returned to nearby farm as organic fertilizer, through a lifting pump and a pipeline network, which will not store in aerobic conditions. During onsite inspection, it was verified the cattle bedding material (dried solid part of digestate) is stored in biogas residue storage room. Via checking usage records of cattle bedding material /79/ and interviewing staff from PP, the assessment team confirmed the bedding material will be used within one day. Via onsite inspection and interview, the assessment team deemed the storage room is a dry and ventilated environment that does not produce anaerobic conditions and thus will not generate emissions. Hence, it was verified no storage or composting is involved in the project activity and leakage in relation to storage or composting of the digestate is 0.

Therefore, $LE_y = 0$

Emission Reductions

Emission reductions are calculated as follows:

According to AMS-III.D., Version 21.0, for **ex ante estimation** of emission reductions, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (12)}$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂e/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

LE_y = Leakage emissions in year y (t CO₂e/yr)

According to AMS-III.D., Version 21.0, for **ex post determination** of emission reductions, the emission reductions achieved by the project activity will be determined ex post through direct measurement of the amount of methane used. It is likely that the project activity involves manure treatment steps with higher methane conversion factors (MCF) than the MCF for the manure treatment systems used in the baseline situation, therefore the emission reductions achieved by the project activity are limited to the ex post calculated baseline emissions minus the project emissions using the actual monitored data for the project activity (i.e. $N_{LT,y}$, $MS\%_{i,y}$, $MS\%_I$, AI_I , as well as $VS_{LT,y}$ in cases where adjusted values for animal weight are used). The emission reductions achieved in any year are the lowest value of the following:

$$ER_{y,ex\ post} = \min[(BE_{y,ex\ post} - PE_{y,ex\ post}), (MD_y - PE_{power,y,ex\ post})] \quad \text{Equation (13)}$$

Where:

$ER_{y,ex\ post}$ = Emission reductions achieved by the project activity based on monitored values for year y (t CO₂e)

$BE_{y,ex\ post}$ = Baseline emissions calculated using equation 1 (for projects using option in paragraph 17(a) of AMS 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 AMS 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 using ex post monitored values of $N_{LT,y}$, $MS\%_{i,y}$, $MS\%_I$, AI_I , $Q_{res\ waste,y}$ and if applicable $VS_{LT,y}$

MD_y = Methane captured and destroyed or used gainfully by the project activity in year y (t CO₂e)

$PE_{power,y,ex\ post}$ = 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 CO₂e)

Biogas flared or combusted, (MD_y) shall be determined using the flare efficiency and methane content of biogas.

$$MD_y = BG_{burnt,y} \times w_{CH_4,y} \times D_{CH_4} \times FE \times GWP_{CH_4} \quad \text{Equation (14)}$$

Where:

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

$w_{\text{CH}_4,y}$ = Methane content in biogas in the year y (volume fraction)

FE = Flare efficiency in the year y (fraction)

Hence for the project activity, the estimated amount of GHG emission reductions (ER_y) is 596,100 tCO_2e during the crediting period from 15-04-2023 to 14-04-2033, resulting in estimated average annual emission reductions of 59,610 tCO_2e .

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCUs (tCO_2e)
15-04-2023 to 31-12-2023	57,715	15,089	0	42,625	0	42,625
01-01-2024 to 25-03-2025	80,712	21,102	0	59,610	0	59,610
01-01-2025 to 31-12-2025	80,712	21,102	0	59,610	0	59,610
01-01-2026 to 31-12-2026	80,712	21,102	0	59,610	0	59,610
01-01-2027 to 31-12-2027	80,712	21,102	0	59,610	0	59,610
01-01-2028 to 31-12-2028	80,712	21,102	0	59,610	0	59,610
01-01-2029 to 31-12-2029	80,712	21,102	0	59,610	0	59,610
01-01-2030 to 31-12-2030	80,712	21,102	0	59,610	0	59,610
01-01-2031 to 31-12-2031	80,712	21,102	0	59,610	0	59,610
01-01-2032 to 31-12-2032	80,712	21,102	0	59,610	0	59,610
01-01-2033 to 14-04-2033	22,997	6,013	0	16,985	0	16,985
Total	807,120	211,020	0	596,100	0	596,100

The assessment team confirms that all data sources and assumptions are appropriate and calculations

are correct, applicable to the project activity and will result in a conservative estimate of the emission reductions. In general, the assessment team is able to confirm the following:

- All assumptions and data used by the project participants are listed in the joint PD & MR (version 4.0 dated 17-09-2025) and/or supporting documents, including their references and sources;
- All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the joint PD & MR (version 4.0 dated 17-09-2025);
- All values used in joint PD & MR (version 4.0 dated 17-09-2025) are considered reasonable in the context of the project activity;
- The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, and leakage emissions;
- All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in joint PD & MR (version 4.0 dated 17-09-2025).

3.4.7 Methodology Deviations

No methodology deviations were applied for the project activity.

3.4.8 Monitoring Plan

The project applies the approved monitoring methodology - AMS-III.D.: Methane recovery in animal manure management systems, version 21.0. The selected monitoring methodology is applicable for the project. The monitoring plan is in accordance with the monitoring methodologies. The monitoring plan will give opportunity for real measurements of achieved emission reductions and contains principles and concepts on which it is based, operational and monitoring obligations of the Project Proponent such as resources involved in the monitoring process, training, support activities, calibration and data collection, quality assurance procedures, data management, electronic support tools.

Parameters determined ex-ante

Data / Parameter:	GWP _{CH4}
Data unit:	/
Description:	Global warming potential of CH ₄
Source of data used:	IPCC AR5
Value applied:	28 By checking para 3.15.4 and Table 2 of VCS Standard v4.7, it was verified "For reductions and removals occurring on or after 1 January 2021, all ex-ante estimates and ex-post calculations shall be converted to CO ₂ e using GWP values from the IPCC Fifth Assessment Report (AR5)" and GWP _{CH4} is verified to be 28. Therefore, the assessment team confirmed value of this parameter in the Joint PD & MR (version 4.0 dated 17-09-2025) is correct.

Data / Parameter:	D_{CH4}
Data unit:	kg/m ³
Description:	CH ₄ density
Source of data used:	AMS-III.D (version 21.0)
Value applied:	0.67 (at 20 °C and 1 atm pressure) As per para 18 (equation 1) of AMS-III.D (version 21.0), value of this parameter is verified to be 0.00067 t/m ³ at room temperature (20 °C) and 1 atm, which is equivalent to 0.67 kg/m ³ (at 20 °C and 1 atm pressure). Therefore, the assessment team confirmed value of this parameter in the Joint PD & MR (version 4.0 dated 17-09-2025) is correct.

Data / Parameter:	UF_b
Data unit:	/
Description:	Model correction factor to account for model uncertainties
Source of data used:	AMS-III.D (version 21.0)
Value applied:	0.94 As per para 18 (equation 1) of AMS-III.D (version 21.0), value of this parameter is verified to be 0.94. Therefore, the assessment team confirmed value of this parameter in the Joint PD & MR (version 4.0 dated 17-09-2025) is correct.

Data / Parameter:	MCF_j
Data unit:	/
Description:	Annual methane conversion factor (MCF) for the baseline animal manure management system j
Source of data used:	Table 10.17(UPDATED) of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 10
Value applied:	76% As per page 10.127 of Chapter 10, Volume 4 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, the climate zone of project site belongs to Warm Temperate Dry (has > 10°C mean annual temperature (MAT) and a ratio of potential evapotranspiration to precipitation (MAP:PET) < 1). By checking public information /19//20/, it is confirmed the climate zone of project site belongs to Warm Temperate Dry (MAT = 14.7 - 15°C, MAP = 850 - 980 mm, and PET = 1314.15 mm). Therefore, default value of Warm Temperate Dry, i.e. 76%, sourced from Table 10.17(UPDATED) of Chapter

	10, Volume 4 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, was applied. Therefore, the assessment team confirmed value of this parameter in the Joint PD & MR (version 4.0 dated 17-09-2025) is correct.
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Data / Parameter:	B_{0,LT}
Data unit:	m ³ CH ₄ /kg-VS
Description:	Maximum methane producing potential of the volatile solid generated for animal type LT
Source of data used:	Table 10.16A (UPDATED) of Chapter 10, Volume 4 of 2019 Refinement to the 2006 IPCC Guidelines
Value applied:	0.24 m ³ CH ₄ /kg-VS According to the scientific publication database, i.e. www.cnki.net, it was verified no specific country or regional specific value in China are available. During site visit and via checking Project Approval /11/ and EIA Approval /13/, it was verified the project is located in Shandong Province, China, Asia. By checking FSR /10/, it was verified the dairy cattle farm is with High Productivity Systems. Therefore, IPCC default values from Table 10.16A (UPDATED) of Chapter 10, Volume 4 of 2019 Refinement to the 2006 IPCC Guidelines for dairy cattle in Other Region with High Productivity Systems, i.e. 0.24 m ³ CH ₄ /kg-VS, was applied for B ₀ . Therefore, the assessment team confirmed value of this parameter in the Joint PD & MR (version 4.0 dated 17-09-2025) is correct.

Data / Parameter:	MS%_{BI,j}
Data unit:	-
Description:	Fraction of manure handled in baseline animal manure management system j
Source of data used:	FSR /10/
Value applied:	100% By checking FSR /10/, it is confirmed that 100% of manure are handled in baseline animal manure management system, i.e. the anaerobic treatment system (open lagoon). Therefore, the assessment team confirmed value of this parameter in the Joint PD & MR (version 4.0 dated 17-09-2025) is correct.

Data / Parameter:	F_{EC,default}
Data unit:	MWh/t CH ₄

Description:	Default factor for the electricity consumption associated with the anaerobic digester per ton of CH ₄ generated
Source of data used:	Tool 14: Project and leakage emissions from anaerobic digesters (version 03.0)
Value applied:	1.02 tCO₂/MWh (Default value of conventional digesters with continuously stirred tank reactor type for wastewater) As justified above, the project activity uses 6 anaerobic digesters, i.e. Completely Stirred Tank Reactors (CSTRs), to treat the manure of dairy cattle, which belongs to conventional digesters with continuously stirred tank reactor type as mentioned in Tool 14. Therefore, as per Data / Parameter table 5 of Tool 14, default value (1.02 MWh/t CH₄) is applied for this project activity. Therefore, the assessment team confirmed value of this parameter in the Joint PD & MR (version 4.0 dated 17-09-2025) is correct.

Data / Parameter:	EF _{EL,default}
Data unit:	t CO ₂ /MWh
Description:	Default emission factor for the electricity consumed in year y
Source of data used:	Tool 14: Project and leakage emissions from anaerobic digesters (version 03.0)
Value applied:	1.3 tCO₂/MWh As per Data / Parameter table 6 of Tool 14, default value (1.3 tCO₂/MWh) is applied for this parameter. Therefore, the assessment team confirmed value of this parameter in the Joint PD & MR (version 4.0 dated 17-09-2025) is correct.

Data / Parameter:	f _{CH4,default} (W _{CH4,y})
Data unit:	m ³ CH ₄ /m ³ biogas
Description:	Default value for the fraction of methane in the biogas
Source of data used:	Tool 14: Project and leakage emissions from anaerobic digesters (version 03.0)
Value applied:	0.6 As per para 15 of Tool 14, there are two different procedures to determine the quantity of methane produced in the digester in year y (Q_{CH4,y}). For large scale projects only Option 1 shall be used. For small scale projects, project participants may choose between Option 1 or Option 2. The project belongs to small scale project, PP selected option 2, which is verified to be

	reasonable. As per option 2 (para 17 of Tool 14), default value for the fraction of methane in biogas, i.e. $0.6 \text{ m}^3 \text{ CH}_4/\text{m}^3$ biogas has been applied, which is verified to be reasonable. Therefore, the assessment team confirmed value of this parameter in the Joint PD & MR (version 4.0 dated 17-09-2025) is correct.
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Data / Parameter:	SPEC_{flare}
Data unit:	Temperature - °C Flow rate or heat flux - kg/h or m³/h Maintenance schedule - number of days
Description:	Manufacturer's flare specifications for temperature, flow rate and maintenance schedule
Source of data used:	Flare manufacturer
Value applied:	By checking the flare specifications set by the manufacturer /64/, the correct operation of the flare for the following parameters are: - Temperature: 600 °C ~1260 °C - Flow rate or heat flux: 0-1900 m³/h - Maintenance schedule: every 12-24 months (around 365days – 730 days) based on operating conditions For biogas flaring, the project uses enclosed flares, and PP chose option A of Project emissions from flaring (version 04.0) for the determination of flare efficiency, which is verified to be reasonable.

Parameters determined ex-post

Parameter	Description	Monitoring procedure
MS% _{oi,y}	Fraction of manure handled in system i in year y	As per AMS-III.D (version 21.0), if animal manure is treated in different treatment systems manure weight delivered to each system shall be directly measured or alternatively manure volume can be measured together with the density determined from representative sample (90/10 precision). The quantity of animal manure from different farms and different animal types shall be recorded separately for cross-check. Recording of the baseline animal manure management system where the animal manure would have been treated anaerobically is also required. During site visit, it was verified this parameter is measured daily, aggregated monthly and yearly.
N _{da,y}	Number of days animal is	The number of days that dairy cattle alive on the farm

	alive in the farm in the year y	will be monitored and recorded by PP. The consistency between the value and indirect information (records of sales, records of food purchases) will be assessed. During site visit, it was verified data will be monthly recorded and yearly aggregated.
$N_{p,y}$	Number of animals produced annually of type LT for the year y	The number of Dairy Cattle produced by the project activity will be recorded manually by PP. The consistency between the value and indirect information (records of sales, records of food purchases) will be assessed. During site visit, it was verified data will be monthly recorded and yearly aggregated. As per the Project Approval /11/ and EIA Approval /13/, the farm is designed to accommodate 24,000 head of dairy cattle, comprising 14,400 adult dairy cattle, 3,100 breeding cattle and 6,500 calves per year. For emission-reduction calculations the project considers 17,500 head (adult dairy cattle and breeding cattle) and excludes calves. The assessment team confirms that the exclusion is conservative and has a negligible impact on the overall estimate of emission reductions.
$VS_{LT,y}$	Volatile solids production/excretion per animal of livestock LT in year y	According to the scientific publication database, i.e. www.cnki.net, it was verified no specific country or regional specific value in China are available. $VS_{LT,y}$ is calculated via equation 10.22A in 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, i.e. equation (2) of this report. For ex-ante estimation, parameters $VS_{rate(T,P)}$ and $TAM_{(T,P)}$ are sourced from Volume 4, Chapter 10 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. For ex-post determination, W_{site} ($TAM_{T,P}$) will be monitored to determine and whether default IPCC value of W_{site} ($TAM_{T,P}$) should be adjusted to ensure the conservativeness when calculating $VS_{LT,y}$. Besides, default values will be updated annually from latest IPCC values to determine $VS_{LT,y}$.
W_{site} ($TAM_{T,P}$)	Average animal weight of a defined livestock population at the project site	The aim of monitoring of this parameter was to adjust default IPCC values for VS and make sure a conservative method is applied to calculate $VS_{LT,y}$, meanwhile, judge the rationality of the project specific animal weights, through comparing with IPCC default values. During site visit, it was verified value of this parameter will be recorded by PP monthly. Sampling procedures can be used to estimate this variable as per the “Standard for sampling and surveys for CDM project activities and Programmes of Activities”.

		The samples will be measured by weight scale, which will be calibrated once every year by a qualified third party in accordance with the “Verification Regulation for Digital Indicating Weighing Instruments” (JJG539-2016) /75/.
$Q_{\text{biogas},y}$ $(BG_{\text{burnt},y})$ $BG_{\text{elec},y}$, $BG_{\text{heat},y}$, $BG_{\text{flare},y}$	Amount of biogas collected at the digester outlet in year y; Biogas volume for power generation in year y; Biogas volume for heat generation in year y; Biogas volume for flare in year y	During site visit, it was verified this parameter will be monitored continuously by flow meters and the meter readings will be automatically converted to value at room temperature (20°C) and 1 atm pressure. The biogas flow will be measured at four points, including: - at the outlet of the pre-treatment system; - at the inlet of power generation system---for the biogas flow to power generation system; - at the inlet of heat generation system---for the biogas flow to heat generation system; - at the inlet of the emergency flare---for the biogas flow to emergency flare. Through checking flow meter manual /70/, operation records /57/, and inspecting the recovery monitoring system onsite, the assessment team confirmed the flow meter used in the project automatically converts the monitoring results to standard value at the normal condition of 0°C and 101,325Pa. Based on the assessment team's sectoral expertise, it is confirmed that the monitoring of this parameter complies with the methodological requirements. The monitoring value also will be aggregated yearly based on accumulative readings. The flow meters will be calibrated once every 2 years by a qualified third party in accordance with the “Verification Regulation of Thermal Mass Gas Flowmeters” (JJG-1132-2017) /68/. Since the measured $Q_{\text{biogas},y}$ ($BG_{\text{burnt},y}$), $BG_{\text{elec},y}$, $BG_{\text{heat},y}$, $Q_{\text{biogas,flare},y}$ ($BG_{\text{flare},y}$) are originated from mixed manure (calves included), no physical or analytical basis exists to isolate the fraction derived from calves. For conservativeness, the data of these parameters will be deducted the biogas generated from calves' manure by the calf fraction (the number of calves / the total number of dairy cattle), thereby excluding the calves contribution when determine the baseline emissions. When calculating project emissions, the actual monitored values of these parameters (without deducting the calf fraction) will be used; this approach is conservative.
W_{CH_4}	Methane content in biogas in the year y (volume fraction)	As per AMS-III.D., Version 21.0, “the fraction of methane in the biogas should be measured with a continuous analyser (values are recorded with the same frequency

		as the flow) or, with periodical measurements at a 90/10 confidence/precision level by following the “Standard for sampling and surveys for CDM project activities and Programme of Activities”, or, alternatively a default value of 60% methane content can be used. Option chosen should be clearly specified in the PDD. It shall be measured using equipment that can directly measure methane content in the biogas - the estimation of methane content of biogas based on measurement of other constituents of biogas such as CO₂ is not permitted. The methane content measurement shall be carried out close to a location in the system where a biogas flow measurement takes place, and on the same basis (wet or dry)”. PP selected default value 60% as methane content, which is in compliance with AMS-III.D., Version 21.0.
FE ($\eta_{\text{flare,m}}$)	Flare efficiency in the year y (fraction)	This parameter was determined ex post and was used to calculate MD_y (biogas flared or combusted), as per para 28 and equation 11 of methodology AMS-III.D. The assessment team deemed FE in equation 11 includes flare efficiency (when biogas is flared) and methane destruction efficiency (when biogas is combusted). <u>For electricity generation and natural gas upgrading</u> As per para 22 of AMS-III.D, if the recovered biogas is combusted for electrical/thermal energy production or for other gainful use, the methane destruction efficiency can be considered as 100%. However, this use of the recovered biogas shall be included in the project boundary and its output shall be monitored in order to ensure that the recovered biogas is actually destroyed, even if the emission reductions from this component are not claimed. As verified during site visit, it is confirmed that the recovered biogas will be used for electricity generation. In the future, the biogas is planned to be sold for natural gas upgrading for burning and utilization by users. Therefore, the methane destruction efficiency can be considered as 100%, which is in compliance with AMS-III.D. Besides, the output, i.e. total electricity generated from the recovered biogas in year y (EG_y) and upgrading natural gas production (NG_y) will be continuously monitored, which is in compliance with AMS-III.D. Considering natural gas upgrading was still under plan and not involved in this monitoring period, the detailed monitoring information of NG_y will be included in subsequent monitoring period and was accepted by the assessment team. <u>For biogas flaring and heat generation</u>

		By checking FSR /10/ and through on site inspection, it is confirmed the project activity utilized an enclosed flare. As per "Project emissions from flaring (version 04.0)", in the case of enclosed flares, PP may choose between the following two options to determine the flare efficiency for minute m ($\eta_{\text{flare},m}$): (a) Option A: Apply a default value for flare efficiency; (b) Option B: Measure the flare efficiency. PP selected option A and a default value was applied for the project activity. For this option, the flare efficiency for the minute m ($\eta_{\text{flare},m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating: (a) The temperature of the flare ($T_{\text{EG},m}$) and the flow rate of the residual gas to the flare ($F_{\text{RG},m}$) is within the manufacturer's operating specification for the flare ($\text{SPEC}_{\text{flare}}$) in the minute m; and (b) The flame is detected in the minute m (Flame_m). Parameters $T_{\text{EG},m}$, $F_{\text{RG},m}$ and Flame_m will be monitored in order to determine whether the above two conditions are met and the default value for flare efficiency 90% can be applied. Besides, as per para 23 of Tool06 version 04.0, for enclosed flares that are defined as low height flares, the flare efficiency shall be adjusted, as a conservative approach, by subtracting 10 percentile points. And as per para 10 of Tool 06 version 04.0, low height flare is an enclosed flare for which the flame enclosure has a height between two and ten times the diameter of the combustion enclosure. As verified through checking Operation Specification of the flare /64/ and onsite inspection and interview, it was confirmed for the biogas flare used by the project activity, the inner diameter of the combustion chamber is 1.5m, the height is 20m. Therefore, the flame enclosure has a height 13.3 times the diameter of the combustion enclosure and the biogas flare utilized by the project activity was not a low height flare. Besides, during site visit, it was verified a biogas heat boiler is installed to generate heat from recovered biogas, and used to warm the anaerobic digesters, and used to warm the anaerobic digesters. Since no monitoring equipment has been installed to monitor the amount of heat generated by recovered biogas, PP assumed these amount of biogas used for heat generated were flared and included these amount of biogas when calculating $\text{PE}_{\text{flare},y}$, which is verified to be conservative. Therefore, the efficiency of biogas boiler is selected to be 90% (the same as flare efficiency), which is verified to be reasonable and thus accepted.
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$T_{EG,m}$	Temperature in the exhaust gas of the enclosed flare in the minute m	Monitoring of this parameter is applicable in case of enclosed flares. Measurements are required to determine if manufacturer's flare specifications for operating temperature are met. The temperature of the exhaust gas in the flare will be measured by an appropriate temperature measurement equipment. Suitable monitoring port will be used to ensure that the flare is functioning correctly. Temperature measurement equipment will be replaced or calibrated once per year in accordance calibration Specification of the Temperature Transmitter (JJF 1183-2007) /67/),
$F_{RG,m}$ ($BG_{flare,y}$)	Flow rate of the residual gas on a dry basis at reference conditions in the minute m	Monitoring of this parameter is applicable in case of enclosed flares. Measurements are required to determine if manufacturer's flare specifications for operating temperature are met. This parameter is 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. The flow meters will be calibrated once every 2 years by a qualified third party in accordance with the "Verification Regulation of Thermal Mass Gas Flowmeters" (JJG-1132-2017) /68/. Since the measured $F_{RG,m}$ ($BG_{flare,y}$) is originated from mixed manure (calves included), no physical or analytical basis exists to isolate the fraction derived from calves. For conservativeness, the data of this parameter will be deducted the biogas generated from calves' manure by the calf fraction (the number of calves / the total number of dairy cattle), thereby excluding the calves contribution from the baseline emissions.
Flame _m	Flame detection of flare in the minute m	This parameter is measured once per minute using a optical flame detector. Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off. Equipment will be maintained and calibrated in accordance with manufacturer's recommendations.
EG _y	Total electricity generated from the recovered biogas in year y	During site visit, it was verified value of this parameter was continuously monitored by an electricity meter inner generator. The meter readings will be monthly recorded. No emission reductions related to electricity generation would be claimed by PP. The aim of monitoring this parameter was to ensure that the recovered biogas is actually destroyed, in order to claim 100% of FE for

		power generation and natural gas upgrading. As confirmed with PP during site visit and checking training records /22/, it is confirmed the PP has provided competency training to O&M staff, who is responsible for carrying out daily inspections, accurately log key data (e.g., power generation) and promptly address any anomalies. Since the measured EG_y is originated from mixed manure (calves included), no physical or analytical basis exists to isolate the fraction derived from calves. For conservativeness, the data of this parameter will be deducted the biogas generated from calves' manure by the calf fraction (the number of calves / the total number of dairy cattle), thereby excluding the calves contribution.
NG_y	Total nature gas upgraded from the recovered biogas in year y	As per para 22 of AMS-III.D (Version 21.0), if the recovered biogas is combusted for electrical/thermal energy production or for other gainful use, the methane destruction efficiency can be considered as 100%. However, this use of the recovered biogas shall be included in the project boundary and its output shall be monitored in order to ensure that the recovered biogas is actually destroyed, even if the emission reductions from this component are not claimed. The aim of monitoring this parameter was to ensure that the recovered biogas is actually destroyed, in order to claim 100% of FE for power generation and natural gas upgrading. During site visit, the assessment team confirmed that the purified natural gas system has not yet been constructed. As confirmed with PP, value of this parameter will be monitored through adequate instrument in the future. Since the measured NG_y is originated from mixed manure (calves included), no physical or analytical basis exists to isolate the fraction derived from calves. For conservativeness, the data of this parameter will be deducted the biogas generated from calves' manure by the calf fraction (the number of calves / the total number of dairy cattle), thereby excluding the calves contribution from the baseline emissions.
Soil application	Soil application of residual waste	Monitoring of this parameter is to ensure that the residual waste from the animal manure management system is handled aerobically. This parameter will be monitored annually. PP will refer to the original design of the soil application to ensure that the residual waste from the animal manure management system is handled aerobically. Any change in the soil application of residual waste after the implementation of the project activity should be

		justified.
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Based on the on-site visit and interviewed with staff from Zhumadian Youran Animal Husbandry Co., Ltd., The assessment team confirmed that monitoring parameter has been correctly described in the joint PD & MR (version 4.0 dated 17-09-2025) and in compliance with the methodology AMS-III.D. version 21.0, CDM Validation and Verification Standard for project activities version 03.0, and VCS standard Version 4.7.

3.5 Non-Permanence Risk Analysis

Not applicable for the present project activity.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The selected monitoring period 15-04-2023 to 31-12-2024 is the 1st monitoring period of the project, which is within the crediting period 15-04-2023 to 14-04-2033.

The control system at the project site is automated and assures continuous operation, including monitoring on malfunction of equipment. By checking the daily operation and maintenance records /57/ and interview with staff from Project Proponent, CTI can confirm that no serious malfunction happened and the project site 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 and their implementation was confirmed by interview with the key operators and observing the operation.

Through visual inspection and document review through site visit, CTI was able to confirm that:

- the project implementation is in accordance with the project description contained in the Joint PD & MR (version 4.0 dated 17-09-2025) and monitoring plan.
- all physical features of the proposed project activity including data collection systems and storage systems have been implemented in accordance with the Joint PD & MR (version 4.0 dated 17-09-2025) and monitoring plan.
- the monitoring plan in the Joint PD & MR (version 4.0 dated 17-09-2025) is in accordance with the approved methodology applied by the project activity, i.e. AMS-III.D (Version 21.0).
- The monitoring has been carried out in accordance with the monitoring plan contained in the Joint PD & MR (version 4.0 dated 17-09-2025).
- 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 joint PD & MR 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 each parameter is further verified in the following sections.

As per the Project Approval and EIA Approval, the farm is designed to accommodate 24,000 head of dairy cattle, comprising 14,400 adult dairy cattle, 3,100 breeding cattle and 6,500 calves per year. For emission-reduction calculations the project considers 17,500 head (adult dairy cattle and breeding cattle) and excludes calves. The assessment team confirms that the exclusion is conservative and has a negligible impact on the overall estimate of emission reductions.

Given that, in the actual operation of this project, calf manure is collected together with that of mature cows in the same barn and both streams are conveyed by the same scraper into a common channel with no physical separation, the assessment team, on grounds of both conservativeness and accuracy, has requested the project participant (PP), to make further adjustments to the calculation of MD_y (Methane captured and destroyed or used gainfully by the project activity in year y) to ensure that the VS contribution from calves is properly excluded from the baseline emission calculations.

Since the measured $Q_{biogas,y}$ ($BG_{burnt,y}$), $BG_{elec,y}$, $BG_{heat,y}$, $Q_{biogas,flare,y}$ ($BG_{flare,y}$), NG_y , EG_y is originated from mixed manure (calves included), no physical or analytical basis exists to isolate the fraction derived from calves. For conservativeness, the project will therefore apply the full measured biogas quantities directly when calculating project emissions. While calculating the parameter of MD_y , the data of these parameters will be deducted the biogas generated from calves' manure, which will be calculated in proportion to the number of calves relative to the total number of dairy cattle. while the same data are reduced by the calf fraction (the number of calves / the total number of dairy cattle) when calculating MD_y , thereby excluding the calves contribution from the baseline emissions.

Implementation Status	Assessment steps, evidence checked, & conclusion:
Project implementation	As described above including assessment steps and evidence, the assessment team can confirm that there is not existence of any material misstatements between the project implementation and the Project Description.
Monitoring plan	PP has operated the Project as per the joint PD & MR /2/. The monitoring organization has been set up and all monitoring staffs have been trained. VCS Monitoring Manual /54/ and internal training records /22/, Operation Staff Accreditation /58/ have been provided and verified by the assessment team. The assessment team confirms that all the documents required by the monitoring plan have been stored. CTI has verified the documents and found the management and operations have been conducted by the PP in accordance with the monitoring plan. The assessment team has onsite interviewed the

	representatives from the PP on the actual monitoring activities, onsite witnessed the actual monitoring activities, and reviewed the documented evidence, i.e. VCS Monitoring Manual /54/, and confirmed that PP has conducted the monitoring activities in accordance with the monitoring plan contained in the joint PD & MR. The assessment team has verified the parameters in the joint PD & MR /1/ and the Emission Reductions Calculation Spreadsheet /2/ and found consistent with the relevant evidences, i.e. Biogas Statistic Records /56/, Daily Production Records /59/, Operation Records /57/. Therefore the assessment team can confirm that: • The PP implemented the monitoring plan as per the project description and the actual monitoring activities are complete, and the implemented monitoring system (i.e. process and schedule for obtaining, recording, compiling and analyzing the monitored data and parameters) is suitable. • There is not any material misstatement between the actual monitoring system and the monitoring plan set out in the project description and the applied methodology.
AFOLU-specific project implementation	N/A

4.2 Accuracy of Reduction and Removal Calculations

In this monitoring period, the parameters monitored ex post were justified as follows:

Parameters monitored ex post

- **MS_{i,y}: Fraction of manure handled in system i in year y**

By checking monthly report and Operation Log /57/ of this monitoring period and via onsite inspection and investigation, it is confirmed all the manure of the project were cleaned by scrapers to the closed transportation pipeline and finally to the anaerobic digesters within 7 hours for anaerobic fermentation, and this value was daily measured, monthly and yearly aggregated, and 100% of the animal manure has been handled in the anaerobic manure management system. Also, via onsite inspection and investigation, it is confirmed no other sequential manure management system existed at the project site and thus 100% is applied. Therefore, 100% has been used in calculation of emission reductions and the monitoring of this parameter is in compliance with methodology and the monitoring plan.

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

By checking Daily Dynamic Table of Dairy Cattle /53/, it is confirmed that the number of animals sold, i.e. number of animals produced during this monitoring period has been monthly recorded and yearly aggregated, which is in compliance with methodology and the monitoring plan.

Data used for ER calculation was sourced from Daily Dynamic Table of Dairy Cattle /53/, which has been crosschecked with the amount of feed purchased in Dairy Cattle Feed Purchase Records /69/. It is verified that number of animals (adult dairy cattle and breeding cattle) produced during this monitoring period is reasonable. It is confirmed that the value of $N_{p,y}$ of this monitoring period was:

Period	Value (head)
15-04-2023 ~ 31-12-2023	14,418
01-01-2024 ~ 31-12-2024	16,611

Additionally, by checking the above two data sources /53//69/, it was verified the number of calves were:

Period	number of calves (day)
15-04-2023 ~ 31-12-2023	2,129
01-01-2024 ~ 31-12-2024	2,455

● **$N_{da,y}$: Number of days animal is alive in the farm in the year y**

Via onsite inspection and investigation, it was verified the project owner has established a unique identification tag for each dairy cattle, which is an electronic ear tag. Through electronic ear tags, the system can count the alive condition and number of dairy cattle. Via onsite interview, it is confirmed an appointed staff from PP is responsible for monitoring this parameter according to operation requirements, and on-site inventory of the cattle herd have been conducted monthly to check the ear tag numbers and system records, and confirm whether the cattle is alive. By checking Operation Log /57/, it is confirmed the number of days animal is alive in the farm during this monitoring period has been monthly recorded and yearly aggregated, which is in compliance with methodology and the monitoring plan.

Data used for ER calculation was sourced from Operation Log /57/, which has been crosschecked with the amount of feed purchased in Dairy Cattle Feed Purchase Records /69/. It is verified that the number of days animal is alive in the farm during this monitoring period is reasonable. 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:

Period	Value (day)
15-04-2023 ~ 31-12-2023	261
01-01-2024 ~ 31-12-2024	366

● **$VS_{LT,y}$: Volatile solids production/excretion per animal of livestock LT in year y**

The default values used to calculate $VS_{LT,y}$ was sourced from latest version IPCC, i.e. 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10.

$VS_{LT,y}$ is calculated via equation 10.22A in 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, i.e. $VS_{(T,P)} = VS_{rate(T,P)} \times \left(\frac{TAM_{T,P}}{1000} \right) \times 365$.

PP applied high PS value for dairy cattle in Asia from Table 10.13A (NEW) of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10, i.e. 8.1kg-VS/1000kg-mass/day, for $VS_{rate(T,P)}$, which is verified to be reasonable. PP adopts high PS value of TAM for dairy cattle in Region "Asia" from 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10A.5, i.e. 485kg animal⁻¹ for $TAM_{(T,P)}$, which is verified to be reasonable.

By checking Dairy Weight Record Table /55/, it was verified the average weight of dairy cattle of this project in 2023 and 2024 is respectively 520 kg and 513 kg, higher than the default value in 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Therefore, the assessment team confirmed the application of default TAM value from IPCC is conservative.

Therefore, $VS_{LT,y}$ is calculated to be: 8.1kgVS(1000kg animal mass)/day * 485/1000*365 = 1,433.90 kg-dm/animal/year, which is verified to be conservative.

- **W_{site} ($TAM_{T,P}$): Average animal weight of a defined livestock population at the project site**

The aim of monitoring of this parameter was to adjust default IPCC values for VS and make sure a conservative method is applied to calculate $VS_{LT,y}$, meanwhile, judge the rationality of the project specific animal weights, through comparing with IPCC default values.

For determining the value of W_{site} , the sampling procedure has been applied by PP. Simple random sampling (SRS) procedure has been applied as per Standard for sampling and surveys for CDM project activities and Programmes of Activities (Version 09.0) with 90/10 confidence/precision level. The sampling size has been determined using CDM sample size calculator (Version 03.1). For 17,500 heads of dairy cattle (target population), the sampling size is calculated to be 267. PP determined the sampling size to be 300, which is verified to be conservative and acceptable.

During site visit, it is confirmed W_{site} was measured by weight scale. By checking Dairy Cattle Weight Records /74/, it is confirmed sufficient samples, were taken monthly to measure the value of W_{site} during this monitoring period.

Data used for ER calculation was sourced from Dairy Cattle Weight Records /74/ and was verified by CTI to be consistent. 90/10 confidence/precision level has been adopted, which is in compliance with Standard for sampling and surveys for CDM project activities and Programmes of Activities (Version 09.0) and AMS-III.D (Version 21.0). Precision have been checked by PP from Guideline - Sampling and surveys for CDM project activities and programmes of activities (version 04.0) and have been verified by the assessment team. It is confirmed the sampling error is within 1% of the mean at 90% confidence and the sample estimation of W_{site} meets the required specification, i.e., 90/10 confidence/precision. Therefore, it is confirmed the value of W_{site} of this monitoring period was:

Monitoring period	W_{site} (Kg)	W_{site} (Kg)
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	Monitoring value	Conservative value
15-04-2023 ~ 31-12-2023	521	520
01-01-2024 ~ 31-12-2024	518	513

Via interviewing PP and checking Factory Certificate of Conformity /78/, the assessment team confirmed the weight scale has only undergone its initial factory calibration and has not been subjected to any subsequent calibrations in this monitoring period. In accordance with the national standard, i.e. Verification Regulation for Digital Indicating Weighing Instruments (JJG539-2016) /75/, the required calibration frequency should be annually. As per para 366 and 367 of CDM Validation and Verification Standard for project activities version 03.0, it is stated that “the DOE may conclude its verification, provided the conservative approach is adopted in the calculation of GHG emission reductions or net anthropogenic GHG removals: applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error. The DOE shall confirm that the error has been applied: In a conservative manner, such that the adjusted measured values of the delayed calibration shall result in fewer claimed GHG emission reductions or net anthropogenic GHG removals”.

According to para 366 and 367 of CDM VVS, PP applied conservative method to calculate the value of W_{site} for the period from 30-12-2023 to 31-12-2024 by applying the accuracy (1%) as the maximum permissible error of the gas analyzer to the measured values, i.e. the adjusted value = measured value $\times (1-1\%)$. Since this parameter is solely intended to adjust default IPCC values for VS and make sure a conservative method is applied to calculate $VS_{LT,y}$, and given that the PP has already adjusted the data in accordance with VVS, the verification team concludes that the adjusted W_{site} data remain reasonable and valid.

The value of dairy cattle weight of this monitoring period is verified to be more than IPCC default value of live weights for finishing dairy cattle in high PS systems in Asia sourced from 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10A.5, which is 485kg animal⁻¹. PP selected default IPCC value, i.e. 485kg animal⁻¹, for emission reductions calculation, which is verified to be conservative.

- **$Q_{biogas,y}/BG_{burnt,y}, BG_{elec,y}, BG_{heat,y}, BG_{flare,y}$: Amount of biogas collected at the digester outlet in year y; Biogas volume for power generation in year y; Biogas volume for heat generation in year y; Biogas volume for flare in year y**

The biogas flow from anaerobic digester system was continuously measured by flow meters installed respectively at the outlet of the pre-treatment system; at the inlet of power generation system—for the biogas flow to power generation system; at the inlet of heat generation system—for the biogas flow to heat generation system; and at the inlet of the emergency flare—for the biogas flow to emergency flare.

By checking Biogas Statistic Records /56/, the assessment team confirmed that the readings of the flow meters were continuously monitored and monthly recorded. The meter readings have been automatically converted to value at room temperature (20°C) and 1 atm pressure. Therefore, it is

confirmed that the monitoring of this parameter is in compliance with methodology and the monitoring plan.

Besides, via onsite inspection and checking calibration records /65/, it is confirmed the flow meter used in this project is a thermal mass flow meter, which directly measures the mass flow of biogas. By checking User Manual of this thermal flow meter /76/, it is confirmed based on the pre-programmed standard density at reference conditions (20 ° C and 1 atm pressure), it converts the mass flow into standard volumetric flow (Nm³/h) without requiring additional temperature or pressure compensation.

Data used for ER calculation was sourced from Biogas Statistic Records /56/, which has been crosschecked with that in the Daily Production Records /59/. All the data have been verified by CTI to be consistent. It is confirmed that the value of $Q_{\text{biogas},y}/BG_{\text{burnt},y}$, $BG_{\text{elec},y}$, $BG_{\text{heat},y}$, $BG_{\text{flare},y}$ was:

Period	$Q_{\text{biogas},y}/BG_{\text{burnt},y}$ (m ³)	$BG_{\text{elec},y}$ (m ³)	$BG_{\text{heat},y}$ (m ³)	$BG_{\text{flare},y}$ (m ³)
15-04-2023~31-12-2023	4,002,234	704,114	518,301	2,779,820
01-01-2024~31-12-2024	7,566,244	2,412,672	2,040,536	3,113,037
Total	11,568,478	3,116,786	2,558,837	5,892,857

Since the measured $Q_{\text{biogas},y}$ ($BG_{\text{burnt},y}$), $BG_{\text{elec},y}$, $BG_{\text{heat},y}$, $Q_{\text{biogas},y}$ ($BG_{\text{flare},y}$) are originated from mixed manure (calves included), no physical or analytical basis exists to isolate the fraction derived from calves. For conservativeness, the data of these parameters will be deducted the biogas generated from calves' manure by the calf fraction (the number of calves / the total number of dairy cattle), thereby excluding the calves contribution from the baseline emissions. Value of these parameters after deducting the calf fraction were verified and listed as follows:

Period	$Q_{\text{biogas},y}/BG_{\text{burnt},y}$ (m ³)	$BG_{\text{elec},y}$ (m ³)	$BG_{\text{heat},y}$ (m ³)	$BG_{\text{flare},y}$ (m ³)
15-04-2023~31-12-2023	3,884,725	685,320	505,710	2,693,696
01-01-2024~31-12-2024	7,359,658	2,355,146	1,994,316	3,010,196
Total	11,244,383	3,040,466	2,500,026	5,703,892

● **w_{CH4}: Methane content in biogas in the year y (volume fraction)**

Default value of w_{CH4,y} from AMS-III.D version 21.0, i.e. 60% is applied for calculation of emission reductions of this monitoring period, which is in compliance with the monitoring plan and AMS-III.D version 21.0.

● **FE ($\eta_{\text{flare},m}$): Flare efficiency in the year y**

Via onsite inspection and as confirmed with PP, it was verified natural gas upgrading was still under plan and not involved in this monitoring period. The biogas was destroyed for electricity and heat generation and the excess biogas was destroyed through flaring in this monitoring period.

As justified above, for biogas combusted for electricity generation, the methane destruction efficiency can be considered as 100%, which is in compliance with methodology and the monitoring plan. As

required by the methodology and the monitoring plan, total electricity generated from the recovered biogas in year y (EG_y) has been monitored for this monitoring period (refer to paragraph below for detailed assessment).

For biogas flaring, the project uses enclosed flares, and PP 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;
- (ii) 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. It was verified the temperatures of the flare burners is 687 °C and 712 °C respectively in 2023 and 2024 during this monitoring period, which is within the manufacturer's operating specification for the flare ($SPEC_{flare}$) (600 °C - 1260 °C), and thereby the assessment team deemed that the $flame_m$ is ON. Additionally, by checking Flaring System Operation Statistics /60/, it was verified the flow rate of the residue gas to the flare ($F_{RG,m}$) is 560.43 Nm^3/h and 514.96 Nm^3/h respectively in 2023 and 2024 during this monitoring period, which is within the manufacturer's operating specification for the flare ($SPEC_{flare}$) (0~1900 m^3/h).

Therefore, 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 . Please refer to detailed justification of parameters " $T_{EG,m}$ ", " $F_{RG,m}$ " and " $Flame_m$ " below.

Besides, during site visit, it was verified a biogas heat boiler is installed to generate heat from recovered biogas, and used to warm the anaerobic digesters, and used to warm the anaerobic digesters. Since no monitoring equipment has been installed to monitor the amount of heat generated by recovered biogas, PP assumed these amount of biogas used for heat generated were flared and included these amount of biogas when calculating $PE_{flare,y}$, which is verified to be conservative. Therefore, the efficiency of biogas boiler is selected to be 90% (the same as flare efficiency), which is verified to be reasonable and thus accepted.

● Temperature in the exhaust gas of the enclosed flare in the minute m ($T_{EG,m}$)

As verified during site visit, it is confirmed a temperature transmitter has been installed to monitor once per minute the temperature in the exhaust gas of the enclosed flare. The readings of temperature transmitter was continuously measured and has been monthly aggregated. Therefore, it is confirmed that the monitoring of this parameter is in compliance with methodology and the monitoring plan.

Data used for ER calculation was sourced from Flaring System Operation Statistics /60/, which has been crosschecked with that in the Flare Operation Report /77/, and it was verified by CTI to be consistent. It is confirmed that the value of $T_{EG,m}$ of this monitoring period was:

Monitoring period	$T_{EG,m}$ (°C)
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15-04-2023~31-12-2023	687
01-01-2024~31-12-2024	712

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

As verified during site visit, it is confirmed the flow meter has been installed at the inlet of the flare system 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. The readings of flow meter was continuously measured has been monthly recorded. Therefore, it is confirmed that the monitoring of this parameter is in compliance with methodology and the monitoring plan.

Data used for ER calculation was sourced from Flaring System Operation Statistics /60/ 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	Flow rate (Nm ³ /h)	$F_{RG,m}$ (Nm ³)
15-04-2023~31-12-2023	560.43	2,779,820
01-01-2024~31-12-2024	514.96	3,113,037
Average/Total	534.45	5,892,857

Since the measured $F_{RG,m}(BG_{flare,y})$ is originated from mixed manure (calves included), no physical or analytical basis exists to isolate the fraction derived from calves. For conservativeness, the data of these parameters will be deducted the biogas generated from calves' manure by the calf fraction (the number of calves / the total number of dairy cattle), thereby excluding the calves contribution from the baseline emissions. Value of this parameter after deducting the calf fraction were verified and listed as follows:

Monitoring period	$F_{RG,m}$ (Nm ³)
15-04-2023~31-12-2023	2,693,696
01-01-2024~31-12-2024	3,010,196
Average/Total	5,703,892

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

As verified during site visit, it is confirmed a temperature transmitter has been installed to monitor once per minute the temperature and also flame detection in the exhaust gas of the enclosed flare. Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off. $T_{EG,m}$ has been monitored for the flaring system. Data used for ER calculation was sourced from Flaring System Operation Statistics /60/, which has been crosschecked with that in the Flare Operation Report /77/, and it was verified $T_{EG,m}$ is above flame temperature for flaring. It is confirmed that the value of $Flame_m$ of this monitoring period was:

Monitoring period	$T_{EG,m}$ (°C)	Flame _m
15-04-2023~31-12-2023	687	ON
01-01-2024~31-12-2024	712	ON

● **EG_y: Total electricity generated from the recovered biogas in year y**

As verified during site visit, it is confirmed EG_y was monitored continuously by a built-in power monitoring meter installed in the biogas generator. Data used for ER calculation was sourced from Biogas Statistic Records /56/, which has been crosschecked with that in the Daily Production Records /59/, it was verified the value of EG_y during this monitoring period was:

Period	EG _y (MWh)
15-04-2023~31-12-2023	1,548,716
01-01-2024~31-12-2024	5,649,364
Total	7,198,080

The rationality of EG_y was verified by the assessment team via calculating the amount of biogas combusted based on EG_y via equation (12) in AMS-III.D and the amount of biogas combusted based on BG_{elec,y} via equation (11) in AMS-III.D, i.e. equation (13) of this report, and corresponding default value in AMS-III.D. The assessment team made the following comparison.

Period	The amount of biogas combusted for electricity generation (tCO _{2e}) Calculated using equation (12) in AMS-III.D	The amount of biogas combusted for electricity generation (tCO _{2e}) Calculated using equation (11) in AMS-III.D, i.e. equation (13) of this report
15-04-2023~31-12-2023	7,283	7,925
01-01-2024~31-12-2024	26,569	27,157
Total	33,852	35,082

The detailed calculation has been included in Joint PD&MR and verified to be correct. Via the above comparison, it was verified the amount of biogas combusted that calculated using EG_y was close to that calculated using BG_{elec,y}. The 3.63% difference is considered by the assessment team to be reasonable.

Therefore, it is confirmed value of EG_y was reasonable and the assessment team deemed that biogas flow from the anaerobic digester system during this monitoring period has been combusted for power generation.

Since the measured EG_y and the amount of biogas combusted for electricity generation is originated from mixed manure (calves included), no physical or analytical basis exists to isolate the fraction derived from calves. For conservativeness, the data of this parameter will be deducted the biogas

generated from calves' manure by the calf fraction (the number of calves / the total number of dairy cattle), thereby excluding the calves contribution from the baseline emissions. Value of these parameters after deducting the calf fraction were verified and listed as follows:

Period	EG _y (MWh)	The amount of biogas combusted for electricity generation (tCO _{2e})
15-04-2023~31-12-2023	1,508.866	7,096
01-01-2024~31-12-2024	5,524.777	25,983
Total	7,033.644	33,070

● **NG_y: Total nature gas upgraded from the recovered biogas in year y**

As verified during site visit and checking FSR /13/, it is confirmed that natural gas upgrading were not involved in this monitoring period. In the future, the biogas is planned to be sold for natural gas upgrading for burning and utilization by users. Therefore, monitoring of this parameter was not involved in this monitoring period and will be assessed in future verifications.

Therefore, the assessment team confirmed the monitoring process of this parameter is in compliance with AMS-III.D. version 21.0.

● **Soil application: Soil application of residual waste**

Monitoring of this parameter is to ensure that the residual waste from the animal manure management system is handled aerobically. This parameter has been monitored annually, which is in compliance with the monitoring plan.

By checking lifting pump and irrigation network during site visit, checking Registration Record of Liquid Fertilizer Production and Utilization /80/ and via site investigation, it was verified liquid digestate from the animal manure management system has been used to the field as liquid fertilizer and irrigation water during this monitoring period. Additionally, By checking lifting pump, irrigation connection pipeline and interviewing stakeholders, it was verified the soild digestate was transported by neighbouring farmers using their own electric tricycles and applied directly to surrounding farmland as organic fertilizer.

Therefore, the assessment team confirmed the residual waste from the animal manure management system is handled aerobically and monitoring of this parameter was verified to be in compliance with the monitoring plan.

In conclusion, 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 assessment 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 /17/ 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 /62/- /66/ is listed as below.

Monitoring parameter	Monitoring equipment	Serial Number	Model	Accuracy Class	Calibration Date	Validity
$Q_{\text{biogas},y}$ ($BG_{\text{burnt},y}$)	flow meter	SBO2E302000	Proline t-mass 65	1%	13-04-2023	12-04-2025
$BG_{\text{elec},y}$	flow meter	SBO2E402000	Proline t-mass 65	1%	13-04-2023	12-04-2025
$BG_{\text{heat},y}$	flow meter	SBO2E202000	Proline t-mass 65	1%	13-04-2023	12-04-2025
$BG_{\text{flare},y}$	flow meter	SBO2E502000	Proline t-mass 65	1%	13-04-2023	12-04-2025
$T_{\text{GE},m}$	temperature transmitter	22K201K13327	WRNK-346	II	14-03-2023 13-03-2024	13-03-2024 12-03-2025
$F_{\text{RG},m}$	flow meter	SBO2E502000	Proline t-mass 65	1%	13-04-2023	12-04-2025
W_{site} ($TAM_{T,p}$)	Scale	BWCT110220060	BW-CT110	III	30-12-2022	29-12-2023

The flow meters were calibrated by qualified third party, i.e. Endress+HauserFlowtecAG. Calibration records and accreditation certificates /62//65/ have been verified by the assessment team. By checking the calibration reports, CTI found the flow meters have been calibrated as per national or industry regulations and standards (i.e. Verification Regulation of Thermal Mass Gas Flowmeters (JJG 1132-2017) /68/) and is in line with methodology and the monitoring plan. Furthermore, the calibrations of these monitoring instruments are verified to be valid for the whole reporting period.

The temperature transmitter were calibrated by qualified third party, i.e. Suzhou Lonbo Calibration & Testing Co., Ltd. Calibration records and accreditation certificates /63//66/ have been verified by the assessment team. By checking the calibration reports, CTI found the flow meters have been calibrated as per national or industry regulations and standards (i.e. Calibration Specification of the Temperature Transmitter (JJF 1183-2007)) /67/) and is in line with methodology and the monitoring plan. Furthermore, the calibrations of these monitoring instruments are verified to be valid for the whole reporting period.

Via onsite inspection, it was verified a built-in power monitoring meter installed in the biogas generator for measuring the electricity generated. As explained by PP, this meter was not calibrated since it was installed inside the biogas generator and was not available for calibration. By checking "Announcement of the State Administration for Market Regulation on Issuing the Catalogue of Measuring Instruments for Compulsory Management" /61/ issued by the State Administration for Market Regulation on 23-10-

2019, it was verified the measuring instruments listed in the “catalogue” should be subject to compulsory verification in use, and other measuring instruments will no longer be subject to compulsory verification. This built-in power monitoring meter was not listed in the “catalogue” of this announcement for mandatory calibration and thereby not compulsorily calibrated. Considering parameter EG_y and the data monitored by this built-in power monitoring meter was only used to determine the rationality of the amount of biogas combusted for electricity generation, not involved in emission reductions calculation, no calibration of this built-in power monitoring meter was thereby accepted by the assessment team.

The weight scale were calibrated by the Manufacturer, i.e. Beijing Guoke Chengta Animal Husbandry Equipment Co., Ltd. The Factory Certificate of Conformity of the weight scale /78/ has been verified by the assessment team. The assessment team further confirmed the weight scale has only undergone the initial factory calibration and has not been subjected to any subsequent calibrations. In accordance with the national standard, i.e. Verification Regulation for Digital Indicating Weighing Instruments (JJG539-2016) /75/, the required calibration frequency should be annually. Therefore, a conservative emission reduction calculation method has been applied by PP and the details have been justified above in section 4.2 of this report.

Data management and control

The Project Proponent 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 /54/, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. By interview with the staff and check records /22//54//57//58/ 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 /22/ of in-plant personnel engaged in measurement of plant parameters were presented during verification and found to be in order.

Calculation of emission reductions

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, the emission reductions are determined as the difference between the baseline emissions, project emissions and leakage:

Baseline emissions

Based on parameters justified in section 3.4.8, section 4.2 and equation (1) in this report, baseline emissions have been calculated in ER calculation sheet and verified by the assessment team. It is confirmed that BE_y (i.e. $BE_{y, \text{ex post}}$) was calculated as follows:

Period	15-04-2023~31-12-2023	01-01-2024~31-12-2024
GWP_{CH_4} (tCO ₂ e/tCH ₄)	28	28
D_{CH_4} (t/m ³)	0.00067	0.00067
UF_b	0.94	0.94
MCF_j (%)	76%	76%
$B_{0,LT}$ (m ³ CH ₄ /kg-VS)	0.24	0.24
$N_{LT,y}$ (hd)	14,418	16,611
$VS_{LT,y}$ (Kg-dm/animal/year)	1,433.90	1,433.90
$MS\%_{i,y}$	100%	100%
$BE_{y, \text{ex post}}$ (tCO₂e)	47,546	76,820

In table above, $N_{LT,y}$ was calculated via equation (3) of this report as follows:

Period	15-04-2023~31-12-2023	01-01-2024~31-12-2024
$N_{p,y}$ (hd)	14,418	16,611
$N_{da,y}$ (days)	261	366
$N_{LT,y}$ (hd)	10,309	16,656

Project emissions

As justified above, PE_y (i.e. $PE_{y, \text{ex post}}$) = $PE_{PL,y} + PE_{flare,y} + PE_{power,y} = PE_{PL,y} + PE_{flare,y} + PE_{EC,y}$

$PE_{PL,y}$ is calculated based on parameters justified in section 3.4.8, section 4.2 and equation (6) in this report. $PE_{PL,y}$ have been calculated in ER calculation sheet and verified by the assessment team. It is confirmed that $PE_{PL,y}$ was calculated as follows:

Period	15-04-2023~31-12-2023	01-01-2024~31-12-2024
GWP_{CH_4} (tCO ₂ e/tCH ₄)	28	28
D_{CH_4} (t/m ³)	0.00067	0.00067
$B_{0,LT}$ (m ³ CH ₄ /kg-VS)	0.24	0.24
$N_{LT,y}$ (hd)	10,309	16,656

$VS_{LT,y}$ (Kg-dm/animal/year)	1,433.90	1,433.90
$MS\%_{i,y}$	100%	100%
$PE_{PL,y} (tCO_2e)$	6,656	10,753

$PE_{flare,y}$ is calculated based on parameters justified in section 3.4.8, section 4.2 and equation (7) in this report. $PE_{flare,y}$ have been calculated in ER calculation sheet and verified by the assessment team. It is confirmed that $PE_{flare,y}$ was calculated as follows:

Period	15-04-2023~31-12-2023	01-01-2024~31-12-2024
$GWP_{CH_4} (tCO_2e/tCH_4)$	28	28
$\rho_{CH_4} (kg/m^3)$	0.67	0.67
$Q_{biogas,flare,y} (m^3)$	2,779,820	3,113,037
$BG_{heat,y} (m^3)$	518,301	2,040,536
$f_{CH_4,default} (m^3 CH_4/m^3 biogas)$	60%	60%
$\eta_{flare,m}$	90%	90%
$PE_{flare,y} (tCO_2e)$	3,713	5,801

$PE_{EC,y}$ (i.e. $PE_{power,y,ex post}$) is calculated based on parameters justified in section 3.4.8, section 4.2 and equation (9) and (10) in this report. $PE_{EC,y}$ (i.e. $PE_{power,y,ex post}$) have been calculated in ER calculation sheet and verified by the assessment team. It is confirmed that $PE_{EC,y}$ (i.e. $PE_{power,y,ex post}$) was calculated as follows:

Period	15-04-2023~31-12-2023	01-01-2024~31-12-2024
$Q_{biogas,y} (m^3)$	3,884,725	7,359,658
$f_{CH_4,default}$ ($m^3 CH_4/m^3 biogas$)	0.6	0.6
$\rho_{CH_4} (t CH_4/m^3 CH_4)$	0.00067	0.00067
$Q_{CH_4,y} (t CH_4)$	1,609	3,042
$F_{EC,default} (MWh/t CH_4)$	1.02	1.02
$EF_{EL,default} (tCO_2/MWh)$	1.3	1.3
$PE_{EC,y}$ (i.e. $PE_{power,y,ex post}$)	2,134	4,034

(tCO ₂ e)		
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Therefore, PE_y (i.e. PE_{y, ex post}) is calculated to be:

Period	15-04-2023~31-12-2023	01-01-2024~31-12-2024
PE _{PL,y} (tCO ₂ e)	6,656	10,753
PE _{flare,y} (tCO ₂ e)	3,713	5,801
PE _{EC,y} (i.e. PE _{power,y,ex post}) (tCO ₂ e)	2,134	4,034
PE_y (i.e. PE_{y, ex post}) (tCO₂e)	12,503	20,588

Leakage

By checking EIA Report /12/, FSR /10/, and through on site inspection, it is confirmed that digestate from the anaerobic digesters will be directly returned to nearby farm as fertilizer as soon as it leaves the digesters. Hence, it was verified no storage or composting is involved in the project activity and leakage in relation to storage or composting of the digestate is 0. therefore, LE_y = 0.

Emission reductions

ER_y (i.e. ER_{y,ex post}) is calculated based on parameters justified in section 3.4.8, section 4.2 and equation (12) and (13) in this report. ER_y have been calculated in ER calculation sheet and verified by the assessment team. It is confirmed that ER_y was calculated as follows:

Period	15-04-2023~31-12-2023	01-01-2024~31-12-2024
BG _{burnt,y} (m ³)	3,884,725	7,359,658
BG _{flare,y} (m ³)	2,693,696	3,010,196
BG _{heat,y} (m ³)	505,710	1,994,316
BG _{elec,y} (m ³)	685,320	2,355,672
W _{CH₄,y}	60%	60%
D _{CH₄} (t/m ³)	0.00067	0.00067
FE (for electricity generation)	100%	100%
FE (for flaring and heat generation)	90%	90%
GWP _{CH₄} (tCO ₂ e/tCH ₄)	28	28
MD _y (tCO ₂ e)	40,125	77,207
BE _{y,ex post}	47,546	76,820
PE _{y, ex post}	12,503	20,588
PE _{power,y,ex post}	2,134	4,034
ER_{y,ex post}	35,043	56,232

Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates ex-ante

The emission reductions claimed are 91,275 tCO₂e in this monitoring period. Compared with expected emission reductions 102,235 tCO₂e (42,625 tCO₂ + 59,610 tCO₂e) calculated ex-ante, the reported emission reductions in this monitoring period are 10.72% less than that expected, which is considered to be in the reasonable variation range.

Verified GHG emission reductions and removals from 15-04-2023 to 31-12-2024:

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCUs (tCO ₂ e)
15-04-2023~31-12-2023	47,546	12,503	0	35,043	0	35,043
01-01-2024~31-12-2024	76,820	20,588	0	56,232	0	56,232
Total	124,366	33,091	0	91,275	0	91,275

Year	Ex-ante emissions reductions/removals	Achieved emissions reductions/removals	Percent difference	Justification for the difference
15-04-2023~31-12-2023	42,625	35,043	-17.79%	As verified, the difference between estimated and achieved emission reductions might resulted by at the beginning of the project operation, which is verified to be reasonable and acceptable.
01-01-2024~31-12-2024	59,610	56,232	-5.67%	
Total	102,235	91,275	-10.72%	

CTI is able to confirm that the actual 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. And CTI is able to confirm that GHG emission reductions and removals have been quantified correctly in accordance with the monitoring plan and applied methodology for this verification period.

4.3 Quality of Evidence to Determine Reductions and Removals

As a result of verification of the ER calculation process, the assessment team confirmed that all the parameters required for the determination of the emission reductions have been included in the joint PD & MR /1/ and ER Calculation Spreadsheet /2/ of this monitoring period and are consistent with the applied methodology - AMS-III.D.: Methane recovery in animal manure management systems, version 21.0 and the monitoring plan contained in the joint PD & MR. The parameters are complete in this monitoring period.

After verifying the reported figures with the raw data sources, it's confirmed that the values of the parameters from the raw data sources are consistent with those quoted in the ER Calculation Spreadsheet of this monitoring period and joint PD & MR. the verification process for the same has been clearly described above in section 4 of the report.

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.

5 VALIDATION AND VERIFICATION OPINION

5.1 Validation and Verification Summary

CTI Certification Co., Ltd (CTI) has been commissioned by Climate Bridge (Shanghai) Ltd. to performed the joint validation and verification of the project activity “Henan Zhumadian Youran Xiping Dairy Farm Biogas Utilization Project” in China (VCS Project ID: 5366) for the monitoring period 15-04-2023 to 31-12-2024 within the fixed crediting period 15-04-2023 to 14-04-2033 on the basis of requirements of Verified Carbon Standard (VCS) version 4.7, VCS Validation and Verification Manual version 3.2, and the approved Clean Development Mechanism (CDM) methodology AMS-III.D. version 21.0, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation and verification scope is defined as an independent and objective review of the Joint Project Description and Monitoring Report (joint PD & MR), the project’s baseline study and monitoring plan, the emission reduction calculation spreadsheet and other relevant documents refer to VCS and CDM requirements. The GHG statement is the responsibility of the project proponent. The joint validation and verification report are summarizing the findings of the validation and verification.

In the course of the validation and verification, 3 Clarification Requests (CLs), 3 Corrective Action Requests (CARs) and no Forwarded Action Requests (FARs) was raised.

5.2 Validation Conclusion

The review of the project design documentation and additional documents related to baseline and monitoring methodology and subsequent background investigation have provided the CTI with sufficient evidence to validate the fulfilment of the stated criteria. In detail the conclusions can be summarized as follows:

- the baseline scenario is correctly defined as per the applied methodology and relate tools;
- the project is additional;
- all data and information used for ex-ante calculation of emission reductions is of projected and/or hypothetical nature;
- a reasonable level of assurance has been applied;
- the monitoring plan in the validated PD is as per the applied methodology AMS-III.D. version 21.0;
- the project has been implemented and operated as per the joint PD & MR;
- the project complies with the validation criteria for projects set out in VCS Standard version 4.7;

- The calculation of the ex ante emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 596,100 tCO₂e are most likely to be achieved within the 10-year fixed crediting period started from 15-04-2023.

It is CTI's responsibility to provide an independent validation statement on the Project's compliance with the VCS Program requirements as set out in the VCS Program Rules. The conclusions of this report show that the project, as it was described in the project description contained in the joint PD & MR, is in line with all criteria applicable for the validation against the VCS standard version 4.7 without any qualifications or limitations.

Crediting Period: From 15-04-2023 to 14-04-2033

Validated estimated GHG emission reductions and carbon dioxide removals for the project crediting period:

Vintage period	Estimated baseline emissions (tCO ₂ e)	Estimated project emissions (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated reduction VCUs (tCO ₂ e)	Estimated removal VCUs (tCO ₂ e)	Estimated total VCUs (tCO ₂ e)
15-04-2023 - 31-12-2023	57,715	15,089	0	42,625	0	42,625
2024	80,712	21,102	0	59,610	0	59,610
2025	80,712	21,102	0	59,610	0	59,610
2026	80,712	21,102	0	59,610	0	59,610
2027	80,712	21,102	0	59,610	0	59,610
2028	80,712	21,102	0	59,610	0	59,610
2029	80,712	21,102	0	59,610	0	59,610
2030	80,712	21,102	0	59,610	0	59,610
2031	80,712	21,102	0	59,610	0	59,610
2032	80,712	21,102	0	59,610	0	59,610
01-01-2033 - 14-04-2033	22,997	6,013	0	16,985	0	16,985
Total	807,120	211,020	0	596,100	0	596,100

5.3 Verification conclusion

The verification is based on the baseline and monitoring methodology AMS-III.D. version 21.0, and the joint PD & MR (version 4.0 dated 17-09-2025). 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 joint PD & MR. Our verification approach was based on the requirements as defined under the applicable VCS Standard version 4.7 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 monitoring plan in joint PD & MR is as per the applied methodology;
- the monitoring complies with the monitoring plan in the joint PD & MR;
- the joint PD & MR and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS Standard version 4.7 and CDM requirements;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

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

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

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

In CTI's opinion the GHG emissions reductions of the "Henan Zhumadian Youran Xiping Dairy Farm Biogas Utilization Project" for the monitoring period 15-04-2023 to 31-12-2024 are fairly stated in the joint PD & MR (version 4.0 dated 17-09-2025). 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 joint PD & MR (version 4.0 dated 17-09-2025).

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 15-04-2023 to 31-12-2024

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

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCUs (tCO ₂ e)	Removal VCUs (tCO ₂ e)	Total VCUs (tCO ₂ e)
15-04-2023~31-12-2023	47,546	12,503	0	35,043	0	35,043
01-01-2024~31-12-2024	76,820	20,588	0	56,232	0	56,232
Total	124,366	33,091	0	91,275	0	91,275

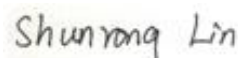
5.4 Ex-ante vs Ex-post ERR Comparison

The emission reductions claimed are 91,275 tCO₂e in this monitoring period. Compared with expected emission reductions tCO₂e calculated ex-ante, the reported emission reductions in this monitoring period are less than that expected, which is considered to be in the reasonable variation range.

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
15-04-2023~31-12-2023	42,625	35,043	-17.79%	As verified, the difference between the estimated and achieved emission reductions might resulted by less biogas generation at the beginning of the project operation, which is verified to be reasonable and acceptable.
01-01-2024~31-12-2024	59,610	56,232	-5.67%	
Total	102,235	91,275	-10.72%	



Mr. Li Ziqi
Team Leader
22-09-2025



Ms. Lin Shunrong
Technical Reviewer
22-09-2025

APPENDIX 1: ABBREVIATIONS

Abbreviations	Full texts
AFOLU	Agriculture, Forestry, and Other Land Use
BM	Build Margin
CDM	Clean Development Mechanism
CME	Coordinating/managing entity
CER	Certified Emission Reduction
CM	Combined Margin
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
DORs	Daily Production Records
EB	Executive Board
GHG	Greenhouse gas(es)
GS	Gold Standard
EIA	Environmental Impact Assessment
ER	Emission Reduction
ETS	Emission Trading Scheme
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
PA	Project Activity
PD	Project Description
PP	Project Proponent
PPA	Power Purchase Agreement
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit
VVB	Validation/Verification Body

APPENDIX 2: <COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS>

Mr. Ziqi LI

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 4: Manufacturing industries	TA 4.1: Cement and lime production
SS 5: Chemical industry	TA 5.1: Chemical industry
	TA 5.2: Caprolactam, nitric and adipic acid
SS 11: Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	TA 11.1: Emissions of fluorinated gases
	TA 11.2: Refrigerant gas production
SS 12: Solvents use	TA 12.1: Chemical industry
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:

Shunrong LIN *Shunrong Lin*

Technical Competent Manager

Shenzhen, 01/01/2024

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

Ms. Qixin ZHANG

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

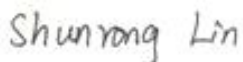
Qualification					
GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
√	√	-	-	-	-

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources
SS 13: Waste handling and disposal	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:

Shunrong LIN



Technical Competent Manager

Shenzhen, 01/05/2024

APPENDIX 3: <REFERENCE LIST>

1. Joint Project Description and Monitoring Report, version 01 dated 06-12-2024, version 2.0 dated 06-03-2025, version 3.0 dated 17-07-2025, version 4.0 dated 17-09-2025
2. ER calculation spreadsheet for ex-ante estimation and for monitoring period from 15-04-2023 to 31-12-2024
3. VCS Standard Version 4.7, issued on 19/09/2019, updated on 16-04-2024
4. VCS Program Guide Version 4.4, issued on 19/09/2019, updated on 29-08-2023
5. VCS Validation and Verification Manual Version 3.2, issued on 04-10-2012, updated on 19-10-2016
6. Approved methodology - AMS-III.D.: Methane recovery in animal manure management systems, version 21.0
7. Tool 06: Project emissions from flaring (version 04.0)
8. Tool 14: Project and leakage emissions from anaerobic digesters (version 03.0)
9. Business License of Zhumadian Youran Animal Husbandry Co., Ltd.
10. Feasibility Study Report (FSR) completed in September 2020
11. Project Approval of the project activity issued by Xiping County Development and Reform Commission on 25-09-2020
12. Environmental Impact Assessment Report compiled by Zhumadian Youran Animal Husbandry Co., Ltd. in December 2020
13. Environmental Impact Assessment (EIA) Approval issued by Zhumadian Ecological Environment Bureau on 12-01-2021
14. Statement from Xiping County Agriculture and Rural Bureau issued on 20-01-2025
15. Public reporting about anaerobic fermentation of manure of dairy cattle, written by Zhang Young, an all media commentator from Hunan Daily Newspaper:
<https://baijiahao.baidu.com/s?id=1730053186941788941&wfr=spider&for=pc>
16. Annual average temperature of Zhumadian City:
https://www.zhumadian.gov.cn/mltz/zrdl/202212/t20221209_35645.html
17. Nameplate of the equipment
18. Inner Mongolia Youran Animal Husbandry Co., Ltd. oversees several animal husbandry farms spread across multiple locations in China and utilize anaerobic manure fermentation and biogas utilization technology

- <http://hy.stock.cnfol.com/dianzixinxijishu/20221229/30001679.shtml>
19. Official data of the potential evapotranspiration (PET) of Xipingxian County
<https://sthjj.zhumadian.gov.cn/zwyw/hbyw/xzgs/hpslgs/202108/P020241220600092178698.pdf>
 20. Official data of the mean annual temperature (MAT) and the mean annual precipitation (MAP) of Xipingxian County
https://www.zhumadian.gov.cn/mltz/zrdl/202212/t20221209_35645.html
 21. Employee Roster
 22. Competence and training records
 23. Environmental Protection Law of the People's Republic of China
http://www.china-npa.org/uploads/1/file/public/201803/20180327160313_j8uwkhdsgn.pdf
 24. Environmental Impact Assessment Law of the People's Republic of China
https://cjjg.mee.gov.cn/xxgk/zcfg/202302/t20230209_1015877.html
 25. Animal Husbandry Law of the People's Republic of China
http://www.npc.gov.cn/npc/c2/c30834/202210/t20221030_320096.html
 26. Law of the People's Republic of China on the Prevention and Control of Solid Waste Pollution
https://www.mee.gov.cn/ywgz/fgbz/fl/202004/t20200430_777580.shtml
 27. Catalogue for the Guidance of Industrial Structure Adjustment (2019 version) issued by Development and Reform Committee of P.R.China on 30-10-2019
https://www.gov.cn/zhengce/2021-12/27/content_5713262.htm
 28. Law of the People's Republic of China on the Prevention and Control of Water Pollution, Regulations on prevention and control of pollution from intensive livestock and poultry breeding
http://www.gov.cn/flfg/2013-11/26/content_2535095.htm
 29. Renewable Energy Law of the People's Republic of China
http://www.nea.gov.cn/2017-11/02/c_136722869.htm
 30. Acceptance Report of the project activity signed between the Project Proponent and Hangzhou Energy and Environmental Engineering Co., Ltd.
 31. Supply and Installation Contract of Manure Treatment System signed between the Project Proponent and Keiai (Shanghai) Animal Husbandry Technology Co., Ltd. on 17-08-2021
 32. Biogas System Equipment Sales and Installation Contract signed between PP and Hangzhou Energy and Environmental Engineering Co., Ltd. on 15-09-2021
 33. Discharge standard of pollutants for livestock and poultry breeding (GB/T 18596-2001)
https://www.mee.gov.cn/ywgz/fgbz/bz/bzwb/shjbh/swrwpfbz/200301/t20030101_66550.sht

ml

34. Technical standard of pollution prevention for livestock and poultry breeding (HJ/T 81-2001)
<https://www.mee.gov.cn/image20010518/4589.pdf>
35. Brochures distributed and Leaflets published on the bulletins dated 04-05-2021
36. Local Stakeholder Consultation Questionnaires on 11-05-2021 and 15-06-2023
37. Hazardous Waste Transfer Records signed among PP, transfer parties and the qualified acceptance parties covering this monitoring period
38. Notice on Strengthening Enterprise Greenhouse Gas Emission Report Management issued by Ministry of Ecology and Environment of P.R.China on 29-03-2021
https://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html
39. Notice on Key Work Related to the Management of Greenhouse Gas Emission Reports for Enterprises in 2022 issued by Ministry of Ecology and Environment of P.R.China on 15-03-2022
https://www.mee.gov.cn/xxgk2018/xxgk/xxgk06/202203/t20220315_971468.html
40. 2023 Baseline Emission Factors for Regional Power Grids in China issued by National Center for Climate Change Strategy and International Cooperation (NCSC)
http://www.ncsc.org.cn/SY/zywj/202407/t20240709_1081217.shtml
41. Declaration for No Double Counting or Participation under Other GHG Programs from PP
42. Equal Remuneration Convention, 1951 (No. 100)
<https://www.ilo.org/publications/equal-remuneration-convention-1951-no-100>
43. "Law of the People's Republic of China on the Protection of Women's Rights and Interests"
https://www.gov.cn/banshi/2005-05/26/content_980.htm
44. "Law of the People's Republic of China on the Protection of Minors"
https://www.gov.cn/xinwen/2020-10/18/content_5552113.htm
45. "Labor Law of the People's Republic of China"
https://www.gov.cn/banshi/2005-05/25/content_905.htm
46. "Labor Contract Law of the People's Republic of China"
http://www.mohrss.gov.cn/xxgk2020/fdzdgknr/zcfg/fl/202011/t20201102_394622.html
47. "Criminal Law of the People's Republic of China"
<http://gongbao.court.gov.cn/details/f8e30d0689b23f57bfc782d21035c3.html>
48. "Prohibition of Child Labor Regulations"
<https://fgw.sh.gov.cn/ys-laogong-1.3.2.1/20240124/9174629f4b0c4453ad48edd741b50ae7.html>

49. "Special Provisions on Labor Protection for Women Workers"
https://www.gov.cn/zwgk/2012-05-Jul-content_2131567.htm
50. "Constitution of the People's Republic of China"
https://www.gov.cn/xinwen/2018-03/22/content_5276319.htm
51. "Anti-Discrimination Law of the People's Republic of China"
<http://www.xixianrencai.com/News/5709.html>
52. 1989 Indigenous and Tribal Peoples Convention (No. 169)
1992 Declaration on the Rights of Persons Belonging to National or Ethnic, Religious and Linguistic Minorities
2007 Declaration on the Rights of Indigenous Peoples
<https://www.un.org/en/genocide-prevention/legal-framework>
53. Daily Dynamic Table of Dairy Cattle covering this monitoring period
54. VCS monitoring manual
55. Dairy Weight Record Table covering this monitoring period
56. Biogas Statistic Records covering this monitoring period
57. Operation logbook covering this monitoring period
58. Operation Staff Accreditation
59. Daily Production Records covering this monitoring period
60. Flaring System Operation Statistics covering this monitoring period
61. Announcement of the State Administration for Market Regulation on Issuing the Catalogue of Measuring Instruments for Compulsory Management" issued by the State Administration for Market Regulation on 23-10-2019
https://scj.sxxz.gov.cn/zljcssyzsfw/jlfw/202107/t20210726_3659463.html
62. Calibration Report of flow meters issued by Endress+HauserFlowtecAG on 05-01-2023, valid till 04-01-2025
63. Calibration Report of temperature transmitter issued by Suzhou Lonbo Calibration & Testing Co., Ltd. on 14-03-2023 and 13-03-2024
64. The operation specification of the flare issued by manufacturer
65. Calibration Qualification of Endress+HauserFlowtecAG issued by Suzhou Industrial Park Market Supervision and Administration Bureau, issued on 11-04-2023, valid till 10-04-2028
66. Calibration Qualification of Suzhou Lonbo Calibration & Testing Co., Ltd. issued by CNAS on 06-06-2022, valid till 05-06-2028

67. Calibration Specification of the Temperature Transmitter (JJF 1183-2007)
<https://www.doc88.com/p-9357863077492.html>
68. Verification Regulation of Thermal Mass Gas Flowmeters (JJG 1132-2017)
<https://www.doc88.com/p-03973185365459.html>
69. The amount of feed purchased in Dairy Cattle Feed Purchase Records covering this monitoring period
70. Flow Meter Manual
71. Import Cattle Agency Agreement signed respectively by PP and Hailu Animal Husbandry (Tianjin) Co., Ltd., Beijing Tianmuda Import & Export Co., Ltd. and China Animal Husbandry Industry Group Co., Ltd.
72. Feed Source Statistics Record for Livestock Cattle covering this monitoring period
73. Livestock Frozen Semen Supply Contract signed between PP and Inner Mongolia Saikexing Reproductive Biotechnology (Group) Co., Ltd. during year 2023-2025
74. Dairy Cattle Weight Records covering this monitoring period
75. Verification Regulation for Digital Indicating Weighing Instruments (JJG539-2016)
<https://www.doc88.com/p-4334928166611.html>
76. User manual of this thermal flow meter
https://bdi-download.endress.com/files/DLA/5135E6D661177311E10000000A35E035/BA111DEN_0610.pdf
77. Flare Operation Report covering this monitoring period
78. Factory Certificate of Conformity of weight scale issued on 30-12-2022
79. Usage Records of cattle bedding material covering this monitoring period
80. Registration Record of Liquid Fertilizer Production and Utilization covering this monitoring period
81. Samples of Customs Declaration and Quarantine Certificate of imported Bovine Semen of this monitoring period
82. Translation document of the screenshots of the queries and responses from the government website
83. Translation document of the screenshots of the publicly available pollution discharge information
84. Translation Qualification of Shanghai Linyue Translation Service Co., Ltd. issued by Orlis Certification Co., Ltd valid from 01-07-2025 till 30-06-2028
85. Business License of Shanghai Linyue Translation Service Co., Ltd. issued by Minhang District

Market Supervision Administration on 10-06-2020

APPENDIX 4: <CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS, FORWARD ACTION REQUESTS (CAR/CL/FAR)>

CL ID	01	Section no.	3.4.2	Date: 24-02-2025
Description of CL				
As per Joint PD&MR, Tool 07 “Tool to calculate the emission factor for an electricity system (version 07.0)” was applicable for the project activity. However, the default emission factor for the electricity consumed in year y and the default factor for the electricity consumption associated with the anaerobic digester per ton of CH ₄ generated sourced from Tool 14 “Project and leakage emissions from anaerobic digesters” (version 03.0) has been applied by PP. Therefore, PP is requested to clarify the methodological tool used to determine emission factor for the electricity consumption and revised Joint PD&MR accordingly.				
Project proponent response				Date: 06-03-2025
Tool 14 “Project and leakage emissions from anaerobic digesters” (version 03.0) has been applied. Joint PD&MR has been updated.				
Documentation provided by project proponent				
Updated Joint PD&MR				
VVB assessment				Date: 02-04-2025
The default emission factor for the electricity consumed in year y and the default factor for the electricity consumption associated with the anaerobic digester per ton of CH ₄ generated sourced from Tool 14 “Project and leakage emissions from anaerobic digesters” (version 03.0) has been applied by PP, while Tool 07 has been deleted from the updated Joint PD&MR, which is verified to be clear and accepted by the assessment team. Therefore, CL01 was closed.				

CL ID	02	Section no.	3.4.4	Date: 24-02-2025
Description of CL				
In the Joint PD&MR, it was mentioned “the baseline scenario of the project is the animal manure waste was left to decay in anaerobic manure management system (open lagoon) at the livestock farms and methane is emitted to the atmosphere directly without any methane recovery and destruction facility”. PP is requested to provide evidence for the baseline scenario of the project				

activity.	
Project proponent response	Date: 06-03-2025
Statement from Xiping County Agriculture and Rural Bureau has been provided to demonstrate the baseline scenario of the project activity, i.e. the baseline scenario of the project is the animal manure waste was left to decay in anaerobic manure management system (open lagoon) at the livestock farms and methane is emitted to the atmosphere directly without any methane recovery and destruction facility.	
Documentation provided by project proponent	
Statement from Xiping County Agriculture and Rural Bureau	
VVB assessment	Date: 02-04-2025
Baseline scenario of the project activity has been confirmed through checking Statement from Xiping County Agriculture and Rural Bureau, which mentioned “there are 8 large-scale livestock farms in Xiping County, Zhumadian City, and more than 80% of them use open anaerobic lagoon to treat animal manure, resulting in large-scale methane release”.	
Therefore, CL02 was closed.	

CL ID	03	Section no.	4.2	Date: 24-02-2025
Description of CL				
In the Joint PD&MR, it was mentioned the digestate from anaerobic digester was used to produce organic fertilizer. However, no leakage association with composting was considered. PP is requested to clarify the reasons for this.				
Project proponent response				Date: 06-03-2025
According to AMS-III.D Methane recovery in animal manure management systems (version 21.0): Leakage is determined by following the relevant procedure in the methodological tool “Project and leakage emissions from anaerobic digesters” .				
As per “Project and leakage emissions from anaerobic digesters” (version 02.0): The following sources of leakage emissions are accounted for in this tool:				
(a) CH ₄ and N ₂ O emission from composting of digestate;				
(b) CH ₄ emissions from the anaerobic decay of digestate disposed in a SWDS or subjected to anaerobic storage, such as in a stabilization pond.				
The leakage emissions associated with the anaerobic digester depend on how the digestate is managed. The leakage emissions include emissions associated with storage of digestate and emissions associated with composting of the digestate.				
The digestate produced after anaerobic fermentation is separated by solid-liquid separation, and the solid part is squeezed twice before entering the drying drum. The dried part is used as cattle bedding material, and the biogas slurry (liquid part) is returned to the nearby farmland through a lifting pump and a pipeline network. Digestate will not be stored under anaerobic conditions. In addition, the project does not involve composting of digestate. Therefore, leakage emissions of the project				

associated with the anaerobic digester is not accounted for, leakage emission is 0.	
Documentation provided by project proponent	
Updated Joint PD&MR	
VVB assessment	Date: 02-04-2025
By checking EIA Report, FSR, and through on site inspection, it is confirmed that digestate from the anaerobic digesters will be directly returned to nearby farm as fertilizer as soon as it leaves the digesters through a lifting pump and a pipeline network. Hence, it was verified no storage or composting is involved in the project activity and leakage in relation to storage or composting of the digestate is 0. Therefore, CL03 was closed.	

CAR ID	01	Section no.	3.4.2	Date: 24-02-2025
Description of CAR				
Please supplement the describe of applicability of Tool 06 in the Joint PD&MR.				
Project proponent response				Date: 06-03-2025
The applicability of Tool 06 has been supplemented in section 3.2 of the updated PD&MR.				
Documentation provided by project proponent				
Updated PD&MR				
VVB assessment				Date: 02-04-2025
The applicability of Tool 06 has been supplemented in section 3.2 of the updated PD&MR. The relevant assessment has been supplemented in section 3.4.2 of this report. Therefore, CAR01 was closed.				

CAR ID	02	Section no.	3.4.8 and 4.2	Date: 24-02-2025
Description of CAR				
Parameter FE should be monitoring ex post as per “Data / Parameter table 9” of AMS-III.D. version 21.0 and the methodological tool “Project emissions from flaring”. Besides, as per para 22 of AMS-III.D. version 21.0, if the recovered biogas is combusted for electrical/thermal energy production or for other gainful use, the methane destruction efficiency can be considered as 100%. However, this use of the recovered biogas shall be included in the project boundary and its output shall be monitored in order to ensure that the recovered biogas is actually destroyed, even if the emission reductions from this component are not claimed. Therefore, PP is also requested to monitor electricity and heat generation, and natural gas upgrading to ensure that				

the recovered biogas is actually destroyed.	
Project proponent response	Date: 06-03-2025
The parameter FE has been moved to section 3.2 “Data and Parameters Monitored” part in the updated PD&MR. As per para 22 of AMS-III.D, if the recovered biogas is combusted for electrical/thermal energy production or for other gainful use, the methane destruction efficiency can be considered as 100%. However, this use of the recovered biogas shall be included in the project boundary and its output shall be monitored in order to ensure that the recovered biogas is actually destroyed, even if the emission reductions from this component are not claimed. The output EG_y is monitored and NG_y will be monitored by the project owner. Due to there is no monitoring equipment to monitor the heat generation for the biogas boiler to warming up the anaerobic digesters of the project, thus it is assumed these amount of biogas used for heat generated were flared and included these amount of biogas when calculating PE_{flare}, which is conservative, therefore, the efficiency of biogas boiler is selected to be 90% (the same as flare efficiency). As per Tool 06, the low height flare is defined as an enclosed flare for which the flame enclosure has a height between two and ten times the diameter of the combustion enclosure. According to the operating specification of biogas flare, the combustion chamber has an inner diameter of 1.5 meters and a height of 20 meters, the height is 13.3 times the diameter of the combustion enclosure, and accordingly the flare of the project is not low height flare. 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 enclosed flare applied by the project is not low height flare.	
Documentation provided by project proponent	
Updated PD&MR	
VVB assessment	Date: 02-04-2025
The generated biogas will be captured and sent for energy (electricity and heat) generation. The excess biogas will be flared. In the future, the biogas is planned to be sold for natural gas upgrading. As per AMS-III.D. (Version 21.0), if the recovered biogas is combusted for electrical/thermal energy production or for other gainful use, the methane destruction efficiency can be considered as 100%. However, this use of the recovered biogas shall be included in the project boundary and its output shall be monitored in order to ensure that the recovered biogas is actually destroyed, even if the emission reductions from this component are not claimed. The output, i.e. total electricity generated from the recovered biogas in year y (EG_y) and upgrading natural gas production (NG_y), which is in compliance with AMS-III.D. (Version 21.0). Parameters $T_{EG,m}$, $F_{RG,m}$ and $Flame_m$ have been monitored by PP to determine whether the flaring system is operating, which is in compliance with AMS-III.D. (Version 21.0). Since no monitoring equipment has been installed to monitor the amount of heat generated by recovered biogas, PP assumed these amount of biogas used for heat generated were flared and included these amount of biogas when calculating $PE_{flare,y}$, which is verified to be conservative. Therefore, the efficiency of biogas boiler is selected to be 90% (the same as flare efficiency), which is verified to be reasonable and thus accepted.	

Therefore, CAR02 was closed.

CAR ID	03	Section no.	4.2	Date: 24-02-2025
Description of CAR				
Please supplement the information including but not limited to type, serial number, accuracy, date of calibration and validity in section 7.1 of the Joint PD&MR.				
Project proponent response				Date: 06-03-2025
The type, serial number, accuracy, date of calibration and validity of the flow meters and temperature sensor have been supplemented in section 7.1 of the updated PD&MR.				
Documentation provided by project proponent				
Updated PD&MR				
VVB assessment				Date: 02-04-2025
The information including type, serial number, accuracy, date of calibration and validity have been supplemented in section 7.1 of the Joint PD&MR, which have been verified through onsite inspection and checking calibration reports.				
Therefore, CAR03 was closed.				