JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Methane gas reduction project in Batangas and Laguna Provinces through AWD (Alternate Wetting and Drying) implementation in rice paddies

A.2. General description of project and applied technologies and/or measures

This project aims to collaborate with local farmers in the Philippines who practice continuous flooding rice cultivation and to introduce Alternate Wetting and Drying (AWD) in target fields to reduce methane emissions.

Rice cultivation in Batangas and Laguna Provinces and in the Philippines at large is predominantly characterized by irrigated, flooded fields. Baseline information collected to establish existing cropping practices shows that the plots are irrigated and under continuous flooding. Before planting, the land is ploughed to stir up the soil, so it is ready for the seedlings. After plowing, the paddies are flooded, and the seedlings are planted by hand in neat rows about 12 cm apart. Watering of the fields is only stopped after rice matures to allow for smooth harvesting.

Despite the positive aspects that rice cultivation brings to society and the world at large, it is also a major emitter of essential and long-lasting greenhouse gasses (hereafter, "GHGs") including CH_4 and N_2O, posing a significant danger to sustainable agriculture.[1] It has been established that rice fields emit around 30% and 11% of global agricultural CH_4 and N_2O emissions, respectively.[2][3] Asia accounts for about 90% of global rice production, [4] and the Philippines stands out as a significant contributor both to the extensive rice yields and GHG emission, with 3,625 kg of CH_4 per hectare was emitted from irrigated rice field.[5]

Therefore, the current project activities focus on modifying irrigation practices from continuous flooding to intermittent flooding by employing alternative wetting and drying (AWD) techniques. AWD is a simple and inexpensive way of reducing water consumption in rice production by 30%, creating conditions that significantly reduce GHG emissions.[2] It involves periodic draining of the field to a certain threshold, usually 15 cm below the soil surface, and re-flooding. A perforated tube placed in the soil enables the farmer to monitor the water level below the soil surface to determine the optimal time for irrigation.

In addition to reducing water consumption, the AWD technology has also been proven to effectively mitigate GHGs, specifically methane, from rice production by 30-70%, without causing a yield reduction.[6] During the dry phases, the methane-producing bacteria are inhibited, thus, setting a condition to reduce GHG emissions. Even when methane production temporarily ceases during dry periods, methane can still remain trapped in the soil of rice paddies. Thus, the application of AWD to rice production is essential in ensuring that the during wet phases CH_4 emission is reduced as it is shown in studies to have reduced 19.8% of annual CH4 emissions.[7]

A.3. Location of project, including coordinates

Country	Republic of the Philippines
Region/State/Province etc.:	Province of Batangas and Laguna
City/Town/Community etc:	Province of Batangas (1) Municipality of Nasugbu (2) Municipality of Lian (3) Municipality of San Juan (4) Municipality of Rosario (5) Municipality of Balayan (6) Municipality of Calatagan (7) Municipality of Lobo Province of Laguna (1) Municipality of Sta Maria (2) Municipality of Victoria (3) Municipality of Calauan (4) Municipality of Nagcarlan
Latitude, longitude	Province of Batangas (1) N 14° 4' 0" and E 120° 37' 0" (2) N 14° 3' 36" and E 120° 38' 24" (3) N 13° 49' 0" and E 121° 23' 0" (4) N 13° 50' 24" and E 121° 12' 0" (5) N 13° 56' 24" and E 120° 43' 12" (6) N 13° 50' 24" and E 120° 38' 24" (7) N 13° 38' 24" and E 121° 15' 36" Province of Laguna

	(1) N 14° 25' 48" and E 121° 24' 0" (2) N 14° 13' 12" and E 121° 19' 48" (3) N 14° 8' 24" and E 121° 18' 36" (4) N 13° 53' 24" and E 121° 21' 36"

A.4. Name of project participants

The Republic of the Philippines	University of the Philippines – Los Baños (UPLB)
Japan	Green Carbon, Inc.

A.5. Duration

Starting date of project operation	01/12/2024
Expected operational lifetime of project	10 years

A.6. Contribution from Japan

Japan contributes to this project through direct investment and the development of a carbon credit generation platform (currently under development). This initiative is driven by the demand for carbon credits from Japan, and the associated funding enables the project's implementation—making these investments a clear and vital contribution from Japan.

Green Carbon, the project proponent, is also developing a digital platform to streamline the management of data required for carbon credit generation. Once completed, this platform will significantly reduce the administrative burden on farmers. For instance, to date, it is said that project developers usually have very little support for organizing inputs for the carbon reduction calculations. To address this, we will facilitate the transition from paper-based logbooks to our digital platform, where farmers can enter their daily activities such as field operations, water management, and input usage. The app will also provide alert notifications for missing entries, helping to improve data completeness and support effective farm management. To ensure ease of use, intuitive icons and guided inputs will be implemented based on the typical sequence of farming activities. These features will not only enhance the accuracy of data collection for carbon credit issuance but also empower farmers in the Philippines with better tools for farm monitoring and planning.

More importantly, the introduction of the carbon credit system incentivizes the adoption of Alternate Wetting and Drying (AWD), which contributes to methane emission reductions in the

Philippines and supports sustainable agriculture through capacity building for local farmers. In essence, the GHG emission reduction from AWD implementation is measured and converted into carbon credits, which are sold to generate additional income for these farmers. Studies have also indicated potential increase in rice yield due to AWD. [6]

This initiative aligns with Japan's commitment to advancing climate solutions and innovation through the Joint Crediting Mechanism (JCM). The project leverages Japan's expertise in Monitoring, Reporting, and Verification (MRV) technologies to ensure transparency, accountability, and environmental integrity in carbon credit generation.

Beyond financial and technical contributions, the project fosters international collaboration by facilitating the transfer of low-emission agricultural technologies and best practices to stakeholders in the Philippines, strengthening regional cooperation on climate action. The model combining carbon finance with sustainable agricultural practices is designed to be scalable and replicable across other Southeast Asian countries with similar rice cultivation conditions, promoting broader climate benefits.

Capacity building is a core component, with workshops and on-field training empowering local farmers and communities to adopt climate-smart agricultural techniques. This strengthens local ownership, resilience, and ensures long-term sustainability of the project beyond its official period.

In addition to reducing greenhouse gases, the project delivers multiple environmental, social, and economic co-benefits aligned with the Sustainable Development Goals (SDGs), including:

Goal 1 – No Poverty
By promoting AWD during rice cultivation, the project improves yields and helps farmers in low-income regions increase their net income. Green Carbon also shares carbon credit revenues with participating farmers, enhancing their financial stability.

Goal 2 – Zero Hunger
AWD not only reduces methane emissions but also enhances root health, improves resistance to lodging and extreme weather, and supports stable yields. Positive results have been confirmed in trials conducted by Green Carbon in partnership with universities across several countries.

Goal 5 – Gender Equality

The project actively encourages female participation by offering training opportunities and promoting women's access to resources and economic activities.

Goal 6 – Clean Water and Sanitation

AWD is a water-efficient irrigation method that manages flooding in rice fields more sustainably. Research indicates it can reduce water use by up to 30% without compromising yields.[2] [6]

Goal 8 – Decent Work and Economic Growth

The project creates local employment opportunities by hiring field staff from surrounding villages to support AWD implementation and monitor water management practices.

Goal 12 – Responsible Consumption and Production

The employment of AWD addresses Target 12.2, which aims for sustainable management and efficient use of natural resources. Efficient use of resources, especially water, is vital as the Philippines faces challenges including 50 major rivers are considered biologically dead, alongside rising potable water costs.[8]

Finally, the project strictly follows internationally recognized methodologies for quantifying GHG reductions and is submitted for validation under JCM whilst considering other international best practices ensuring its credibility, transparency, and contribution to global climate goals.

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	PH_AM004
Version number	Ver1.0

B.2. Explanation of how the project meets eligibility criteria of the approved methodology

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	The project field is rice paddy field that changes water regime during cultivation period from continuously flooded to single or	This project involves collaboration with farmers in the Province of Batangas and Laguna who traditionally practiced continuous flooding irrigation. The

	multiple drainage, or from single to multiple drainage. For the former, farmers have not conducted single or multiple drainage in the past 2 years prior to the start of the project, and for the latter, farmers have not conducted multiple drainage in the past 2 years prior to the start of the project.	project introduces Alternate Wetting and Drying (AWD) irrigation practices. Therefore, it entails a transition from continuous flooding to multiple drainage, fulfilling this criterion.
Criterion 2	A drainage is considered fully completed when the water level is observed to reach 15cm below the soil surface. To maintain yield, irrigation is carried out within 2 days after the completion of the drainage.	This project collaborates with a local university specializing in the implementation of Alternate Wetting and Drying (AWD), whereby irrigation is promptly conducted after achieving a water level of 15 cm or below.
Criterion 3	Single or multiple drainage is not required by the local or national legislation in the project field.	In the Philippines and the Province of Batangas, the introduction of AWD is recommended to secure water resources, but it is not widely adopted among farmers due to limited direct benefits. Therefore, carbon finance introduced by this project serves as a motivation for adoption.

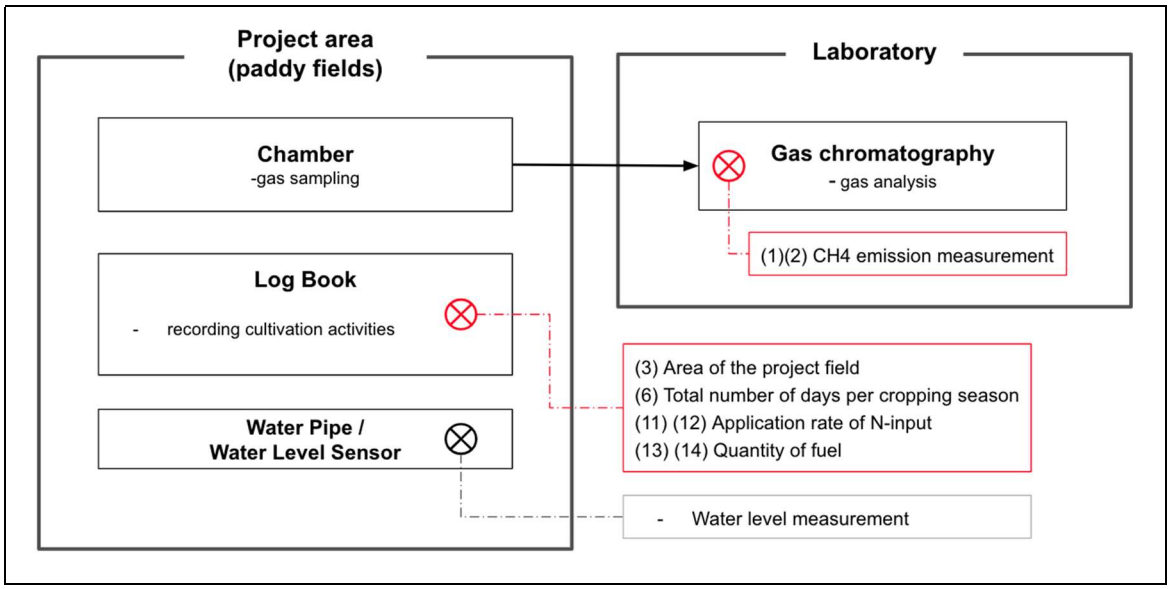
C. Calculation of emission reductions

C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions	
Emission sources	GHG type
CH_4 generated from rice paddy field due to activity of microorganism under anaerobic soil condition.	CH_4
N_2O emissions from fertilizer application.	N_2O
CO_2 emissions due to the utilization of drainage pumps used to drain	CO_2

water from rice paddy fields.	
CO_2 emission due to utilization of irrigation pumps.	CO_2
Project emissions	
Emission sources	GHG type
CH_4 generated from rice paddy field due to activity of microorganism under anaerobic soil condition.	CH_4
N_2O emissions from fertilizer application	N_2O
CO_2 emissions due to the utilization of drainage pumps used to drain water from rice paddy fields.	CO_2
CO_2 emission due to utilization of irrigation pumps.	CO_2

C.2. Figure of all emission sources and monitoring points relevant to the JCM project



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_2e)	Estimated Project Emissions (tCO_2e)	Estimated Emission Reductions (tCO_2e)
2025	15,000.15	8,451.95	6,548.20
2026	78,293.85	44,142.77	34,151.08
2027	156,587.70	88,285.54	68,302.16
2028	156,587.70	88,285.54	68,302.16
2029	156,587.70	88,285.54	68,302.16
2030	156,587.70	88,285.54	68,302.16
Total (tCO_2e)			313,907.92

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	No

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

To solicit comments from the local stakeholders, the project participant conducted a local stakeholders consultation meeting as follows:

Batangas:

Nasugbu:

◆ Date /Time: June 11, 2024 / 9:36am ~11:08am

◆ Venue: Cafe de Nasugbu, Concepcion St, Nasugbu, Batangas

◆ Attendees:

University of the Philippines Los Baños (hereafter, "UPLB")
National Irrigation Administration (hereafter, "NIA")
Municipality Disaster Risk Reduction and Management Office (MDRRMO)
Local Government Unit (hereafter, "LGU")
Municipality Agriculture Office (hereafter, "MAO")
Farmers

20 attendees

◆ Invitation method:

Email / Letter / Phone call / SMS were sent a week before the date of the meeting to different Government Offices involved in the meeting along with the Farmers Cooperative and Association involved in rice production

◆ Meeting agenda

1. Opening remark
2. Participants' introduction
3. Project outline and project benefit

4. Discussion on procedure of the project
5. Open forum (Q & A)
6. Closing remark

Lian:

◆ Date /Time: November 7, 2024 / 1:30 pm ~ 4:00 pm

◆ Venue: So. Molino Kapito Lian, Batangas

◆ Attendees:

UPLB
Green Carbon
MAO of Lian
Leaders of Different Rice Farmer Associations

19 Attendees

◆ Invitation method:

Email / Letter / Phone call / SMS were sent a week before the date of the meeting to Farmers Cooperative and Association involved in rice production

◆ Meeting agenda

Introduction of stakeholders
Short discussion about the project and AWD system
Q&A with stakeholders
Field demo for gas sampling

Balayan:

◆ Date /Time: December 19, 2024 / 9:30 am ~ 12:00 pm

◆ Venue: AVP Room, Office of Municipal Agriculture, Balayan, Batangas, Philippines

◆ Attendees:

Green Carbon, Inc. Managers
Farmer Leaders of Balayan
MAO of Balayan

16 attendees

◆ Invitation method:

The invitation was made by the Municipal Agricultural Office through their Facebook Messenger Group together with the different Farmers/Stakeholders involved in the rice production of Balayan, Batangas.

The invitation does not involve discrimination on the basis of gender; thus, men and women have the equal right to attend the stakeholder meeting.

◆ Meeting agenda

1. Opening of the meeting
2. Explanation of the project in non-technical terms to cover:

The AWD Project was presented by Green Carbon Project Manager Mr. Paolo Tatlonghari. The following topics were discussed:

- Company overview
- Project Development Policy
- Advanced AWD Project (Vietnam, Philippines)
- AWD (Methane gas emission from paddy fields)
- AWD (Image and benefit)
- AWD project result in Vietnam and Philippines
- Green Carbon's willingness (AWD project)
- Benefit for the Province

3. Question and answer session about the project
4. Information on next steps and contact details
5. Field demonstration for the gas sampling using the gas chamber
6. Closure of the meeting

Other consultations:

In the sessions targeted at the Barangay level, where various farmers are coordinated, we primarily discussed the project overview and the management structure and information dissemination scheme for the farmers. Regarding the management structure and information dissemination, we reached an agreement to operate the project by following the current on-site management system that is in place.

Laguna:

Sta Maria:

◆ Date /Time: November 14, 2024 / 9:00 am ~ 12:00 pm

◆ Venue: Sta. Maria Municipal Covered Court, Laguna

◆ Attendees:

Jaira Gaviola, Green Carbon

Patrick Rocamora, UPLB Professor

Sophia Bugia, UPLB Researcher

Ella Rafael, UPLB Researcher

Farmers

Agricultural Technicians

MAO of Sta. Maria

Total attendees: 38

◆ Meeting agenda

1. Gather farmers who will join the project
2. Discussion of AWD and its benefits
3. Discussion regarding the number of hectares, planting date, project site
4. Farmers inquiries

Green Carbon presented its company profile, project details, and objectives to provide farmers with essential information about the initiative. The local Green Carbon Manager, along with representatives from the University of the Philippines Los Baños (UPLB), explained the Alternate Wetting and Drying (AWD) methodology to the farmers. The team outlined benefits available to participants, including technical training opportunities, water conservation methods, employment possibilities, and profit-sharing arrangements. Green Carbon arranged this meeting through the Municipal Agriculture Office (MAO) of Sta. Maria, coordinating with Mr. Carlo Sumaria. Farmer comprehension of the project was identified as critical since their decision to participate would determine project viability. The project cannot proceed without securing farmer cooperation and engagement.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
A representative	The local Government of Nasugbu cannot make a commitment towards	The issue was resolved with the help of the Municipal Administrator Mr.

from the Local Government of Nasugbu (Nasgubu, Batangas)	the farmers' availability without a signed MOA.	Emer Bordeos who mentioned that the training can be commenced soon given that the farmers organization agrees with it. The farmers' leader agreed to the proposal, confirming participants for training and discussion for the project site which will follow in the coming days.
Representative from the Municipal Environment and Natural Resources Office (MENRO) Engr. Dolores Robles (Nasgubu, Batangas)	What gasses will be gathered during the project and will the gas chamber be installed on the field permanently?	Mr. Rocamora stated that methane and carbon dioxide would be the gasses that will be collected and analyzed while the gas chamber will not be installed but instead be brought from one farm to another to gather gas
Farmers of Nasugbu (Nasgubu, Batangas)	Stated that out of the 800 hectares that is serviceable by the irrigator's association, there are already 200 hectares planted with rice, thus about 500 hectares would only be available for data collection. Farmers would start planting by July.	Mr. Rocamora expressed that given the situation, it would be ideal to get farmers who have not planted yet. He also mentioned that preferred areas should be closely between each other to make data collection easier. It must also be homogenous and have control over water to be able to implement AWD. There will also be a biophysical assessment of the area.
Ms. Lora Destreza, the Municipal Agricultural Officer	Aired their concern for the continuation of the project since there are still no existing MOA. She also asked about the coverage of the training.	Mr. Rocamora mentioned that the training can push through even if there are still no MOA given that the LGU and the farmers agree with it. For the training that would be given,

(Nasgubu, Batangas)		it would cover the same training of gas and data collection that was done in Vietnam. Training can be done both face to face and virtually, depending on the availability of participants.
Local Farmers (Sta Maria, Laguna)	How will the farmer monitor that AWD is being implemented?	We will check your logbook where you will add a log whenever you irrigate, and we will ask the help of MAO personnel to help us monitor the logbooks and the area where AWD is being implemented.
Local Farmers (Sta Maria, Laguna)	Are all the corners of the paddy field installed with pani pipes?	No, we will scatter the pvc pipes on the project site and will select an area to install the pvc pipe that is near the water entry
Local Farmers (Sta Maria, Laguna)	Who will collect the vial and where will we put it?	The vials for the gas sampling will be collected by UPLB after the gas sampling.
Local Farmers (Sta Maria, Laguna)	Do we lower the gas chambers in flooded fields?	Yes, even if it is flooded, the chambers will be lowered on the field.
Local Farmers (Sta Maria, Laguna)	When do we measure the water inside the pipes?	It will be everyday at any time of the day. We will have a contact person to communicate between the farmers and UPLB/Green Carbon.
Local Farmers (Sta Maria, Laguna)	Do we remove the water inside the pvc pipe after measuring the water inside?	No, we will just leave it be. As long as there is no rain, the water inside the pvc pipe should go down. When there is no water inside the pvc pipe, we will ask you to irrigate the plot.
Local Farmers (Sta Maria,	In our experience when the field is left with no water for two days, the soil cracks.	It's okay, the cracks don't mean that there is no water left under the soil. The pvc is the important

Laguna)		measurement if there is still water or not. Water saving will be efficient because we will only water the field once the pvc pipe is empty of water. Water will stay mostly for one week.
Local Farmers (Sta Maria, Laguna)	What if we missed the water schedule because of AWD?	We will coordinate with NIA regarding your water schedule so we can schedule the irrigation for AWD implementation. Communication with the farmers will be done everyday so we can confirm the schedule.
Local Farmers (Sta Maria, Laguna)	If our municipality joins the AWD project would you monitor the AWD implementation everyday? Will you be on-site everyday?	Yes, we will monitor it everyday using the PVC pipes installed in the fields. However, we will not be on site.
Local Farmers (Sta Maria, Laguna)	What time do we collect water and gas sample?	Gas sampling is done between 7am to 10am and water monitoring is done anytime of the day.
Local Farmers (Sta Maria, Laguna)	How many pipes will you put in 1 hectare?	We will base the number of pipes on the topography and leveling of the soil.
Local Farmers (Sta Maria, Laguna)	Where will we do gas sampling?	We will base it on the map to select the most suitable site to do gas sampling.
Local Farmers (Sta Maria, Laguna)	How many people do you need for gas sampling?	12 people at least

F. References

[1] Sun, Huifeng, Sheng Zhou, Zishi Fu, Guifa Chen, Guoyan Zou, and Xiangfu Song. “A

Two-Year Field Measurement of Methane and Nitrous Oxide Fluxes from Rice Paddies under Contrasting Climate Conditions." *Scientific Reports* 6, no. 1 (June 20, 2016): 28255. https://doi.org/10.1038/srep28255.

[2] International Rice Research Institute. "Alternate Wetting and Drying." GHG Mitigation in Rice. Accessed March 3, 2025. https://ghgmitigation.irri.org/mitigation-technologies/alternate-wetting-and-drying.

[3] Gupta K, Kumar R, Baruah KK, Hazarika S, Karmakar S, Bordoloi N. Greenhouse gas emission from rice fields: a review from Indian context. *Environ Sci Pollut Res Int*. 2021 Jun;28(24):30551-30572. doi: 10.1007/s11356-021-13935-1. Epub 2021 Apr 27. PMID: 33905059.

[4] Reddy, V, and Dil Rahut. MULTIFUNCTIONALITY of RICE PRODUCTION SYSTEMS in ASIA a Synoptic Review ADBI Series on Asian and Pacific Sustainable Development *ASIAN DEVELOPMENT BANK INSTITUTE*. 2023.

[5] Bautista, Elmer Granadozo, and Masanori Saito. "Greenhouse Gas Emissions from Rice Production in the Philippines Based on Life-Cycle Inventory Analysis." ResearchGate, 2016, www.researchgate.net/publication/273636139_Greenhouse_gas_emissions_from_rice_production_in_the_Philippines_based_on_life-cycle_inventory_analysis.

[6] Cheng, Haomiao, Kexin Shu, Tengyi Zhu, Liang Wang, Xiang Liu, Wei Cai, Zhiming Qi, and Shaoyuan Feng. "Effects of Alternate Wetting and Drying Irrigation on Yield, Water and Nitrogen Use, and Greenhouse Gas Emissions in Rice Paddy Fields." *Journal of Cleaner Production* 349 (May 15, 2022): 131487. https://doi.org/10.1016/j.jclepro.2022.131487.

[7] Li, Jianling, et al. "Annual Greenhouse Gas Emissions from Rice Paddy with Different Water-Nitrogen Management Strategies in Central China." *Soil & Tillage Research*, vol. 235, 1 Jan. 2024, pp. 105906‑105906, https://doi.org/10.1016/j.still.2023.105906. Accessed 10 Nov. 2023.

[8] Rola, Agnes, et al. "Challenges of Water Governance in the Philippines." Philippine Journal of Science, vol. 144, no. 2, 2015, pp. 197–208, philjournalsci.dost.gov.ph/images/pdf/pjs_pdf/vol144no2/pdf/challenges_of_water_governance_in_the_Phils_FinalCopy_05_April_2016.pdf.

Reference lists to support descriptions in the PDD, if any.

Annex

Annex 1: **Estimated emissions reductions for 2031-2034**

Year	Estimated Reference emissions (tCO2e)	Estimated Project Emissions (tCO2e)	Estimated Emission Reductions (tCO2e)
2031	156,587.70	88,285.54	68,302.16
2032	156,587.70	88,285.54	68,302.16
2033	156,587.70	88,285.54	68,302.16
2034	156,587.70	88,285.54	68,302.16
Total (tCO2e)			273,208.64

Annex 2: **Estimated emissions reductions for the entire project lifetime**

Year	Estimated Reference emissions (tCO_2e)	Estimated Project Emissions (tCO_2e)	Estimated Emission Reductions (tCO_2e)
2025	15,000.15	8,451.95	6,548.20
2026	78,293.85	44,142.77	34,151.08
2027	156,587.70	88,285.54	68,302.16
2028	156,587.70	88,285.54	68,302.16
2029	156,587.70	88,285.54	68,302.16
2030	156,587.70	88,285.54	68,302.16
2031	156,587.70	88,285.54	68,302.16
2032	156,587.70	88,285.54	68,302.16
2033	156,587.70	88,285.54	68,302.16
2034	156,587.70	88,285.54	68,302.16
Total (tCO_2e)			499,049.07

Revision history of PDD

Version	Date	Contents revised
1.0	23/05/2025	First Version