BAITANG AONONG SWINE FARM COMPOSTING PROJECT

Document Prepared by Baineng New Energy (Shen Zhen) Co., Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Baitang Aonong Swine Farm Composting Project (hereinafter referred to as the Project) is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R. China. The project is owned and implemented by Guizhou Aonong Qihuan Animal Husbandry Co., Ltd.

The project will introduce new anaerobic animal manure management system (Anaerobic Digester) to treat manure of from Huangping Aonong Swine Breeding Farm. The project uses digester to treat animal manure, collect the generated biogas to avoid methane emissions. The generated biogas will be captured and flared within the project site. The residual waste from the digester will be used for agriculture fertilization aerobically in the nearby farmland. Wastewater from the animal manure treatment system will be used for irrigation and no wastewater will be discharged to the environment. Construction of the project started on 20-Feb-2020 and the project is started operation on 01-Aug-2021.

Prior to the implementation of the project, the manure was left to decay in open anaerobic lagoon at the project site and generated methane is emitted to the atmosphere directly without any methane recovery and destruction facility.

The project is expected to avoid GHG emission of methane from the uncovered open lagoon. The project is expected to achieve annual GHG emissions reduction of 28,075 tCO_2e and a total emission reduction of 280,750 tCO_2e during the 10-year crediting period.

Audit Type	Period	Program	VVB Name	Number of years
Validation	24-02-2023--17-07-2023	Verified Carbon Standard	CTI Certification Co., Ltd.	NA
	NA	NA	NA	NA
Total	NA	NA	NA	NA

1.2 Sectoral Scope and Project Type

Sectoral Scope 13: Waste handling and disposal.

Sectoral scope 15: livestock and manure management.

The project is a Non-AFOLU project.

The project is not a grouped project.

1.3 Project Eligibility

The scope of the VCS Program includes:

1) The seven Kyoto Protocol greenhouse gases: The project is expected to avoid methane (CH_4) emission from the anaerobic lagoon in the baseline scenario, which will be captured and destroyed in the project scenario.

2) Ozone-depleting substances: Not Applicable.

3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process: Not Applicable.

4) Project activities supported by a methodology approved under a VCS approved GHG program, unless explicitly excluded under the terms of Verra approval: The project utilizes the methodology AMS-III.D (Version 21.0) which is a methodology approved under CDM Program, an approved GHG program by VCS.

5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements: Not Applicable.

Purpose of the project is to treat manure from livestock farm and does not generate GHG emissions primarily for the purpose of their subsequent reduction, removal, or destruction.

Meanwhile, the project does not belong to the excluded projects in Table 1 of VCS Standard 4.4.

Thus, the project is eligible under the scope of VCS program.

1.4 Project Design

The project has been designed to be a single installation of an activity, not a grouped project.

Eligibility Criteria

The project is not a grouped project. Thus, this section is not applicable.

1.5 Project Proponent

Organization name	Guizhou Aonong Qihuan Animal Husbandry Co., Ltd
Contact person	Xiaomin Long
Title	Project Manager
Address	Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province ,China

Telephone	0855-2327977
Email	2327977@qq.com

1.6 Other Entities Involved in the Project

Organization name	Beijing Huayuan Carbon and Environmental Protection Technology Co., Ltd.
Role in the project	Consultant
Contact person	Liangliang Wang
Title	Project Manager
Address	Room 2032, Floor 2, Building 1, No. 4, West Matou Village, Tongzhou District, Beijing,China
Telephone	+86 19943777575
Email	15911077662@163.com

Organization name	Baineng New Energy （Shenzhen） Co.,Ltd.
Role in the project	VCS buyer
Contact person	Zexu Zhang
Title	Project Manager
Address	Room 302, No.2815 Longteng Avenue, Shanghai
Telephone	+86 15623507976
Email	project@cypressenergy.cn

1.7 Ownership

The project owner of the project is Guizhou Aonong Qihuan Animal Husbandry Co., Ltd. The Environmental Impact Assessment (EIA) Approval, Project Approval and the business license of the project owner are evidence for legislative right. Besides, the construction contract is the evidence for the ownership of the plant.

1.8 Project Start Date

As per Section 3.8 of the VCS Standard, v4.4, the project start date of a non-AFOLU project is the date on which the project began generating GHG emission reductions or removals. The project started operation on 01-Aug-2021 when the new anaerobic animal manure management system (Anaerobic Digester) started operation that began to generate GHG emission reductions. Therefore, project start date of the project is 01-Aug-2021.

1.9 Project Crediting Period

This project adopts fixed crediting periods of 10 years (from 01-Aug-2021 to 31-July-2031, both days included.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	✓
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
01-Aug-2021 - 31-Dec-2021	11,768
01-Jan-2022 - 31-Dec-2022	28,075
01-Jan-2023 - 31-Dec-2023	28,075
01-Jan-2024 - 31-Dec-2024	28,075
01-Jan-2025 - 31-Dec-2025	28,075
01-Jan-2026 - 31-Dec-2026	28,075
01-Jan-2027 - 31-Dec-2027	28,075
01-Jan-2028 - 31-Dec-2028	28,075
01-Jan-2029 - 31-Dec-2029	28,075
01-Jan-2030 - 31-Dec-2030	28,075
01-Jan-2031 - 31-July-2031	16,307
Total estimated ERs	280,750
Total number of crediting years	10
Average annual ERs	28,075

1.11 Description of the Project Activity

The project is to build anaerobic animal manure management system (Anaerobic Digester) to treat manure waste (swine) from Huangping Aonong Swine Breeding Farm. The generated biogas will be captured and flared within the project site. The residual waste from the digester will be used for agriculture fertilization aerobically in the nearby farmland. Wastewater from the animal manure treatment system will be used for irrigation.

The project is expected to avoid GHG emission of methane through recovery and destruction of biogas. The recovered biogas will be flared.

The key system involved in the project are as follows:

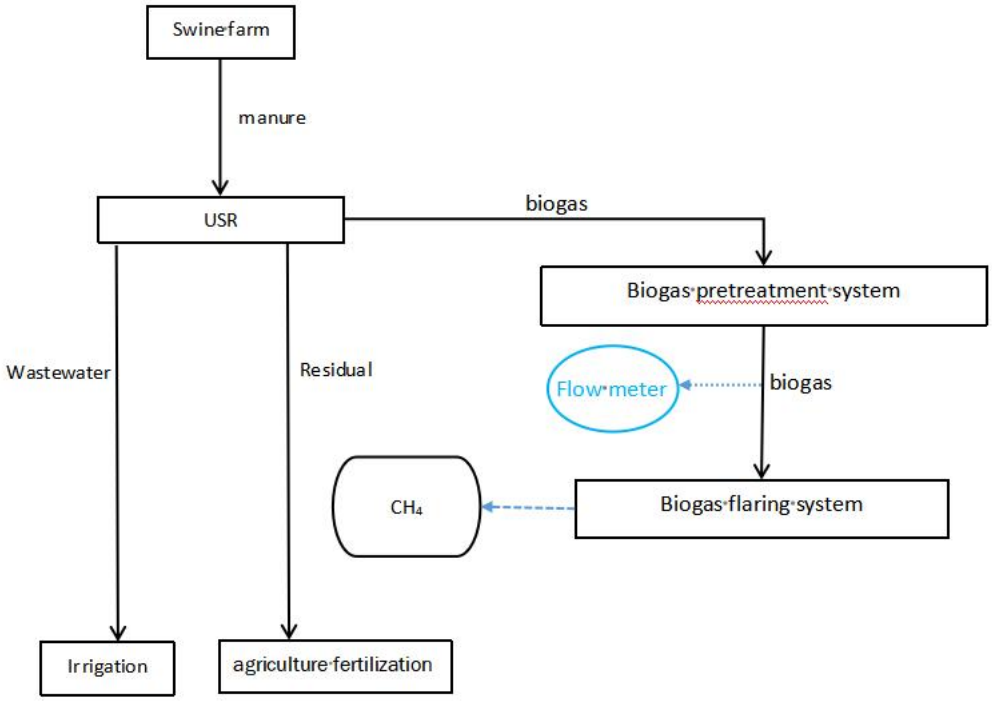

Figure 1-1 flow chart of the project

Anaerobic animal manure management system:

The digester with effective volume of 2,639 m^3 will be applied in the project. The project is expected to produce 2,639 m^3 biogas per day. The project applies normal temperature fermentation and the digester will operate stablely under temperature under 10℃. The detail information of digester is shown as below:

Item	Unit	Data
Effective volume	m^3	2,639
Handling capacity	t/d	500

Lifetime	Year	20

Biogas pre-treatment system

Before flaring, the biogas will be pre-treated to remove impurities and moisture etc., to prevent the corrosion of the facility. In addition, biogas should be in a stable condition before flowing into flaring system.

Flare combustion system

The project will install an enclosed flare combustion system, temperature of in the exhaust gas of the enclosed flare in the minute m is 800-1,000° C or above, and maximun flow rate of the residual gas to the flare is 300 m^3/h. The recovered methane will be sent to the flaring system to be flared instead of being emitted to atmosphere.

The Residual waste treatment system

The residual waste from the anaerobic management system will be handled aerobically outside of project site and used in nearby farmland as fertilizer. Wastewater from the animal manure treatment system will be used for irrigation.

1.12 Project Location

The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R. China.

The geographical coordinates of the project site are east longitude 107°54'42.87" and north latitude *26°58'8.71"*. The geographic location of the project is shown in Figure 1-2.

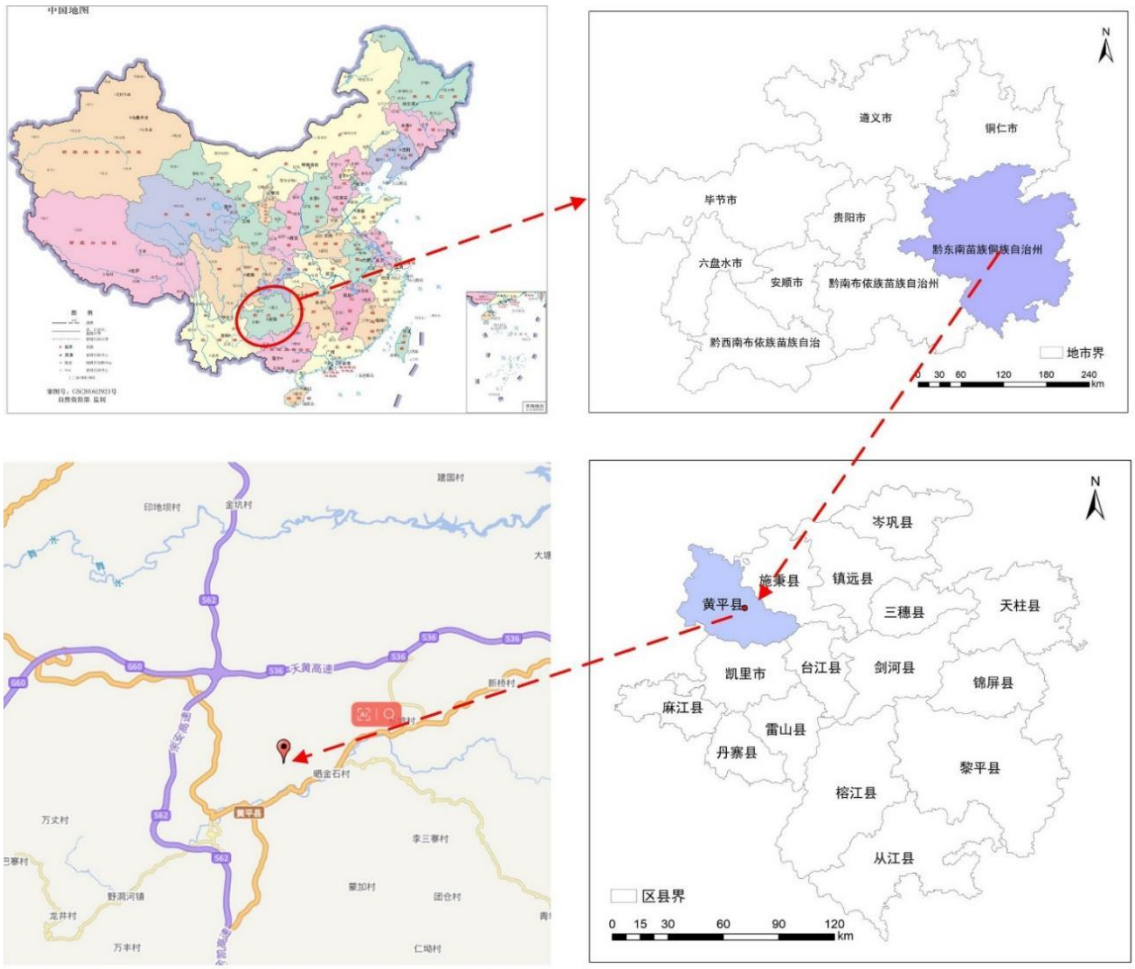

Figure 1-2 project location

1.13 Conditions Prior to Project Initiation

The scenario existing prior to the start of the implementation of the project is:

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

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project complies with all Chinese relevant laws and regulations, including:

1. Environmental Protection Law of the People's Republic of China;

2. Prevention and Control of Environmental Pollution by Solid Waste Law of the People's Republic of China;

3. Guiding items for industrial structure adjustment (2019);

4. Water Pollution Prevention and Control Law of the People's Republic of China;

5. Renewable Energy Law of the People's Republic of China;

6. Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution.

The project has obtained the project approval and EIA approval from governmental authorities, which could demonstrate that local government permits construction and operation of the project.

Therefore, the project is in compliance with laws, status and other regulatory frameworks.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has neither been registered nor is seeking registration under any other GHG programs.

The project is seeking registration only under VCS program.

1.15.2 Projects Rejected by Other GHG Programs

The project is not seeking registration under any other GHG program, and the project has not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project has not been registered as a CCER (Chinese Certified Emission Reductions) project in China and CCER is allowed to be traded in China national Emission Trading Scheme (ETS). Also, only the high-emission industries are included, the project proponent is not included in the compliance entity list by China ETS. Thus, the emission reductions generated by project is not eligible to be used under the national emission trading programme as per the requirement of the China ETS.

The project is not involved in an emission trading program or any other mechanism that includes GHG allowance trading. The GHG emission reductions and removals generated by the project will not be enforced to be used for compliance in China. The project proponent has signed statement on not being used for the compliance and no double counting claiming of the credits.

1.16.2 Other Forms of Environmental Credit

The project hasn’t sought or received another form of environmental credits.

Supply Chain (Scope 3) Emissions

Purpose of the project is to treat manure from the to avoid GHG emissions from uncovered anaerobic lagoon. This section is not applicable as the project will not impact goods or services by the technologies and measures specified in the project description. There is no supply chain involved. Thus, there will be no double counting of VCUs from upstream of the supply chain.

As per shareholder information of the PP (Guizhou Aonong Qihuan Animal Husbandry Co., Ltd), the farm owner is parent company of the PP[1]. It could be ensured that no double counting occurs with the farm owner with the GHG emission reductions obtained from the treatment of their manure as the farm owner and PP have signed contract that only the PP will claim emission reductions of the project. Also, the owner of swine farm has signed a statement of no double counting of GHG emission reductions obtained from the project.

1.17 Sustainable Development Contributions

The Project will contribute to sustainable development in the following ways:

SDG 8 Decent Work and Economic Growth: Construction and operation of the project will provide new employment opportunities with decent income, which will bring positive effect on the local economy. During the first crediting period, direct and indirect employment opportunities will be generated, which increased income of local residents and improve economic growth.

Thus, the project will contribute to SDG 8 Decent Work and Economic Growth.

SDG 12, Responsible Consumption and Production: The residual waste from the digester will be used as organic fertilizer in the nearby farmland, which is benefit for improvement of farmland. .

Thus, the project will contribute to SDG 12 Responsible Consumption and Production.

The residual waste from the digester will be used for agriculture fertilization aerobically in the nearby farmland. Wastewater from the animal manure treatment system will be used for irrigation and no wastewater will be discharged to the environment.

SDG 13 Climate Action: The project avoids the emission of methane that would be generated under baseline condition. The expected total GHG emission reduction is 280,750 tCO_2e during the 10 year crediting period , with annual average emission reductions 28,075 tCO_2e.

[1] https://www.qcc.com/firm/7d2f0ec033cebe60b7c66302555a0464.html

Thus, the project will contribute to SDG 13 Climate Action.

SDG	Indicators	Chinese Sustainable Development Progress	Project activity contribution
SDG 8	Decent Work and Economic Growth	China continuously improves the quality and efficiency of development. In-depth implementation of the innovation-driven development strategy, the rapid development of small and medium-sized enterprises. Adhering to the policy of giving priority to employment, the unemployment rate has remained at a low level. By coordinating epidemic prevention and control and economic and social development, it has become the only major economy to achieve positive growth in 2020 and has made positive contributions to the recovery of the global economy.	The project will provide decent job opportunities and increase tax revenue, which will have a positive effect on the local economy. This contributes to one of Chinese actions for promoting sustainable developing: "by 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value”.
SDG 12 Responsible Consumption and Production	Ensure sustainable consumption and production patterns	China follows the concept of green development, continues to promote the resource utilization of livestock and poultry breeding waste, forms a circular chain of breeding and planting, and synergistically promotes livestock and poultry breeding and environmental protection, promoting sustainable development.	The residual waste from the digester will be used for agriculture fertilization aerobically in the nearby farmland. The organic fertilizer will be freely supplied to the surrounding farmland for soil application.
SDG 13	Climate Action.	In 2020, China's energy consumption per unit of GDP was reduced by 24.4% compared with 2012; carbon dioxide emissions per unit of GDP was reduced by 18.8% compared with 2015 and 48.4% compared with 2005, all of which have already fulfilled China's	The project avoids the emission of methane that would be generated under baseline condition. This contributes to achieve one of Chinese stated sustainable development priorities "Actively adapt to climate change and strengthen resistance capacity to climate risks in agriculture, forestry, water resources and other key fields, as well as cities, coastal

		commitment to the international community in 2020 ahead of schedule.	regions and ecologically vulnerable areas"

Thus, the project will contributes to achieving nationally stated sustainable development priorities of China.

1.18 Additional Information Relevant to the Project

Leakage Management

Not applicable.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Further Information

Not applicable.

2 SAFEGUARDS

2.1 No Net Harm

The Environmental Impact Assessment (EIA) of the project was completed in Nov 2017 and approved by Environment Protection Bureau of Qiandongnan Miao and Dong Autonomous Prefecture on 17-Nov-2017 (Approval No. “Qiandongnanhuanshen[2017] 22”). Environment Check and Accept Report was completed after operation start of the project. According to conclusion of EIA and Environment Check and Accept Report, there are no significant environmental impacts or net harm caused by construction and implementation of the project on the basis that environmental protection measures are taken. Meanwhile, implementation of the project will improve local social and economic development through creating job opportunities and paying taxes.

In conclusion, the project has no negative impacts on local environment. No net harm on local environment and social community has been detected for the project.

2.2 Local Stakeholder Consultation

The project owner collected comments by local stakeholders on the project. Survey questionnaires were distributed to relevant personnel of local villagers and government officials

by the project owner on 17-Feb-2020. The survey questionnaire was designed to assess the project impacts on the local environment and social economic development. The structure of the survey respondents is listed in Table 2-1 below.

Table 2-1 Structure of stakeholder survey

Items		Amount
Gender stakeholders surveyed	Male	29
	female	20
Age	<25	10
	25-55	26
	>55	13
Education	Junior high school or below	19
	Senior high school	17
	College or above	13
Occupation	Worker	11
	Farmer	16
	Management personnel	13
	Civil servant	9

49 questionnaires were distributed to local stakeholders, and all questionnaires have been recollected. Comments from these questionnaires are summarized in Table 2-2 below:

Table 2-2 Summary of stakeholders' comments

Questions	Attitude or Opinion	Amount
1. Do you know the purpose of this project?	Know	36
	Heard of	9
	nothing	4
2. What do you think is the impact of the implementation of this project on the local environment?	reduce environmental pollution and improve the quality of environment	42
	No impact on the local environment	7
3. What impact do you think the implementation of this project will have on your life?	get free organic fertilizer and bring economic benefits to their lives	37
	Reduce the odor and improve the air quality	11
	No impact on your life	1
4. Do you think the implementation of this project is in harmony with the local ecosystem?	in harmony with the local ecosystem	37
	not sure whether it is in harmony	12
5. What impact do you think the implementation of this project will	good impact on the social economy	36
	no impact on the social economy	13

have on the social economy?		
6. What effect do you think the implementation of this project will have on local sustainable development?	promote energy conservation and emission reduction, improve environmental quality and investment environment, and promote the sustainable development of the local economy.	47
	no impact on local sustainable development	2
7. What effect do you think the implementation of this project will have on local employment?	no impact on local employment	0
	promote employment growth	49
8. Do you think other regions should also vigorously promote this type of technology?	Not worth promoting	7
	actively promote	42
9. Do you support the construction and implementation of this project?	against	0
	support	49
10. Do you have any suggestions and comments on this project?	Comments/suggestions	/
	No comments and fully support	49

In general, local stakeholders are supportive of the project construction. The project owner carefully listened to and accepted the suggestions and opinions of stakeholders and stated that it will implement environmental protection facilities (AWMS) in strict accordance with the requirements in the environmental impact report form and the approval opinions of the local environmental protection bureau. There is no suggestion about the project design.

In addition, the project owner established the mechanism for on-going communication with local stakeholders. That is, a continuous Input / Grievance Expression Process Book is prepared at the guard of each farm, and any stakeholders can express their opinions and views on the project.

As change of the project during construction, a stakeholder meeting was held with local residents to collect comments of the stakeholders on 23-Mar-2020 and 8 farmers nearby attended the meeting. As per outcomes of the meeting, stakeolders are aupportive of the project change and no no suggestion about the project design received.

2.3 Environmental Impact

The Environmental Impact Assessment (EIA) of the project was completed in Nov 2017 and approved by Environment Protection Bureau of Qiandongnan Miao and Dong Autonomous

Prefecture on 17-Nov-2017 (Approval No. "Qiandongnanhuanshen[2017] 22"). Environment Check and Accept Report was completed after operation start of the project. According to conclusion of EIA and Environment Check and Accept Report, there are no significant environmental impacts or net harm caused by construction and implementation of the project on the basis that environmental protection measures are taken.

The outcome of EIA indicated that there are no significant environmental impacts caused by construction and implementation of the project on the basis that environmental protection measures are implemented as required by the EIA. Furthermore, during project construction and operation, all mitigation measures recommended by the EIA will be implemented, and the following key aspects addressed:

(a) Construction phase

Air pollution

During the construction period, effective measures including regular watering, ensuring vehicles and equipment under normal condition etc as required in the EIA will be taken to ensure that there is no severe air pollution in this period.

Wastewater

The water pollution of this project mainly comes from construction wastewater and domestic sewage. The construction water is reused on site and domestic sewage will be treated in the dry toilet onsite and pulled away by nearby farmers.

Noise

The noise pollution of this project is mainly mechanical noise. The main measures are as follows: reasonable planning of the layout of various construction machinery and equipment, reasonable arrangement of construction time, and prohibition of night construction. Use low-noise, high-efficiency equipment, and install sound insulation covers for mechanical equipment.

Solid waste

During the construction period, a certain amount of construction waste and domestic waste from construction workers will be generated,. The construction waste will be recycled, and the domestic waste will be handed over to the sanitation department for disposal. After the above measures are taken, the solid waste of the project will not cause pollution to the surrounding environment.

(b) Operation phase

Air pollution

The air pollution of the project is from exhaust gas of the flaring. The exhaust gas is to be treated through purification equipment before being discharged. The NOx, sulfur dioxide and

other pollutant in the exhaust gas will meet the relevant environment protection standards.after being treated.

Wastewater

Wastewater from the animal manure treatment system will be used for irrigation and no wastewater will be discharged to the environment.

Noise

The source of noise pollution of the project are pumps and fans in the animal manure treatment area. The project owner will select low-noise equipment, and for high-noise equipment, noise reduction and sound insulation measures will be taken. After the measures are taken, noise of the project could meet the requirements of relevant environment protection standards.

Solid waste

Solid waste generated during operation of the project is digestate from the treatment system which will be used for agriculture fertilization aerobically in the nearby farmlands and returned to the field for comprehensive utilization.

In conclusion, the environmental impact of the project is not significant on the basis that the environment protection measures are taken. The project can reduce greenhouse gas emissions and environmental pollution caused by methane emission.

2.4 Public Comments

The project was open for public comment from 24/02/2023 to 26/03/2023 in the following web platform: https://registry.verra.org/app/projectDetail/VCS/4168. During the period, one public comments were received:

Comment 1 In the PD, it said the biomass residue waste is treated in the solid waste disposal site. However, in China, there's no way the biomass residue waste is treated in SWDS. the SWDS in China is used to landfill domestic garbage only. The garbage collection system between the farm land and the SWDS is not exist at all in the project site. the PP shall clarify with solid evidence how they come to the conclusion that the biomass residue waste is treated in SWDS in the baseline. this issue lead to a significant over estimation of ER. Section 4.4 of the PD, the baseline emissions include the emissions from waste water treatment. However, the wastewater does not exist at all in the baseline scenario, as the wastewater is actually the water content in the animal manure which was separated from the dry matter content of the manure in the project scenario. the baseline emissions from the wastewater are actually a part of the baseline emissions from animal manure. Apparently this part of baseline emissions are double counted, which lead to a significant over estimation of ER.

Demonstrate how due account of the comment received during the public comment period has been taken:

Aerobic composting was planned to treat the swine manure with mixture of biomass during the project design, however, the anaerobic digestion system is applied instead of aerobic composting in the project situation and the project does not involve biomass. As per information from PP, the biomass residue is deposited at stacking sites before being used or disposed of in the local area. However, the stacking sites were regarded as SWDS by mistake, which wrongly lead to the conclusion that the biomass residue waste is treated in SWDS in the baseline. As confirmed by PP, the "wastewater" mentioned in the PD version 01 is water content in the animal manure actually, which is animal manure. Therefore, the project does not involve wastewater treatment.

As per on-site inspection, confirmation from PP and operation log of the project, the project situation does not involve biomass or wastewater treatment mentioned above as described below:

The PD version 1.0 dated 01/02/2023 was completed based on the FSR and EIA approved by local government authorities and the manure was designed to be treated with aerobic composting. The project started construction on 20-Feb-2020 and part of the aerobic composting facilities have been constructed. However, as the aerobic composting system needs to cover a big area of land which is bigger than the land allocated for the system and faces governmental approval risk, the PP decided to change the treatment method from aerobic composting to anaerobic digestion and biogas flaring (cover a small area of land and needs less investment) on 05-Mar-2020. The anaerobic digestion system have been constructed and put into operation while the installed aerobic composting facilities did not put into use.

According to the Law of Environmental Impact Assessment in China, construction projects with major items change needs re-approval of the EIA. Compared with the "Major Items Change List for Pollution Impact Construction Projects (Trial)(2020 Issuance)" issued by Ministry of Ecology and Environment of People's Republic of China on 13/12/2020, change of the project does not belong to major items change list and re-approval procedure from local government is not required. However, environmental impact of the change shall be assessed during the "Environment Check and Accept" procedure after operation of the project. Environment Check and Accept Report of the project (based on actually applied anaerobic digestion and biogas flaring, while the project name was not changed) was completed by Guizhou Longsheng Environmental Protection Technology Co., Ltd after operation of the project, which was examined by environment protection experts and government authorities and concluded that there is no significant impact on the environment caused by the project change.

As impacts of Corona Virus Disease 2019, the consultant team and PP could not work on-site and project information was collected by internet and Wechat, as a result, the project information was not provided completely. The FSR, EIA approvals and other information was provided while the Environment Check and Accept Report was not provided. The PD version 01

open for public comment was prepared based on the FSR and EIA approved by local government authorities and the manure was designed to be treated with aerobic composting which was partly constructed on-site and did not put into use. The PD version 02 has been prepared based on the Environment Check and Accept Report and information collected during site inspection, which could reflect real situation of the project. Therefore, in the project situation, biomass residual waste is not involved and not related to estimation of ER.

Swine manure is treated at project site and the emission reductions is calculated as per AMS-III.D. The baseline emissions are calculated as per equation 1 of AMS-III.D and there is no over estimation of ER. ER calculation has been modified in the revised PD and ER calculation spreadsheet.

Therefore, there is no overestimation or double counting of ER for the project.

2.5 AFOLU-Specific Safeguards

Not applicable.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The methodologies applied to the project is small scale CDM methodology:

AMS-III.D Methane recovery in animal manure management systems (version 21.0);

This methodology also refers to the latest version of the following tools:

Tool 06: Project emissions from flaring (version 04.0);

Tool 14: Project and leakage emissions from anaerobic digesters (version 02.0);

For more detail information about the methodology and tools, please reference to the following link:

https://cdm.unfccc.int/methodologies/DB/H9DVSB24O7GEZQYLYNWUX23YS6G4RC

https://cdm.unfccc.int/Reference/tools/index.html

3.2 Applicability of Methodology

The project satisfies all the applicability criteria of the methodology AMS-III.D (Version 21.0), of which the detailed description is listed in Table 3 below:

Table 3: Applicability of AMS-III.D

No.	Applicability conditions of the methodology	The project
1	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.	Applicable. The project is located at Huangping Aonong Swine Breeding Farm and introduces a new anaerobic animal manure management system (anaerobic digester) which will collect manure waste from the Huangping Aonong Swine Breeding Farm. The project replaces existing anaerobic animal manure management system (open lagoon) in Huangping Aonong Swine Breeding Farm to achieve methane recovery and destruction by flaring.
2	This methodology is only applicable under the following conditions: a) The livestock population in the farm is managed under confined conditions	Applicable. All the livestock population in the farm within the project boundary 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	Applicable. As per the EIA report, manure or the streams obtained after treatment are used in farmland nearby and not discharged into natural water resources (e.g. river or estuaries).
	c) The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5℃	Applicable. The annual average temperature of baseline site where anaerobic manure treatment facility is located is 15.4℃[2] and higher than 5℃.
	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	Applicable. In the baseline scenario, the retention time of manure in the anaerobic treatment facility is 3-6 months and greater than one month, and the depth is 3 m and more than 1 m.
	e) No methane recovery and destruction by flaring or combustion for gainful use takes place in the baseline scenario	Applicable. Manure was treated in open lagoon and methane was emitted to atmosphere directly and no methane recovery and destruction by flaring or combustion for gainful use takes place in the baseline

[2] http://invest.guizhou.gov.cn/tzgz/tzgk/zshj/qdnz/201601/t20160119_10996514.html

		scenario.
3	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;	Applicable. The residual waste from the animal manure management system of the project will be used for agriculture fertilization aerobically in the nearby farmlands, which will not result in methane emissions.
	(b) Technical measures shall be used (including a flare for exigencies) to ensure that all biogas produced by the digester is used or flared;	Applicable. Biogas generated by the project will be sent to flaring system to ensure that all biogas produced by the digester is destroyed.
	(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.	Applicable. The manure will be fed into the digester once being removed from the animal barns. Thus the storage time of the manure after removal from the animal barns, including transportation will not exceed 45 days before being fed into the anaerobic digester.
4	Projects that recover methane from landfills shall use " AMS-III.G Landfill methane recovery" 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".	Irrelevant. The project does not involve landfill methane recovery, wastewater treatment, composting animal manure or co-digestion of animal manure and other organic matters.
5	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.	Irrelevant The biogas will be flared.
6	New facilities (Greenfield projects) and project activities involving capacity additions compared	Applicable. The project is a Greenfield project. The

	to the baseline scenario are only eligible if they comply with the related and relevant requirements in the "General guidelines for SSC CDM methodologies".	emission reduction sourced from methane recovery is 28,075 tCO_2e/yr, which is lower than the threshold of 60,000 tCO_2e/yr; Therefore, the project is in line with ” General Guidelines to SSC CDM methodologies”
7	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".irrelevant	Irrelevant. The project is a Greenfield project and will replace the existing open anaerobic animal manure management system (open lagoon). Thus the project does not involve the replaced equipment and this is irrelevant.
8	Measures are limited to those that result in aggregate emission reductions of less than or equal to 60 kt CO2 equivalent annually from all Type III components of the project activity.	Applicable. The emission reductions from the recovery and destruction of methane (viz. Type III components of the project) is 28,075 tCO_2e/yr, which is less than 60 kt CO_2 equivalent.

Table 4: Applicability of applied tools

Tool	Applicability	The project
Tool 06: Project emissions from flaring (version 04.0)	This tool provides procedures to calculate project emissions from flaring of a residual gas. The tool is applicable to enclosed or open flares and project participants should document in the PD the type of flare used in the project activity.	Applicable. The project will use enclosed flare system.
	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).	Applicable. Methane is the component with the highest concentration in the biogas. The source of residual gas is from biogas.
	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.	Applicable. The project does not use auxiliary fuels. Methane is the component with the highest concentration in the biogas flared in the project. Thus, the residual gas has sufficient flammable gas present to sustain combustion. The operating specifications was provided by the

		manufacturer of the flare.
Tool 14: Project and leakage emissions from anaerobic digesters (version 02.0)	The following sources of project emissions are accounted for in this tool: (a) CO_2 emissions from consumption of electricity associated with the operation of the anaerobic digester; (b) CO_2 emissions from consumption of fossil fuels associated with the operation of the anaerobic digester; (c) CH_4 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) CH_4 emissions from flaring of biogas.	Applicable. (a) According to applied methodology, CO_2 emissions from use of electricity for the operation of all the installed facilities are accounted as $PE_{EC,y}$. (b) According to applied methodology, CO_2 emissions from use of fossil fuels for the operation of all the installed facilities are accounted, the project doesn't involve use of fossil fuel, thus, $PE_{FC,y} = 0$. (c) According to applied methodology, 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 are accounted as $PE_{PL,y}$. (d) According to applied methodology, emissions from flaring or combustion of the gas stream are accounted as $PE_{flare,y}$.
	The following sources of leakage emissions are accounted for in this tool: (a) CH_4 and N_2O 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.	Irrelevant. The project does not involve composting or anaerobic storage of digestate.
	Emission sources associated with N_2O 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. However, as per the applied methodology, N_2O emissions are neglected because these are minor emission sources.

3.3 Project Boundary

According to the methodology AMS-III.D, the project boundary includes the physical, geographical site(s) of (a) The livestock; (b) Animal manure management systems (including

centralized manure treatment plant where applicable); (c) Facilities which recover and flare/combust or use methane.

Hence, the project boundary of the project includes the physical and geographical site of Huangping Aonong Swine Breeding Farm, the animal manure management system and the biogas flaring system.

Figure 3-1 describes the project boundary of the Project Activity.

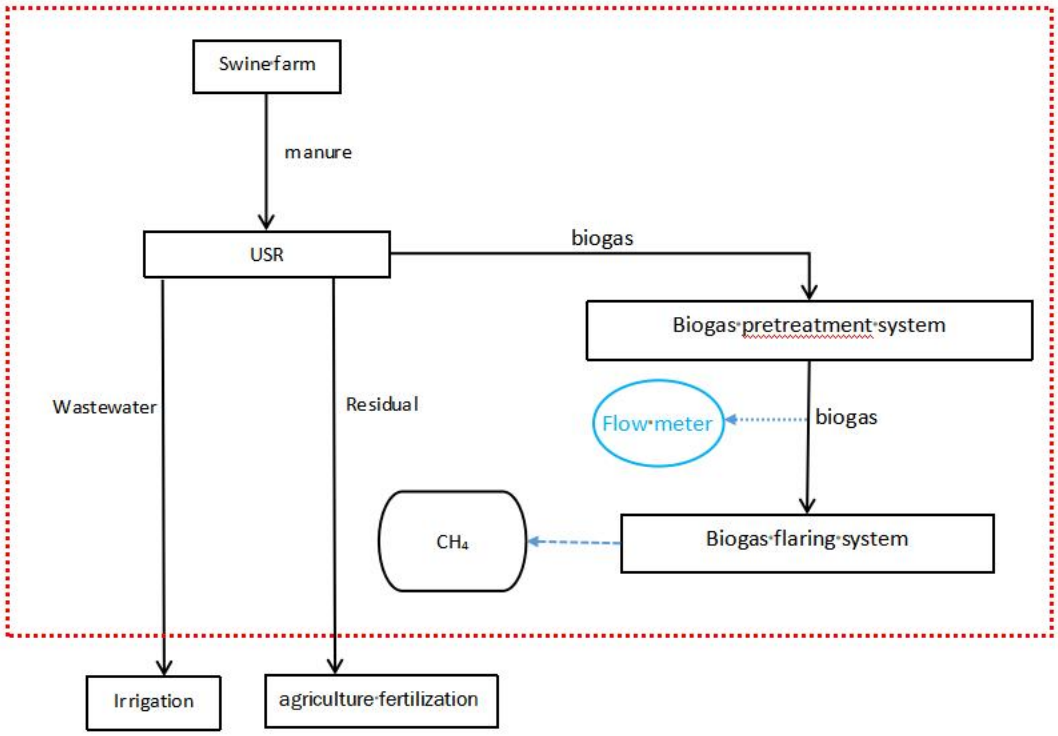

Figure 3-1: Project boundary of the project

Source		Gas	Included?	Justification/Explanation
Baseline	Direct emissions from the manure treatment processes	CO_2	No	Excluded for simplification.
		CH_4	Yes	The major source of emissions in the baseline
		N_2O	No	Excluded for simplification.
Project	Physical leakage of biogas in the manure management systems	CO_2	No	Excluded for simplification.
		CH_4	Yes	Main emission source.
		N_2O	No	Excluded for simplification.
	Emissions from	CO_2	No	Excluded for simplification.

Source		Gas	Included?	Justification/Explanation
	flaring or combustion of the gas stream	CH_4	Yes	Main emission source.
		N_2O	No	Excluded for simplification.
	Emissions from use of fossil fuels or electricity	CO_2	Yes	The project consumes electricity during operation, so emission from use of electricity is the main emission source. The project does not involve fossil fuel consumption, so the emission from use of fossil fuels is not included.
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.
	Emissions from incremental transportation distances	CO_2	No	No incremental transportation involved
		CH_4	No	No incremental transportation involved
		N_2O	No	No incremental transportation involved.
	Emissions from the storage of manure	CO_2	No	Excluded for simplification.
		CH_4	No	The storage time of the manure after removal from the animal barns is within 24 hours before being fed into the anaerobic digester, hence emissions from the storage of manure is not accounted for.
		N_2O	No	Excluded for simplification.

3.4 Baseline Scenario

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

In accordance with photos of baseline open lagoon at the farm, relative records of local agricultural and rural bureau and operation record of the livestock farm,, the baseline scenario of the project is that the animal manure waste was left to decay in open anaerobic manure management system (lagoon) at the livestock farm and methane is emitted to the atmosphere directly without any recovery and destruction facility.

3.5 Additionality

As per applied methodology 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. 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.

The regulations relative to the project in China are identified as below:

Environmental Protection Law of the People's Republic of China;

b) Prevention and Control of Environmental Pollution by Solid Waste Law of the People's Republic of China;

c) Guiding items for industrial structure adjustment (2019);

d) Water Pollution Prevention and Control Law of the People's Republic of China;

e) Renewable Energy Law of the People's Republic of China;

f) Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution.

It has been identified that all the above laws and regulations in China do not require the collection and destruction of methane from livestock manure. According to requirement of applied methodology AMS-III.D, the project is deemed automatically additional.

3.6 Methodology Deviations

There is no methodology deviation of the project.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to the methodology AMS-III.D, 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 (Bo);

(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.

The project applies option (a) to calculate baseline emissions from the manure management (BE_y), and baseline emissions are determined as follows:

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

Where:

BE_y	Baseline emissions in year *y* (t CO_2e)
GWP_{CH4}	Global Warming Potential (GWP) of CH_4 applicable to the crediting period (t CO_2e/t CH_4)
D_{CH4}	CH_4 density (0.00067 t/m^3 at room temperature (20 ºC) and 1 atm pressure)
LT	Index for all types of livestock
j	Index for animal manure management system
MCF_j	Annual methane conversion factor (*MCF*) for the baseline animal manure management system *j*
$B_{0,LT}$	Maximum methane producing potential of the volatile solid generated for animal type *LT* (m^3 CH_4/kg-dm)
$N_{LT,y}$	Annual average number of animals of type *LT* in year *y* (numbers)
$VS_{LT,y}$	Volatile solids production/excretion per animal of livestock *LT* in year *y* (on a dry matter weight basis, kg-dm/animal/year)
$MS\%_{Bl,j}$	Fraction of manure handled in baseline animal manure management system *j*
UF_b	Model correction factor to account for model uncertainties (0.94)

a) The maximum methane-producing capacity of the manure ($B_{o,LT}$) varies by species and diet. The preferred method to obtain $B_{o,LT}$ measurement values is to use data from country-specific published sources, measured with a standardized method ($B_{o,LT}$ 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_o values are not available, default values from tables 10 A-4 to 10 A-9 of 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.

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;

c) 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.

Country specific VS values, feed intake levels are not available. And the animal mass on site (market swine:61 kg, breeding swine 190kg) is not similar with the default value (market swine:56 kg, breeding swine 160kg). As the site-specific average animal weight could be measured on-site, the PP selects to adjust default IPCC values for VS for a site-specific average animal weight and the following equation shall be used:

$$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}}\right) \times VS_{default} \times nd_y \quad (2)$$

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*

The project is located located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, $W_{default}$ value of 56 kg is applied for market swine and 160 kg for breeding swine.

$VS_{default}$ is calculated with volatile solid excretion rate value and $W_{default}$ ($VS_{default}$=volatile solid excretion rate value × $W_{default}$ ÷1000). The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, volatile solid excretion rate value of 5.1 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} is applied for market swine and 2.3 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} for breeding swine.

The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R. China, Asia, and the

involved swine farm is high productivity systems. According to 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, the maximum methane producing potential($B_{0,LT}$) for Market swine and Breeding swine in Asia region is 0.45 m^3 CH_4/kg-dm..

d) 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, chapter 10, volume 4, 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.

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

$$N_{LT,y} = N_{da,y} \times (\frac{N_{p,y}}{365}) \quad (3)$$

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)

4.2 Project Emissions

According to the methodology AMS-III.D, project emissions consist of:

(a) 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 ($PE_{PL,y}$);

(b) Emissions from flaring or combustion of the gas stream ($PE_{flare,y}$);

(c) CO_2 emissions from use of fossil fuels or electricity for the operation of all the installed facilities ($PE_{power,y}$);

(d) CO_2 emissions from incremental transportation distances ($PE_{transp,y}$);

(e) Emissions from the storage of manure before being fed into the anaerobic digester ($PE_{storage,y}$).

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y} \quad (4)$$

Where:

PE_y Project emissions in year y (tCO_2e)

$PE_{PL,y}$ Emissions due to physical leakage of biogas in year y (tCO_2e)

$PE_{flare,y}$ Emissions from flaring or combustion of the biogas stream in the year y (tCO_2e)

$PE_{power,y}$ Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (tCO_2e)

$PE_{transp,y}$ Emissions from incremental transportation in the year y (tCO_2e), as per relevant paragraph in AMS-III.AO

$PE_{storage,y}$ Emissions from the storage of manure (tCO_2e)

1. Emissions due to physical leakage of biogas in year y

As the project uses option 17(a) of AMS-III.D for calculating baseline emission, 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:

$$PE_{PL,y} = 0.10 \times GWP_{CH4} \times D_{CH4} \times \sum_{i,LT} B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{i,y} \quad (5)$$

Where:

GWP_{CH4} = Global Warming Potential (GWP) of CH_4 applicable to the crediting period (t CO_2e/t CH_4)

D_{CH4} = CH_4 density (0.00067 t/m^3 at room temperature (20 °C) and 1 atm pressure)

LT = Index for all types of livestock

j = Index for animal manure management system

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

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

$MS\%_{i,y}$ = 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) of AMS-III.D shall be used to estimate the project emissions due to physical leakage of biogas in each stage

$B_{0,LT}$ = Maximum methane producing potential of the volatile solid generated for animal type *LT* (m^3 CH_4/kg-VS), as per paragraph18 of AMS-III.D

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

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" (version 04.0)".

As per "Project emissions from flaring" (version 04.0)", emissions from flaring ($PE_{flare,y}$) should be calculated as follows:

$$PE_{flare,y} = GWP_{CH4} \times \sum_{m=1}^{525600} F_{CH4,RG,m} \times (1 - \eta_{flare,m}) \times 10^{-3} \quad (6)$$

Where:

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

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

Option A: Default value is applied to determine flare efficiency of the project. As per Technical Specification of enclosed flaring system, the project applies SZQH300 flaring system with height of 6m which belong to high height flare and not low height flare. Monitoring measures have been added in the monitoring plan to ensure two conditions are met for application of the default value 90%.

$F_{CH4,RG,m}$ should be calculated as follows:

$$\sum_{m=1}^{525600} F_{CH4,RG,m} = Q_{CH4,y} \quad (7)$$

For the calculation of $Q_{CH4,y}$, please refer to the equation (10).

3. Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y

Project emissions from electricity and fossil fuel consumption are determined by following the methodological tool "Project and leakage emissions from anaerobic digesters" (version 02.0), where $PE_{Power,y}$ is the sum of $PE_{EC,y}$ and $PE_{FC,y}$ in the tool.

$$PE_{power} = PE_{EC,y} + PE_{FC,y} \quad (8)$$

Where:

$PE_{EC,y}$ Project emissions from electricity consumption associated with the anaerobic digester in year y (tCO_2)

$PE_{FC,y}$ Project emissions from fossil fuel consumption associated with the anaerobic digester in year y (tCO_2)

The project does not use any fossil fuel, so $PE_{FC,y}$ is not included in the project emission.

As per the methodological tool "Project and leakage emissions from anaerobic digesters" (version 02.0), project emissions from electricity consumption associated with the anaerobic digester are calculated as follows:

$$PE_{EC,y} = Q_{CH4,y} \times F_{EC,default} \times EF_{EL,default} \quad (9)$$

Where:

$Q_{CH4,y}$ Quantity of methane produced in the anaerobic digester in year y (tCH_4)

$F_{EC,default}$ Default factor for the electricity consumption associated with the anaerobic

digester per ton of methane generated (MWh/tCH_4)

$EF_{EL,default}$ Default emission factor for the electricity consumed in year y (tCO_2/MWh)

Digester applied by the project is upflow anaerobic sludge blanket reactor, as per "Project and leakage emissions from anaerobic digesters" (version 02.0), $F_{EC,default}$=0.01 MWh/t CH_4 produced.

As per the methodological tool "Project and leakage emissions from anaerobic digesters" (version 02.0), the quantity of methane produced in the anaerobic digester ($Q_{CH4,y}$) is calculated as follows:

$$Q_{CH4,y} = Q_{biogas,y} \times f_{CH4,default} \times \rho_{CH4} \quad (10)$$

Where:

$Q_{biogas,y}$ = Amount of biogas collected at the digester outlet in year y (Nm^3biogas),

$f_{CH4,default}$ = Default value for the fraction of methane in the biogas (m^3CH_4/ m^3 biogas).

ρ_{CH4} = Density of methane at normal conditions (t CH_4 / Nm^3 CH_4).

4. Emissions from incremental transportation in the year y

The digester is installed within the Huangping Aonong Swine Breeding Farm, so there's no incremental transportation.

5. Emissions from the storage of manure

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:

(a) The storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester;

(b) The dry matter content of the manure when removed from the animal barns is less than 20%.

As per the EIA Report of the project, the project is installed at Huangping Aonong Swine Breeding Farm and the storage time of the manure after removal from the animal barns is about 8 hours before being fed into the anaerobic digester. Therefore, emissions from the storage of manure are not accounted for, $PE_{storage,y}$ = 0 tCO_2e.

In conclusion, the project emission of the project activity is calculated as follows:

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{EC,y} \quad (11)$$

4.3 Leakage

As per "Project and leakage emissions from anaerobic digesters" (version 02.0), 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 composting of the digestate.

Digestate from anaerobic digester of the project will be used for organic fertilizer production with aerobic composting as soon as digestate is removed from the digester and after composting, it will be used in nearby farmland as fertilizer. Digestate will be transported to the aerobic composting system once removed from the digester and will not be stored under anaerobic conditions. In addition, the project does not involve anaerobic composting of digestate.

Therefore, leakage emissions of the project associated with the anaerobic digester is not accounted for.

4.4 Net GHG Emission Reductions and Removals

The emission reductions achieved by the project will be determined ex post through direct measurement of the amount of methane flared. It is likely that the project 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 are limited to the ex post calculated baseline emissions minus the project emissions using the actual monitored data for the project activity (i.e. $N_{LT,y}$, $MS\%_{i,y}$, 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:

$$ER_{y,ex\ post} = \min\left[\left(BE_{y,ex\ post} - PE_{y,ex\ post}\right), \left(MD_y - PE_{power,y,ex\ post}\right)\right] \quad (12)$$

Where:

$ER_{y,ex\ post}$	Emission reductions achieved by the project activity based on monitored values for year y (tCO_2e)
$BE_{y,ex\ post}$	Baseline emissions calculated using equation 1. For projects using option in paragraph 17(a) using ex post monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$. For projects using option in paragraph 17(b), 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 11 using ex post monitored values of $N_{LT,y}$, $MS\%_{i,y}$, and if applicable $VS_{LT,y}$
MD_y	Methane captured and destroyed or used gainfully by the project activity in year *y* (tCO_2e)
$PE_{power,y,ex\ post}$	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities based on monitored values in the year *y* (tCO_2e)

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

$$MD_y = BG_{burnt,y} \times w_{CH4,y} \times D_{CH4} \times FE \times GWP_{CH4} \quad (13)$$

Where:

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

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

FE Flare efficiency in the year y (fraction), which is equal to $\eta_{flare,m}$

Ex-ante calculation of GHG emission reductions

1. Calculation of baseline emissions:

Table 5: Ex-ante value of parameters to calculate BE_y

Parameter	Value	Unit	Data Source
GWP_{CH4}	28	tCO_2e/tCH_4	IPCC Fifth Assessment Report (AR5)
D_{CH4}	0.00067	t/m^3	AMS-III.D
UF_b	0.94	-	AMS-III.D
MCF_j	76	%	The project activity is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R. China, where the annual average temperature is 15.4°C and a ratio of potential evapotranspiration (<960mm) toprecipitation (1,307.9 mm) < 1 (Warm temperate dry). As per 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories Volume 4 chapter 10 table 10.17, 76% is applied for MCF_j, considering the baseline manure management system and specific annual average temperature in local area
$B_{o,LT}$	Market swine: 0.45 Breeding swine: 0.45	m^3CH_4/kg VS	The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R. China, Asia, and the involved swine farm is high productivity systems. According to 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, the maximum methane producing potential($B_{0,LT}$) for Market swine and Breeding swine in Asia region is 0.45

			m^3 CH_4/kg-dm.
VS_{rate} （Default VS excertion rate）	Market swine: 5.1 Breeding swine:2.3	kg VS (1000 kg animal mass)$^{-1}$day^{-1}	The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, volatile solid excretion rate value of 5.1 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} is applied for market swine and 2.3 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} for breeding swine.
$W_{default}$	Market swine: 56 Breeding swine: 160	kg	The project is located located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, $W_{default}$ value of 56 kg is applied for market swine and 160 kg for breeding swine.
W_{site}	Market swine: 61 Breeding swine: 190	kg	PP
$VS_{default}$	Market swine: 0.2856 Breeding swine: 0.3680	kg/hd/day	The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, volatile solid excretion rate value of 5.1 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} is applied for market swine and 2.3 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} for

			breeding swine. VS default value is calculated with the default values for volatile solid excretion rate and $W_{default.}$
$VS_{LT,y}$	Market swine: 113.55 Breeding swine: 159.51	kg-dm/animal/year	Calculated as equation 10.22a of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10. $VS_{LT,y}= VS_{rate}*W_{site}/1000*365$ =5.1*61/1000*365=113.55 (Market swine) $VS_{LT,y}= VS_{rate}*W_{site}/1000*365$ =2.3*190/1000*365=159.51 (Breeding swine)
$MS\%_{BI,j}$	100	%	EIA Report
nd_y	365	day	EIA Report
$N_{da,y}$	Market swine: 150 Breeding swine: 365	day	EIA Report
$N_{p,y}$	Breeding swine:6,000 Market swine: 100,000	Head	EIA Report
$N_{LT,y}$	Market swine: 41,096 Breeding swine: 6,000	Head	Calculated as per equation (3)

As per equations (1), (2), (3) the result of the ex-ante calculated baseline emissions of methane from the manure treatment processes of the project is:

Table 6: Ex-ante Baseline Emissions BE_y

Index for all types of livestock (LT)	The annual average number of animals ($N_{LT,y}$)	Volatile solids production of livestock LT in year y ($VS_{LT,y}$) (kg-dm/animal/year)	Baseline Emissions (BE_y) tCO_2e
Market swine	41,096	113.55	28,143

Breeding Swine	6,000	159.51	5,771
Total	-	-	33,914

So, the ex-ante calculated baseline emissions (BE_y) is 33,914 tCO_2e.

2. Calculation of project emissions

Table 7: Ex-ante value of parameters to calculate project emissions

Parameter	Value	Unit	Data Sources
GWP_{CH4}	28	tCO_2e/tCH_4	IPCC Fifth Assessment Report (AR5)
D_{CH4} (ρ_{CH4})	0.00067	t/m^3	AMS-III.D
$B_{o,LT}$	Market swine: 0.45 Breeding swine: 0.45	m^3CH_4/kg VS	The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R. China, Asia, and the involved swine farm is high productivity systems. According to 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, the maximum methane producing potential($B_{0,LT}$) for Market swine and Breeding swine in Asia region is 0.45 m^3 CH_4/kg-dm.
VS_{rate}（Default VS excertion rate）	Market swine: 5.1 Breeding swine:2.3	kg VS (1000 kg animal mass)$^{-1}$day^{-1}	The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, volatile solid excretion rate value of 5.1 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} is applied for market swine and 2.3 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} for breeding swine.
$W_{default}$	Market swine: 56 Breeding swine: 160	kg	The project is located located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high

			productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, $W_{default}$ value of 56 kg is applied for market swine and 160 kg for breeding swine.
W_{site}	Market swine: 61 Breeding swine: 190	kg	PP
$VS_{default}$	Market swine: 0.2856 Breeding swine: 0.3680	kg/hd/day	The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, volatile solid excretion rate value of 5.1 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} is applied for market swine and 2.3 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} for breeding swine. VS default value is calculated with the default values for volatile solid excretion rate and $W_{default.}$
$VS_{LT,y}$	Market swine: 113.55 Breeding swine: 159.51	kg-dm/animal/year	Calculated as equation 10.22a of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10. $VS_{LT,y}= VS_{rate}*TAM/1000*365$
$MS\%_{i,y}$	100	%	EIA Report
$N_{da,y}$	365	day	EIA Report
$N_{p,y}$	Breeding swine:6,000 Market	Head	EIA Report

	swine: 100,000		
$N_{LT,y}$	Market swine: 41,096 Breeding swine: 6,000	Head	Calculated as per equation (3)
$Q_{biogas,d}$	2,639	m^3/d	EIA Report
$f_{CH4,default}$	0.6	-	"Tool to Project and leakage emissions from anaerobic digesters"
$\eta_{flare,m}$	90	%	Tool 06: "Project emissions from flaring" For the enclosed flares, the following two conditions are met: (a) The temperature of the flare ($T_{EG.m}$, *800-1,000 °C*) and the flow rate of the residual gas to the flare ($F_{RG,m}$, 300 m^3/h) is within the manufacturer's operating specification for the flare ($SPEC_{flare}$) in the minute *m*; and (b) The flame is detected in the minute *m* ($Flame_m$) with detection electrode. Thus, 90% is chosen for the flare efficiency. In ex-ante calculation, this parameter will adopt 90%, and it will be monitored in verification period to ensure 90% can be chosen for flare efficiency.
$F_{EC,default}$	0.01	MWh/tCH_4	"Tool to Project and leakage emissions from anaerobic digesters". This project uses upflow anaerobic sludge blanket reactor digester; So, the project shall use default value 0.01
$EF_{EL,default}$	1.3	tCO_2/MWh	"Tool to calculate baseline, project and/or leakage emissions from electricity consumption"

2.1 Emissions due to physical leakage of biogas in year y

As described in 4.2, project emissions from physical leakage of biogas are calculated as per equations (2), (3), (5).

Table 8: Ex-ante calculate Physical leakage of biogas ($PE_{PL,y}$)

Index for all types of livestock (LT)	The annual average number of animals ($N_{LT,y}$)	Volatile solids production of livestock LT in year y ($VS_{LT,y}$) (kg-dm/animal/year)	Physical leakage of biogas ($PE_{PL,y}$) tCO_2e
Market swine	41,096	113.55	3,940
Breeding Swine	6,000	159.51	808
Total	-	-	4,748

So, the ex-ante calculated result of the project's physical leakage of biogas is 4,748 tCO_2e.

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

As described in 4.2, the emissions from flaring or combustion of the biogas stream shall ex-ante calculated as per equations (6), (7) and (10).

Table 9: Ex-ante calculate emissions from flaring or combustion of the biogas stream

Anaerobic animal manure management systems	Mass methane in the residual gas $\sum_{m=1}^{525600} F_{CH4,RG,m}$ (tonnes)	Emissions from flaring or combustion of the biogas stream in the year y $PE_{flare,y}$ (tCO_2e)
-	$\sum_{m=1}^{525600} F_{CH4,RG,m} = Q_{CH4,y} = Q_{biogas,y} \times f_{CH4,default} \times \rho_{CH4}$	$PE_{flare,y} = GWP_{CH4} \times \sum_{m=1}^{525600} F_{CH4,RG,m} \times (1 - \eta_{flare,m}) \times 10^{-3}$
Anaerobic animal manure management system	388	1,085
Total	-	1,085

So, the ex-ante calculated result of the project's emissions from flaring or combustion of the biogas stream is 1,085 tCO_2e.

2.3 Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y

As described in 4.2, The project does not use any fossil fuel, so $PE_{FC,y}$ is not included in the project emission.

As described in 4.2, the ex-ante project emissions from electricity consumption associated with the anaerobic digester in year y ($PE_{EC,y}$) shall calculate as per equations (9) and (10):

Table 10: Project emissions from electricity consumption associated with the anaerobic digester

Anaerobic animal manure management systems	The quantity of methane produced in the anaerobic digester in year y $Q_{CH4,y}$ (tonnes)	Emissions from electricity consumption associated with the anaerobic digester in year y $PE_{EC,y}$ (tCO_2e)	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in year y $PE_{power,y}$

			(tCO_2e)
-	$Q_{CH4,y} = Q_{biogas,y} \times f_{CH4,default} \times \rho_{CH4}$	$PE_{EC,y} = Q_{CH4,y} \times F_{EC,default} \times EF_{EL,default}$	$PE_{power,y} = PE_{EC,y}$
Anaerobic animal manure management systems	388	6	6

So, the ex-ante calculated result of the project emissions from the use of fossil fuel or electricity for the operation of the installed facilities ($PE_{power,y}$) is 6 tCO_2e.

2.4 Emissions from incremental transportation in the year y

As described above, $PE_{transp,y}$ = 0 for the project.

2.5 Emissions from the storage of manure

As described above, $PE_{storage,y}$ = 0 tCO_2e.

So, the ex-ante estimated project emission shall calculate as per equation (10):

$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y}$ =4,748tCO_2e+1,085tCO_2e+6tCO_2e=5,839tCO_2e

3. Calculation of leakage

According to "Project and leakage emissions from anaerobic digesters" (version 02.0), 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 composting of the digestate.

Digestate from anaerobic digester of the project will be used for organic fertilizer production with aerobic composting after being removed from the digester and will be used in nearby farmland as fertilizer. Digestate will not be stored under anaerobic conditions. In addition, the project does not involve anaerobic composting of digestate.

Therefore, leakage emissions of the project associated with the anaerobic digester is not accounted for.

Thus, LE_y = 0.

4. Calculation of emission reductions (Ex ante calculation)

Estimated annual emission reductions of the project can be calculated as following equation (12):

$$ER_y = BE_y - PE_y - LE_y = BE_y - PE_y \quad (14)$$

Year	Estimated baseline	Estimated project	Estimated leakage	Estimated net GHG emission

	emissions or removals (tCO_2e)	emissions or removals (tCO_2e)	emissions (tCO_2e)	reductions or removals (tCO_2e)
01-Aug-2021 - 31-Dec-2021	14,216	2,448	0	11,768
01-Jan-2022 - 31-Dec-2022	33,914	5,839	0	28,075
01-Jan-2023 - 31-Dec-2023	33,914	5,839	0	28,075
01-Jan-2024 - 31-Dec-2024	33,914	5,839	0	28,075
01-Jan-2025 - 31-Dec-2025	33,914	5,839	0	28,075
01-Jan-2026 - 31-Dec-2026	33,914	5,839	0	28,075
01-Jan-2027 - 31-Dec-2027	33,914	5,839	0	28,075
01-Jan-2028 - 31-Dec-2028	33,914	5,839	0	28,075
01-Jan-2029 - 31-Dec-2029	33,914	5,839	0	28,075
01-Jan-2030 - 31-Dec-2030	33,914	5,839	0	28,075
01-Jan-2031 - 31-July-2031	19,698	3,391	0	16,307
Total	339,140	58,390	0	280,750

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	GWP_{CH4}
Data unit	tCO_2e/tCH_4
Description	Global Warming Potential (GWP) of CH_4 applicable to the crediting period

Source of data	IPCC
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Default value of 28 from IPCC Fifth Assessment Report (AR5). Shall be updated according to any future revision to VCS standard by VERRA.
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	-

Data / Parameter	$VS_{default}$
Data unit	kg-dm/animal/day
Description	Default value for the volatile solid excretion rate per day on a dry- matter basis for a defined livestock population.
Source of data	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories
Value applied	0.2856(breeding swine) 0.3680 (Market Swine) The project is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, volatile solid excretion rate value of 5.1 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} is applied for market swine and 2.3 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} for breeding swine. VS default value is calculated with the default values for volatile solid excretion rate and $W_{default.}$
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per equation 10.22(a) and Default values for volatile solid excretion rate of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	$SPEC_{flare}$
Data unit	Temperature - °C Flow rate or heat flux - kg/h or m^3/h Maintenance schedule - number of days

Description	Manufacturer's flare operating specifications for temperature, flow rate and maintenance schedule
Source of data	PP
Value applied	Temperature 800-1,000 °C or above Flow rate or heat flux - 300 m^3/h Maintenance schedule - 100 days
Justification of choice of data or description of measurement methods and procedures applied	Document in the CDM-PDD the flare operating specifications set by the manufacturer for the correct operation of the flare for the following parameters: (a) Minimum and maximum inlet flow rate, if necessary converted to flow rate at reference conditions or heat flux; (b) Minimum and maximum operating temperature; and (c) Maximum duration in days between maintenance events
Purpose of Data	
Comments	/

Data / Parameter	D_{CH4}
Data unit	t/m^3
Description	CH_4 density
Source of data	AMS-III.D
Value applied	0.00067 (at 20 °C and 1 atm pressure)
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	-

Data / Parameter	UF_b
Data unit	-
Description	Model correction factor to account for model uncertainties
Source of data	AMS-III.D

Value applied	0.94
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	-

Data / Parameter	MCF_j
Data unit	-
Description	Annual methane conversion factor (MCF) for the baseline animal manure management system j
Source of data	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories
Value applied	76%
Justification of choice of data or description of measurement methods and procedures applied	The project activity is located at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R. China, where the annual average temperature is 15.4°C and a ratio of potential evapotranspiration (<960mm) toprecipitation (1,307.9 mm) < 1 (Warm temperate dry) through checking public information /25/. As per 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories Volume 4 chapter 10 table 10.17, 76% is applied for MCF_j, considering the baseline manure management system and specific annual average temperature in local area
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	-

Data / Parameter	$B_{0,LT}$
Data unit	$m^3 CH_4/kg\text{-}VS$
Description	Maximum methane producing potential of the volatile solid generated for animal type LT
Source of data	2019 Refinement to the 2006 IPCC Guidelines for National

	Greenhouse gas Inventories
Value applied	<table><tr><td>Animal type</td><td>$B_{0,LT}$</td></tr><tr><td>Market swine</td><td>0.45</td></tr><tr><td>Breeding Swine</td><td>0.45</td></tr></table>
Justification of choice of data or description of measurement methods and procedures applied	*The project is l*ocated at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R. China, Asia, and the involved swine farm is high productivity systems. According to 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, the maximum methane producing potential($B_{0,LT}$) for Market swine and Breeding swine in Asia region is 0.45 m^3 CH_4/kg-dm.
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	-

Data / Parameter	$MS\%_{BL,j}$
Data unit	-
Description	Fraction of manure handled in baseline animal manure management system j
Source of data	EIA Report
Value applied	100%
Justification of choice of data or description of measurement methods and procedures applied	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
Purpose of Data	Calculation of baseline emissions and project emissions
Comments	-

Data / Parameter	$f_{CH4,default}$
Data unit	-
Description	Default value for the fraction of methane in the biogas
Source of data	Tool "Project and leakage emissions from anaerobic digesters"
Value applied	0.6
Justification of choice of data or description of measurement methods and procedures applied	There are two different procedures to determine the quantity of methane produced in the digester in year y ($Q_{CH4,y}$). For small scale projects, project participants may choose between Option 1 or Option 2. ● Option 1: Procedure using monitored data ● Option 2: Procedure using a default value Use this default value for Option 2 of the step "Determination of the quantity of methane produced in the digester"
Purpose of Data	Calculate the quantity of methane produced in the digester in year y
Comments	-

Data / Parameter	$F_{EC,default}$
Data unit	MWh/tCH_4
Description	Default factor for the electricity consumption associated with the anaerobic digester per ton of methane generated.
Source of data	Tool to Project and leakage emissions from anaerobic digesters
Value applied	0.01
Justification of choice of data or description of measurement methods and procedures applied	● 0 - Covered anaerobic lagoons (gravity fed) / conventional digesters; ● 0.01 - upflow anaerobic sludge blanket reactor (UASB) / filter bed reactor for wastewater / fluidized bed reactor; ● 1.02 - Conventional digesters with continuously stirred tank reactor type for wastewater; ● 1.54 - Any anaerobic digester for solid waste with preprocessing of wastes (e.g. pulverizing). The project uses upflow anaerobic sludge blanket reactor digester; So, the project shall use default value 0.01

Purpose of Data	Calculate the project emissions from the electricity consumption.
Comments	-

Data / Parameter	$EF_{El,default}$
Data unit	tCO_2/MWh
Description	Default emission factor for the electricity consumed in year y
Source of data	Tool to Project and leakage emissions from anaerobic digesters
Value applied	1.3
Justification of choice of data or description of measurement methods and procedures applied	The project chooses option 2 of Step 2 in "Tool to Project and leakage emissions from anaerobic digesters" to determine project emissions from electricity consumption. So, the project shall apply the default value in the option 2.
Purpose of Data	Calculation of project emissions.
Comments	-

Data / Parameter	$W_{default}$
Data unit	kg
Description	Default average animal weight of a defined population
Source of data	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10 table 10A.5
Value applied	Market swine: 56 Breeding Swine: 160
Justification of choice of data or description of measurement methods and procedures applied	The project is located in Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table 10A.5 of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, $W_{default}$ value of 56 kg is applied for market swine and 160 kg for breeding swine.
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	Default VS excertion rate
Data unit	kg VS (1000 Kg animal mass)$^{-1}$day^{-1}
Description	Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population
Source of data	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10 table 10.13(A)
Value applied	Market swine: 5.1 Breeding Swine:2.3
Justification of choice of data or description of measurement methods and procedures applied	*The project is located* at Baitang Village, Xinzhou Town, Huangping County, Qiandongnan Miao and Dong Autonomous Prefecture, Guizhou Province, P.R.China, Asia, and the involved swine farms are high productivity systems. According to table *10A.5 of* 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories volume 4, chapter10, *volatile solid excretion rate* value of 5.1 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} is applied for market swine and 2.3 kg VS (1000 Kg animal mass)$^{-1}$day^{-1} for breeding swine.
Purpose of Data	Calculation of baseline and project emissions
Comments	-

Data / Parameter	$w_{CH4,y}$
Data unit	%
Description	Methane content in biogas in the year y
Source of data	AMS-III.D default value
Value applied	60
Justification of choice of data or description of measurement methods and procedures applied	Default value of 60% is applied as per AMS-III.D
Purpose of Data	Calculation of project emissions
Comments	-

5.2 Data and Parameters Monitored

Data / Parameter	$N_{p,y}$
Data unit	Number
Description	Number of animals produced annually of type LT for the year y
Source of data	Project proponents
Description of measurement methods and procedures to be applied	The number of swine in the farm will be recorded manually by the responsible staff.
Frequency of monitoring/recording	Annually, based on monthly records
Value applied	Market swine: 100,000 Breeding swine: 6,000
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	To calculate the annual average number of animals ($N_{LT,y}$)
Calculation method	-
Comments	-

Data / Parameter	W_{site}
Data unit	kg
Description	Average animal weight of a defined livestock population at the project site
Source of data	Project proponents
Description of measurement methods and procedures to be applied	Measured by the weight measure
Frequency of monitoring/recording	monthly
Value applied	61kg for market swine and 190 for breeding swine
Monitoring equipment	weight measure

QA/QC procedures to be applied	This parameter is used in equation 4 for estimating $VS_{LT,y}$ using option 3, and in equation 2 (appendix 2) for estimating $NEX_{LT,y}$ when using 2019 refinement to IPCC 2006 default values. Sampling procedures can be used to estimate this variable, taking into account the following guidance: (a) To ensure representativeness, each defined livestock population will be classified into a minimum of three age categories; (b) For each defined livestock population, a minimum of one monthly sample per age category should be taken; (c) When estimating baseline emissions and emissions released during baseline scenario from land application of the treated manure in the leakage section, the lower bound of the 95% confidence interval obtained from the sampling measurements should be used; (d) When estimating project emissions and emissions released during project activity from land application of the treated manure in the leakage section, the upper bound of the 95% confidence interval obtained from the sampling measurements should be used. Weight measurers were calibrated once a year by officially accredited entity in compliance with JJG539-2016 “Verification Regulation of Digital Indicating Weighting Instruments” in China.
Purpose of data	Used for estimating $VS_{LT,y}$
Calculation method	/
Comments	/

Data / Parameter	$T_{EG.m}$
Data unit	℃
Description	Temperature in the exhaust gas of the enclosed flare in the minute m
Source of data	PP
Description of measurement methods and procedures to be applied	Measure the temperature of the exhaust gas in the flare by an appropriate temperature measurement equipment. Measurements outside the operational temperature specified by the manufacturer may indicate that the flare is not functioning

	correctly and may require maintenance. Flare manufacturers must provide suitable monitoring ports for the monitoring of the temperature of the flare. These would normally be expected to be in the middle third of the flare. Where more than one temperature port is fitted to the flare, the flare manufacturer must provide written instructions detailing the conditions under which each location shall be used and the port most suitable for monitoring the operation of the flare according to manufacturer's operating specifications for temperature
Frequency of monitoring/recording	Once per minute
Value applied	800-1000
Monitoring equipment	temperature port
QA/QC procedures to be applied	Temperature measurement equipment should be replaced or calibrated once a year in accordance with their maintenance schedule
Purpose of data	/
Calculation method	/
Comments	Unexpected changes such as a sudden increase/drop in temperature can occur for different reasons. These events should be noted in the site records along with any corrective action that was implemented to correct the issue. Monitoring of this parameter is applicable in case of enclosed flares. Measurements are required to determine if manufacturer's flare operating specifications for operating temperature are met

Data / Parameter	$F_{RG,m}$
Data unit	m^3/h
Description	Flow rate of the residual gas to the flare
Source of data	PP
Description of measurement methods and procedures to be applied	/
Frequency of monitoring/recording	Once per minute

Value applied	300
Monitoring equipment	Flow meter
QA/QC procedures to be applied	/
Purpose of data	/
Calculation method	/
Comments	/

Data / Parameter	$Flame_m$
Data unit	Flame on or Flame off
Description	Flame detection of flare in the minute m
Source of data	PP
Description of measurement methods and procedures to be applied	Measure using a fixed installation optical flame detector: Ultra Violet detector or Infra-Red or both
Frequency of monitoring/recording	Once per minute. Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off
Value applied	/
Monitoring equipment	/
QA/QC procedures to be applied	Equipment shall be maintained and calibrated once a year in accordance with manufacturer's recommendations
Purpose of data	/
Calculation method	/
Comments	Applicable to all flare

Data / Parameter	$VS_{LT,y}$
Data unit	kg dry matter/animal/year
Description	Volatile solids for livestock *LT* entering the animal manure management system in year *y*
Source of data	-

Description of measurement methods and procedures to be applied	Only required when data from national published source are not available or IPCC default value from 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10 table 10 A- 4 to 10 A- 9 are not used. When country-specific excretion rates is to be estimated from feed intake levels as indicated in the paragraph 18(b), 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, parameters of GE_{LT}, DE_{LT}, UE, ASH and ED_{LT} shall be monitored as detailed below to derive this value. When developed country values are to be used in the project, relevant parameters specified in the paragraph 18(d) and 36(b) shall be monitored/documented. If IPCC default values are to be adjusted for a site-specific average animal weight as specified in paragraph 18(c), the average animal weight of a defined livestock population at the project site (W_{site}) shall be monitored as detailed in the table 4 below.
Frequency of monitoring/recording	annually
Value applied	Market swine: 113.55 Breeding swine: 159.51
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Calculation of baseline and project emissions
Calculation method	Calculated as per 10.22 (a) from 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse gas Inventories
Comments	/

Data / Parameter	nd_y
Data unit	number
Description	The number of days the treatment plant was operational in year y.

Source of data	Project proponents
Description of measurement methods and procedures to be applied	365 days used for ex-ante estimation. The actual number of days the treatment plant was operationally used in the monitoring periods will be monitored and recorded by staff.
Frequency of monitoring/recording	Annually, based on daily records and monthly aggregation
Value applied	365
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	To estimate the annual volatile solid excretions for livestock LT entering all animal waste management systems on a dry matter weight basis ($VS_{LT,y}$).
Calculation method	-
Comments	-

Data / Parameter	FE ($\eta_{flare,m}$)
Data unit	%
Description	The flare efficiency
Source of data	Project emissions from flaring (version 04.0)
Description of measurement methods and procedures to be applied	As for flaring, the project uses enclosed flares, and the project chose option A of Project emissions from flaring (version 04.0) for the determination of flare efficiency. The flare efficiency of the project is determined as 90% since the project meets the following two conditions when in operating: • The temperature of the flare and the flow rate of the residual gas to the flare is within the manufacturer's specification for the flare; and • The flame is detected in minute m.
Frequency of monitoring/recording	Annually
Value applied	90%

Monitoring equipment	-
QA/QC procedures to be applied	
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	-

Data / Parameter	$N_{da,y}$
Data unit	Number
Description	Number of days animal is alive in the farm in the year *y*
Source of data	-
Description of measurement methods and procedures to be applied	The VCS-PD should describe the system for monitoring the number of livestock population. The consistency between the value and indirect information (records of sales, records of food purchases) should be assessed sales, records of food purchases) should be assessed.
Frequency of monitoring/recording	Annually, based on monthly records
Value applied	Market swine: 150 Breeding swine: 365
Monitoring equipment	-
QA/QC procedures to be applied	
Purpose of data	Calculation of baseline and project emissions
Calculation method	-
Comments	-

Data / Parameter	$MS\%_{i,y}$
Data unit	-
Description	Fraction of manure handled in system i in year y

Source of data	Project proponents
Description of measurement methods and procedures to be applied	All manure would be handled in this project, 100% is applied for $MS\%_{i,y}$ in ex-ante estimation. This parameter will be monitored in verification period.
Frequency of monitoring/recording	-
Value applied	100%
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Calculation of baseline emissions and project emissions
Calculation method	-
Comments	-

Data / Parameter	Proper soil application of the residual wastes
Data unit	-
Description	-
Source of data	Records by project participants
Description of measurement methods and procedures to be applied	The monitoring of proper soil application of the residual wastes will be conducted by PP for every soil application of the residual waste to ensure not resulting in methane emissions
Frequency of monitoring/recording	-
Value applied	-
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	-
Calculation method	-
Comments	-

Data / Parameter	$Q_{biogas,y}$ ($BG_{burnt,y}$)
Data unit	Nm^3 biogas
Description	Amount of biogas collected at the digester outlet in year y/ Biogas flared in year y
Source of data	Records by project participants
Description of measurement methods and procedures to be applied	The amount of biogas collected at the digester outlet in year y shall be monitored ex post by the flow meter installed between outlet of biogas pretreatment system and inlet of the flaring system. Continuously measured by the flow meter. The meter readings will be automatically converted to value at room temperature (20 ºC) and 1 atm pressure. The flow meter will be read by project staff and recorded daily and aggregated in the monthly operation records.
Frequency of monitoring/recording	Annually, based on continuous flow measurement with accumulated volume recording (e.g. daily accumulated reading)
Value applied	Monitored ex-post
Monitoring equipment	Flow meter
QA/QC procedures to be applied	Flow meter will be calibrated once a year at the periodic interval as per national regulations.
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	-

Data / Parameter	On-site inspections for livestock farm
Data unit	-
Description	On-site inspections for each individual farm included in the project boundary where the project activity is implemented
Source of data	Records by project participants
Description of measurement methods and procedures to be applied	On-site inspections for livestock farm will be conducted by PP to ensure proper operation of the farm

Frequency of monitoring/recording	Daily
Value applied	-
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	-
Calculation method	--
Comments	-

5.3 Monitoring Plan

The monitoring plan presented in this report assures that real, measurable, long-term GHG emission reductions can be monitored, recorded and reported. It is a crucial procedure to identify the final VCUs of the project. This monitoring plan will be implemented by the project owner during the project operation. The details of the monitoring plan are specified as follows:

（A） Data and parameters to be monitored

Data and parameters to be monitored are listed below Figure 5-1 shows the positions of the monitoring instruments and Table 5-1 lists the corresponding parameters monitored:

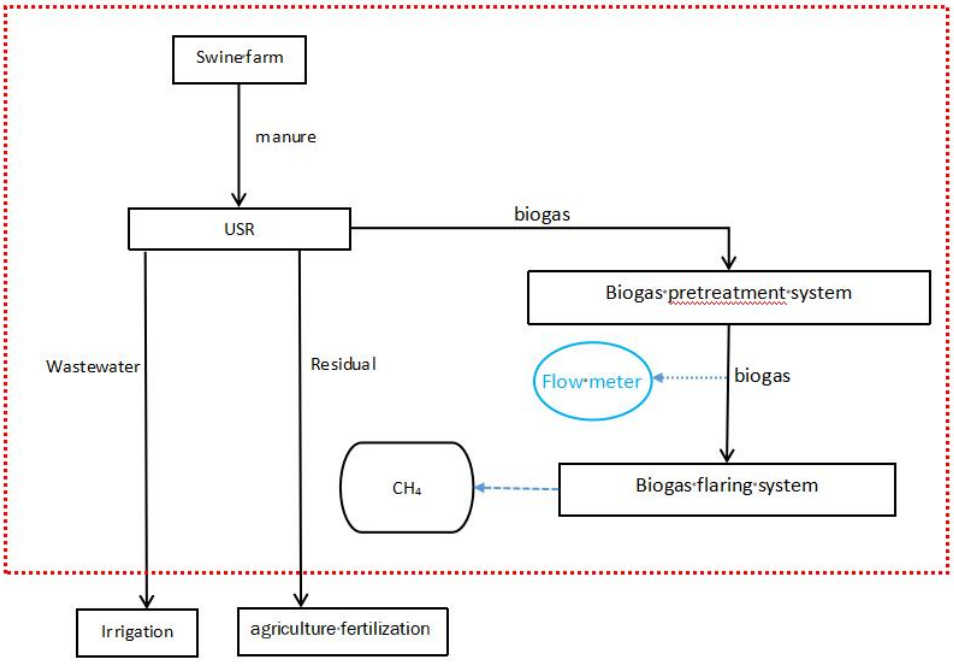

Figure 5-1: Project monitoring diagram

Table 5-1: Corresponding parameters monitored

Parameter Monitored	Description
$BG_{burnt,y}$/ $Q_{biogas,y}$	Continuously measured by the flow meter. The meter readings will be automatically converted to value at room temperature (20 °C) and 1 atm pressure. The flow meter will be read by project staff and recorded daily in the monthly operation records.
FE ($\eta_{flare,m}$), $w_{CH4,y}$	The flare efficiency and methane content in biogas in year y will be updated according to relevant data sources.
$N_{p,y}$	The number of swine in the farm will be recorded manually by the responsible staff.
$N_{da,y}$	The number of alive days of swine within the livestock farm will be recorded manually by the responsible staff.
nd_y	The actual number of days the treatment plant was operationally used in the monitoring periods will be monitored and recorded by staff.
$MS\%_{i,y}$	Fraction of manure handled in system i in year y
W_{site}	Average animal weight of a defined livestock population at the project site
$T_{EG.m}$	Temperature in the exhaust gas of the enclosed flare in the minute m
$F_{RG,m}$	Flow rate of the residual gas to the flare
$Flame_m$	Flame detection of flare in the minute m
$VS_{LT,y}$	Volatile solids for livestock LT entering the animal manure management system in year y
On-site inspections for livestock farm	On-site inspections for each individual farm included in the project boundary where the project activity is implemented
Proper soil application of the residual wastes	The monitoring of proper soil application of the residual wastes will be conducted by PP for every soil application of the residual waste to ensure not resulting in methane emissions

(B) Management Structure

The project owner organizes a specific VCS team in the project development department to be responsible for data collection, supervision, and witness the whole process of data measuring and recording. A VCS manager is appointed to take full responsibility for the overall monitoring

of the project. The monitoring and measurement are to be carried out by designated monitoring officers. In addition, the project developer appoints internal verifiers who are responsible for internal check of the measurement, collection of relevant receipts and invoices, and the calculation of the emission reductions. A monitoring and management manual of the project that identifies detailed duties and responsibilities of the relevant parties is developed and served as the basis of the project monitoring. Figure 5-2 shows the operation and management structure of the Project.

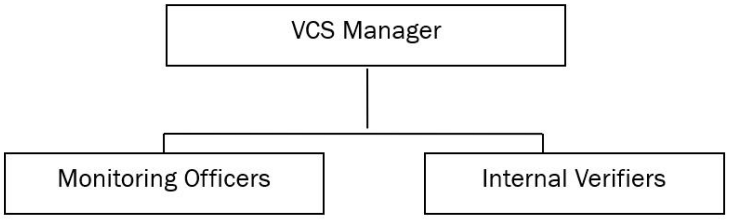

Figure 5-2: Operation and management structure of the project

(C) Data collection

Monitoring officers are responsible for data collection. Designated teams will read and collect the monitored data regularly. The computer system will automatically monitor and record relevant meter data. Automatic records will serve as the main data source for emission reductions calculation. All data files, relevant flow rate records will be collected by a designated monitoring officer, who will prepare backup in time and archive all documents properly.

(D) Quality assurance

All metering equipment for monitoring will be chosen in accordance with VCS requirements, and will be calibrated once a year for accuracy by qualified party according to the national regulations. To assist in future verification, the project owner will preserve the calibration records, along with the data files of project monitoring.

Error check routines will be established on site and at the point of data storage to detect data measuring/transmission failures as well as malfunctions. In the case of malfunction of the meters, the meter supplier will provide technical support to engage the problem promptly and emission reductions during the corresponding period will be calculated conservatively.

The installation of flow meters will fulfill the national standard. All the meters will be checked and maintained periodically.

(E) Data file management

All monitoring data will be electronically filed by the end of each month and the electronic data files will be archived in both disk copy and printed hard copy. Other documents in paper e.g. maps, forms and environment assessment reports will be preserved as well. All data collected

as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the crediting period. The project owner will provide original records and documents if necessary.

Sample plan

The sampling objective

To determining the average animal weight of a defined livestock population at the project site during the crediting period with a 95/10 confidence/precision.

According to "Sampling and surveys for CDM project activities and programme of activities (Version 09.0)[3]", the sampling plan is as follows:

Parameter	W_{site}
Objectives and reliability requirements	Determining the Average animal weight of a defined livestock population at the project site during the crediting period. According to standard of the "Sampling and surveys for CDM project activities and programs of activities (Version 09.0)", PP shall use 95/10 confidence/precision as the criteria for the reliability of sampling efforts for large-scale project. Each defined livestock population should be classified into a minimum of three age categories; The three age categories of swine are classified according to the age in days, i.e. The three age categories of market swine are classified according to the age in days, i.e. Nursery phase with 30-60days, Growing phase with 60-110days and Mature phase with 110-150days.The three age categories of breeding swine are classified according to the age in days, i.e. Nursery phase with 30-70days, Growing phase with 70-220days and Mature phase with 220-310days. For each defined livestock population, a minimum of one monthly sample per age category should be taken. In this project, the monitoring activities of the Average animal weight of a defined livestock population at the project site will be conducted in the three age groups of Nursery phase, growing phase and mature phase in the swine farm at least one monthly.
Target population and sampling frame	For the ex-calculation, A total of 47,096swine included in this project and the data of the average animal weight of a defined livestock population at the project site is from the Project Evaluation Report. During the monitoring periods, the target population will be changed as the actual situation.
Sampling method	As this project involved 1 swine farm and two types of swine i.e., Market swine and Breeding swine, and as per applied

[3] https://cdm.unfccc.int/filestorage/e/x/t/extfile-20210531160756474-Meth_Stan05.pdf/Meth_Stan05.pdf?t=T2x8cjBuZjFpfDDpBcoW32Nj3OQglkN4PmUs

	methodology, each defined livestock population should be classified into a minimum of three age categories, so the sampling method is Stratified random sampling. The specific sampling methods are as follows: For the sampling, PP should calculate the overall sample size based on the population of pigs in stock firstly. As the project involved 1 swine farm, so the sample size in the swine farm should be determined based on the proportion of the farm. Similarly, the sample size of each age group of Market swine and Breeding swine in the farm were also calculated based on the proportion of the number of each age group of Market swine and Breeding swine to the total number of swine in the farm. After the sample size in each age group of Market swine and Breeding swine of this swine farm determined, the sample can be conducted. Since swine in different age are kept in the different pig houses, samples can be randomly selected from pig houses of this age group. After the samples are selected, the weight is measured by weight measurers and recorded in the weight record table.

The sampling sizes

According to the standard of the "Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)", PP shall use 95/10 confidence/precision as the criteria for the reliability of sampling efforts for large-scale project.

As per to statistical principles and sampling survey method, the sample size should be determined as follows:

$$n_1 = \frac{Z^2\sigma^2}{d^2} = \frac{Z^2(\sigma^2/X^2)}{d^2/X^2} = Z^2V^2/e^2$$

$$n_2 = n_1\, N/(N + n_1)$$

$$n_3 = Bn_2$$

$$n_4 = n_3/r$$

$$n = n_4(110\%)$$

Where:

Z the Z-statistic and the value taken is 1.96 (corresponding to 95% confidence level);

σ the standard deviation;

d the maximum error of estimate;

X the mean value of samples;

V the coefficient of variation, V=$\sigma/X \leq 1$ and its maximum value 1 is taken

e the allowed relative sampling error ("precision") and the value taken is 10%;

N the total number of involved swine47,096

B the survey design effect and the value taken is 1 because for stratification sampling the B value is less than or equal to 1;

r the survey replies rate and the value taken is 100%;

110% 10% contingency was added to produce the final sample size;

$n_1, n_2, n_3, n_4\ n$ the adjusted values after each step with n being the final number of samples to be taken. Actually, n_4 is the required number of samples based on calculation, 10% contingency was added to n_4 to produce n in this sampling.

For pre-calculation, since the total number of involved swine is 47,096, N in the calculation of sample size is 47,096, and the calculation result is as follows:

Z	V	e	N	B	r
1.96	1	0.1	47,096	1	100%
n_1	Z^2V^2/e^2	384			
n_2	$n_1 N/(N+n_1)$	381			
n_3	Bn_2	381			
n_4	n_3/r	381			
n	$n_4(110\%)$	420			

The calculation result of n is 420. Therefore, 420 samples should be sufficient to satisfy the desired confidence and precision.

As the applied value of 41,096 Market swine and 6,000 Breeding swine is the design stock scale, during the monitoring periods, the actual breeding scale of the farm is not exceeding the design value, so the sample size calculated from the design values can be used in the monitoring period and it is conservative.

Stratified sampling (with samples of 420) was used for the monitoring of the W_{site}. The specific sampling methods are as follows: For the sampling, PP should calculate the overall sample size based on the population of pigs in stock firstly. Since the project involved only one pig farm, the sample size should be determined in proportion to the number of pigs in that farm. Similarly, the sample size of market pigs and breeding pigs for each age group on a farm are calculated in proportion to the number of pigs at each age. The number of market pigs and breeding pigs equals the total number of pigs on the farm.

Finally, 420 pig samples were selected for W_{site} monitoring,

Sample	Phase	Number	total
Breeding	Nursery phase	18	54
	Growing phase	18	
	Mature phase	18	
Market	Nursery phase	122	366
	Growing phase	122	
	Mature phase	122	

Implementation and Monitoring frequency

The Sampling process will start as soon as the target population is determined. The Sampling process will be determined by the VCS monitoring team. The one monthly monitoring activity of the samples will be completed during each monitoring periods.

Because the sampling activity is once a month, all the samples are changed in the next month. The monitoring data will be collected and recorded throughout the entire crediting period. All archived data and documentation will be kept for at least 2 years after the end of the last crediting period.

Procedures for Administering Data Collection and Minimizing Non-sampling Errors

During the monthly monitoring activities, the weight of the month's sample was recorded in the weight record table by the monitoring team member in the swine farms. Then average weight of a defined livestock population at the project site was calculated based on these data by the monitoring team member. The data is reviewed by the project developer and VVB.

If the recorded raw data on the monitoring form are reasonable and basically consistent with the actual growth state, the raw data is archived. If the data record is missing or damaged or the target animal was dead during the monitoring periods, the following makeup process should be conducted:

1) The general principle is that zero value is used for the missing or damaged data. This is most conservative approach. The monitoring personnel are trained before the starting of the project operation to ensure that each team member is fully aware of and able to strictly follow this conservative principle. During the monitoring process, the monitoring personnel are required to strictly abide by the above conservative principle in data recording, i.e., use zero values for all the missing or damaged data.

2) If this is due to the working error of the monitoring personnel, further train the person until he or she can perform the job properly. And in the meantime, use zero value for the missing or damaged data;

3) If this is due to the inability or attitude of a particular worker in monitoring team, dismiss such worker and re-hire those with proper ability and attitude. And in the meantime, use zero value for the missing or damaged data;

4) If some data recorded are significantly higher than the normal range and inconsistent with normal growth, the monitoring personnel should ask for the reason. If the measurement is high due to the damage of weighing scales or other measurement equipment, zero value is used for that day's data. And need to calibrate and maintain the weighing scale or replace the measuring equipment immediately and avoid this situation in the future. If the monitoring results are satisfactory in terms of correct reporting, data completeness and correct analysis, the data is accepted for the monitoring report.