



**Verified Carbon
Standard**

FUTONG ADJUSTED WATER MANAGEMENT IN RICE CULTIVATION



DOCUMENT PREPARED BY SEARCH CO₂(SHANGHAI) ENVIRONMENTAL SCIENCE &
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1 PROJECT DETAILS

1.1 Summary Description of the Project

The project changing from continuously flooded to intermittent flooded condition during rice cultivation is conducted in Fuyang District and Tonglu County under the jurisdiction of Hangzhou City, Zhejiang Province of China, which have a total acreage of 12,300 ha for single-cropping rice. Without this project providing ditches to conduct intermittent flooded method, the continuously flooded method would be continued, so the scenario that rice was cultivated by continuously flooded method is the baseline scenario. Since the organic matter in rice soil under flooded condition can emit a large amount of methane (CH₄) because of anaerobic decomposition, the intermittent flooded method is more beneficial to water conservation, production increase and methane emission removal than the continuously flooded.

This project involves 13,127 farmers in 3,466 households. With the project implementation, the cement ditches, reservoirs and relevant technical training are provided for these farmers to help them conduct the intermittent flooded water regime during rice cultivation, which replaces the traditional continuously flooded method. According to the needs of rice growth, farmers use cement ditches and reservoirs to control irrigation and drainage, which not only saves water resources, but also reduces methane emissions from soil organic matter under anaerobic conditions (flooded state). Through the cement ditches and reservoirs, the necessary water can be supplied to the rice paddies in time in the dry season, and the excess water can be drained from the rice paddies in the rainy season. In this case, the CH₄ emission can be declined by an average of 48%¹. Hence, this project activity is estimated to reduce 4.87 tCO₂e/ha.

The implementation of the project is expected to reduce the GHG emissions amounting to 419,601 tCO₂e in the first seven-year period with an average annual GHG emission reduction of 59,943 tCO₂e. During the first monitoring period from 10-June-2018 to 31-December-2021, a total of 240,357tCO₂e GHG emissions were reduced. However, the project proponent only claimed the 60,000 tCO₂e annually since the net GHG emission reductions generated during this monitoring period have exceeded the threshold required in the small-scale methodology applied. Therefore, the number of GHG credits issued to the Project during this Monitoring period is 240,000 VCU.

This project aims to:

¹ Dr. Reiner Wassmann (2016). Coordinator, Climate Change Research. International Rice Research Institute. Available from: r.wassmann@irri.org

- High yield brings extra income and improves the living standard of local farmers
- Women are given priority for employment and their social status is raised
- Provide more job opportunities for local farmers
- Sequester greenhouse gas and mitigate climate changes

1.2 Sectoral Scope and Project Type

The project is developed under VCS scope 14 “Agriculture, Forestry and Other Land Use (AFOLU)” with an activity category of Improved Cropland Management (ICM) under Agricultural Land Management (ALM). Although the AMS-III.AU methodology applied is approved under sectoral scope 15 (agriculture) of CDM, this project is categorized as sectoral scope 14 (AFOLU) under Verra. This is in accordance with the definitions of eligible AFOLU project categories set out in Appendix 1 of the VCS Standard, 4.2 and can be demonstrated from the following three points.

Requirements	Evidence
1. Eligible ALM activities are those that reduce net GHG emissions on croplands and grasslands by increasing carbon stocks and woody biomass and/or decreasing CO ₂ , N ₂ O and/or CH ₄ emissions from soils.	This project reduces CH ₄ emissions on croplands by replacing continuously flooded method by intermittent flooded method. So, this project can be categorized as eligible ALM activity.
2. The project area shall not be cleared of native ecosystems within the 10-year period prior to the project start date.	The project area has not been cleared of native ecosystems since 2005 ² .
3. Eligible ALM activities include: Improved Cropland Management (ICM): This category includes practices that demonstrably reduce net GHG emissions of cropland systems by increasing soil carbon stocks, reducing soil N ₂ O emissions, and/or reducing CH ₄ emissions.	This project practices intermittent flooded method on croplands, which is demonstrated that can reduce net GHG emissions by reducing CH ₄ emissions. So, this project is an eligible ICM activity.

² Evidence on Certificate of Eligibility for Land provided by Hangzhou Agricultural Bureau, which is the superior authority of Fuyang District and Tonglu County

The project is not a grouped project.

1.3 Project Eligibility

According to Section 2.1.1 of “VCS Standard version 4.2”, this project activity meets two of the scopes of the VCS program:

- 1) The six Kyoto Protocol greenhouse gases.
- 4) Project activities supported by a methodology approved under a VCS approved GHG program, unless explicitly excluded under the terms of Verra approval.

Accordingly, this project produces methane (CH₄) emission reductions, which is one kind of the six Kyoto Protocol GHGs. Besides, this project activity is supported by the CDM small-scale methodology: **Methane emission reduction by adjusted water management practice in rice cultivation** which is approved under a VCS approved GHG program – United Nations Clean Development Mechanism and is not explicitly excluded under the terms of Verra approval. Therefore, this project is eligible under the scope of the VCS program

1.4 Project Design

The project is an instance of a single project activity.

Eligibility Criteria

The project is not a grouped project.

1.5 Project Proponent

Organization name	Hangzhou Chunmeng Agricultural Technology Co., Ltd
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Hangzhou Chunmeng Agricultural Technology Co., Ltd (hereinafter referred to as Hangzhou Chunmeng) is a company whose main business is agricultural technology research and crop

cultivation and management, with Search Co2 (Shanghai) Environmental Science & Technology Co., Ltd holding 70% of the shares.

1.6 Other Entities Involved in the Project

Organization name	Search Co2 (Shanghai) Environmental Science & Technology Co. Ltd
Role in the project	Consultant
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Search Co2(Shanghai) Environmental Science & Technology Co. Ltd (hereinafter referred to as Search Co2) is founded in 2018 with a registered capital of 5 million and 20 full-time employees. Search Co2 has developed more than 200 offset projects in China, ranging from wind, solar and forestry, under various standards including VCS, Gold Standard and CCER, with rich experience in developing the type of Natural-Based Solution projects.

1.7 Ownership

As described in Section 2.5 below, there are three legal categories of land in China, and rice paddies are categorized as “agricultural land”. According to the Article 10 of the Land Management Law of China, state-owned land and land collectively owned by farmers can be determined for use by units or individuals legally. Units and individuals that use land have the obligation to protect, manage and make rational use of land. The people’s government at the county level (or higher if necessary) shall register, issue certificates and confirm the ownership, any disputes regarding ownership or usage right of the land shall be arbitrated by the people’s government at or above the county level. All the rice paddies of 12,300 ha involved in this project belong to 13,127 farmers, which has been confirmed by the Fuyang and Tonglu Land and Resources Bureaus³ and Fuyang and Tonglu Agricultural Bureaus. Since these rice paddies are all legal agricultural fields, and the ownership is clear, there is no dispute over land ownership in the project site. As the owner of the rice paddies, these farmers have authorized Hangzhou

³ Certificate of land ownership from Fuyang and Tonglu Land and Resources Bureaus

Chunmeng has overall control and responsibility for the carbon project as the project proponent without violating farmers' right.

During the construction period, Hangzhou Chunmeng invested and cooperated with Fuyang District and Tonglu County Agricultural Bureaus in the construction of ditches and reservoirs, while the local farmers were hired to build the ditches and reservoirs. During the operation period, Hangzhou Chunmeng is responsible for supervising technicians to patrol and maintain the ditches and reservoirs. Furthermore, as the owner of the rice paddies, these farmers authorized Hangzhou Chunmeng as a representative of the carbon project owner and Hangzhou Chunmeng has overall control and responsibility for the carbon project as the project proponent without violating farmers' rights. Search Co2 has researched on the application of intermittent flooded method in methane emission reduction in rice paddies, accompanying with China National Rice Research Institute, and applied for the patents⁴. The patent names *A method for reduction methane emissions in rice paddies by changing the rhizosphere oxygen environment*, which provides intermittent flooded water regime as a method of changing the rhizosphere oxygen environment, thus resulting in reducing CH₄ emissions in rice paddies. Thus, Search Co2 has the mature technique and technical team, and it was entrusted and appointed by Hangzhou Chunmeng as the developer of rice emission reduction project. Search Co2 has the responsible of helping the project proponent with development and management of the carbon project, including compiling the monitoring plan, organizing the training, etc., and it does not affect project proponent's rights and obligations as the project proponent.

1.8 Project Start Date

According to VCS standard, v4.2, the project start date is the date on which activities that lead to the generation of GHG emission reductions or removals are implemented (e.g., preparing land for seeding, planting, changing agricultural or forestry practices, rewetting, restoring hydrological functions, or implementing management or protection plans). For this project, according to the requirements of the AMS-III.AU methodology applied, an entire cropping season is started from land preparation and the emission reduction calculation is also started this day. So, the project start date is 10-June-2018⁵ when the land preparation was started.

1.9 Project Crediting Period

The crediting period of this project will be using a 7-year, twice renewable crediting period, for a combined total project crediting period of 21 years from 10-June-2018 to 09-June-2039, and

⁴ The patent number is 201611116382.X, which is available from:
http://www.xjishu.com/zhuanli/01/201611116382_3.html

⁵ The earliest start date of rice cropping season among involved farmers are recorded in the farmers' database.

the first 7-year period is from 10-June-2018 to 09-June-2025. Also, the project lifetime⁶ is 30 years from 04-April-2018⁷ to 03-April-2048.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
10-June-2018 to 31-December-2018	59,943
01-January-2019 to 31-December-2019	59,943
01-January-2020 to 31-December-2020	59,943
01-January-2021 to 31-December-2021	59,943
01-January-2022 to 31-December-2022	59,943
01-January-2023 to 31-December-2023	59,943
01-January-2024 to 31-December-2024	59,943
01-January-2025 to 09-June-2025	0 ⁸

⁶ Acceptance Report of Hangzhou City Functional Areas for Grain Production in 2017

⁷ The project lifetime is calculated from the time when ditches and reservoirs, as the major construction, are put into use, while the start dates of the project and of the crediting period are the dates when the project begins to produce emission reductions. According to The Acceptance Report of Hangzhou City Functional Areas for Grain Production in 2017, the ditches and reservoirs were put into use on 04 April 2018. Therefore, the project lifetime starts on 04 April 2018 instead of the project crediting period start date on 10 June 2018.

⁸ Section 3.8 of the VCS Standard v4.3 states that “The project crediting period is the time period for which GHG emission reductions or removals generated by the project are eligible for issuance as VCU.” According to the Methodology of *Methane emission reduction by adjusted water management practice in rice cultivation*, the time when the project produces emission reductions is the start time of land preparation. And the land preparation means the start of a rice season. The main activity of this project is emission reduction due to adjusted water regime during rice cultivation, which means emission reduction for each year, for period from 10-June-2018 to 09-June-2025, only occurred in the rice growing season. Therefore, during the period of 01-January-2025~09-June-2025, as the non-cropping season, the emission reduction is 0.

Total estimated ERs	419,601 tCO ₂ e
Total number of crediting years	7 years
Average annual ERs	59,943 tCO ₂ e

1.11 Description of the Project Activity

The project changing from continuously flooded to intermittent flooded condition during rice cultivation is conducted in Fuyang District and Tonglu County, Zhejiang Province, which is one of the major rice-producing provinces in China. At the same time, Fuyang District and Tonglu County have strong rice productivity. However, the living standard of farmers within the project zone is relatively low, where the annual household income of farmers is only CNY 19,870 in Fuyang District and CNY 17,945 in Tonglu County⁹, and most of it is used to maintain the survival. In this case, they lacked funds to build ditches for applying intermittently flooded method. So, continuously flooded method was used in rice paddies, which means fields have standing water throughout the rice growing season and may only dry out for harvest. However, the organic matter in rice soil under flooded condition can emit a large amount of methane (CH₄) because of anaerobic decomposition. In contrast, there are at least once aeration period of more than three days, except for end-season drainage, during the cropping season by conducting intermittent flooded method after the cement ditches and reservoirs are built in this project activity. Since the CH₄ in rice paddies is produced by the anaerobic decomposition of organic matter after the flooding, allowing the field to drain halts CH₄ production, which happens in anaerobic condition, reducing the total quantity of CH₄ released during the cropping season. Moreover, the intermittent flooded method is more beneficial to water conservation, production increase and methane emission removal than the continuously flooded. The project aims to replace the traditional cultivation method by intermittent flooded method for GHG removal in the project zone. 12,300 ha (184,500 Mu¹⁰) of rice paddies are changed to apply intermittent flooded method in Fuyang District and Tonglu County, where the rice used to be cultivated under continuously flooded condition.

The project is conducted in Fuyang District and Tonglu County, where all the rice paddies belong to the farmers. During the construction period, Hangzhou Chunmeng invested and cooperated with Fuyang District and Tonglu County Agricultural Bureaus in the construction of ditches and reservoirs, while the local farmers were hired to build the ditches and reservoirs. During the operation period, Hangzhou Chunmeng is responsible for supervising technicians to patrol and maintain the ditches and reservoirs. Furthermore, as the owner of the rice paddies, these farmers

⁹ Source: The ex ante investigation report in Fuyang and Tonglu Area in 2017 from Zhejiang Academy of Social Sciences

¹⁰ A Chinese metric unit of area, 1ha = 15 Mu.

have right to authorize Hangzhou Chunmeng has overall control and responsibility for the carbon project as the project proponent without violating farmers' right. Search Co2 has researched on the application of intermittent flooded method in methane emission reduction in rice paddies, accompanying with China National Rice Research Institute, and applied for the patents. The patent names A method for reduction methane emissions in rice paddies by changing the rhizosphere oxygen environment, which provides intermittent flooded water regime as a method of changing the rhizosphere oxygen environment, thus resulting in reducing CH₄ emissions in rice paddies. Thus, Search Co2 has the mature technique and technical team, and it was entrusted and appointed by Hangzhou Chunmeng as the developer of rice emission reduction project. Therefore, it is responsible for helping the project proponent with development and management of the carbon project, including compiling the Monitoring and Quality Control Manual¹¹, organizing the training, etc., and it does not affect project proponent's rights and obligations as the project proponent. Moreover, the local agricultural bureau is responsible for technical training. Farmers are the main operators to practice intermittent flooded water regime and supposed to record the cultivation logbooks. The technicians should carry out monthly inspections according to the requirements of Monitoring and Quality Control Manual. The profit from this carbon reduction project is shared with farmers. The implementation of the project activity generates 59,943 tCO₂e/year and contributes to 4 SDGs.

This project is not located within a jurisdiction covered by a jurisdictional REDD+ program.

The implementation schedule of this project is listed as follows:

Date	Milestone (s) in the project's development and implementation
23-May-2017	Hangzhou Chunmeng held a general meeting of their stockholders and they decided to develop this project as a carbon trading project.
30-June-2017	The ex ante investigation report ¹² in Fuyang and Tonglu Area in 2017 from Zhejiang Academy of Social Sciences was completed
13 October 2017	Implementation Plan of Construction Project of Grain Production Functional Areas at Fuyang District, Hangzhou City, Zhejiang Province in 2017 was completed by Fuyang Agricultural Bureau

¹¹ Source: Monitoring and Quality Control Manual is Compiled by Search Co2 (Shanghai) Environmental Science & Technology Co. Ltd.

¹² The main contents of the ex-ante investigation report are divided into three parts: 1. the geographical and human conditions in the project area; 2. Rice planting before the project started operation; and 3. The economic income of local farmers.

23 October 2017	Implementation Plan of Construction Project of Grain Production Functional Areas at Tonglu County in 2017 was completed by Tonglu Agricultural Bureau
24-November-2017	The Notice on the Implementation Plan of Construction Task of Functional Areas for Grain Production in Hangzhou City in 2017 was issued by Hangzhou Agricultural Bureau ¹³
05-January-2018	Construction of rice fields in Functional Areas for Grain Production was started at Fuyang District
08-January -2018	Construction of rice fields in Functional Areas for Grain Production was started at Tonglu County
09-March-2018	The training was carried out in 2018
24-April-2018	All the construction of functional areas for grain production was finished and pass the acceptance.
10-June-2018	The project activity was started, which means the land preparation was started at Fuyang District and Tonglu County
12-October-2018	The harvest was started in 2018.
12-March-2019	The training was carried out in 2019
13-June-2019	The land preparation was started in 2019
17-October-2019	The harvest was started in 2019.
23-March-2020~29-March-202	Training 2020 was carried out. The training took the form of distributing learning materials that farmers in China could learn at home after the COVID-19 outbreak.
14-June-2020	The land preparation was started in 2020
15-October-2020	The harvest was started in 2020.
16-March-2021	The training was carried out in 2021
12-June-2021	The land preparation was started in 2021
12-October-2021	The harvest was started in 2021.
10-January-2022	Emission reduction purchase agreement
25-February-2022~25-March-2022	Public comment period
18-April-2022~22-April - 2022	VVB on-site visit

1.12 Project Location

¹³ Hangzhou Agricultural Bureau is the superior department in charge of Fuyang and Tonglu Agricultural Bureaus, and this document is the approval of Implementation Plan of Construction Project of Functional Areas for Grain Production at Fuyang District and Tonglu County, Hangzhou City, Zhejiang Province in 2017.

The project is implemented in Fuyang District and Tonglu County, under jurisdiction of Hangzhou City, Zhejiang Province, China. The geographical coordinates of the project are shown in the following Table 1-1.

Table 1-1 The geographical coordinates of Fuyang District and Tonglu County

Name of District/County	Geographical Coordinates
Fuyang District	119° 10'~119° 58' E, 29° 35'~30° 05' N
Tonglu County	119° 25'~120° 19.5' E, 29° 44'45"~30° 11'58.5"N

The locations of the project activity at Fuyang District and Tonglu County are illustrated in Figure 1-1. According to VCS standard, Fuyang District and Tonglu County are defined as the project zone, and the rice paddies applied intermittent flooded water regime at Fuyang District and Tonglu County are defined as the project area. Project zone is shown in Figure 1-2, and the KML file has also been submitted. The map of the project boundary is provided as the Figure 1-3 below, and the yellow sections show the specific project areas.

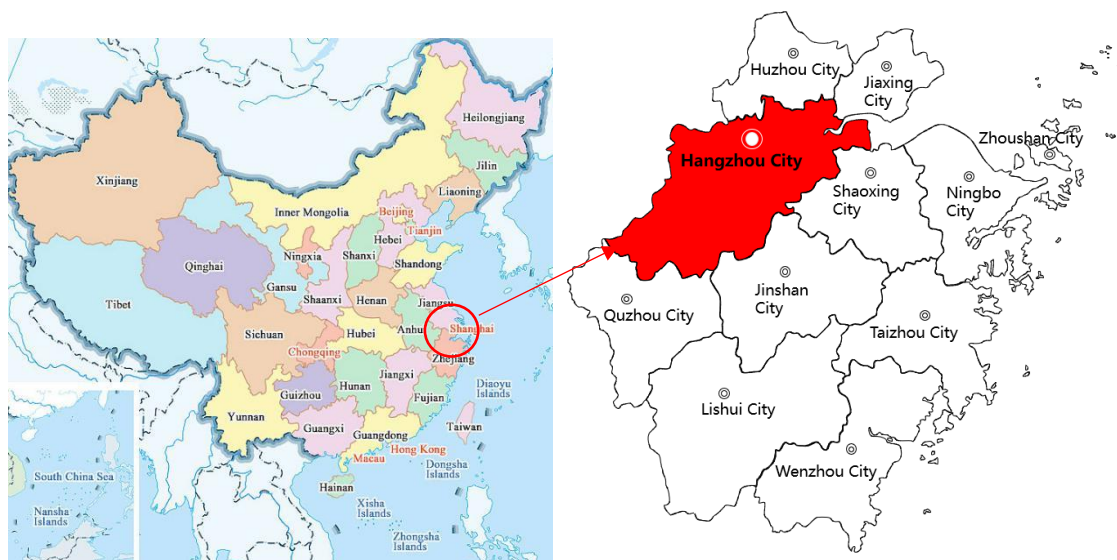


Figure 1-1 The map of Zhejiang Province, China



Figure 1-2 The map of project zone – Fuyang District and Tonglu County

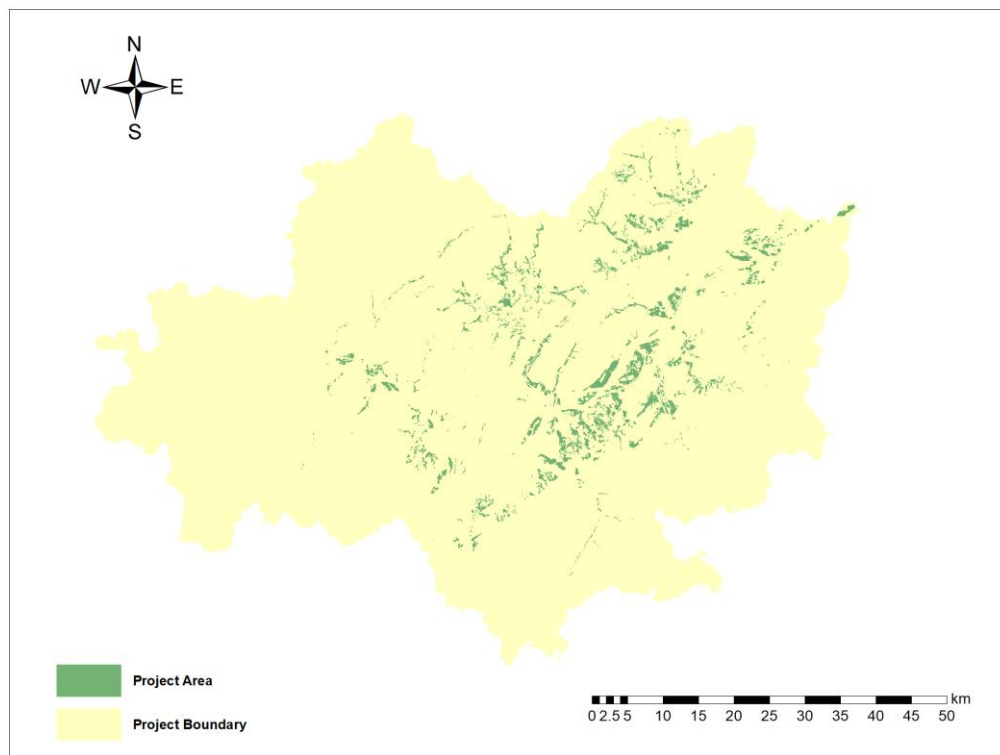


Figure 1-3 The map of the project area

1.13 Conditions Prior to Project Initiation

Prior to the project initiation, economic conditions in the project area are backward and the level of education is relatively low¹⁴, so farmers lack advanced irrigation technologies like intermittent flooded water regime. However, intermittent flooded water regime requires that irrigation and drainage can be controlled according to the growth needs of rice during its cultivation. Whereas, the low economic level leads to the low income of farmers¹⁴, which means that farmers have no additional economic capacity to afford the construction of cement ditches which are able to practice controllable irrigation and drainage. So, the project has not been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.

Since the conditions existing prior to the project initiation is the same as baseline scenario, please refer to Section 3.4 (Additionality) to see the detail information. Besides, this project does not affect the environmental conditions, including climate, hydrology, topography, soils, relevant historical conditions, type of vegetation, ecosystems, etc., so, the present and prior environmental conditions of this project are the same, which are listed as follows.

Conditions	Fuyang District	Tonglu County
Climate	The climate of Fuyang district belongs to subtropical monsoon climate, which is characterized by cold winter and hot summer with four distinct seasons. There are abundant rainfall and sufficient light. Besides, the rain and heat are synchronous in spring and summer, and the light and temperature are complementary in autumn and winter. In spring, the average temperature is 19.1 °C , the precipitation is 426.80 mm, the rainy days are 41.7 days and the sunshine is 351.1 hours. In summer, the average temperature is 26.5 °C , the precipitation is 546.60 mm, the rainy days are 44.7 days and the sunshine is 649.4 hours. In autumn, the average temperature is 14.5 °C , the	The climate of Tonglu County belongs to subtropical monsoon climate with four distinct seasons, sufficient sunshine and abundant precipitation. Light, temperature and water basically increase and decrease synchronously throughout the year, with good coordination and rich climate resources. The annual average temperature is 16.5 °C . The annual average rainy day is 161 days. The average annual precipitation is 1552 mm. The annual average relative temperature is 79%, and the interannual variation is small, ranging from 76% to 81%. The frost-free period is 258 days ¹⁶ .

¹⁴ The ex ante investigation report in Fuyang and Tonglu Area in 2017 from Zhejiang Academy of Social Sciences

¹⁶ <https://baike.baidu.com/item/%E6%A1%90%E5%BA%90%E5%8E%BF/5956158?fr=aladdin>

Conditions	Fuyang District	Tonglu County
	precipitation is 144.80 mm, the rainy days are 20.5 days and the sunshine is 297.1 hours. In winter, the average temperature is 6.4 °C, the precipitation is 339.60 mm, the rainy days are 45.4 days and the sunshine is 365.6 hours ¹⁵ .	
Hydrology	All the rivers in Fuyang District belong to the Qiantang River system. The Fuchun River runs through the central part of the city, with a total length of 68 km and a flow of 52 km. It flows through Fuyang, Luzhu River, Huyuan River, Xinqiao River, evergreen River, Longmen River, Qingyunpu River, Dayuan River, Xiaoyuan River, Yushan River, etc., and flows into the East China Sea along the Qiantang River ¹⁵ .	Fuchun River and Fenshui River run through the whole territory, with rich water resources. There are Fuchun River reservoir, Fenshui River Reservoir and other national large and medium-sized reservoirs. The area of rivers and lakes reaches 71.10 square kilometers, with good water quality, no pollution and low mineralization, which is suitable for long-term drinking. The water quality of Fuchun River in Tonglu County has been better than that of entry for five consecutive years ¹⁷ .
Topography	The overall landform of Fuyang district is characterized by "one river sandwiched between two mountains", which are Tianmu Mountain located in the northwest, Xianxialing mountain located in the southeast and Fuchun River running from Southeast to Northwest between the two mountains. The terrain inclines from southeast and northwest to the middle. The mountainous and hilly area is 1439.6 square kilometers, accounting for 78.61% of the total urban area, while the area of plain and	Tonglu County is mainly hilly and mountainous area with few plains. Surrounded by mountains, the middle is a narrow valley plain, and hills are scattered between mountains and plains. Guanyinjian, the main peak of Longmen Mountain, is the highest peak in the territory, with an altitude of 1246.5 meters. In the land area of the whole county, mountains and hills account for 86.3%, and

¹⁵https://baike.baidu.com/item/%E5%AF%8C%E9%98%B3%E5%8C%BA/10366004?fr=aladdin#3_4

¹⁷ <https://lszhlv.kuaizhan.com/71/68/p408246015af739>

Conditions	Fuyang District	Tonglu County
	basin is 299.63 square kilometers, accounting for 16.36%. Moreover, the water area is 91.98 square kilometers, accounting for 5.02% ¹⁵ .	plains and waters account for 13.7% ¹⁸ .
Soils	The main soil types in Fuyang district are divided into 6 main classes, 13 sub classes, 28 soil genera and 50 soil species. The six types are red soil, yellow soil, limestone, coarse bone soil, fluvo aquic soil and paddy soil. Red soil and paddy soil are the main soils in the whole area. Red soil is 1066.20km ² , accounting for 57.95% of the total area while paddy soil is 403.59km ² , accounting for 21.94% ¹⁹ .	Tonglu County has 5 soil types, 11 subcategories, 29 soil genera and 56 soil species, including red soil, yellow soil, lithologic soil, tidal soil and paddy soil. Agricultural soils mainly include paddy soil and red soil ²⁰ .
Relevant historical conditions	On 18 January 1994, with the approval of the State Council of the People's Republic of China, Fuyang County was abolished and Fuyang City was established. On 04 February 2014, the people's Government of Zhejiang Province issued the notice on revoking Fuyang City and establishing Fuyang District of Hangzhou City ²¹ .	In May 1949, the CPC Tonglu and Fenshui County committees were established to abolish Baojia and implement the three-level system of county, district and township. Tonglu County has 5 districts and 24 townships, while Fenshui county has 4 districts and 17 townships. After the foundation of the people's Republic of China, Tonglu and Fenshui belonged to Jiande district (initially known as the Fourth District). In March

¹⁸ <https://baike.baidu.com/item/%E6%A1%90%E5%BA%90%E5%8E%BF/5956158?fr=aladdin>

¹⁹ Danyu Si, Geochemical evaluation of land quality based on space technology [D], Zhejiang University, 2016

²⁰ Zhong Ying, etc., Analysis of soil fertility status and its changing characteristics in Tonglu County [J], Zhejiang Agricultural Sciences, 2015, 56(07):1107-1109

²¹ https://baike.baidu.com/item/%E5%AF%8C%E9%98%B3%E5%8C%BA/10366004?fr=aladdin#3_4

Conditions	Fuyang District	Tonglu County
		1950, it was changed to Lin'an special area. In 2011, Zhejiang Province approved to cancel the establishment of Fengchuan Town, and its administrative area was directly under the jurisdiction of Tonglu County Government²².
Type of vegetation	In 2016, there were 1.946 million mu of forest land and 1.669 million mu of forest land in Fuyang District, including 500000 mu of bamboo and 436000 mu of Phyllostachys pubescens forest, with a forest volume of 5.559 million cubic meters and a forest coverage rate of 63.1%²¹.	Tonglu County is rich in plant resources, with 15 kinds of protected plants. Tonglu County now has an ecological public welfare forest area of 7.46 million ha, including 42700 ha of key public welfare forests, 1.39 million ha of municipal public welfare forests and 18100 ha of county-level public welfare forests²³.
Ecosystems	In Fuyang District, there are 45 <i>Taxus chinensis</i>, among which 27 are ancient and famous trees. There are 5870 <i>Torreya grandis</i>, 4536 <i>Torreya grandis</i>, 336 <i>jinqiansong</i> and 36 palm trees; Pangolin is a national first-class protected animal²⁴. Moreover, it has the largest wildlife world in East China, with hundreds of rare birds and animals from all over the world and nearly 10000 first and second class protected animals in China, such as white lion, white tiger,	Tonglu County has carried out biodiversity investigation year by year to find out the background of biological resources in the county. 118 species of plants belonging to 60 families, 18 species of amphibians belonging to 7 families, 36 species of fish belonging to 8 families and 27 species of benthos belonging to 4 categories were found in the county, including 2 species of animals and plants under national first-class protection,

²² <https://baike.baidu.com/item/%E6%A1%90%E5%BA%90%E5%8E%BF/5956158?fr=aladdin>

²³ <https://www.docin.com/p-56930079.html>

²⁴ http://fydaily.fynews.com.cn/html/2014-08/30/content_6_1.htm

Conditions	Fuyang District	Tonglu County
	white rhinoceros, giant panda, golden monkey, etc ²⁵ .	33 species of animals and plants under national second-class protection and 30 species of animals and plants under key protection in Zhejiang Province; 154 species of birds belonging to 16 orders and 46 families were investigated, and 88 species were supplemented, belonging to 13 orders and 38 families ²⁶ .

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project conforms to all kinds of regulations, which are listed as below:

PRC Constitution, PRC Agricultural Law, Law of the PRC on Land Administration, Implementing Regulations of the Law of the PRC on Land Administration, Law of the PRC on Rural Land Contracting, PRC Production Safety Law, and PRC Labour Law.

- Notice on Printing and Distributing of the National Plan (2009-2020) for Newly Increased Grain Production Capacity of 100 billion Cattles
- Opinions on Strengthening the Construction and Protection of Food Production Functional Areas (Issued by Zhejiang People's Government Office [2010] No.7)
- Design Specification for Irrigation and Drainage Engineering (GB50288-1999)
- Technical Specification for Water-saving Irrigation Engineering (GB/T50363-2006)

According to the Inspection and Acceptance Report of the project, during the construction of cement ditches, the requirements of *Design Specification for Irrigation and Drainage Engineering (GB50288-1999)* and *Technical Specification for Water-saving Irrigation Engineering (GB/T50363-2006)* have been followed, which requires no harm to the surrounding soils. Besides, the construction of farmland in Functional Areas for Grain Production also followed the

²⁵ <https://baike.baidu.com/item/%E6%9D%AD%E5%B7%9E%E9%87%8E%E7%94%9F%E5%8A%A8%E7%89%A9%E4%B8%96%E7%95%8C/5901418?fr=aladdin>

²⁶ <https://baijiahao.baidu.com/s?id=1700771353222454099&wfr=spider&for=pc>

requirements of *PRC Agricultural Law, Notice on Printing and Distributing of the National Plan (2009-2020) for Newly Increased Grain Production Capacity of 100 billion Cattles*, and *Opinions on Strengthening the Construction and Protection of Food Production Functional Areas (Issued by Zhejiang People's Government Office [2010] No.7)*, without causing negative impact on the local ecological environment. Besides, the project will be subject to regular inspection by local government during the implementation period to ensure continuous compliance.

1.15 Participation under Other GHG Programs

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

The project has not been registered or is seeking registration under any other GHG programs. This project is seeking registration only in VCS program.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

According to China's national emissions trading scheme, only the high-emission industries are included, covering thermal power generation, petrochemical, chemical, building materials, iron and steel, non-ferrous, paper, aviation and other key emission industries that emitted at least 26,000 tCO₂e in any one year from 2013 to 2016, without renewable project²⁷. Moreover, the project proponent, including this project activity, is except for mandatory emission control scheme²⁸. Therefore, this project will not and cannot be double counted.

The project is not involved in an emission trading program or any other mechanism that includes GHG allowance trading and also has not been rejected by other GHG program. GHG emission reductions and removals generated by the project will not be used for compliance under any programs or mechanisms.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit.

1.17 Sustainable Development Contributions

²⁷ https://www.mee.gov.cn/xxgk/xxgk05/202103/t20210330_826728.html

²⁸ https://www.mee.gov.cn/xxgk/xxgk03/202012/t20201230_815546.html

1.17.1 Sustainable Development Contributions Activity Description

The Project may contribute to achieving sustainable development as following:

- High yield brings extra income and improves the living standard of local farmers
- Women are given priority for employment and their social status is raised
- Provide more job opportunities for local farmers
- Sequester greenhouse gas and mitigate climate changes

Goal 1	Higher income
Provisions for monitoring and reporting the Goal	Payroll of the workers who worked as technicians related to the project, and the questionnaires on the increase of farmers' income.
Affected Stakeholder Group(s)	A total number of 3,466 households is 13,127 farmers who are involved in this project
Expected Achievement	Agricultural farming is a major source of income for the farmers in the project zone. Therefore, the increase of yield is of great importance for them, which can increase their income. The project will provide provision of technicians during the operation of the project, which could help them gain extra money.

Goal 5	Help in gender equality
Provisions for monitoring and reporting the Goal	The payroll of female workers.
Affected Stakeholder Group(s)	Women workers within the project area
Expected achievement	23 new job opportunities for technicians would be created by this project, and the women shall be given priority for employment which improves their social status.

Goal 8	More job opportunities and growth of local economy
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Provisions for monitoring and reporting the Goal	Payroll of the workers who worked as technicians related to the project, and the questionnaires and interviews on the increase of farmers' income.
Affected Stakeholder Group(s)	A total number of 3,466 households is 13,127 farmers who are involved in this project
Expected achievement	In order to practice the intermittent flooded method, some better irrigation and drainage facilities should be provided, such as the cement ditches and reservoirs. In this case, a large number of job opportunities could be created for the farmers involved in this project, including building the ditches and reservoirs, working as technicians, etc. Therefore, the male adults working outside the Fuyang District and Tonglu County would come back to make contribution to their hometown.
Goal 13	CH ₄ emission reduction
Provisions for monitoring and reporting the Goal	The Reports of Effect on Methane Emission Rate in Rice Paddies with Adjusted Water Management in Fuyang and Tonglu Area from China National Rice Research Institute were used to prove the amount of net GHG emission reduction.
Affected Stakeholder Group(s)	Farmers within the project area
Expected achievement	It is expected to reduce 59,943 tCO ₂ e every year by conducting this project, because the duration of anaerobic decomposition of soil organic matters in rice paddies is shorten by replacing continuously flooded with intermittently flooded.

1.17.2 Sustainable Development Contributions Activity Monitoring

By the end of this monitoring period (December 2021), the project has been running for four years, and all the rice paddies of 12,300 ha have been planted with intermittent flooded water regime. Since intermittent flooded water regime enables rice to be planted under the appropriate conditions, flooded or dry out, according to different stages of growth, this project increases farmer' income by higher rice yield, contributes to gender equality by giving priority to women during job recruitment, provides extra job opportunities and money by hiring farmers as technicians and reduces methane emissions from rice paddies.

The specific SDG Targets contributed by this project and its corresponding provisions for monitoring and reporting have been described in detail in Table 1-1 below.

The evidence for each contribution has been identified and provided as appendices to this project, since these are sensitive information and the project proponent is unwilling to disclose them. The corresponding evidences have been submitted to VVB and can also be submitted to Verra if required.

Table 1-2: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	1.4	The growth of farmers' income	Implemented activities to increase	Firstly, according to questionnaires ²⁹ , farmers income has been increased because of the 10% higher rice yield. Secondly, 23 farmers were hired as technicians with a salary of CNY150 per month, which provides them with extra money.	according to questionnaires ³⁰ , farmers income has been increased because of the 10% higher rice yield. Secondly, 23 farmers were hired as technicians with a salary of CNY150 per month, which provides them with extra money.
2)	5.5	The percentage of women hired in this project.	Implemented activities to increase	In this project, 23 new job opportunities for technicians were created to do methane monitoring, maintenance of ditches and reservoirs, among which 65% are female workers ³¹ .	In this project, 23 new job opportunities for technicians were created to do methane monitoring, maintenance of ditches and reservoirs, among which 65% are female workers

²⁹ Stakeholder Satisfaction Questionnaires from farmers

³⁰ Stakeholder Satisfaction Questionnaires from farmers

³¹ Payroll of female workers

3)	8.5	The number of job opportunities provided by this project to local farmers	Implemented activities to increase	In this project, 23 new job opportunities for technicians with a salary of CNY 150 per month were created to do methane monitoring, maintenance of ditches and reservoirs ³² .	In this project, 23 new job opportunities for technicians with a salary of CNY 150 per month were created to do methane monitoring, maintenance of ditches and reservoirs.
4)	13.0	Tons of greenhouse gas emissions avoided or removed	Implemented activities to increase	This project reduces about 240,357 tCO ₂ e emissions from 10-June-2018 to 31-December-2021 ³³ , with an average annual GHG emission reduction of 60,089 tCO ₂ e.	This project reduces about 240,357 tCO ₂ e emissions from 10-June-2018 to 31-December-2021 ³⁴ , with an average annual GHG emission reduction of 60,089 tCO ₂ e.

³² Technician Recruitment Appointment Contract

³³ Since the amount of methane emissions reduced shall be calculated based on the parameters of $A_{s,g}$ (area of project fields of group g in season s), $EF_{BL,s,g}$ and $EF_{P,s,g}$ (baseline and project emission factors of group g in season s), please refer to Section 6.5 of this monitoring report for more details.

³⁴ Since the amount of methane emissions reduced shall be calculated based on the parameters of $A_{s,g}$ (area of project fields of group g in season s), $EF_{BL,s,g}$ and $EF_{P,s,g}$ (baseline and project emission factors of group g in season s), please refer to Section 6.5 of this monitoring report for more details.

1.18 Additional Information Relevant to the Project

Leakage Management

According to the applied methodology: *Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation*, any effects of the project activity on GHG emissions outside the project boundary are deemed to be negligible and do not have to be considered under this methodology. So, leakage does not need to be considered.

Commercially Sensitive Information

None of the project documents will be considered commercially sensitive information, and all the documentation is available to any stakeholders.

Further Information

There is no any further information that may have a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

The potential negative environmental and socio-economic impacts and steps to mitigate them have been summarized in the following table:

Environmental		Socio-Economic	
Potential Negative Impacts	Actions	Potential Negative Impacts	Actions
During the construction, a large amount of construction waste could be generated, which has a negative impact on water resources, air quality and soil quality.	During the construction process of the project, the construction waste should be uniformly classified and collected according to the requirements of Hangzhou Management and Implementation Measures	The construction of the project may prevent farmers from carrying out other farming activities and lose income from their produces.	Project proponent provided a part of funds as subsidies to farmers involved in this project to ease their economic pressure ³⁶ .

³⁶ Carbon reduction project cooperation agreement signed between the farmers and Hangzhou Chunmeng

	of Engineering Residue ³⁵ . The construction entity shall provide personnel in charge of the discharge of construction wastes at the construction site, supervise the standard shipment of construction wastes at the construction site, and ensure that the transport vehicles are washed clean before leaving.		
During the construction, the construction dust could be produced, which could form haze and harm the air quality.	During the construction, water should be sprayed frequently to reduce the negative impacts brought by the dust.	If the intermittent flooded method cannot be conducted strictly during rice cultivation within the project area, then the yield would not be great and the income will not be increased.	The relevant training should be conducted every year and the technician should also give timely guidance during every monthly inspection.

2.2 Local Stakeholder Consultation

Stakeholder consultation

Before the project started, on 15 June 2017, Zhejiang Academy of Social Science held a stakeholder meeting, including the content of the consultation, and asked residents about their willingness to participate. About a week before the meeting, the project proponent posted the meeting notice on the notice board in each village, including the meeting time and main topics. After the meeting, Zhejiang Academy of Social Science organized a team of people to interview the village representatives, relevant government officials and distribute the questionnaires to gather local farmers' opinions. The ex-ante survey is aimed at the farmers from households involved in the project. According to the *Standard for Sampling Surveys for CDM Project Activities and Programme of Activities (v9.0)*, the number of households involved was too large and scattered to carry out a census. Moreover, households are homogeneous which is suitable for

³⁵ http://www.hangzhou.gov.cn/art/2016/4/26/art_1229063382_1760093.html

simple random sampling. Thus, random sampling is used for the survey, and the calculation is shown as follows.

$$n \geq \frac{1.645^2 \times N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.645^2 \times p(1-p)}$$

Where:

Parameters	Description
n	Sample size.
N	The total number of households, is 13,127 as stated in Section 2.5 below.
p	The expected value is 0.77 based on the experience of the Zhejiang Academy of Social Sciences combined with the local condition.
1.645	Represents the 90% confidence as required in the Standard that 90/10 confidence/precision as the criteria for the reliability of sampling efforts for small-scale CDM project activities.
0.1	Represents the 10% relative precision.

Thus, substituting in the values gives:

$$n \geq \frac{1.645^2 \times 13,127 \times 0.77 \times (1-0.77)}{(13,127-1) \times 0.1^2 \times 0.77^2 + 1.645^2 \times 0.78 \times (1-0.77)} = 81$$

The final result is $n \geq 81$, which means the sample size at least is 81 in this ex-ante survey. Under the conservative principle of the sample survey, a total of 100 questionnaires were distributed and returned before the meeting. Since Zhejiang Academy of Social Sciences is a national-level public academic institution, the sample size of 100 is used as the representative of the households involved, which is reliable based on their experience.

- Most farmers are aware of the benefits of adjusted water management during rice cultivation. They understand that the intermittently flooded method can reduce methane emissions, save water-resource, and increase rice productivity.
- Prior to the meeting, most local farmers had never heard of carbon trading, VCS or carbon credits. After the introduction, they strongly agreed that the project should be registered as a carbon reduction project and participate in the carbon trading market.
- Local farmers believe that the project can 1) create jobs; 2) get more benefits from selling carbon credits; 3) reduce methane emissions, save water-resource, and increase rice productivity; and 4) improve the social status of women by hiring them to be technicians.
- Local Agricultural and Rural Committee is very clear about the benefits of the intermittently flooded cultivation method and understands that carbon trading can make projects more sustainable.

Table 2-1 Background information of these 100 stakeholders

Categories	Proportion
Nationality	4% of them are Hui, 1% of them are Miao and the rest are Han.
Educational Level	20% and 19% are at the primary and high school levels, respectively, with the rest are all at the junior high school level.
Career	Mostly farmers, only 21% work for factories and 1% are village officials
Gender	68% are female and 32% are male.
Age-bracket	32~54 years old

Table 2-2 Survey Results Summary Sheet

Question	Survey Result	
	Fuyang District	Tonglu County
How many people in your family? How much is the annual income? What are the main economic sources?	The average number of people is 3.65 in one family and the average annual income is CNY 19,870. The main economic source is planting rice.	The average number of people is 4.14 in one family and the average annual income is CNY 17,945. The main economic source is planting rice.
Do you think the intermittently flooded water regime is good for rice cultivation?	It is favourable.	It is favourable.
What do you know about the benefits of the intermittently flooded water regime?	Reduce methane emissions, save water resource and increase the rice productivity	Reduce methane emissions, save water resource and increase the rice productivity
What industries does your family member work in?	Labor and farming	Labor and farming
What kind of production activities does your family do?	Crop farming	Crop farming
What is your educational level?	67% are middle school level, 12% are high school level and the rest are primary school level.	71% are middle school level, 15% are high school level and the rest are primary school level.
Is the land ownership involved in the project clear?	Yes.	Yes.

Did you know carbon trading before?	Most people had never known.	Most people had never known.
Through the staff's introduction to carbon trading, do you support this project's application for development as a carbon reduction project?	Definitely support.	Definitely support.
If this project is successfully applied for development as a carbon reduction project, what benefits do you think can be brought?	Create more job opportunities for economic benefits, improve the local environment, reduce methane emissions, save water resource, and increase the rice productivity.	Create more job opportunities for economic benefits, improve the local environment, reduce methane emissions, save water resource, and increase the rice productivity.
Do you support hiring women to participate in rice cultivation and management in this project?	Yes.	Yes.
Do you think there is anything that needs to be improved in the design or implementation of this project? Please provide your valuable comments.	There are some comments came up from farmers: 1. They worried that they cannot afford the self-raised part of construction funds. 2. They worried that they cannot conduct the intermittent flooded water regime well. Firstly, during the stakeholders meeting, the representatives of Hangzhou Chunmeng and local agricultural bureaus explained that the government and Hangzhou Chunmeng would jointly fund the construction of farmland in Functional Areas for Grain Production to reduce the economic burden on farmers. For the second problem, expert from local agricultural bureaus and technical team from Search Co2 train the technicians every year, and the technicians also train farmers every March to master their skills of practicing intermittent flooded water regime. Lastly, the farmers represent that they have no comments.	

Therefore, the stakeholders have no opinions on the project implementation, and there is no need to change the project design.

The mechanism for ongoing communication with local stakeholders.

There is a Suggestion Book published with the phone number of contact person on the notice board in each of villages throughout the lifetime of the project. Stakeholders can write their comments or suggestions in the book anytime anonymously as they wish. The project proponent will check the book regularly and collect all the comments received.

Besides, the technicians as the project monitoring executor have surveyed the project area. The distance from one village to another is so short that the locals can talk directly to the technicians or even the local agricultural bureaus if they have any opinions. Meanwhile, technicians would also pay a regular visit to the villages and collect comments if any. So, the stakeholders have been and will be communicated on the followings.

- During the stakeholders' meeting before the implementation of this project, the project proponent and local agricultural bureaus have explained all the designs of farmland construction in Functional Areas for Grain Production and carbon development project. During the operation phase, all the stakeholders have been and will be communicated about the results of monitoring through villagers' meetings
- During this monitoring period since the project has been running for four years, 12,300 ha rice paddies have been equipped with reservoirs and cement ditches to conduct controllable drainage and irrigation, where the water regime applied during rice cultivation has been changed from a continuously flooded method to intermittent flooded method. In this case, 240,357 tCO₂e emissions have been reduced. All the ditches and reservoirs were operating well without damages and farmers were familiar with the intermittent flooded water regime gradually because of the project.
- Also, in the stakeholder's meeting before the project started, the project proponent once explained the potential costs, risks, and benefits the project may bring to local stakeholders. During the monitoring period, all the risks, costs, and benefits that the project proponent has communicated with the stakeholders remain unchanged. Moreover, through the daily visits of technicians, the potential costs, risks, and benefits of this project were conveyed and explained to relevant villagers and stakeholders again for further feedback.
- During this monitoring period, the representative of Hangzhou Chunmeng, under the supervision of the local agricultural bureau and government, has also informed farmers of all relevant laws and regulations covering workers' rights in the host country.
- After this Joint Project Description and Monitoring Report was submitted to the VVB, the monitoring plan and manual in Chinese were also posted on notice boards of these villages. Moreover, the on-site verification was from 18-April-2022 to 22-April-2022, and when the project proponent and Search Co2 confirmed the specific on-site visit time, the technicians started to inform the farmers to participate in the on-site stakeholder's interview through door-to-door announcements and posting meeting notices. The phone number of the project contact person was also attached to the meeting notice, so the villagers can directly submit

the problem about the project. No comments from the villagers were received during this monitoring period

2.3 Environmental Impact

According to the Environmental Impact Assessment Law of the People's Republic of China, this project does not require any environmental impact assessments. The environmental impacts, both positive and negative, produced during construction and operation of this project activity and the mitigation of negative impact are summarized as follows.

Stages	Positive impact	Negative impact and its mitigation
Construction period	In the process of construction, the soil has been turned from a deep level, which can improve the soil structure to a certain extent.	(1) - Negative impact: During the construction, a large amount of construction waste could be generated, which has a negative impact on water resources, air quality and soil quality. - Its mitigation: During the construction process of the project, the construction waste should be uniformly classified and collected according to the requirements of Hangzhou Management and Implementation Measures of Engineering Residue³⁷. The construction entity has appointed personnel in charge of the discharge of construction wastes at the construction site,

³⁷ http://www.hangzhou.gov.cn/art/2016/4/26/art_1229063382_1760093.html

		supervise the standard shipment of construction wastes at the construction site, and ensure that the transport vehicles are washed clean before leaving (2) ● Negative impact: During the construction, the construction dust could be produced, which reduces the air quality. ● Its mitigation: During the construction, water should be sprayed frequently to reduce the negative impacts brought by the dust. According to the Standard for Safety Inspection of Building Construction (JGJ59) ³⁸, dustproof measures must be taken at the construction site. Since all the construction sites of this project has passed the acceptance, it means that the corresponding dustproof measures have been taken during the construction period.
Operation period	● Drainage and irrigation can be controlled, so water resources could be saved compared to the	● Negative impact: In the course of drainage, if the ditches are damaged, the discharged water

³⁸ <https://www.waizi.org.cn/bz/61496.html>

	original continuously flooded method. ● Drainage and irrigation can be controlled, so methane emissions from soil organic matter under flooded conditions during rice cultivation can be reduced.	may not be discharged into the reservoir in accordance with the set route and contaminate other water resources ● Its mitigation: Since each technician is in charge of several villages, farmers would immediately call the technician if a ditch broke down in their fields. If it is a minor problem, including a blocked water outlet, the technician shall be on site within an hour to solve it. If the technician cannot solve the problem, they should immediately inform Search Co2 and contact the local agricultural bureau to activate the emergency mechanism and take corresponding measures. For example, if the ditch is broken or leaking, the repair shall be arranged within 24 hours. Because this project has been operated since 2018, all the ditches and reservoirs have been in good operation without any damages. Besides, during the yearly technicians' training, technicians have been received relevant emergency
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		training. Moreover, Search Co2 has rich experience in this kind of rice emission reduction project, thus, they are competent enough to deal with these emergencies.
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2.4 Public Comments

The project documents have been open on VCS websites for public comments, and local communities and other stakeholders can easily download them from the website. The periodic development progress of the project was published on the notice board of each village, with contact information attached. If there is any negative feedback, a meeting will be immediately held in the village. No comments have been received during the public comments period.

Futong Adjusted Water Management in Rice Cultivation

ID: 2771

Program: VCS

Public Comment Period Type: Validation

Location: China

Project Activity: ALM

Sectoral Scope: 14. AFOLU

Methodology: AMS-III.AU

Estimated Annual ERRs: 59, 943 tCO₂e

Public Comment Period: 25 February 2022 – 25 March 2022

2.5 AFOLU-Specific Safeguards

1. Stakeholder Identification

This stakeholder's identification started by listing all the people or groups who might have an influence over or be impacted by a project. The local village committees and village officials were considered as the key informants and focus groups who know best about the local farmers. In June 2017, the project proponent and Zhejiang Academy of Social Sciences held a consultant meeting with local village committees before the project start, and the main purpose of the meeting was to identify the stakeholders in the project.

- 1) Village residents: (including 13,127 local farmers within 3,466 households of which 8,795 are females, accounting for about 67%)

In Fuyang District and Tonglu County, a total of 13,127 farmers have been directly affected by the activities of the project. In addition, the rice paddies in the project area belong to these farmers. Hence, the village committees collected the opinions and consent of the farmers in respective villages through face-to-face meetings before deciding to apply to the local governments and agricultural bureaus for using intermittent flooded method through participation in the Construction Project of Grain Production Functional Area³⁹ (hereinafter referred to as CPGPFA). These farmers were also responsible for signing the cooperation agreements with the project proponents to ensure the proper development of the project.

Since June 2017, before the project started, the village committees conducted a survey of the local farmers' willingness to participating in the CPGPFA for applying the intermittent flooded method during rice cultivation. This was done through meetings and interviews with farmers. All the farmers agreed to use this advanced cultivation method in the end.

The meeting held on 15 June 2017 was attended by the representatives of agricultural bureaus of Fuyang District and Tonglu County, the representatives of Hangzhou Chunmeng, the representative of Search Co2, the representatives of farmers, and the representatives of the village committees. The theme of the meeting was to solicit farmers' suggestions on the implementation of project activities and their willingness to participate in rice planting.

This project activity has greatly benefited the local farmers and could only carry out with the farmers' consent. Hence, all the farmers within the project area are recognized to be stakeholders in the project.

- 2) Agricultural Bureaus of Fuyang District and Tonglu County

The techniques of intermittent flooded method are provided by the local agricultural bureaus, which inspects successful rice cultivation. In this respect, the farmers, the committees, the local governments granting permission and local agricultural bureau providing advice and inspections, are all identifies as relevant stakeholders in this project.

- 3) Local governments of Fuyang District and Tonglu County

The local administration is responsible for the local social and environmental management. They are responsible and accountable to all local farmers for any violation of their rights.

- 4) Village committees of Fuyang District and Tonglu County

They are responsible for collecting opinions from the respective locals and villages with the project proponent or agricultural bureaus.

³⁹ This project is government-led, involving the construction of ditches and the leveling of rice paddies, and voluntary participation is applied for by farmers

The results of identified stakeholders will be publicly announced on VCS website as part of the draft PD which can be accessed by everyone, in case there is any other person who may consider themselves as one of the project's stakeholders, they can directly contact the project owner for consultation.

2. Potential Risks and Measures

Potential risks to stakeholders	1. During the implementation of the project, since it is necessary to go to the field every day to observe the growth of rice and the change of water level, drainage and irrigation are carried out from time to time, which increases the chances of farmers encountering dangers, such as slipping while checking the field. 2. During the implementation of the project, the rice yield may be affected due to weather, natural disasters. 3. Project development failed to increase production and carbon benefits as expected.
Measures to mitigate it	1. All these potential risks should be told to the stakeholders in advance and some simple first aid measures also need to be communicated to farmers during training to reduce the injuries. 2. During the implementation of the project, the local agricultural bureaus issue disaster warnings to minimize the impact on farmers. 3. Experts from China National Rice Research Institute guide the work to ensure rice production. Hangzhou Chunmeng and Search Co2 provided the farmers with professional technical support to ensure the carbon benefits.

Prior to the project implementation, these soil ditches cannot be controlled by irrigation and drainage, so rice has to be cultivated under the conditions of continuously flooded method, which leads to a lower productivity and the poor income of local farmers. After the construction of the cement ditches, farmers volunteered to conduct intermittent flooded water regime, because it allowed them to irrigate and drain the rice according to its growth needs, resulting in higher yields⁴⁰. Besides, the 12,300 ha of construction land within the project has been agricultural land

⁴⁰ Which is stated in Technical Guidelines for Techniques of Carbon Emission Reduction in Rice Paddies in Zhejiang Province

since 2005, which has been proved by Fuyang and Tonglu Agricultural Bureaus⁴¹. In addition, this project activity only adjusts the water regime during rice cultivation but not changes the type of land use, therefore, the project would not impact local stakeholder's property rights without the free, prior and informed consent.

Feedback and Grievance Redress Procedure

There is a Suggestion Book published with the phone number of contact person on the notice board in each of villages throughout the lifetime of the project. Stakeholders can write their comments or suggestions in the book anytime anonymously as they wish. The project proponent will check the book regularly and collect all the comments received. If there is a conflict of interest between the parties, the stakeholders can appeal to the local agricultural bureau through the village representative or directly, which is the most effective way to solve the problem. They appeal through the phone number of the relevant contact or file a complaint during the meeting.

The project proponent has appointed a staff member to record and collect conflicts and dissatisfaction between local communities and individual villagers. Technicians' monthly inspection play an important role in dealing with conflicts and dissatisfaction and report to the agricultural bureau. Upon receipt of the technicians' report, the relevant management unit should contact and discuss with the relevant community or other stakeholders within 3 days. Based on the information collected by the relevant parties, the specific staff member shall propose a solution and mediation plan within one week and solve the conflict within 30 days.

- the location of communities, local stakeholders, and areas outside the project area that are predicted to be impacted by the project

As defined in Section 1.12, only the rice paddies applied intermittent flooded water regime at Fuyang District and Tonglu County are defined as the project area. Thus, the locations of communities and local stakeholders outside the project area are predicted to be impacted by the project, but these locations are still within the project zone, Fuyang District and Tonglu County. The detailed information of conditions prior to project initiation in Fuyang and Tonglu County have been described in Section 1.11.

- The location of territories and resources what local stakeholders own or to which they have customary access

According to the Land Management Law of China⁴², there are three legal categories of land in China based on their using purpose, which are agricultural land, construction land and unused land. The term "agricultural land" refers to the land directly used for agricultural production, including cultivated land, forest land, grassland, land for farmland water conservancy, water surface for breeding, etc. "Construction land" refers to the land for buildings and structures,

⁴¹ Evidence on Certificate of Eligibility for Land provided by Hangzhou Agricultural Bureau, which is the superior authority of Fuyang District and Tonglu County

⁴² <http://www.npc.gov.cn/npc/c30834/201909/d1e6c1a1eec345eba23796c6e8473347.shtml>

including land for urban and rural housing and public facilities, land for industry and mining, land for transportation water conservancy facilities, land for tourism, land for military facilities, etc. Moreover, “unused land” refers to land other than agricultural land and construction land. All the land must be used in accordance with their legal categories defined in General Land Utilization Plan approved by local government. It is strictly forbidden for any individuals or entities to change the using purpose of any lands.

According to the Article 10 of the Land Management Law of China, state-owned land and land collectively owned by farmers can be determined for use by units or individuals legally. Units and individuals that use land have the obligation to protect, manage and make rational use of land. The people’s government at the county level (or higher if necessary) shall register, issue certificates and confirm the ownership, any disputes regarding ownership or usage right of the land shall be arbitrated by the people’s government at or above the county level.

All the rice paddies of 12,300 ha involved in this project belong to 13,127 farmers, which has been confirmed by the Fuyang and Tonglu Land and Resources Bureaus⁴³ and Fuyang and Tonglu Agricultural Bureaus. Since these rice paddies are all legal agricultural fields, and the ownership is clear, there is no dispute over land ownership in the project site. As the owner of the rice paddies, these farmers have authorized Hangzhou Chunmeng has overall control and responsibility for the carbon project as the project proponent without violating farmers’ right.

The local governments proved that the land belongs to all the farmers so no one can encroach as private property and change the land usage. No matter whether the water management project applies for VCS project or not, the lands are private properties. The local government is responsible for all farmers if there is anything relating to the encroachment of the farmers’ right the lands.

- Whether the project proponent nor any other entity involved in project design or implementation are be involved in any form of discrimination or sexual harassment.

The project proponent should obey the Labor Law of the People’s Republic of China with anti-discrimination assurance, allowing workers sign up voluntarily regardless of gender, race, religion, sexual orientation or any other basis, without extra requirement for women or minorities. Moreover, all the workers should have equal pay for equal work. In case of any discrimination occurred, anyone could report to the project proponent following the relevant procedure. Then, the project proponent will demand the person who is responsible for discrimination end his/her involvement with the project immediately and find someone else to take over his/her job.

⁴³ Certificate of land ownership from Fuyang and Tonglu Land and Resources Bureaus

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The small-scale methodology AMS-III.AU: *Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation/version 4.0* is used. Also, the project proponent shall apply the “*General guidelines for SSC CDM methodologies/version 23.1*”.

In addition, since the reporting and verification shall be done on the basis of samples of the logbooks from the farmers, the *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities/version 9.0* and the *Guideline for Sampling and Surveys for CDM Project Activities and Programme of Activities/version 4.0* are used.

The TOOL 21“*Demonstration of Additionality of Small-scale Project Activities (version 13.1)*” is used to demonstrate the additionality.

3.2 Applicability of Methodology

- 1) As mentioned in Section 3.1, the methodology applied in this project is AMS-III.AU (version 4.0) which is applicable under the following conditions:

Conditions required by methodology	Applicability of this project
2. The methodology comprises technology/measures that result in reduced anaerobic decomposition of organic matter in rice cropping soils and thus reduced generation of methane. The methodology includes projects such as: a) Rice farms that change the water regime during the cultivation period from continuously to intermittent flooded conditions and/or a shortened period of flooded conditions; b) Alternate wetting and drying method and aerobic rice cultivation methods;	This project activity realized the type (a), changing the water regime during the cultivation period from continuously to intermittent flooded conditions, through the construction of cement ditches for controllable irrigation and drainage.

c) Rice farms that change their rice cultivation practice from transplanted to direct seeded rice.	
3. This methodology is applicable under the following conditions: a) Rice cultivation in the project area is predominantly characterized by irrigated, flooded fields for an extended period during the growing season, i.e. farms whose water regimes can be classified as upland or rainfed and deep water are not eligible to apply this methodology. This shall be shown from a representative survey conducted in the geographical region of the proposed project or by using national data. This project area characterization shall also include information on pre-season water regime and applied organic amendments, so that all dynamic parameters as shown in Table 3-1 below are covered by the baseline study.	According to the result of <i>The ex-ante investigation report in Fuyang and Tonglu Area in 2017</i>⁴⁴, rice cultivation in the project area is predominantly characterized by irrigated, flooded fields for an extended period during the growing season. And the pre-season water regime is mainly continuously flooded with no any organic amendments.
b) The project rice fields are equipped with controlled irrigation and drainage facilities such that both during dry and wet season, appropriate dry/flooded conditions can be established on the fields;	With the project, the rice fields are equipped with controlled irrigation and drainage facilities such that intermittently flooded method can be conducted.
c) The project activity does not lead to a decrease in rice yield. Likewise, it does not require the farm to switch to a cultivar that does not been grown before;	Farmers are not required to switch to a new cultivar that has not been grow before, while the type of rice planted in this project is very common and the project activity is not

⁴⁴ Source: The ex ante investigation report in Fuyang and Tonglu Area in 2017 from Zhejiang Academy of Social Sciences

	subject to any local regulatory restrictions, so it will not lead to a decrease in rice yield ⁴⁵ .
d) Training and technical support during the cropping season that delivers appropriate knowledge in field preparation, irrigation, drainage and use of fertilizer to the farmer is part of the project activity and is to be documented in a verifiable manner (e.g. protocol of trainings, documentation of on-site visits). In particular, the project proponent is able to ensure that the farmer by himself or through experienced assistance is able to determine the crop's supplemental N fertilization need. The applied method shall assess the fertilizer needs using for example a leaf colour chart or photo sensor or testing stripes. Alternatively, a procedure to ensure efficient fertilization considering the specific cultivation conditions in the project area backed by scientific literature or official recommendations shall be used;	By now since the project activity was started in 2018, expert from China National Rice Research Institute and the technical team from Search Co2 trained technicians in intermittent irrigation, requiring correct drainage and irrigation at the corresponding stages during rice planting. Every March from 2018, farmers have also been trained by technicians intensively. During the training, it will be emphasized that the application amount of fertilizer should not exceed the recommended amount for Fuyang and Tonglu by China National Rice Research Institute, which is 13-14.1kg/mu ⁴⁶ .
e) Project proponents shall assure that the introduced cultivation practice, including the specific cultivation elements, technologies and use of crop protection products, is not subject to any local regulatory restrictions;	The intermittent flooded water regime, the optimal amount of nitrogen utilization and the construction of Functional Areas for Grain Production introduced in the project area are legal.
f) Except the case where the default value approach indicated as follows, "Emission reductions using IPCC tier 1 approach or	For the ex ante emission reduction calculation, since "Emission reductions using IPCC tier 1 approach or default values" is

⁴⁵ It can be proved by comparing the yield recorded in the farmers' logbooks with that from The ex-ante investigation report in Fuyang and Tonglu Area in 2017 from Zhejiang Academy of Social Sciences. Besides, according to the yield recorded in logbooks of three project reference fields set in this project, this project activity did not lead to a decrease in rice yield.

⁴⁶ The Technical Guidelines for Techniques of Carbon Emission Reduction in Rice Paddies in Zhejiang Province, later issued by China National Rice Research Institute, also emphasized that the optimal amount of nitrogen fertilizer used in Zhejiang rice paddy fields is 12.5-14.5kg/ Mu.

default values” is chosen for emission reductions calculations, project proponents have access to infrastructure to measure CH₄ emissions from reference fields using closed chamber method and laboratory analysis;	chosen for emission reductions calculations, project proponent made measurements by using the closed chamber to determine baseline emission factors for continuously flooded field⁴⁷. For the post-emission reduction calculation, project proponent has already set the closed chamber in baseline and project reference fields respectively, and made the plan of monitoring.
g) Aggregated annual emission reductions of all fields included under one project activity shall be less than or equal to 60 kt CO₂ equivalent.	Those rice paddies belong to the local farmers, covering a total of 12,300 hectares, and 59,943 tCO₂e is expected to be generated every year, which is below 60 kt CO₂e. If the emission reductions monitored during the verification exceeds the threshold, the project proponent will only claim gap of 60,000 tons according to the Applicability of small-scale methodology.

Table 3-1 Parameters for the definition of cultivation patterns

Nr.	Parameter	Type	Values/categories	Source/method
1	Water regime – on-season	Dynamic	Continuously flooded	Baseline: Farmer’s information
			Single drainage	
			Multiple drainage	
2	Water regime – pre-season		Flooded	
			Short drainage (<180d)	
			Multiple drainage (>180d)	Project: Monitoring
3	Organic amendment		Straw on-season	
			Green manure	

⁴⁷ The Report of Effect on Methane Emission Rate in Paddy Fields with Continuously Flooded Method in Fuyang and Tonglu Area was completed on 05 December 2017

			Straw off-season	
			Farm yard manure	
			Compost	
			No organic amendment	
4	Soil pH	Static	<4.5	ISRIC-WISE soil property database or national data
			4.5-5.5	
			>5.5	
5	Soil organic carbon		<1%	
			1-3%	
			>3%	
6	Climate		[AEZ] ⁴⁸	Rice Almanac, HarvestChoice ^f

As described above, this small-scale methodology AMS-III.AU (version 4.0) is applicable to the proposed activity.

- 2) The Tool 21 “Demonstration of Additionality of Small-scale Project Activities (version 13.1) applied in this project is applicable under the following conditions:

Conditions required by methodology	Applicability of this project
4. The use of the methodological tool “Demonstration of additionality of small-scale project activities” is not mandatory for project participants when proposing new methodologies. Project participants and coordinating/managing entities may propose alternative methods to demonstrate additionality for consideration by the Executive Board.	For this project activity, this methodological tool is decided to be used. Besides, Hangzhou Chunmeng (as the project participant) and Search Co2 (as the project managing entities) do not plan to propose alternative methods.
5. Project participants and coordinating/managing entities may also	This project activity is expected to generate 59,943 tCO ₂ e emission reductions per year

⁴⁸ Climate zone: use agroecological zone as shown in the Rice Almanac (Third Edition, 2002), or by HarvestChoice.

apply “TOOL 19: Demonstration of additionality of microscale project activities” as applicable.	which is greatly more than 20 ktCO ₂ e/year defined under microscale project activities, so it is not applicable to “TOOL 19”.
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3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	The rice fields where water regime is changed	CO ₂	No	Not included in this project
		CH ₄	Yes	Baseline emissions consist of the CH ₄ emissions.
		N ₂ O	No	Due to the optimized N fertilization practice regulated by the methodology, N ₂ O emissions do not significantly deviate from the baseline emissions and hence are not considered.
		Other	No	Not included in this project
Project	The rice fields where water regime is changed	CO ₂	No	Not included in this project
		CH ₄	Yes	Project emissions consist of the CH ₄ emissions, which will still be emitted under the changed water regime.
		N ₂ O	No	Due to the optimized N fertilization practice regulated by the methodology, N ₂ O emissions do not significantly deviate from the baseline emissions and hence are not considered.
		Other	No	Not included in this project

The rice paddies applied intermittent flooded water regime in Fuyang District and Tonglu County are defined as the project area, also the project boundary where the cultivation method and water regime are changed. The map of the project boundary is provided as the Figure 3-1, and the yellows sections show the specific project area where the project activity is taking place. No reference areas or leakage belts are involved.

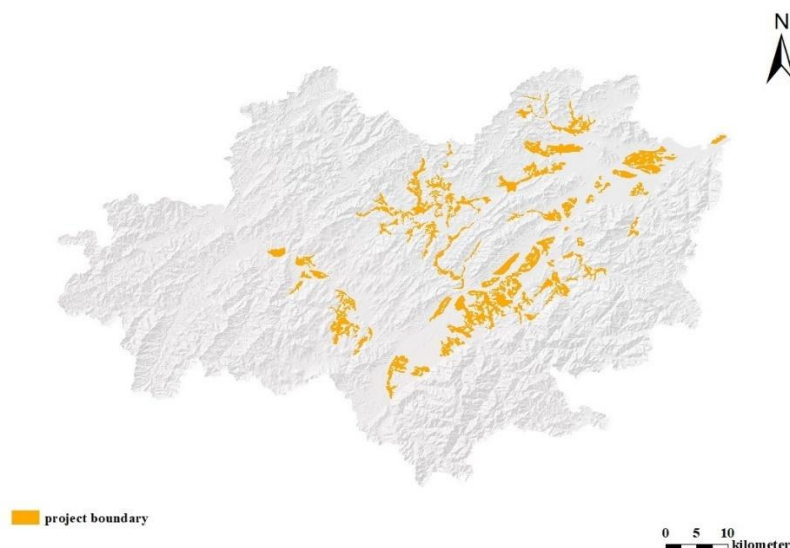


Figure 3-1 The map of the project boundary

According to section 3.9.3 of VCS Standard v4.3: “where applying a methodology with scale and/or capacity limits, it shall be demonstrated that the project is not a fragmented part of a larger project or activity that would otherwise exceed such limits. The project shall be considered a fragmented part of a larger project if within one kilometer of the project boundary there exists another project where:

- 1) The project proponents for both projects are the same.
- 2) The sectoral scope and project activity for both projects are the same.
- 3) The other project has been registered under the VCS Program or another GHG program within the previous two years.”

The project applied a small-scale methodology, according to the KML file of the project boundary and checking the areas within 1 km of the project boundary, there is no another project exists, hence the project is not a fragmented part of a larger project.

3.4 Baseline Scenario

According to the small-scale methodology “Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation”, the baseline scenario of the project is to implement a continuously flooded water regime to plant single-cropping rice without any organic amendment during rice cultivation in the project fields.

Firstly, these rice paddies belong to farmers involved in this project, and these farmers have the legal right to use their own fields, which means they can choose the method applied during rice cultivation freely without the mandatory requirements of laws and regulations. Besides, there is no laws and regulations on species or methods used during rice cultivation. The state only

formulated some methods to judge the quality level of crops, such as the Measures for Examination and Approval of Major Crops Species in Zhejiang Province⁴⁹. Moreover, although the Government of Zhejiang Province has also formulated some policies for China's Nationally Determined Contributions, such as The Implementation Opinions of Zhejiang Provincial People's Government on Speeding Up the Establishment and Improvement of Green and Low-carbon Circular Development Economic System⁵⁰, but it does not contain any mandatory requirements for rice planting methods.

Secondly, without this project activity, there are two difficulties in implementing intermittent flooded water regime. 1. The irrigation and drainage system of rice fields is not perfect enough to drain the water in rice fields in time since farmers cannot afford the construction fee of cement ditches, reservoirs and valves (referred to as Financial Barrier) ; 2. Practicing intermittent flooded water regime requires farmers to go to the fields frequently to check the growth status of rice and whether they need drainage or irrigation (referred to as Technological Barrier) . Compared with the previous continuously flooded water regime, it takes too much energy and time, and farmers are reluctant to spend it.

Thirdly, according to The ex ante investigation report in Fuyang and Tonglu Area in 2017 from Zhejiang Academy of Social Sciences, 96.7% famers in Fuyang District and 98.9% farmers⁵¹ in Tonglu County practiced continuously flooded method during rice cultivation and all the rice were cultivated without any organic amendment. The other 3.4% and 1.1% (very few) farmers' paddy fields can drain the water once in a few cases because of the relatively high terrain. In other words, these 3.4% and 1.1% farmers can drain the water in rice paddies with the advantage of natural terrain, not by building the cement ditches, reservoirs and valves like in project scenario. However, the imperfect drainage facilities still cannot allow these farmers carry out intermittent flooded method, so in these 3.4% and 1.1% rice fields, rice are still flooded during the whole season.

Therefore, as demonstrated above, in the baseline scenario, rice was cultivated by continuously flooded water regime without any organic amendment in the project fields which is the current practice in project area of Fuyang District and Tonglu County.

3.5 Additionality

Although many projects using methodology AMS-III.AU in the same country and region with a very similar project design and activities under the VCS Program and some of these projects are also in close proximity to each other with the same project proponent, this project is not a part of a larger initiation akin to a bundled project. The reasons are as follows.

⁴⁹ http://www.yy.gov.cn/art/2021/7/7/art_1229550784_59031532.html

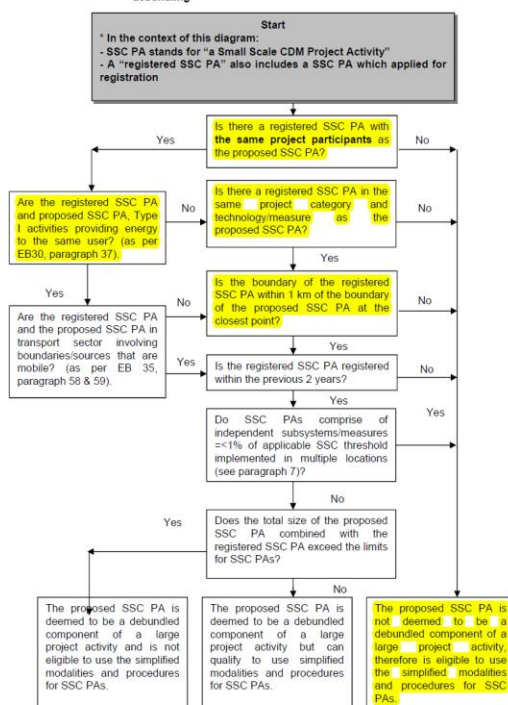
⁵⁰ https://www.zj.gov.cn/art/2021/12/7/art_1229019364_2378478.html

⁵¹ The results that 96.7% and 98.9% farmers in Fuyang and Tonglu Area used to practice the continuously flooded method is from sampling survey in the project zone. However, in the project area, all the farmers within 3,466 households used to practice the continuously flooded method as baseline scenario

Firstly, the boundaries of these projects are more than one kilometer apart. According to Section 9 and Section 15 in CDM-Tool 20 “Assessment of debundling for small-scale project activities” V4.0, there are two elements to determine the occurrence of debundling: “(a) Has the same activity implementer as the proposed small-scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and; (b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.” Thus, this project doesn’t fit condition (b), which means it does not a part of a bundled project.

Furthermore, as per two flowcharts in Figure 1 (shown as follows) in Tool 20, the Step 1, the registered SSC PA and the proposed SSC PA do both have the same project participants, then it should flow to “Yes”. The step 2, these projects do not provide energy to the same user, and then it flows to “No”. Step 3, this registered SSC PA in the same project category and technology/measure as the proposed SSC PA, then it flows to “Yes”. Step 4, the project’s boundary is over 1 km of the boundary of the proposed SSC PA at the closest point, thus the conclusion is that the proposed SSC PA is not deemed to be a large project activity. See below highlight parts for step-wise approach to demonstrate the project is not a part of a large project.

Figure 1. Flowchart of the step-wise approach for determining the occurrence of debundling



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Therefore, this project is not deemed to be a debundled component of a large-scale activity, therefore is eligible to use the simplified modalities and procedures for small-scale project activities.

Secondly, the method of additionality demonstration is regulated by the methodology applied. As required by Section 3.13.1 of VCS Standard, v4.3, “additionality shall be demonstrated and

assessed with the requirements set out in the methodology applied”, the additionality of this project should be demonstrated according to the requirements set out in *The small-scale methodology AMS-III.AU: Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation/version 4.0*. Also, the project proponent shall apply the “General guidelines for SSC CDM methodologies/version 23.1”. As required in the paragraph 5 of the methodology AMS-III.AU, project participants shall apply the “General guidelines for SSC CDM methodologies and Guidelines on the demonstration of additionality of small-scale project activities”. Thus, TOOL 21 is applied to demonstrate the additionality of this project.

According to TOOL 21 “Demonstration of Additionality of Small-scale Project Activities (version 13.1)”, project participant shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

- a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;
- b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;
- c) Barrier due to the prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
- d) Other barriers: without the project activity, for another specific reason identifies by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

Project activity would not have occurred due to investment barrier and technological barrier as analyzed below.

Investment barrier

First of all, Hangzhou Chunmeng Agricultural Technology Co., Ltd., as the project proponent, is a company whose main business is agricultural technology research and crop cultivation and management. Before the project activity started, the project proponent learned that intermittent flooded method can increase the rice yield and reduce methane emissions in rice paddies compared with the prevailing continuously flooded method at that time. Then, project proponent began to publicize the advantages of intermittent flooded water regime to local farmers and agricultural bureaus. After understanding the advantages of intermittent flooded water regime, farmers were willing and hoped to have drainage and irrigation facilities in their rice fields. However, farmers cannot to afford it. Therefore, project proponent applied to local agricultural bureau to consider building a higher-standard drainage and irrigation facilities in rice paddies. Thus, because of the publicity and efforts of the project proponent, farmers applied to the local agricultural bureau to join the Functional Areas for Grain Production Construction, and local

agricultural bureau approved the project and also allocated certain funds for building cement ditches and reservoirs in rice paddies, but due to the project was applied by project proponent and farmers rather than requested by the government, so the government funds was not sufficient to cover all the cost of the project. According to the ex-ante investigation report⁵², the living balance of local farmers is only CNY 1,345 per year in Fuyang District and CNY 1,150 in Tonglu County. The costs of construction of farmland irrigation and drainage facilities in Functional Areas for Grain Production are 16,605,000 in Fuyang District and 6,457,500 in Tonglu County, while local government's funding only covers the material costs, accounting for 86.4%, which is not enough to cover the costs of labor, operation and maintenance of ditches and reservoirs built. Besides, farmers still have to bear the cost of building branch ditches from the main ditches to their own rice fields and reservoirs. Therefore, if these farmers would keep the status quo rather than pay for it, intermittent flooded method cannot be practiced in farmers' rice fields. To complete the construction of the project, also considering that only carbon benefits that would be brought by this project, the project proponent paid around CNY17/mu⁵³ as subsidy to local farmers to fill up the funding gap in the labor cost of irrigation and drainage ditches for farmland construction of Functional Areas for Grain Production. In the end, this project can be implemented successfully.

In conclusion, this project is not a government-run program, but a voluntary activity proposed by project proponent.

Secondly, refer to the demonstration of baseline scenario above (please refer to Section 3.4 above for details), there is no laws and regulations on rice cultivation, whether it involves the species or methods used during cultivation. Since farmers involved in this project own the rice paddies, they have the legal right to use their own fields, which means they can choose the method applied during rice cultivation freely without the mandatory requirements of laws and regulations.

Thirdly, China has suspended the application for voluntary emission reduction projects and emission reduction issuance, and so far, it has not been restarted. As clarified in Section 1.16.1, according to China's national emissions trading scheme, only the high-emission industries are included, covering thermal power generation, petrochemical, chemical, building materials, iron and steel, non-ferrous, paper, aviation and other key emission industries that emitted at least 26,000 Tco₂e in any one year from 2013 to 2016, without renewable project⁵⁴. Moreover, the project proponent, including this project activity, is except for mandatory emission control

⁵² The ex ante investigation report in Fuyang and Tonglu Area in 2017 from Zhejiang Academy of Social Sciences

⁵³ Carbon reduction project cooperation agreement signed between the farmers and Hangzhou Chunmeng.

⁵⁴ https://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html

scheme⁵⁵. Therefore, this project will not and cannot be double counted. The project proponent declared and promised that this project is not involved in an emission trading program or any other mechanism that includes GHG allowance trading and also has not been rejected by other GHG program. Besides, GHG emission reductions and removals generated by the project will not be used for compliance under any programs or mechanisms.

Therefore, this project is not a part of a mandated national GHG ERR strategy.

As per clarification above, this project meets the regulatory surplus requirements as per Section 3.5 VCS Methodology Requirements, v4.2.

Technological barrier

The original water regime used during rice cultivation in baseline scenario, continuously flooded method, is less technologically advanced, because it only requires that the fields should be flooded throughout the whole season and there is no need to pay close attention to the growth status of rice for appropriate drainage and irrigation. Thus, simple soil ditches are enough in baseline scenario so that 96.7% famers in Fuyang District and 98.9% farmers in Tonglu County practiced continuously flooded method during rice cultivation错误!未定义书签。 , which means the new technology, intermittent flooded water regime, has a low market share.

In general, this project has both investment and technological barriers, so it is additional

3.6 Methodology Deviations

No deviations from the procedures indicated by the methodology have been made.

4 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

As described in methodology AMS-III.AU (version 4.0) mentioned above, the baseline scenario is the continuation of the current practice, e.g. continuously flooded rice cultivation in the project fields, the baseline emissions are estimated as follows:

⁵⁵ https://www.mee.gov.cn/xxgk2018/xxgk/xxgk03/202012/t20201230_815546.html

$$BE_y = \sum_s BE_s \quad (1)$$

$$BE_s = \sum_{g=1}^G EF_{BL,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \quad (2)$$

Where:

Parameters	Description
BE_y	Baseline emissions in year y (Tco ₂ e)
BE_s	Baseline emissions from project fields in season s (Tco ₂ e)
$EF_{BL,s,g}$	Baseline emissions factor of group g in season s (kgCH ₄ /ha per season)
$A_{s,g}$	Area of project fields of group g in season s (ha)
GWP_{CH_4}	Global warming potential of CH ₄ (Tco ₂ e/Tch ₄)
g	Group g, covers all project fields with the same cultivation pattern (G = total number of groups)

However, according to Section 5.3 and 5.4 stated in Methodology AMS-III.AU (version 4.0), the equation (1) and (2) above are used to calculate the ex-post emission reduction. During the project operation period, three baseline reference fields shall be set up in a way that they are representative of baseline emissions to measure the baseline emissions factor of group g in season s ($EF_{BL,s,g}$) as follows, therefore, it is only available for ex-post emission reduction calculation. As for ex-ante estimation, as required in Section 5.8.1 and 5.8.2 stated in Methodology AMS-III.AU (version 4.0), the project proponent shall estimate baseline and project emissions using the IPCC tier 1 approach but undertaking measurements to determine baseline emission factors for continuously flooded fields as described in Section 4.4 and relevant values used for calculation had been included.

Thus, at this stage in which the ex-ante calculation of emission reduction is performed, there are no relevant values available for calculation of the baseline emissions in year y (BE_y , tCO₂e).

Determination of baseline emission factor on reference fields

Baseline reference fields shall be set up in a way that they are representative of baseline emission in the project rice fields. For each group of fields with the same cultivation pattern, as defined with the help of Table 3-1 above, at least three reference fields with the same pattern shall be determined in the project area. On these fields, measurements using the closed chamber method shall be carried out, each resulting in an emission factor expressed as kgCH₄/ha per

season. The seasonally integrated baseline emission factor $EF_{BL,s,g}$ shall be derived as average value from the three measurements for each group.

In this project, all the dynamic and statistic parameters of rice paddies within the project area are the same, according to the ex ante investigation report⁵⁶, which can be summarized as follows:

Table 4-1 The dynamic and static parameters of rice paddies within the project area

No.	Parameter	Type	Conditions within the project area
1	Water regime – on-season	Dynamic	Continuously flooded
2	Water regime – pre-season		Flooded
3	Organic amendment		No organic amendment
4	Soil Ph	Static	The soil Ph within project area is 5.5~7.5, which is in the range of larger than 5.5.
5	Soil organic carbon		The soil organic carbon is 0.81% which is less than 1%.
6	Climate		According to the Rice Almanac (Third Edition, 2002), the project zone, Fuyang and Tonglu area, lies in agroecological zones 6 (AEZs),

⁵⁶ The ex ante investigation report in Fuyang and Tonglu Area in 2017 from Zhejiang Academy of Social Sciences

			which is warm subhumid subtropics with summer rainfall.
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Therefore, all fields within project area have the same cultivation pattern and there is only one group in this project.

4.2 Project Emissions

According to the applied methodology AMS-III.AU (version 4.0), the project emissions within the project boundary are calculated as follows:

$$PE_y = \sum_s PE_s \quad (3)$$

$$PE_s = \sum_{g=1}^G EF_{p,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \quad (4)$$

Where:

Parameters	Description
PE_y	Project emissions in year y (Tco ₂ e)
PE_s	Project emissions from project fields in season s (Tco ₂ e)
$EF_{p,s,g}$	Project emission factor of group g in season s (kgCH ₄ /ha per season

Similarly, according to Section 5.6 and 5.7 stated in Methodology AMS-III.AU (version 4.0), the equation (3) and (4) above are used to calculate the ex-post emission reduction. During the project operation period, three project reference fields shall be set up in a way that they are representative of project emissions to measure the project emissions factor of group g in season s ($EF_{p,s,g}$) as follows, therefore, it is only available for ex-post emission reduction calculation. As for ex-ante estimation, as required in Section 5.8.1 and 5.8.2 stated in Methodology AMS-III.AU (version 4.0), the project proponent shall estimate baseline and project emissions using the IPCC tier 1 approach but undertaking measurements to determine baseline emission factors for continuously flooded fields as described in Section 4.4 and relevant values used for calculation had been included.

Thus, at this stage in which the ex-ante calculation of emission reduction is performed, there are no relevant values available for calculation of the baseline emissions in year y (PE_y , tCO₂e)

Determination of project emission factor on reference fields

The seasonally integrated project emission factor $EF_{P,s,g}$ shall be determined using measurements on at least three project reference fields that fulfil the same conditions as the baseline reference fields, with the difference that they are cultivated according to the defined project cultivation practice. Project reference fields shall be established close to the baseline reference fields and begin with the growing season at the same time. $EF_{P,s,g}$ is the average of the measurement results from the three reference fields.

There is only one group for all rice paddies in this project, so a total of three project reference fields were established about 1.5 km away from the baseline reference fields and began with the growing season at the same time.

4.3 Leakage

According to the applied methodology AMS-III.AU (version 4.0), any effects of the project activity on GHG emissions outside the project boundary are deemed to be negligible and do not be considered under this methodology. So, leakage does not need to be considered in this project.

4.4 Estimated Net GHG Emission Reductions and Removals

The emission reductions achieved by the project activity shall be calculated as the difference between the baseline and the project emissions, which is also used as post-emission reduction:

$$ER_s = BE_s - PE_s \quad (5)$$

Where:

Parameters	Description
ER_s	Emission reductions in season s (Tco ₂ e)

Ex ante estimation of emission reductions

According to the applied methodology AMS-III.AU (version 4.0), for the ex ante estimation of emission reductions within the project design document prior to the project implementation, project proponent shall refer to own field experiments or estimate baseline and project emissions with the help of national data or IPCC tier 1 default values for emission and scaling factors.

In this project, using the IPCC tier 1 approach but undertaking measurements to determine baseline emission factors for continuously flooded fields, as per the following formula:

$$ER_y = EF_{ER} \times A_y \times L_y \times 10^{-3} \times GWP_{CH_4} \quad (6)$$

$$EF_{ER} = EF_{BL} - EF_P \quad (7)$$

$$EF_{BL} = EF_{BL,c} \times SF_{BL,w} \times SF_{BL,p} \times SF_{BL,o} \quad (8)$$

$$EF_P = EF_{BL,c} \times SF_{P,w} \times SF_{P,p} \times SF_{P,o} \quad (9)$$

Where:

Parameters	Description
ER_y	Emission reductions in year y (t CO ₂ e)
EF_{ER}	Adjusted daily emission factor (kgCH ₄ /ha/day). Alternatively, seasonal emission factor (kg CH ₄ /ha/season ⁵⁷) may be determined
A_y	Area of project fields in year y (ha)
L_y	Cultivation period of rice in year y (days/year). This is not applicable when seasonal emission factor is determined.
GWP_{CH_4}	Global warming potential of CH ₄ (t CO ₂ e/t CH ₄)
EF_{BL}	Baseline emission factor (kg CH ₄ /ha/day) or (kg CH ₄ /ha/season)
EF_P	Project emission factor (kg CH ₄ /ha/day) or (kg CH ₄ /ha/season)
$EF_{BL,c}$	Baseline emission factor for continuously flooded fields without organic amendments (kg CH ₄ /ha/day) or (kg CH ₄ /ha/season)
$SF_{BL,w}$ or $SF_{P,w}$	Baseline or project scaling factors ⁵⁸ to account for the differences in water regime during the cultivation period
$SF_{BL,p}$ or $SF_{P,p}$	Baseline or project scaling factors to account for the differences in water regime during the pre-season before the cultivation period
$SF_{BL,o}$ or $SF_{P,o}$	Baseline or project scaling factors should vary for both type and amount of organic amendment applied

Determination of $EF_{BL,c}$

However, the baseline emission factor for continuously flooded fields without organic amendments ($EF_{BL,c}$) can be determined ex ante prior to the start of the project activity, in this case, the ex ante value should be used to calculate emission reduction during the crediting period.

⁵⁷For all scaling factor used in this methodology, the average values in 2006 IPCC Guidelines for National Greenhouse Gas Inventories are chosen.

⁵⁸ For all scaling factor used in this methodology, the average values in 2006 IPCC Guidelines for National Greenhouse Gas Inventories are chosen.

It should be measured by using closed chamber in three reference fields which are chosen in the project area.

According to the guidance on methane measurement in the appendix of AMS-III.AU Methodology, the following requirements should be met.

1. The implementation of methane measurement in rice fields requires the involvement of experts in this field or at least experienced staff trained by experts (i.e. from research institutions). These guidelines cannot replace expertise in setting up chamber measurements. They rather set minimum requirements that serve for standardizing the conditions under which methane emissions are measured for projects under this methodology.

The closed chamber measurement requires the involvement of technicians trained by experts from China National Rice Research Institute and the technical team from Search Co2. China National Rice Research Institute (CNRRI) is a national multi-disciplinary research institute with rice as its main research object. The base is embedded in rice paddies on 24-March-2017⁵⁹, and all baseline reference fields were selected in Nanshan Village, Fuyang District. A total of 9 chambers were set up in three baseline reference fields, three in each field. The first gas sampling began on the second day after transplanting, followed by sampling every 7 days. After sampling, the gas is stored in the evacuated vial, and the samples collected for two days should be taken together for laboratory analysis.

2. Project proponents shall prepare a detailed plan for the seasonal methane measurements before the start of the season. The plan shall include the schedule for the field and laboratory measurements, the logistics that are necessary to get the gas samples to the laboratory and a cropping calendar. The plan shall also include all reference field specific information regarding location and climate, soil, water management, plant characteristics, fertilizer treatment and organic amendments.

Project proponent prepared a detailed plan⁶⁰ for measuring the $EF_{BL,c}$ before the start of the season, and the details of reference fields for measuring $EF_{BL,c}$ has been summarized in Table 4-2 below.

Table 4-2 The details of reference fields for measuring $EF_{BL,c}$

Specific Information	Plot 1	Plot 2	Plot 3
Area	0.52 ha	0.56 ha	0.54 ha

⁵⁹ The Report of Effect on Methane Emission Rate in Paddy Fields with Continuously Flooded Method in Fuyang and Tonglu Area was completed on 05 December 2017.

⁶⁰ Pilot plan of methane emission rate in rice paddies with continuously flooded water regime has been provided as evidence

Specific Information	Plot 1	Plot 2	Plot 3
Coordinate	E 119.87063166°, N 29.98750525°	E 119.87098037°, N 29.98737261°	E119.87115367°, N29.98734151°
Location	Nanshan Village, Lushan Street, Fuyang District		
The type of rice	Hybrid rice		
Climate	Subtropical monsoon climate		
Soil	pH5.65 and the soil organic carbon is 0.81%		
Water management	Continuously flooded ⁶¹		
Fertilizer treatment	No any organic amendments, the amount of nitrogen fertilizer applied is 13kg/mu		

In addition, according to the guidance on methane measurement in the appendix of AMS-III.AU Methodology, the steps from field measurement to $EF_{BL,c}$ should be taken as follows.

Table 4-3 On the field – technical options for the chamber design

Feature	Requirements	Conditions in the project
Chamber material	Option 1: Non-transparent - Commercially available PVC containers or manufactured chambers (e.g. using galvanized iron); - Painted white or covered with reflective material (to prevent increasing inside temperature); - Only suitable for short-term exposure (typically 30 min) followed by immediate removal from the field	The chamber used in this project is made of PVC materials covered with reflective material to prevent the increasing inside temperature. And it is only put just before the sampling and then is removed after 30 mins of sampling.
Placement in soil	Option 1: Fixed base Base made of non-corrosive material and	The base used in this project is made of non-corrosive PVC material and was embedded

⁶¹ Continuously flooded: fields have standing water throughout the rice growing season and may only dry out for harvest (end-season drainage)

Feature	Requirements	Conditions in the project
	remains in the field for the whole season; ● Base should allow tight sealing of the chamber; ● Base should have bores in the submerged section to allow water exchange between inside and outside; ● Base should be installed at least 24 hours before the first sampling	before transplantation, remaining in the field for the whole season. Base allows tight sealing of the chamber and has bores in the submerged section to allow water exchange. The first sampling was taken 24 hours after the base installation.
Auxiliaries of chamber	● Thermometer for measuring the temperature inside the chamber; ● Fan (battery operated) inside the chamber for mix the inside air during sampling; ● Sampling port (rubber stopper placed in a bore of the chamber)	There are a thermometer and a fan inside the chamber and the sampling port is set on the top of the chamber.
Basal area	Rectangular or rounded, but has to cover minimum of four rice hills (ca. 0.1m² minimum)	The base is rectangular and installed covering four rice hills.
Height	Option 1: Fixed height Total height (protruding base + chamber) should exceed plant height	The total height of chamber and base is 1.5 meters which is higher than 1.2 meters, the largest height of the plant.

Table 4-4 On the field – air sampling

Feature	Requirements	Conditions in the project
Replicate chambers per plot	Minimum requirement: Three replicate chambers per plot	Three replicate chambers were placed in every plot.
Number of air samples per exposure/data points per measurement	Minimum requirement: Three samples per exposure	Three samples for every exposure.
Exposure time	30 minutes	30 minutes
Daytime of measurement	Morning	9.30 – 10.00 a.m.
Measurement interval	Minimum requirement: once per week	Once a week
Syringe	Suitability test (leak proof) before measurement Preferably equipped with a lock for ease of handling	The syringe with a lock was used in this project and it is checked for leak proof before every measurement.
Sample storage until analysis	- Storage < 24h: air samples can remain in syringe; - Storage > 24h: transfer air samples into evacuated vial, store with slight overpressure	Three samples were taken before a laboratory analysis was performed, so the samples were stored in the evacuated vials.

Table 4-5 Laboratory analysis

Feature	Requirements	Conditions in the project
Method	Gas Chromatography with flame ionization detector (FID)	FID
Injection	Direct injection or with multi-port valve and sample loop	Direct injection
Column	Packed (e.g. molecular sieve) or capillary column	Packed
Calibration	With certified standard gas each day of analysis before	With certified standard gas each day of analysis before

Feature	Requirements	Conditions in the project
	and after the analyses are done	and after the analyses are done

It is demonstrated by *The Report of Effect on Methane Emission Rate in Paddy Fields with Continuously Flooded Method in Fuyang and Tonglu Area in 2017* from China National Rice Research Institute (see further details in Section 5.1 below) that the baseline emission factor for continuously flooded fields without organic amendments ($EF_{BL,C}$) is 3.95 kg CH₄/ha/day. The process of calculation is shown as follow.

Calculation of the emission rate for a plot (reference field)

- (1) For each gas analysis, calculate the mass of CH₄ emissions with the help of the following formula:

$$m_{CH_4,t} = c_{CH_4,t} \times V_{chamber} \times M_{CH_4} \times \frac{1atm}{R \times T_t \times 1000} \quad (10)$$

Where:

Parameters	Description
m_{CH_4}	Mass of CH ₄ in chamber at time t (mg)
t	Point of time of sample (e.g. 0,15,30 in case of three samples within 30 minutes)
$c_{CH_4,t}$	CH ₄ concentration in chamber at time t, from gas analysis (ppm)
$V_{chamber}$	Chamber volume (L)
M_{CH_4}	Molar mass of CH ₄ : 16g/mol
$1atm$	Assume constant pressure of 1atm, unless pressure measurement is installed
R	Universal gas constant: 0.08206 L atm/K ⁻¹ x mol ⁻¹
T_t	Temperature at time t (K)

- (2) Determine the slope of the line of best fit for the values of over time with the help of Excel:

$$s = \frac{\Delta m_{CH_4}}{\Delta t} \quad (11)$$

Where:

Parameters	Description
s	Slope of line of best fit (mg/min)

(3) Calculate the emission rate per hour for one chamber measurement:

$$RE_{ch} = s \times \frac{60min}{A_{chamber}} \quad (12)$$

Where:

Parameters	Description
RE_{ch}	Emission rate of chamber ch (mg/h × m ²)
ch	Index for replicate chamber on a plot
$A_{chamber}$	Chamber area (m ²)

(4) Calculate the average emission rate of a chamber measurement per plot:

$$RE_{plot} = \frac{\sum_{ch=1}^{Ch} RE_{ch}}{Ch} \quad (13)$$

Where:

Parameters	Description
RE_{plot}	Average emission rate of a plot (mg/h × m ²)
Ch	Number of replicate chambers per plot

(5) Further procedure: from the average emission rates per plot of each chamber measurement, derive the daily emission factor by converting from mg/m² to kg/ha by multiplying with 0.01 and 24 (hours a day). So, the final integrated results of RE_{plot} with the unit of kg/day/ha in the three reference fields are equal to $EF_{BL,c}$ (kgCH₄/day/ha), which are summarized in Table 4-6 below.

Table 4-6 RE_{plot} (kg/day/ha) in reference fields

RE_{plot}	(mg/h × m ²)	(kg/day/ha)
Plot 1	16.947	4.07
Plot 2	15.320	3.68
Plot 3	17.111	4.11
Average	16.459	3.95

Therefore, the baseline emission factor for continuously flooded fields without organic amendments ($EF_{BL,c}$) is 3.95 kg CH₄/ha/day.

Determination of $SF_{BL,w}$ or $SF_{P,w}$

According to the methodology, the IPCC default for $SF_{BL,w}$ or $SF_{P,w}$ is as follows:

Water regime during the cultivation period		$SF_{BL,w}$ or $SF_{P,w}$
Irrigated	Continuously flooded ⁶²	1
	Intermittently flooded-single aeration ⁶³	0.60
	Intermittently flooded-multiple aeration ⁶⁴	0.52

For the baseline scenario, the water regime is continuously flooded, so the $SF_{BL,w}$ is 1. As described in Section 1.11, the water regime of this project activity is intermittently flooded with multiple aeration, so the $SF_{P,w}$ is 0.52.

Determination of $SF_{BL,p}$ or $SF_{P,p}$

In addition, IPCC default for $SF_{BL,p}$ or $SF_{P,p}$ is provided in the following table.

Water regime prior to cultivation period	$SF_{BL,p}$ or $SF_{P,p}$
Non-flooded pre-season < 180 days (indicating double cropping)	1
Non-flooded pre-season > 180 days (indicating single cropping)	0.68

In the project area, all the rice cultivation is single cropping, so both $SF_{BL,p}$ and $SF_{P,p}$ are 0.68.

Determination of $SF_{BL,o}$ or $SF_{P,o}$

Accordingly, since no amendments are applied under both baseline and project scenario, $SF_{BL,o}$ and $SF_{P,o}$ are calculated as follows according to the Methodology.

⁶² Continuously flooded: fields have standing water throughout the rice growing season and may only dry out for harvest (end-season drainage)

⁶³ Single aeration: fields have a single aeration during the cropping season at any growth stage (except for end-season drainage)

⁶⁴ Multiple aeration: fields have more than one aeration period during the cropping season (except for end-season drainage)

$$SF_o = \left(1 + \sum_i ROA_i \times CFOA_i \right)^{0.59} \quad (14)$$

Where:

Parameters	Description
ROA_i	Application rate of organic amendment type i, in dry weight for straw and fresh weight for others, tonne ha ⁻¹
$CFOA_i$	Conversion factor for organic amendment type i (in terms of its relative effect with respect of straw applied shortly before cultivation)

There are no organic amendments applied under both baseline and project scenario, so $ROA_i=0$ and both $SF_{BL,o}$ and $SF_{P,o}$ are 1.

Taking all the information above, the table below can be reached.

Parameters	Values
$EF_{BL,c}$ (kg CH ₄ /ha/day)	3.95
$SF_{BL,w}$	1
$SF_{P,w}$	0.52
$SF_{BL,p} / SF_{P,p}$	0.68
$SF_{BL,o} / SF_{P,o}$	1
GWP_{CH_4} (t CO ₂ e/t CH ₄)	28
A_y (ha)	12,300
L_y (days/year) ⁶⁵	135
P.S. The GWP_{CH_4} is taken from the IPCC's Fifth Assessment report, GHG Protocol	

Under this methodology, any effects of the project activity on GHG emissions outside the project boundary are deemed to be negligible and do not have to be considered, so the leakage of this project activity is zero.

Thus, the emission reduction should be calculated as follows:

⁶⁵ It is an experience value for the days of single-cropping rice cultivation in Fuyang and Tonglu Area from local agricultural bureaus.

$$EF_{BL} = EF_{BL,c} \times SF_{BL,w} \times SF_{BL,p}$$

$$= 3.95 \text{ kgCH}_4 * \text{ha}^{-1} * \text{day}^{-1} \times 1 \times 0.68$$

$$= 2.686 \text{ kgCH}_4 * \text{ha}^{-1} * \text{day}^{-1}$$

$$EF_P = EF_{BL,c} \times SF_{P,w} \times SF_{P,p}$$

$$= 3.95 \text{ kgCH}_4 * \text{ha}^{-1} * \text{day}^{-1} \times 0.52 \times 0.68$$

$$= 1.39672 \text{ kgCH}_4 * \text{ha}^{-1} * \text{day}^{-1}$$

$$EF_{ER} = EF_{BL} - EF_P$$

$$= 2.686 \text{ kgCH}_4 * \text{ha}^{-1} * \text{day}^{-1} - 1.39672 \text{ kgCH}_4 * \text{ha}^{-1} * \text{day}^{-1}$$

$$= 1.28928 \text{ kgCH}_4 * \text{ha}^{-1} * \text{day}^{-1}$$

$$ER_y = EF_{ER} \times A_y \times L_y \times 10^{-3} \times GWP_{CH_4}$$

$$= 1.28928 \text{ kgCH}_4 * \text{ha}^{-1} * \text{day}^{-1} \times 12,300 \text{ ha} \times 10^{-3} \times 135 \text{ days/year} \times 28 (\text{t CO}_2\text{e/t CH}_4)$$

$$= 59,943 \text{ tCO}_2\text{e}$$

Therefore, for a whole year, the emission reduction is 59,943 tCO₂e.

The ex ante calculations of baseline and project emissions are shown in excel and the results are summarized in the Table following.

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
10-June-2018 to 31-2018	N/A ⁶⁶	N/A	0	59,943
01-Januray-2019 to 31-December-2019	N/A	N/A	0	59,943
01-Januray-2020 to 31-December-2020	N/A	N/A	0	59,943

⁶⁶ According to the CDM small-scale methodology: **Methane emission reduction by adjusted water management practice in rice cultivation (v4.0)**, Para 5.8.1 Ex ante estimation of emission reductions, PP has chosen option 1 for the calculation of Ex ante ER, while the according to the Equation (6) $ER_y = EF_{ER} \times A_y \times L_y \times 10^{-3} \times GWP_{CH_4}$ in the methodology, the ex ante of ER value is calculated directly but not calculated by Baseline emissions minus project emissions. So PP provided N/A in the table in section 4.4.

01-January-2021 to 31-December-2021	N/A	N/A	0	59,943
01-January-2022 to 31-December-2022	N/A	N/A	0	59,943
01-January-2023 to 31-December-2023	N/A	N/A	0	59,943
01-January-2024 to 31-December-2024	N/A	N/A	0	59,943
01-January-2025 to 09-June-2025	N/A	N/A	0	0 ⁶⁷
Total	N/A	N/A	0	419,601

5 MONITORING

5.1 Data and Parameters Available at Validation

According to the methodology, there is no pre-determined data, as long as the monitoring data, but the ex-ante calculation method was used in determining $EF_{BL,C}$, and the A_y used to calculate the ex ante emission reduction is only used in the ex ante calculation formula, so the relevant ex ante calculation data are listed in this section.

Data / Parameter	A_y
Data unit	ha
Description	Area of project fields in year y
Source of data	Determined by collecting the project field sizes in a project database. The size of project fields is determined by GPS or satellite data.

⁶⁷ Section 3.8 of the VCS Standard v4.3 states that “The project crediting period is the time period for which GHG emission reductions or removals generated by the project are eligible for issuance as VCUs.” According to the Methodology of *Methane emission reduction by adjusted water management practice in rice cultivation*, the time when the project produces emission reductions is the start time of land preparation. And the land preparation means the start of a rice season. The main activity of this project is emission reduction due to adjusted water regime during rice cultivation, which means emission reduction for each year, for period from 10-June-2018 to 09-June-2025, only occurred in the rice growing season. Therefore, during the period of 01-January-2025~09-June-2025, as the non-cropping season, the emission reduction is 0.

Value applied	The total area is 12,300ha
Justification of choice of data or description of measurement methods and procedures applied	The size of project field is determined through GPS by Fuyang and Tonglu agricultural bureaus ⁶⁸
Purpose of Data	The parameter is used to calculate the estimated net GHG removals.
Comments	N/A

Data / Parameter	GWP_{CH_4}
Data unit	t CO ₂ e/t CH ₄
Description	Global warming potential of CH ₄
Source of data	The number of GWP_{CH_4} is taken from the IPCC's Fifth Assessment report, GHG Protocol
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Any future revision of the IPCC's assessment report should be taken account.
Purpose of Data	The parameter is used to calculate the estimated net GHG removals.
Comments	N/A

Data / Parameter	$EF_{BL,c}$
Data unit	kg CH ₄ /ha/day
Description	Seasonal baseline emission factor for continuously flooded fields without organic amendments
Source of data	The Report of Measuring Methane Emission Rate in Rice Paddies with Continuously Flooded Method by Closed Chamber in Fuyang and Tonglu Area in 2017.

⁶⁸ Certificates of Land Ownership proved by Fuyang and Tonglu Land and Resources Bureaus

Value applied	3.95 kg CH ₄ /ha/day
Justification of choice of data or description of measurement methods and procedures applied	The methodology provides two kinds of methods, which are ex ante calculation and monitoring. The project proponent chose the ex ante calculation method, and then conducted methane measurement according to the requirements in the Appendix according to the requirements of the ex ante calculation method, and finally obtained the above value according to the calculation method in the Appendix of methodology.
Purpose of Data	The parameter is used to calculate the baseline emission factor EF _{BL} and the project emission factor EF _P .
Comments	N/A

Data / Parameter	$SF_{BL,w}$
Data unit	N/A
Description	Baseline scaling factors to account for the differences in water regime during the cultivation period
Source of data	It is chosen from 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	1
Justification of choice of data or description of measurement methods and procedures applied	Since the rice is cultivated under continuously flooded condition in baseline scenario, the 1 of value is used.
Purpose of Data	The parameter is used to calculate the baseline emission factor EF _{BL} and ex ante emission reduction calculation.
Comments	N/A

Data / Parameter	$SF_{P,w}$
Data unit	N/A
Description	Project scaling factors to account for the differences in water regime during the cultivation period
Source of data	It is chosen from 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Value applied	0.52
Justification of choice of data or description of measurement methods and procedures applied	Since the rice is cultivated under intermittent flooded condition in project scenario, the 0.52 of value is used.
Purpose of Data	The parameter is used to calculate the project emission factor EF_p and ex ante emission reduction calculation.
Comments	N/A

Data / Parameter	$SF_{BL,p}$
Data unit	N/A
Description	Baseline scaling factors to account for the differences in water regime in the pre-season before the cultivation period.
Source of data	It is chosen from 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	0.68
Justification of choice of data or description of measurement methods and procedures applied	Since the cultivation mechanism in rice field is single cropping in baseline scenario, the 0.68 of value is used.
Purpose of Data	The parameter is used to calculate the baseline emission factor EF_{BL} and ex ante emission reduction calculation.
Comments	N/A

Data / Parameter	$SF_{p,p}$
Data unit	N/A
Description	Project scaling factors to account for the differences in water regime in the pre-season before the cultivation period.
Source of data	It is chosen from 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied	0.68

Justification of choice of data or description of measurement methods and procedures applied	Since the cultivation mechanism in rice field is single cropping in project scenario, the 0.68 of value is used.
Purpose of Data	The parameter is used to calculate the project emission factor EF_P and ex ante emission reduction calculation.
Comments	N/A

Data / Parameter	$SF_{BL,o}$
Data unit	N/A
Description	Baseline scaling factors should vary for both type and amount of organic amendment applied
Source of data	It is calculated using equation (14) above.
Value applied	1
Justification of choice of data or description of measurement methods and procedures applied	Since no organic amendment was used in baseline scenario, which means the $ROA_i=0$, so $SF_{BL,o}$ is 1.
Purpose of Data	The parameter is used to calculate the baseline emission factor EF_{BL} and ex ante emission reduction calculation.
Comments	N/A

Data / Parameter	$SF_{P,o}$
Data unit	N/A
Description	Project scaling factors should vary for both type and amount of organic amendment applied
Source of data	It is calculated using equation (14) above.
Value applied	1
Justification of choice of data or description of measurement methods and procedures applied	Since no organic amendment was used in project scenario, which means the $ROA_i=0$, so $SF_{P,o}$ is 1.

Purpose of Data	The parameter is used to calculate the project emission factor EF_p and ex ante emission reduction calculation.
Comments	N/A

Data / Parameter	L_y
Data unit	Days/year
Description	Cultivation period of rice in year y
Source of data	It is an empirical value for the days of single-cropping rice cultivation in Fuyang and Tonglu Area from local agricultural bureaus
Value applied	135
Justification of choice of data or description of measurement methods and procedures applied	Since this value is used for ex-ante emission reduction calculation before the project started, there was no cultivation logbooks from farmers. Therefore, this value is an empirical value from local agricultural bureaus.
Purpose of Data	The parameter is used for ex ante emission reduction calculation.
Comments	N/A

5.2 Data and Parameters Monitored

Data / Parameter	$A_{s,g}$
Data unit	ha
Description	Aggregated project area in a given season s
Source of data	To determine by collecting the project field sizes in a project database. Project proponent shall set up a database which holds data and information that allow an unambiguous identification of participating rice farms, including the size of field. The technicians should submit the report of the monitoring results every season.
Description of measurement methods	The size of project fields shall be determined by GPS or satellite data. Should such technologies not be available, established field

and procedures to be applied	size measurement approaches shall be used provided that uncertainties are taken into account in a conservative manner.
Frequency of monitoring/recording	Every season
Value applied	N/A
Monitoring equipment	GPS or satellite data
QA/QC procedures to be applied	General guidelines for SSC CDM methodologies
Purpose of data	The parameter is used to calculate the baseline emissions from project fields in season s (BE_s) and project emissions from project fields in season s (PE_s).
Calculation method	N/A
Comments	Only compliant farms are considered

Data / Parameter	$EF_{BL,s,g}$
Data unit	kg CH ₄ /ha per season
Description	Baseline emission factor of group g in a given season s
Source of data	Field measurements in baseline reference fields
Description of measurement methods and procedures to be applied	As per instructions in the appendix (Guidelines for measuring methane emissions from rice fields) and IPCC 2006, volume 4, chapter 5.5.
Frequency of monitoring/recording	It is obtained from the calculation of the emission rate for baseline reference fields according to the requirements in the Appendix of methodology, and the $C_{CH_4,t}$ (CH ₄ concentration in chamber at time t) of weekly gas samplings is derived from the laboratory analysis. Regular measurements as per closed chamber method guidance, seasonally integrated
Value applied	N/A
Monitoring equipment	Closed chamber and also devices in laboratory
QA/QC procedures to be applied	The implementation of methane measurement in rice fields shall be conducted by technicians trained by experts from China National Rice Research Institute. Besides, the laboratory analysis

	is also conducted in this institution. All the data should be cross-checked by technicians and experts.
Purpose of data	The parameter is used to calculate the baseline emissions from project fields in season s (BE_s).
Calculation method	N/A
Comments	N/A

Data / Parameter	$EF_{p,s,g}$
Data unit	kg CH ₄ /ha per season
Description	Project emission factor of group g in a given season s
Source of data	Field measurements in project reference fields
Description of measurement methods and procedures to be applied	As per instructions in the appendix (Guidelines for measuring methane emissions from rice fields) and IPCC 2006, volume 4, chapter 5.5.
Frequency of monitoring/recording	It is obtained from the calculation of the emission rate for project reference fields according to the requirements in the Appendix of methodology, and the $C_{CH_4,t}$ (CH ₄ concentration in chamber at time t) of weekly gas samplings is derived from the laboratory analysis. Regular measurements as per closed chamber method guidance, seasonally integrated
Value applied	N/A
Monitoring equipment	Closed chamber and also devices in laboratory
QA/QC procedures to be applied	The implementation of methane measurement in rice fields shall be conducted by technicians trained by experts from China National Rice Research Institute. Besides, the laboratory analysis is also conducted in this institution. All the data should be cross-checked by technicians and experts.
Purpose of data	The parameter is used to calculate the project emissions from project fields in season s (PE_s).
Calculation method	N/A
Comments	N/A

5.3 Monitoring Plan

Monitoring team

The monitoring team consists of Hangzhou Chunmeng, technical team from Search Co2 (Shanghai) Environmental Science & Technology Co. Ltd., technicians and experts from China National Rice Research Institute. Firstly, Search Co2 sets the number of reference fields, and drafts cultivation logbooks template, tables, etc. Secondly, project proponent and Search Co2 confirm the monitoring frequency and notify the technicians and the agricultural bureau. The technicians also need to instruct the farmers and check the famers' logbooks every month. Finally, according to the requirements in the Appendix of methodology, the gas sampling on field should be conducted once a week in baseline and project reference fields, respectively. Then, the $EF_{BL,s,g}$ and $EF_{P,s,g}$ can be obtained from the calculation of the emission rate for baseline reference fields according to the requirements in the Appendix of methodology, and the $C_{CH_4,t}$ (CH_4 concentration in chamber at time t) of weekly gas samplings is derived from the laboratory analysis. The implementation of methane measurement in both baseline and project reference fields is involved by the experts from China National Rice Research Institute which is an institution owned the certificate to do the laboratory analysis. The expert who is the leader of the experiment has a doctoral degree and her field of study is application of crop high yield and emission reduction technology. Therefore, the accuracy of monitoring results is guaranteed.

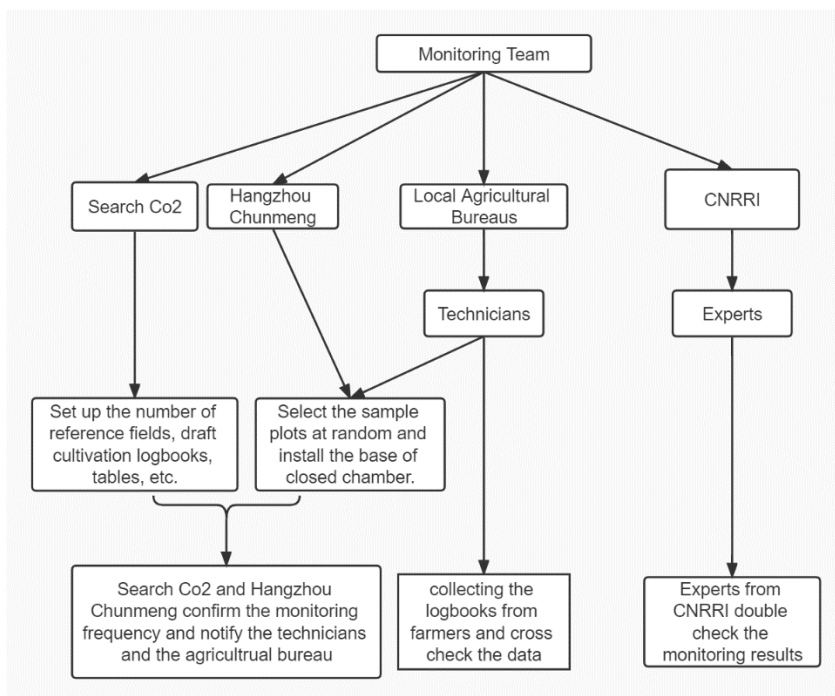


Figure 5-1 The figure of the monitoring team

Monitoring process

a. Determine the reference fields

In this project, all the dynamic and statistic parameters of rice paddies within the project area are the same, according to the ex-ante investigation report⁶⁹, which can be summarized as follows:

No.	Parameter	Type	Conditions within the project area
1	Water regime – on-season	Dynamic	Continuously flooded
2	Water regime – pre-season		Flooded
3	Organic amendment		No organic amendment
4	Soil pH	Static	The soil pH within project area is 5.5~7.5, which is in the range of larger than 5.5.
5	Soil organic carbon		The soil organic carbon is 0.81% which in the range between 1% and 3%.
6	Climate		According to the Rice Almanac (Third Edition, 2002), the project zone, Fuyang and Tonglu Area, lies in agroecological zones 7 (AEZs), which is warm/cool humid subtropics with summer rainfall.

⁶⁹ The ex ante investigation report in Fuyang and Tonglu Area in 2017 from Zhejiang Academy of Social Sciences

Therefore, all fields within project area have the same cultivation pattern and there is only one group in this project. Then, in May 2018, before the cropping season started, 3 baseline reference fields and 3 project reference fields were set in Nanshan Village, respectively, which are fixed rice paddies with area of around 0.54 ha⁷⁰ as shown in Table 5-1 below. The reason of choosing these reference fields is that the expert from China National Rice Research Institute believed that these fields were representative of the baseline scenario and project scenario in all of the parameters mentioned above.

The measurements on project and baseline reference fields were carried out in an equal manner and simultaneously. The baseline reference fields were selected that they are representative of baseline scenario where double-cropping rice was planted by continuously flooded method without any organic amendments, while the project reference fields were selected that they are representative of project scenario where double-cropping rice was planted by intermittent flooded method without any organic amendments. During this monitoring period, these fields have been used as baseline and project reference fields and have not been changed.

⁷⁰ According to the opinions of experts who is leading the on-site sampling and laboratory analysis and the general size of farmland in Functional Areas for Grain Production in Fuyang and Tonglu area, the experimental data is reliable and reasonable to select about 0.54 hectares of farmland as the reference fields.

Table 5-1 The information of baseline and project reference fields

Specific Information	Baseline Reference Fields			Project Reference Fields		
	Plot 1	Plot 2	Plot 3	Plot 1	Plot 2	Plot 3
Area	0.52	0.56	0.54	0.50	0.57	0.55
Geological coordinates	119.87063166° E, 29.98750525° N	119.87098037° E, 29.98737261° N	119.87115367° E, 29.98734151° N	119.88097265° E, 29.97967614° N	119.88035872° E, 29.97958508° N	119.88014907° E, 29.97949126° N
Location	Nanshan Village, Fuyang District			Nanshan Village, Fuyang District		
The type of rice	Hybrid rice			Hybrid rice		
Climate	Subtropical humid monsoon climate			Subtropical humid monsoon climate		
Soil	pH=5.65 and the soil organic carbon is 0.81%			pH=5.65 and the soil organic carbon is 0.81%		
Water management	Continuously flooded ⁷¹			Intermittent flooded		
Fertilizer treatment	No any organic amendments, the amount of nitrogen fertilizer applied is 13 kg/mu			No any organic amendments, the amount of nitrogen fertilizer applied is 13 kg/mu ⁷²		

⁷¹ Continuously flooded: fields have standing water throughout the rice growing season and may only dry out for harvest (end-season drainage)

⁷² The amount of nitrogen used in project reference fields is the optimal amount in Fuyang and Tonglu Area recommended by China National Rice Research Institute. According to the small-scale methodology applied, “Due to the optimized N fertilization practice, N₂O emissions do not significantly deviate from the baseline emissions and hence are not considered”. Therefore, the N₂O emissions do not need to be considered in this project.

b. Monitoring of baseline and project emissions (determination of $EF_{BL,s,g}$ and $EF_{P,s,g}$)

According to the applied methodology AMS-III.AU (version 4.0), post-emission reduction shall be calculated by the formulas (1) – (5) shown in Section 4.1 and Section 4.2 above. So, $EF_{BL,s,g}$ and $EF_{P,s,g}$ shall be measured by technicians based on the requirements in the appendix (shown as follows) and IPCC 2006, volume 4, chapter 5.5.

1. The implementation of methane measurement in rice fields requires the involvement of experts in this field or at least experienced staff trained by experts (i.e. from research institutions). These guidelines cannot replace expertise in setting up chamber measurements. They rather set minimum requirements that serve for standardizing the conditions under which methane emissions are measured for projects under this methodology.
2. Project proponents shall prepare a detailed plan for the seasonal methane measurements before the start of the season. The plan shall include the schedule for the field and laboratory measurements, the logistics that are necessary to get the gas samples to the laboratory and a cropping calendar. The plan shall also include all reference field specific information regarding location and climate, soil, water management, plant characteristics, fertilizer treatment and organic amendments.
3. The following guidance is structured according to the steps from field measurement to emission factor calculation. Project proponents shall make sure that the measurements on project and baseline reference fields are carried out in an equal manner and simultaneously.

Table 5-2 On the field – technical options for the chamber design

Feature	Conditions	
Chamber material	Option 1: Non-transparent ● Commercially available PVC containers or manufactured chambers (e.g. using galvanized iron); ● Painted white or covered with reflective material (to prevent increasing inside temperature); ● Only suitable for short-term exposure (typically 30 min) followed by	Option 2: Transparent ● Manufactured chambers using acrylic glass; ● Advantage of transparent chambers: could be placed for longer time spans on the field if equipped with a lid that remains open between measurements and is only closed during measurements

	immediate removal from the field	
Placement in soil	Option 1: Fixed base ● Base made of non-corrosive material and remains in the field for the whole season; ● Base should allow tight sealing of the chamber; ● Base should have bores in the submerged section to allow water exchange between inside and outside; ● Base should be installed at least 24 hours before the first sampling	Option 2: Without base ● Chamber have to be placed on the soil with open lid to allow escape of eventual ebullition
Auxiliaries of chamber	● Thermometer for measuring the temperature inside the chamber; ● Fan (battery operated) inside the chamber for mix the inside air during sampling; Sampling port (rubber stopper placed in a bore of the chamber)	
Basal area	Rectangular or rounded, but has to cover minimum of four rice hills (ca. 0.1m ² minimum)	
Height	Option 1: Fixed height Total height (protruding base + chamber) should exceed plant height	Option 2: Flexible height ● Adjustable to plant height; ● Chambers with different heights or modular design

Table 5-3 On the field – air sampling

Feature	Conditions
---------	------------

Replicate chambers per plot	Minimum requirement: Three replicate chambers per plot
Number of air samples per exposure/data points per measurement	Minimum requirement: Three samples per exposure
Exposure time	30 minutes
Daytime of measurement	Morning
Measurement interval	Minimum requirement: once per week
Syringe	Suitability test (leak proof) before measurement Preferably equipped with a lock for ease of handling
Sample storage until analysis	Storage < 24h: air samples can remain in syringe; Storage > 24h: transfer air samples into evacuated vial, store with slight overpressure

Table 5-4 Laboratory analysis

Feature	Conditions
Method	Gas Chromatography with flame ionization detector (FID)
Injection	Direct injection or with multi-port valve and sample loop
Column	Packed (e.g. molecular sieve) or capillary column
Calibration	With certified standard gas each day of analysis before and after the analyses are done

As mentioned above, three baseline reference fields and three project reference fields were selected in Nanshan Village, and the project reference fields are 1.5km away from baseline reference fields. Besides, the measurements on project and baseline reference fields were carried out in an equal manner and simultaneously. Three replicate bases were placed in each reference fields just after rice transplanting (i.e. in June from 2018 to 2021 and please refer to Section 6.1 and Section 6.2 for details). The first gas sampling was conducted by technicians 24 hours after transplanting. Then, technicians conducted the gas sampling in both baseline and project reference fields once a week and the last sampling were taken just before harvest (see details in Table 5-8). During every sampling, the technicians covered the chamber on the base for half an hour and took three samples from each chamber. Then, the technicians could gain 54 samples at a time from all baseline and project reference fields and took the gas samples to

laboratory. After sampling has been taken for two weeks, all 108 gas samples would be analysed by FID in laboratory to obtain CH_4 concentration in chamber at time t ($c_{CH_4,t}$) that can be used to calculate average emission rate of a plot (reference field) in $mg/h \times m^2$. After that, from the average emission rates per plot of each chamber measurement, the seasonally integrated emission factors were derived by integration of the measurement results over the season length, which means multiplying the emission rate with the number of hours of the measurement interval and accumulating the results of every measurement interval over the season. Finally, the seasonally integrated baseline emission factor $EF_{BL,s,g}$ and project emission factor $EF_{P,s,g}$ were derived as average value from the replicate three measurements for baseline reference fields and project reference fields. Please refer to Section 6.1 and Section 6.2 for detailed process of calculation.

Search Co2 entrusted China National Rice Research Institute to prepare a detailed plan⁷³ in June 2017 before the start of the project. The plan has included the schedule for the field and laboratory measurements, the logistics that are necessary to get the gas samples to laboratory and a cropping calendar. Please refer to the Table 5-1 above for all reference fields' specific information. The implementation of methane measurement in both baseline and project reference fields was conducted by technicians trained by expert from China National Rice Research Institute which is an authoritative and official institute to do the laboratory analysis. The expert who is the leader of the experiment has a doctoral degree and her field of study is application of crop high yield and emission reduction technology.

Table 5-5 On the field – technical options for the chamber design

Feature	Requirements	Conditions in the baseline reference fields	Conditions in the project reference fields
Chamber material	Option 1: Non-transparent - Commercially available PVC containers or manufactured chambers (e.g. using galvanized iron); - Painted white or covered with	The chamber used in this project is made of PVC materials covered with reflective material to prevent the increasing inside temperature. And it is only put just before the sampling and then is	The chamber used in this project is made of PVC materials covered with reflective material to prevent the increasing inside temperature. And it is only put just before the sampling and then is

⁷³ The Test Plan for Researching the Effect on Methane Emissions in Rice Paddies by Adjusting Water Management

Feature	Requirements	Conditions in the baseline reference fields	Conditions in the project reference fields
	reflective material (to prevent increasing inside temperature); Only suitable for short-term exposure (typically 30 min) followed by immediate removal from the field	removed after 30 mins of sampling.	removed after 30 mins of sampling.
Placement in soil	Option 1: Fixed base - Base made of non-corrosive material and remains in the field for the whole season; - Base should allow tight sealing of the chamber; - Base should have bores in the submerged section to allow water exchange between inside and outside; - Base should be installed at least 24 hours before the first sampling	The base used in this project is made of non-corrosive PVC material and was embedded before transplantation, remaining in the field for the whole season. Base allows tight sealing of the chamber and has bores in the submerged section to allow water exchange. The first sampling was taken 24 hours after the base installation.	The base used in this project is made of non-corrosive PVC material and was embedded before transplantation, remaining in the field for the whole season. Base allows tight sealing of the chamber and has bores in the submerged section to allow water exchange. The first sampling was taken 24 hours after the base installation.
Auxiliaries of chamber	- Thermometer for measuring the temperature inside the chamber; - Fan (battery operated) inside the	There are a thermometer and a fan inside the chamber and the sampling port is set on the top of the chamber.	There are a thermometer and a fan inside the chamber and the sampling port is set on the top of the chamber.

Feature	Requirements	Conditions in the baseline reference fields	Conditions in the project reference fields
	chamber for mix the inside air during sampling; Sampling port (rubber stopper placed in a bore of the chamber)		
Basal area	Rectangular or rounded, but has to cover minimum of four rice hills (ca. 0.1m ² minimum)	The base is rectangular and installed covering four rice hills.	The base is rectangular and installed covering four rice hills.
Height	Option 1: Fixed height Total height (protruding base + chamber) should exceed plant height	The total height of chamber and base is 0.9 meters which is higher than 0.8 meters, the largest height of the rice.	The total height of chamber and base is 0.9 meters which is higher than 0.8 meters, the largest height of the rice.

Table 5-6 On the field – air sampling

Feature	Requirements	Conditions in the baseline reference fields	Conditions in the project reference fields
Replicate chambers per plot	Minimum requirement: Three replicate chambers per plot	Three replicate chambers were placed in every plot.	Three replicate chambers were placed in every plot.
Number of air samples per exposure/data points per measurement	Minimum requirement: Three samples per exposure	Three samples for every exposure.	Three samples for every exposure.
Exposure time	30 minutes	30 minutes	30 minutes

Feature	Requirements	Conditions in the baseline reference fields	Conditions in the project reference fields
Daytime measurement of	Morning	9.30 – 10.00 a.m.	9.30 – 10.00 a.m.
Measurement interval	Minimum requirement: once per week	Once a week	Once a week
Syringe	Suitability test (leak proof) before measurement Preferably equipped with a lock for ease of handling	The syringe with a lock was used in this project and it is checked for leak proof before every measurement.	The syringe with a lock was used in this project and it is checked for leak proof before every measurement.
Sample storage until analysis	- Storage < 24h: air samples can remain in syringe; - Storage > 24h: transfer air samples into evacuated vial, store with slight overpressure	Three samples were taken before a laboratory analysis was performed, so the samples were stored in the evacuated vials.	Three samples were taken before a laboratory analysis was performed, so the samples were stored in the evacuated vials.

Table 5-7 Laboratory analysis

Feature	Requirements	Conditions in the baseline reference fields	Conditions in the project reference fields
Method	Gas Chromatography with flame ionization detector (FID)	FID	FID
Injection	Direct injection or with multi-port valve and sample loop	Direct injection	Direct injection
Column	Packed (e.g. molecular sieve) or capillary column	Packed	Packed

Feature	Requirements	Conditions in the baseline reference fields	Conditions in the project reference fields
Calibration	With certified standard gas each day of analysis before and after the analyses are done	With certified standard gas each day of analysis before and after the analyses are done	With certified standard gas each day of analysis before and after the analyses are done

During this monitoring period, the laboratory analysis was done in China National Rice Research Institute, which is an authoritative and official institute to do this analysis. The patent named *A method for reduction methane emissions in rice paddies by changing the rhizosphere oxygen environment* was also born in this institute, which provides intermittent flooded water regime as a method of changing the rhizosphere oxygen environment, thus resulting in reducing CH₄ emissions in rice paddies ⁷⁴. Thus, the equipment, including FID, syringe, evacuated vial and the closed chamber used in this project, has been qualified⁷⁵.

In combination with the experimental requirements and the Functional Areas for Grain Production, the expert selected three baseline reference fields and three project reference fields in Nanshan Village, respectively, which represents the baseline and project scenario well in terms of the parameters listed above (shown in the Monitoring Process). Firstly, the technicians buried the base in the fields before transplanting, and plant 4 rice hills in the base area (as shown in the Figure 5-2 below). The base size is 0.5m×0.5m, so the requirement of covering 0.1m² minimum was guaranteed. The first sampling was taken the next day after transplanting, and then once a week. At each sampling, the closed chamber was mounted on the base for 30 minutes and then three gas samples were gained by technicians. The gas samples were transferred into evacuated vial for storage. After the field sampling has been completed 3 times, all gas samples were sent to the laboratory for FID analysis. Finally, the expert calculated the final result by Equation (1) ~ (4), and then the report⁷⁶ was finished by expert at the end of each cropping season. Please refer to Section 6.2 and 6.3 for specific number of gas samples gained from field measurement.

⁷⁴ See more details in the Invention Patent Certificate

⁷⁵ Which is required by the small-scale methodology applied and the results of calibration can be proved by The Reports of Effect on Methane Emission Rate in Rice Paddies with Adjusted Water Management in Fuyang and Tonglu Area from 2018 to 2021 from China National Rice Research Institute

⁷⁶ The Reports of Effect on Methane Emission Rate in Rice Paddies with Adjusted Water Management in Fuyang and Tonglu Area from 2018 to 2021

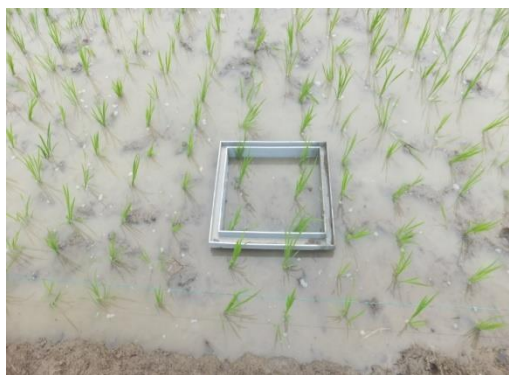


Figure 5-2 The base buried in the reference fields (which covers 4 rice hills)

Taking sampling in single cropping rice in 2018 as an example, the detailed process and final results of monitoring in both baseline and project reference fields are described as follows, including the schedule, personnel and equipment involved in field gas collection, laboratory analysis and report preparation.

Table 5-8 Sampling in single cropping rice in 2018

Time	Activity	Equipment	Personnel
14 June	Land preparation	-----	Farmers
16 June	Transplantation	-----	Farmers
17 June	Base was buried	Base	Technicians and Farmers
18 June	The first sampling	Closed chamber	Technicians
25 June	The second sampling		
	Laboratory Analysis	FID	Expert
02 July	The third sampling	Closed chamber	Technicians
09 July	The fourth sampling		
	Laboratory Analysis	FID	Expert
16 July	The fifth sampling	Closed chamber	Technicians
23 July	The sixth sampling		
	Laboratory Analysis	FID	Expert
30 July	The seventh sampling	Closed chamber	Technicians
06 August	The eighth sampling		
	Laboratory Analysis	FID	Expert
13 August	The ninth sampling	Closed chamber	Technicians
20 August	The tenth sampling		
	Laboratory Analysis	FID	Expert
27 August	The eleventh sampling	Closed chamber	Technicians

03 September	The twelfth sampling		
	Laboratory Analysis	FID	Expert
10 September	The thirteenth sampling	Closed chamber	Technicians
17 September	The fourth sampling		
	Laboratory Analysis	FID	Expert
24 September	The fifth sampling	Closed chamber	Technicians
01 October	The sixth sampling		
	Laboratory Analysis	FID	Expert
08 October	The seventh sampling	Closed chamber	Technicians
15 October	The eighth sampling		
	Laboratory Analysis	FID	Expert
22 October	The ninth sampling	Closed chamber	Technicians
25 October	The last sampling and then harvest		
	Laboratory Analysis	FID	Expert
10 December 2018	The Report of Effect on Methane Emission Rate in Rice Paddies with Adjusted Water Management in Fuyang and Tonglu Area in 2018 was completed	----	Expert

Since the measurements on project and baseline reference fields were carried out in an equal manner and simultaneously, the schedule of measurements and laboratory analysis, and the number of gas samples collected from baseline and project reference fields were the same.

Calculation of the emission rate for a plot (reference field)

- (1) For each gas analysis, calculate the mass of CH₄ emissions with the help of the following formula:

$$m_{CH_4} = c_{CH_4,t} \times V_{chamber} \times M_{CH_4} \times \frac{1atm}{R \times T_t \times 1000} \quad (15)$$

Where:

Parameters	Description
m_{CH_4}	Mass of CH ₄ in chamber at time t (mg)
t	Point of time of sample (e.g. 0,15,30 in case of three samples within 30 minutes)

$c_{CH_4,t}$	CH ₄ concentration in chamber at time t, from gas analysis (ppm)
$V_{chamber}$	Chamber volume (L)
M_{CH_4}	Molar mass of CH ₄ : 16g/mol
1atm	Assume constant pressure of 1atm, unless pressure measurement is installed
R	Universal gas constant: 0.08206 L atm/K ⁻¹ *mol ⁻¹
T_t	Temperature at time t (K)

- (2) Determine the slope of the line of best fit for the values of over time with the help of software (e.g. Excel):

$$s = \frac{\Delta m_{CH_4}}{\Delta t} \quad (16)$$

Where:

Parameters	Description
s	Slope of line of best fit (mg/min)

- (3) Calculate the emission rate per hour for one chamber measurement:

$$RE_{ch} = s \times \frac{60min}{A_{chamber}} \quad (17)$$

Where:

Parameters	Description
RE_{ch}	Emission rate of chamber ch (mg/h*m ²)
ch	Index for replicate chamber on a plot
$A_{chamber}$	Chamber area (m ²)

- (4) Calculate the average emission rate of a chamber measurement per plot:

$$RE_{plot} = \frac{\sum_{ch=1}^{ch} RE_{ch}}{Ch} \quad (18)$$

Where:

Parameters	Description
RE_{plot}	Average emission rate of a plot (mg/h*m ²)
Ch	Number of replicate chambers per plot

- (5) Further procedure: from the average emission rates per plot of each chamber measurement, derive the seasonally integrated emission factor by integration of the measurement results over the season length. The simplest way of integration is multiplying the emission rate with the number of hours of the measurement interval (e.g. one week) and accumulating the results of every measurement interval over the season. Convert from mg/m² to kg/ha by multiplying with 0.01.

c. Monitoring of farmers' compliance with project cultivation practice (determination of $A_{s,g}$)

In order to determine whether the project fields are cultivated according to intermittent flooded cultivation practice, and thus assure that measurements on the reference fields are representative for the emissions from the project fields, a cultivation logbook shall be maintained for all project fields. With the help of the logbook, all parameters, as following, that are part of the project cultivation practice shall be documented by the farmers:

- (a) Sowing date;
- (b) Fertilizer, organic amendments, and crop protection application (date and amount);
- (c) Water regime on the field (e.g. "dry/moist/flooded") and dates where the water regime is changed from one status to another;
- (d) Yield.

In addition, farmers shall state whether they have followed fertilization recommendations⁷⁷ provided with the introduction of the adjusted water management practice.

Project proponent has established a database which holds data and information of these 3,466 households involved in this project activity, which contains the name, ID number, address of the head of the household, size of the field, completion date of construction, the starting date of rice season. Therefore, the sampling below is based on the database.

Since the reporting and verification shall be done on the basis of samples of the logbooks from the farmers, according to the latest version of the "Standard for sampling and surveys for CDM project activities and programme of activities (version 9.0)", the process of sampling is shown as follows:

⁷⁷ The Technical Guidelines for Techniques of Carbon Emission Reduction in Rice Paddies in Zhejiang Province, later issued by China National Rice Research Institute, also emphasized that the optimal amount of nitrogen fertilizer used in Zhejiang rice paddy fields is 12.5-14.5kg/ Mu.

● Objectives and Reliability Requirements

In this project, every farmer's household owning the paddy fields is regarded as an isolate unit. This sampling plan is for 3,466 households involved in this project. The project had applied intermittent flooded water regime with the same type, same category and same technology. After the implementation, this new water regime displaced the traditional continuously flooded method during rice cultivation in the project area. The farmers' logbooks should be sampled for assuring the project activity. In this case, the project proponent shall use 90/10 confidence/precision according to the sampling standard mentioned above.

● Target Population

From the description, the target population is the related 3,466 households planting the rice.

Table 5-9 the number of farmers in each town/street/township at Fuyang District and Tonglu County

District/County	Name of Town/Street	The number of households
Fuyang District	Huanshan Township	76
	Xintong Township	84
	Chang'an Town	173
	Changkou Town	436
	Dayuan Town	103
	Yinhu Street	258
	Longmen Town	47
	Luzhu Town	95
	Xindeng Town	463
	Xukou Town	121
	Yongchang Town	70
	Fuchun Street	144
	Chunjiang Street	31
	Dongzhou Street	177
	Lushan Street	217
Tonglu County	Tongjun Street	53

District/County	Name of Town/Street	The number of households
	Chengnan Street	114
	Jiuxian Street	95
	Fengchuan Street	97
	Jiangnan Town	303
	Hengcun Town	187
	Yaolin Town	122
Total		3,466

● Sample Method

Since the households are numerous and scattered, the water regime used during rice cultivation is identical, stratified random sampling is adopted in order that each one can be selected with equal probability. The strata should be mutually exclusive: every element in the population must be assigned to only one stratum. The stratification requires that information on the stratification variable, e.g. survey sample household will be changed once per year. Simple random sampling method will be taken in each stratum by using Microsoft Excel.

● Sample Size

According to the “Standard for sampling and surveys for CDM project activities and programme of activities (version 9.0)”, the desired confidence level is 90% and the desired precision is 10%. Based on the statistical principles and sampling survey method, 308 samples should be sufficient to satisfy the desired confidence and precision. For mean value sampling, the required sampling quantity is calculated by the following steps:

$$n_1 = \frac{Z^2 \sigma^2}{d^2} \quad (19)$$

Step1:

Where:

Parameters	Description
Z	The symbol used in general formula for confidence intervals. The validation team confirms it is to be 1.645 when confidence interval is 90%
σ	The population standard deviation, which is not available to PP

d	The maximum error of estimate
-----	-------------------------------

Step 2: Deformation of basic formula

$$n_1 = \frac{Z^2 \sigma^2}{d^2} = \frac{Z^2 \left(\frac{\sigma^2}{X^2} \right)}{d^2/X^2} = Z^2 V^2 / e^2 \quad (20)$$

Where:

Parameters	Description
V	the coefficient of variation, and $V = \sigma/X$. As population standard deviation σ shall be smaller than the sample mean value X , hence from conservative consideration point of view, making $V=1$ can get the biggest sample size. It is conservative
e	the relative sampling error, and $e = d/X$, which is the precision. In this case, $e=10\%$ as discussed above

Consequently, $n_1 = \frac{Z^2 V^2}{e^2} = \frac{1.645^2}{0.01} = 270.6$, and round up to 271.

Step 3: Correction based on population size

$$n_2 = \frac{n_1 N}{n_1 + N} \quad (21)$$

Where:

Parameters	Description
N	The population size, it is 3,466 under project context

Therefore,

$$n_2 = \frac{n_1 N}{n_1 + N} = \frac{271 \times 3,466}{271 + 3,466} = 251.35, \text{ and round up to be } 252, \text{ it takes } n_2 = 252 \text{ is preferable.}$$

Step 4: Correction based on sampling approach

$$n_3 = B n_2 \quad (22)$$

Where:

Parameters	Description
B	The survey design effect

As discussed in *Procedures for Administering Data Collection and Minimizing Non-Sampling Errors*. The project adopts multi-stage sampling approach. In this case, $B \leq 1$ as per Sampling Design and Methodology. It's conservative consideration.

Thus, $n_3 = Bn_2 = 1 \times n_2 = 252$

Step 5: Correction based on responding rate

$$n_4 = \frac{n_3}{r} \quad (23)$$

Where:

The responding rate is adopted to be less 90% according to investigation report.

Thus, $n_4 = \frac{n_3}{r} = \frac{252}{90\%} = 280$, round up to be 280.

Step 6: Correction based on contingency consideration

$$n = 110\% \times n_4 \quad (24)$$

Where:

Consequently, the sample size $n = 110\% \times n_4 = 110\% \times 280 = 308$, round up to be 308.

The calculation result for n is 308. Therefore, although all the households are required to complete the logbooks, only 308 sample logbooks from households will be selected from the sampling frame according to stratified sampling method at the beginning of each year during the crediting period. The template of logbook was compiled by Search Co2 in accordance with the requirements of methodology. An inclusion of 308 samples in total, the sample size of each township was decided on the method of proportional distribution.

● Sampling Frame

In the investigation, sampling frame is worked out independently by taking town as sampling unit. Sampled group will be changed in each monitoring period. Firstly, calculate the ratio of households in every administrative town to the total population at Fuyang District and Tonglu County. According to the ratio of every town, calculate the sampling size of every town, and then set the amount of sampling 308 households, the actual sampling size is the ratio of every town multiply by 308. Finally, according to the number of samples needed for each town, the random sampling function of Excel is used to extract from the database mentioned above.

Table 5-10 The sampling size of logbooks from households in each town/street/township at Fuyang District and Tonglu County

District/County	Name of Town/Street	The number of households
Fuyang District	Huanshan Township	7
	Xintong Township	7
	Chang'an Town	15
	Changkou Town	39
	Dayuan Town	9
	Yinhu Street	23
	Longmen Town	5
	Luzhu Town	8
	Xindeng Town	41
	Xukou Town	11
	Yongchang Town	6
	Fuchun Street	13
	Chunjiang Street	5
	Dongzhou Street	16
	Lushan Street	19

District/County	Name of Town/Street	The number of households
Tonglu County	Tongjun Street	2
	Chengnan Street	10
	Jiuxian Street	8
	Fengchuan Street	9
	Jiangnan Town	27
	Hengcun Town	17
	Yaolin Town	11
Total		308

After the sampling logbooks are collected by the technicians, the expert will check the contents in the logbooks first to confirm whether the nitrogen application amount and drainage and irrigation frequency recorded by the farmers meet the requirements of the project activity, and then hand it to Search Co2 for final check, and then complete the monitoring report.

As required in Paragraph 13 of Small-scale methodology AMS-III.AU “Methane emission reduction by adjusted water management practice in rice cultivation”, for each group of fields with the same cultivation pattern, at least three reference fields with the same pattern shall be determined in the project area. Thus, these three baseline reference fields in Nanshan Village chosen in this project are included in the project area but excluded in the ER calculation.

Monitoring results of $A_{s,g}$ during the 1st monitoring period

Every January from 2018 to 2021, the technicians gave out the blank cultivation logbooks to all the households. During the entire cropping season, farmers recorded the information required in the logbooks, including the date of transplanting, date of fertilization, the amount of fertilizer applied, water regime and yield. The technicians patrolled the fields every week and checked every household’s logbook. If the water management was inappropriate, the technician would

instruct the farmer how to practice intermittent flooded water regime correctly and ask him to make adjustments. At the same time, if the records in logbooks were incorrect, the technicians would also ask the farmer to correct them immediately. At the end of each year, Search Co2 used Excel software to randomly select 308 households from 3,466 households for inspection. After the 308 households are selected, Search Co2 informed the technicians to collect the corresponding logbooks. A total of 1,232 cultivation logbooks of different households were extracted for four years. All cultivation logbooks collected have been reviewed by expert and the results were compiled into an excel sheet (which has been submitted to VVB for verification). According to the excel sheet, all the 1,232 households have applied intermittent flooded water regime as required during this monitoring period.

Besides, as mentioned above, the size of each household's rice field is provided by Fuyang and Tonglu Agricultural Bureaus to the project proponent, which then makes a database before the project implementation. The technicians used this database to monitor and check each household in it. Every week, the technicians checked whether the project fields recorded in the database are cultivated by intermittent flooded method with the help of the logbooks. Finally, technicians submitted the *Fact Sheets on Rice Cultivation in Fuyang and Tonglu Area from 2018 to 2021*, which proved that all the rice paddies of 12,300 ha were cultivated by intermittent flooded water regime during this monitoring period. Besides, the baseline reference fields are excluded. Thus, $A_{s,g} = 12,300 \text{ ha}$.

Monitoring frequency

The monitoring of the project implementation will be taken place every year. The monitoring frequency should be determined according to the methodology requirements for each parameter in the project after the project registration to ensure the continuity of the benefits. Firstly, the aggregated project area in a given season s ($A_{s,g}$) is required to be monitored by technicians for every season. Should farmers relevantly deviate from the defined project cultivation practice, so that their fields cannot be deemed to be represented by the reference fields any more, those fields shall not be taken into account for the determination of the aggregated project area $A_{s,g}$ of that season.

Secondly, baseline and project emission factor of group g in a given season s ($EF_{BL,s,g}$ and $EF_{P,s,g}$) are obtained from the calculation of the emission rate for baseline reference fields according to the requirements in the Appendix of methodology, and the $C_{CH_4,t}$ (CH_4 concentration in chamber at time t) of weekly gas samplings is derived from the laboratory analysis. So, technicians should do the on-field sampling once a week, while the laboratory analysis is conducted by experts from China National Rice Research Institute every three times of samplings. It is an institution owned the certificate to do the laboratory analysis and the expert who is the leader of the experiment has a doctoral degree and her field of study is application of crop high yield and emission reduction technology. Therefore, the accuracy of monitoring results can be guaranteed.

The installation and calibration of the closed chamber and laboratory analysis shall be in accordance with the requirements in the Appendix of methodology (shown in Table 5-4~Table 5-6 above). The equipment, including FID, syringe, evacuated vial and the closed chamber used in this project, has been qualified.

Data management

All data collected as part of monitoring is archived electronically. All information should be stored by the technology department of the project proponent and all the materials have physical copies for backup. All data collected shall be archived at least two years after the end of the last crediting period of the project activity.

QA/QC

A systematic internal review and correction process will be used to assure/control the quality. The technicians are required to collect the logbooks from farmers once a month and cross check the data with experts. Similarly, the process of monitoring is also supervised by experts. When they find some unusual data, they will feed back to technicians and then correct the data before share it with Search Co2. Search Co2 will draft the monitoring report based on the raw data and cross-check with the experts. If there are not any further comments from the experts, Search Co2 will finalise the report. All parties are required to reply any questions raised within 30 days.

Emergency procedure

In this project, it is possible to cause equipment damage or missing data due to negligence and improper operation.

First of all, before the start of each growing season, Search Co2 should train technicians on how to check whether the equipment is working properly. After that, the technicians should check whether the equipment in the field is in good condition. Secondly, if there is any damage, the replacement should be completed before the land preparation, and the replacement should be recorded by Hangzhou Chunmeng and Search Co2 to ensure that the replaced equipment meets the requirements of this project. All the equipment should be in place before the start of growing season (land preparation). Thirdly, the technician should pay close attention to weather forecasts during rice planting. If extreme weather, such as heavy rain, is imminent, on-field gas sampling should be carried out before and after the extreme weather to ensure the monitoring frequency, at least once a week, required in the Appendix of methodology. Finally, if data loss or equipment damage occurs during the monitoring process, the corresponding emission reduction will be deducted in the most conservative way.

No emergency occurred during this monitoring period.

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Data / Parameter	A _{s,g}
Data unit	ha
Description	Aggregated project area in a given season s
Value applied:	During this monitoring period from 2018 to 2021, all the rice paddies of 12,300ha involved in this project have been cultivated with intermittent flooded water regime as required.
Comments	The size of each household's rice field is determined by using GPS device provided by Fuyang and Tonglu Agricultural Bureaus to the project proponent to make a database. The technicians monitor and check each household with the database. Every week, the technicians are required to check whether the project fields recorded in the database are cultivated by intermittent flooded method with the help of the logbooks. Finally, technicians should submit the Fact Sheets on Rice Cultivation in Fuyang and Tonglu Area from 2018 to 2021. The specifications of GPS device are shown as follows: Model: GNSS handheld GPS measuring equipment of G1BD series Precision: Real-time display of the estimation accuracy of the current horizontal position in meters. Calibration: The compass is calibrated by placing the device horizontally and vertically before use. The automatic calibration of the barometer is turned on before use. According to requirement described in Quality Assurance/Quality Control of <i>General guidelines for SSC CDM methodologies</i>, the monitoring of aggregated project area in a given season s (A_{s,g}) was divided into two sections. Firstly, the size of each household's rice field is provided by the agricultural bureaus to the project proponent, which then makes a database. The technicians used this database to monitor and check each household in it.

	Secondly, technicians checked whether the project fields recorded in the database are cultivated by intermittent flooded method with the help of the logbooks every week. At the end of each cropping season, the technicians submitted the Fact Sheets on Rice Cultivation in Fuyang and Tonglu Area from 2018 to 2021. Only compliant farms are considered. According to the Fact Sheets on Rice Cultivation in Fuyang and Tonglu Area from 2018 to 2021 submitted by technicians and the cultivation logbooks collected from households, all the households cultivated single-cropping rice with intermittent flooded water regime in this monitoring period.
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Data / Parameter	EF _{BL,s,g}									
Data unit	kg CH ₄ /ha per season									
Description	Baseline emission factor of group g in a given season s.									
Value applied:	Year 2018: 363.57 kg CH ₄ /ha Year 2019: 363.57 kg CH ₄ /ha Year 2020: 363.53 kg CH ₄ /ha Year 2021: 363.38 kg CH ₄ /ha									
Comments	As per instructions in the appendix (Guidelines for measuring methane emissions from rice fields) and IPCC 2006, volume 4, chapter 5.5. It was obtained from the calculation of the emission rate for baseline reference fields according to the requirements in the Appendix of methodology (please refer to calculation of the emission rate for a plot (reference field) below for details), and the C_{CH₄, t} (CH₄ concentration in chamber at time t) of weekly gas samplings was derived from the laboratory analysis. Since there are only one group in this project, three baseline reference fields where rice is cultivated by continuously flooded method are needed to measure the gas samples. Three closed chambers should be placed in each field and samples should be measured three times a week from each closed chamber. Therefore, the number of gas samples gained during this monitoring period is summarized as follows. <table><tr><td>Year</td><td>2018</td><td>2019</td><td>2020</td><td>2021</td></tr></table>					Year	2018	2019	2020	2021
Year	2018	2019	2020	2021						

Days of gas sampling	20	20	19	19
Number of gas samples	540	540	513	513

There are two sets of monitoring equipment involved. Firstly, the gas samples were measured by using the closed chambers. Then, all the samples should be analyzed in laboratory by FID.

The material and design of base and chamber used in the field measurement were chosen according to the requirements of Appendix in small-scale methodology applied. Moreover, depending on the design of the field measurement and the purpose of the equipment, no accuracy or calibration information is required for the closed chamber.

The FID specifications for laboratory analysis are as follows:

Model: Agilent 7890A GS System

Injection: Direct

Column: PQ Packed

Calibration: With certified standard gas each day of analysis before and after the analyses are done (the concentration of the certified standard gas: 1.8×10^{-6} mol/mol and 19×10^{-6} mol/mol).

The technicians trained by experts from China National Rice Research Institute should conduct gas sampling once a week. As mentioned above, three closed chambers were placed in each baseline reference field and each chamber was sampled three times at a time. Therefore, there were 27 gas samples a week. All these gas samples were stored in evacuated vial and then sent to laboratory for analysis by FID. Besides, the laboratory analysis was also conducted at China National Rice Research Institute which is an authoritative and official institute to do this analysis, because there is a patent related to methane emissions in rice paddies was conducted in this institute as well. All the technicians are rigorously trained by expert before they started gas sampling. Once the expert finds abnormal data, it is immediately verified with the technicians. If data is wrong, it will be discarded according

	to the actual situation. Thus, the quality of this data can be assured and controlled.
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Data / Parameter	EF _{P, s, g}																			
Data unit	kg CH ₄ /ha per season																			
Description	Project emission factor of group g in a given season s																			
Value applied:	Year 2018: 189.07 kg CH ₄ /ha Year 2019: 189.06 kg CH ₄ /ha Year 2020: 189.03 kg CH ₄ /ha Year 2021: 188.99 kg CH ₄ /ha																			
Comments	As per instructions in the appendix (Guidelines for measuring methane emissions from rice fields) and IPCC 2006, volume 4, chapter 5.5. It was obtained from the calculation of the emission rate for project reference fields according to the requirements in the Appendix of methodology (please refer to Calculation Method of Parameter EF_{BL,s,g} mentioned above for details), and the C_{CH₄,t} (CH₄ concentration in chamber at time t) of weekly gas samplings was derived from the laboratory analysis. Since there are only one group in this project, three project reference fields where rice is cultivated by intermittent flooded method are needed to measure the gas samples. Three closed chambers should be placed in each field and samples should be measured three times a week from each closed chamber. Therefore, the number of gas samples gained during this monitoring period is summarized as follows. All the samples should be analyzed in laboratory by FID as the same as described above for EF_{BL,s,g}. <table><tr><td>Year</td><td>2018</td><td>2019</td><td>2020</td><td>2021</td></tr><tr><td>Times of gas sampling</td><td>20</td><td>20</td><td>19</td><td>19</td></tr><tr><td>Number of gas samples</td><td>540</td><td>540</td><td>513</td><td>513</td></tr></table> The technicians trained by experts from China National Rice Research Institute should conduct gas sampling once a week. As					Year	2018	2019	2020	2021	Times of gas sampling	20	20	19	19	Number of gas samples	540	540	513	513
Year	2018	2019	2020	2021																
Times of gas sampling	20	20	19	19																
Number of gas samples	540	540	513	513																

mentioned above, three closed chambers were placed in each baseline reference field and each chamber was sampled three times at a time. Therefore, there were 27 gas samples a week. All these gas samples were stored in evacuated vial and then sent to laboratory for analysis by FID. Besides, the laboratory analysis was also conducted at China National Rice Research Institute which is an authoritative and official institute to do this analysis, because there is a patent related to methane emissions in rice paddies was conducted in this institute as well. All the technicians are rigorously trained by expert before they started gas sampling. Once the expert finds abnormal data, it is immediately verified with the technicians. If data is wrong, it will be discarded according to the actual situation. Thus, the quality of this data can be assured and controlled.

6.2 Baseline Emissions

As described in methodology AMS-III.AU (version 4.0) mentioned above, the baseline scenario is the continuation of the current practice, e.g. continuously flooded rice cultivation in the project fields, the baseline emissions are estimated as follows:

$$BE_y = \sum_s BE_s \quad (25)$$

$$BE_s = \sum_{g=1}^G EF_{BL,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \quad (26)$$

Where:

Parameters	Description
BE_y	Baseline emissions in year y (tCO ₂ e)
BE_s	Baseline emissions from project fields in season s (tCO ₂ e)
$EF_{BL,s,g}$	Baseline emissions factor of group g in season s (kgCH ₄ /ha per season)
$A_{s,g}$	Area of project fields of group g in season s (ha)
GWP_{CH_4}	Global warming potential of CH ₄ (tCO ₂ e/tCH ₄)

g	Group g, covers all project fields with the same cultivation pattern (G = total number of groups)
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Determination of baseline emission factor on baseline reference fields ($EF_{BL,s,g}$)

Baseline reference fields shall be set up in a way that they are representative of baseline emission in the project rice fields. Please refer to Section 5.3 for details of selecting baseline reference fields and the measurement of the seasonally integrated baseline emission factor $EF_{BL,s,g}$. And the specific information of baseline reference fields has been summarized in Table 5-1 (Section 5.3). Besides, the plan for field measurement and laboratory analysis from baseline reference fields has been shown as Table 6-1 below.

Table 6-1 The plan for the seasonal methane measurements in single cropping rice paddies during this monitoring period from 2018 to 2021

Activity	2018		2019		2020		2021	
	Gas Sampling	Laboratory Analysis	Gas Sampling	Laboratory Analysis	Gas Sampling	Laboratory Analysis	Gas Sampling	Laboratory Analysis
Land preparation	14 June	----	13 June	----	15 June	----	12 June	----
Transplantation	16 June	----	14 June	----	19 June	----	14 June	----
Base was buried	17 June	----	15 June	----	20 June	----	15 June	----
The first sampling	18 June	25 June	16 June	23 June	21 June	28 June	16 June	23 June
The second sampling	25 June		23 June		28 June		23 June	
The third sampling	02 July	09 July	30 June	07 July	05 July	12 July	30 June	07 April
The fourth sampling	09 July		07 July		12 July		07 July	
The fifth sampling	16 July	23 July	14 July	21 July	19 July	26 July	14 July	21 July
The sixth sampling	23 July		21 July		26 July		21 July	
The seventh sampling	30 July	06 August	28 July	04 August	02 August	09 August	28 July	04 August
The eighth sampling	06 August		04 August		09 August		04 August	

The ninth sampling	13 August	20 August	11 August	18 August	16 August	23 August	11 August	18 August
The tenth sampling	20 August		18 August		23 August		18 August	
The eleventh sampling	27 August	03 September	25 August	01 September	30 August	06 September	25 August	01 September
The twelfth sampling	03 September		01 September		06 September		01 September	
The thirteenth sampling	10 September	17 September	08 September	15 September	13 September	20 September	08 September	15 September
The fourth sampling	17 September		15 September		20 September		15 September	
The fifth sampling	24 September	01 October	22 September	29 September	27 September	04 October	22 September	29 September
The sixth sampling	01 October		29 September		04 October		29 September	
The seventh sampling	08 October	15 October	06 October	13 October	11 October	24 October	06 October	20 October
The eighth sampling	15 October		13 October		18 October		13 October	
The ninth sampling	22 October	25 October	20 October	23 October	24 October		20 October	
The last on-site sampling and then harvest	25 October		23 October		---	---	---	---

It is demonstrated by *The Report of Effect on Methane Emission Rate in Rice Paddies with Continuously Flooded Method in Fuyang and Tonglu Area in 2018, 2019, 2020 and 2021* from China National Rice Research Institute that the baseline emissions factor of group g in season s ($EF_{BL,s,g}$) is shown as Table 6-2 below.

Table 6-2 The baseline emissions factor of group g in season s ($EF_{BL,s,g}$) from 2018 to 2021

YEAR	2018	2019	2020	2021
$EF_{BL,s,g}$ (kgCH ₄ /season)	363.57	363.57	363.53	363.38

- (6) Please refer to Section 5.3 for detailed calculation process. The final integrated results of RE_{plot} with the unit of (kg/season/ha) in the three reference fields is equal to $EF_{BL,s,g}$ (kgCH₄/season/ha) which are summarized in Table 6-3 below.

Table 6-3 RE_{plot} (kg/season/ha) in baseline reference fields during this monitoring period from 2018 to 2021

YEAR	Baseline Reference Fields	RE_{plot} (mg/h × m ²)	Hours over the season	RE_{plot} (kg/season/ha)
2018	Plot 1	11.271	3,216 hours (134 days)	362.48
	Plot 2	11.233		361.25
	Plot 3	11.411		366.98
	Average	11.305		363.57
2019	Plot 1	11.289	3,192 hours (133 days)	360.34
	Plot 2	11.382		363.31
	Plot 3	11.499		367.05
	Average	11.390		363.57
2020	Plot 1	11.494	3,168 hours (132 days)	364.13
	Plot 2	11.591		367.20
	Plot 3	11.340		359.25
	Average	11.475		363.53
2021	Plot 1	11.605	3,144 hours (131 days)	364.86
	Plot 2	11.453		360.08
	Plot 3	11.616		365.21
	Average	11.558		363.38

Therefore, the baseline emission factors of group g in season s ($EF_{BL,s,g}$) are summarized as follows:

Table 6-4 $EF_{BL,s,g}$ (kg CH₄/season/ha) in baseline reference fields during this monitoring period from 2018 to 2021

YEAR	2018	2019	2020	2021
$EF_{BL,s,g}$ (kgCH ₄ /season/ha)	363.57	363.57	363.53	363.38

Calculation of the baseline emissions in year y BE_y (tCO₂e)

Taking all the information above, the table below can be reached.

Year	2018	2019	2020	2021
$EF_{BL,s,g}$ (kgCH ₄ /season/ha)	363.57	363.57	363.53	363.38
GWP_{CH_4} (t CO ₂ e/t CH ₄)	28			
$A_{s,g}$ (ha)	12,300			
P.S. 1. The GWP_{CH_4} is taken from the IPCC’s Fifth Assessment report, GHG Protocol 2. The number of $A_{s,g}$ is obtained from the Fact Sheets⁷⁸ of the monitoring results submitted by technicians				

Since there are two seasons in one year and one group in the project, the baseline emissions BE_y (tCO₂e) during the period from 2018 to 2021 are calculated as follows:

(1) In 2018

$$\begin{aligned}
 BE_s &= \sum_{g=1}^G EF_{BL,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \\
 &= 363.57 \text{ kgCH}_4/\text{season/ha} \times 12,300\text{ha} \times 10^{-3} \times 28\text{ t CO}_2\text{e/t CH}_4 \\
 &= 125,213 \text{ tCO}_2\text{e}
 \end{aligned}$$

(2) In 2019

$$\begin{aligned}
 BE_s &= \sum_{g=1}^G EF_{BL,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \\
 &= 363.57 \text{ kgCH}_4/\text{season/ha} \times 12,300\text{ha} \times 10^{-3} \times 28\text{ t CO}_2\text{e/t CH}_4
 \end{aligned}$$

⁷⁸ Fact Sheets on Rice Cultivation in Fuyang and Tonglu Area from 2018 to 2021 submitted by technicians

$$= 125,213 \text{ tCO}_2\text{e}$$

(3) In 2020

$$\begin{aligned} BE_s &= \sum_{g=1}^G EF_{BL,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \\ &= 363.53 \text{ kgCH}_4/\text{season/ha} \times 12,300\text{ha} \times 10^{-3} \times 28\text{t CO}_2\text{e/t CH}_4 \\ &= 125,199 \text{ tCO}_2\text{e} \end{aligned}$$

(4) In 2021

$$\begin{aligned} BE_s &= \sum_{g=1}^G EF_{BL,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \\ &= 363.38 \text{ kgCH}_4/\text{season/ha} \times 12,300\text{ha} \times 10^{-3} \times 28\text{t CO}_2\text{e/t CH}_4 \\ &= 125,148 \text{ tCO}_2\text{e} \end{aligned}$$

Since there is only one season for single-cropping rice in the whole year, BE_y is the same as BE_s . Overall, the baseline emissions BE_y (tCO₂e) during the period from 2018 to 2021 are summarized as follows:

Table 6-5 BE_y (tCO₂e) in baseline reference fields during this monitoring period from 2018 to 2021

YEAR	2018	2019	2020	2021
BE_s (tCO ₂ e)	125,213	125,213	125,199	125,148
BE_y (tCO ₂ e)	125,213	125,213	125,199	125,148

6.3 Project Emissions

According to the applied methodology AMS-III.AU (version 4.0), the project emissions within the project boundary are calculated as follows:

$$PE_y = \sum_s PE_s \quad (27)$$

$$PE_s = \sum_{g=1}^G EF_{P,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \quad (28)$$

Where:

Parameters	Description
PE_y	Project emissions in year y (tCO ₂ e)
PE_s	Project emissions from project fields in season s (tCO ₂ e)
$EF_{P,s,g}$	Project emission factor of group g in season s (kgCH ₄ /ha per season

Determination of project emission factor on reference fields ($EF_{P,s,g}$)

The seasonally integrated project emission factor $PE_{P,s,g}$ shall be determined using measurements on at least three project reference fields that fulfil the same conditions as the baseline reference fields, with the difference that they are cultivated according to the defined project cultivation practice. Project reference fields shall be established close to the baseline reference fields and begin with the growing season at the same time. $EF_{P,s,g}$ is the average of the measurement results from the three reference fields.

There is only one group for all rice paddies in this project, so a total of three project reference fields were established about 1.5km away from the baseline reference fields and began with the growing season at the same time. Please refer to Section 5.3 for details of selecting project reference fields and the measurement of the seasonally integrated project emission factor $EF_{P,s,g}$. And the specific information of project reference fields has been summarized in Table 5-1 (Section 5.3). Besides, the plan for field measurement and laboratory analysis from project reference fields has been shown as Table 6-1 above, since all the practice in project reference fields including the timeline of sampling should be consistent with that in baseline reference field except for water regime.

It is demonstrated by *The Report of Effect on Methane Emission Rate in Rice Paddies with Adjusted Water Management in Fuyang and Tonglu Area in 2018, 2019, 2020 and 2021* from China National Rice Research Institute that the project emissions factor of group g in season s ($EF_{P,s,g}$) is shown as Table 6-6 below.

Table 6-6 The project emissions factor of group g in season s ($EF_{P,s,g}$) from 2018 to 2021

YEAR	2018	2019	2020	2021
$EF_{P,s,g}$ (kgCH ₄ /season)	189.07	189.06	189.03	188.99

The process of calculation is shown as follow.

- (7) Please refer to Section 5.3 above for detailed calculation process. The final integrated results of RE_{plot} with the unit of (kg/season/ha) in the three reference fields is equal to $EF_{P,s,g}$ (kgCH₄/season/ha) which are summarized in Table 6-7 below.

Table 6-7 RE_{plot} (kg/season/ha) in project reference fields during this monitoring period from 2018 to 2021

YEAR	Project Reference Fields	RE_{plot} (mg/h × m ²)	Hours over the season	RE_{plot} (kg/season/ha)
2018	Plot 1	5.943	3,216 hours (134 days)	191.13
	Plot 2	5.893		189.52
	Plot 3	5.801		186.56
	Average	5.879		189.07
2019	Plot 1	5.964	3,192 hours (133 days)	190.37
	Plot 2	5.912		188.71
	Plot 3	5.893		188.10
	Average	5.923		189.06
2020	Plot 1	5.869	3,168 hours (132 days)	185.93
	Plot 2	6.149		194.80
	Plot 3	5.883		186.37
	Average	5.967		189.03
2021	Plot 1	5.889	3,144 hours (131 days)	185.15
	Plot 2	6.021		189.30
	Plot 3	6.123		192.51
	Average	6.011		188.99

Therefore, the project emission factors of group g in season s ($EF_{p,s,g}$) are summarized as follows:

Table 6-8 $EF_{p,s,g}$ (kg CH₄/season/ha) in project reference fields during this monitoring period from 2018 to 2021

YEAR	2018	2019	2020	2021
$EF_{p,s,g}$ (kgCH ₄ /season/ha)	189.07	189.06	189.03	188.99

Calculation of the project emissions in year y PE_y (tCO₂e)

Taking all the information above, the table below can be reached.

Year	2018	2019	2020	2021
$EF_{P,s,g}$ (kgCH ₄ /season/ha)	189.07	189.06	189.03	188.99
GWP_{CH_4} (t CO ₂ e/t CH ₄)	28			
$A_{s,g}$ (ha)	12,300			
P.S. 1. The GWP_{CH_4} is taken from the IPCC’s Fifth Assessment report, GHG Protocol 2. The number of $A_{s,g}$ is obtained from the Fact Sheet⁷⁹ of the monitoring results submitted by technicians				

Since there are two seasons in one year and one group in the project, the project emissions PE_y (tCO₂e) during the period from 2018 to 2021 are calculated as follows:

(1) In 2018

$$\begin{aligned}
 PE_s &= \sum_{g=1}^G EF_{P,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \\
 &= 189.07 \text{ kgCH}_4/\text{season/ha} \times 12,300\text{ha} \times 10^{-3} \times 28\text{t CO}_2\text{e/t CH}_4 \\
 &= 65,115 \text{ tCO}_2\text{e}
 \end{aligned}$$

(2) In 2019

$$\begin{aligned}
 PE_s &= \sum_{g=1}^G EF_{P,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4} \\
 &= 189.06 \text{ kgCH}_4/\text{season/ha} \times 12,300\text{ha} \times 10^{-3} \times 28\text{t CO}_2\text{e/t CH}_4 \\
 &= 65,112 \text{ tCO}_2\text{e}
 \end{aligned}$$

(3) In 2020

$$PE_s = \sum_{g=1}^G EF_{P,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4}$$

⁷⁹ Fact Sheets on Rice Cultivation in Fuyang and Tonglu Area from 2018 to 2021 submitted by technicians

$$= 189.03 \text{ kgCH}_4/\text{season/ha} \times 12,300\text{ha} \times 10^{-3} \times 28\text{t CO}_2\text{e/t CH}_4$$

$$= 65,101 \text{ tCO}_2\text{e}$$

(4) In 2021

$$PE_s = \sum_{g=1}^G EF_{P,s,g} \times A_{s,g} \times 10^{-3} \times GWP_{CH_4}$$

$$= 188.99 \text{ kgCH}_4/\text{season/ha} \times 12,300\text{ha} \times 10^{-3} \times 28\text{t CO}_2\text{e/t CH}_4$$

$$= 65,088 \text{ tCO}_2\text{e}$$

Since there is only one season for single-cropping rice in the whole year, PE_y is the same as PE_s . Overall, the baseline emissions PE_y (tCO₂e) during the period from 2018 to 2020 are summarized as follows:

Table 6-9 PE_y (tCO₂e) in baseline reference fields during this monitoring period from 2018 to 2021

YEAR	2018	2019	2020	2021
PE_s (tCO ₂ e)	65,115	65,112	65,101	65,088
PE_y (tCO ₂ e)	65,115	65,112	65,101	65,088

6.4 Leakage

According to the applied methodology AMS-III.AU (version 4.0), any effects of the project activity on GHG emissions outside the project boundary are deemed to be negligible and do not consider under this methodology.

So, leakage does not need to be considered in this project.

6.5 Net GHG Emission Reductions and Removals

The emission reductions achieved by the project activity shall be calculated as the difference between the baseline and the project emissions, which is also used as post-emission reduction:

$$ER_s = BE_s - PE_s \quad (29)$$

Where:

Parameters	Description
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ER_s	Emission reductions in season s (tCO ₂ e)
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Thus, the emission reduction during this monitoring period from 2018 to 2021 are calculated as follow:

(1) Year 2018

$$\begin{aligned}
 ER_s &= BE_s - PE_s \\
 &= 125,213 \text{ tCO}_2\text{e} - 65,115 \text{ tCO}_2\text{e} \\
 &= 60,098 \text{ tCO}_2\text{e}
 \end{aligned}$$

(2) Year 2019

$$\begin{aligned}
 ER_s &= BE_s - PE_s \\
 &= 125,213 \text{ tCO}_2\text{e} - 65,112 \text{ tCO}_2\text{e} \\
 &= 60,101 \text{ tCO}_2\text{e}
 \end{aligned}$$

(3) Year 2020

$$\begin{aligned}
 ER_s &= BE_s - PE_s \\
 &= 125,199 \text{ tCO}_2\text{e} - 65,101 \text{ tCO}_2\text{e} \\
 &= 60,098 \text{ tCO}_2\text{e}
 \end{aligned}$$

(4) Year 2021

$$\begin{aligned}
 ER_s &= BE_s - PE_s \\
 &= 125,148 \text{ tCO}_2\text{e} - 65,088 \text{ tCO}_2\text{e} \\
 &= 60,060 \text{ tCO}_2\text{e}
 \end{aligned}$$

Because the reduction of CH₄ emissions from rice fields in this project only focuses on the reduction of CH₄ GHG emissions, this project is not subject to buffer withholding. Therefore, the emission by this project during this monitoring period from 2018 to 2021 can be summarized as follow:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)	Buffer pool allocation	VCUs eligible for Issuance
10-June-2018 to 31-December-2018 ⁸⁰	125,213	65,115	0	60,098	N/A	60,000
01-January-2019 to 31-December-2019	125,213	65,112	0	60,101	N/A	60,000
01-January-2020 to 31-December-2020	125,199	65,101	0	60,098	N/A	60,000
01-January-2021 to 31-December-2021	125,148	65,088	0	60,060	N/A	60,000
Total	500,773	260,416	0	240,357	N/A	240,000

The net emission reductions of GHG during the monitoring period exceeded the threshold required in the small-scale methodology applied, which is 60,000 tCO₂e per year, therefore, the project proponent only claimed the 60,000 tCO₂e per year.

⁸⁰ Section 3.8 of the VCS Standard v4.3 states that “The project crediting period is the time period for which GHG emission reductions or removals generated by the project are eligible for issuance as VCUs.” According to the Methodology of *Methane emission reduction by adjusted water management practice in rice cultivation*, the time when the project produces emission reductions is the start time of land preparation. And the land preparation means the start of a rice season. The main activity of this project is emission reduction due to adjusted water regime during rice cultivation, which means emission reduction for each year, for period from 2018 to 2021, only occurred throughout the rice growing season. Therefore, although the crediting period in 2018 does not start from 1st January, it has already included the whole rice growing season in a year, that is why the amount of emission reduction is similar to that in 2019 and 2021.

APPENDIX 1: EVIDENCE OF SD CONTRIBUTIONS

No.	SD Contributions	Evidences
1)	1.4 The growth of farmers' income resulting from higher rice yield and extra pay by hiring as technicians	1. Stakeholder Satisfaction Questionnaires from farmers 2. Technician recruitment appointment contract and these technicians' payrolls
2)	5.5 The percentage of women hired in this project	Payroll of these women workers.
3)	8.5 The number of job opportunities provided by this project to local farmers	Technician recruitment appointment contract
4)	13.0 Tons of greenhouse gas emissions avoided or removed.	Since the amount of methane emissions reduced shall be calculated based on the parameters of $A_{s,g}$ (area of project fields of group g in season s), $EF_{BL,s,g}$ and $EF_{P,s,g}$ (baseline and project emission factors of group g in season s), the evidences are as follows. 1. The Reports of Effect on Methane Emission Rate in Rice Paddies with Adjusted Water Management in Fuyang and Tonglu Area from 2018 to 2021 for $EF_{BL,s,g}$ and $EF_{P,s,g}$ (baseline and project emission factors of group g in season s) 2. Fact Sheets on Rice Cultivation in Fuyang and Tonglu Area from 2018 to 2021 for $A_{s,g}$ (area of project fields of group g in season s).