CTCN Technical Assistance

Request Submission Form

Requesting country or countries:	VIET NAM
Request title:	Feasibility study of 'Waste to Energy (Livestock Manure to Biogas and Organic Fertilizer)' for rural communities in Vietnam, using anaerobic digestion technology
NDE	**Contact Person:** Pham Van Tan **Position:** Deputy Director – General **Organization:** Department of Climate Change (DCC), Ministry of Natural Resources and Environment (MONRE) **Phone:** +84-4-37955116, +84-4-37759770, **Email:** pvtanll@gmail.com **Address:** 10 Ton That Thuyet, Hanoi, Vietnam
Request Applicant:	**Contact Person:** Duong Tat Thang **Position:** Director **Organization:** Department of Livestock Production, Ministry of Agriculture and Rural Development (MARD) **Phone:** +84903466100 **Email:** thangdt.cn@mard.gov.vn **Address:** No16 Thuy Khue, Hannoi, Vietnam

Climate objective:

☐ Adaptation to climate change
☐ Mitigation of climate change
☒ Combination of adaptation and mitigation of climate change

Geographical scope:

☐ Community level
☐ Sub-national
☒ National
☐ Multi-country

If the request is at a sub-national or multi-country level, please describe specific geographical areas (provinces, states, countries, regions, etc.).

Problem statement related to climate change (up to one page):

With the livestock industry growing, managing livestock manure has been a rising issue in Vietnam. As of 2018, the total solid waste generated from livestock industry is estimated to 62.07 million tons and the total liquid waste about 63 million m3. Also, it has been identified that 47% of the household raising livestock do not take any treatment measure before discharging the livestock manure[1]. As improperly treated/discharged waste leads to contamination of soil and water, this is an obvious threat to residents' public health and hygiene. Also, as a result of the recent ASF epidemic in Vietnam, demand for safer and cleaner livestock products are on a rise[2], which adds on to the pressing needs and urgency of the strengthened livestock manure management practice put in place.

On mitigation aspect, improperly managed livestock manure generates fair amount of short-lived climate pollutants (SLCPs), mainly in the forms of CH4 and N2O. As it negatively affects National GHG Inventory, Vietnamese government has been taking actions to collect and treat millions tonnes of organic waste in livestock production to make organic fertilisers[3]. However, there are still

[1] MARD(2019), Support for Ministry of Agriculture and Rural Development (MARD) of Vietnam to finalize the Animal Husbandry Law

[2] USDA(2021), Vietnam Livestock Market Update

[3] Viet Nam(2020), NDC

difficulties and challenges left in applying relevant technologies. To face the challenge, Vietnamese government has once again prioritized (i) applying management and technology solutions in husbandry, and (ii) applying technology to treat and reuse by-products and waste in livestock production in the National Determined Contribution (2020), as did before in National Technology Needs Assessment (2012), asking for international support in its implementation.

To address the two issues stated above, the request aims to develop a Biogas pilot facility that feeds on livestock manure and other agricultural wastes to generate heat energy, electricity, and also organic fertilizer as its by-product. The plant is expected to generate the following benefits:

1) Reduction in CH4, N2O emissions by strengthened management of livestock manure
2) Prevention in soil, water contamination and improvement in settlement environment for residents by strengthened management of livestock manure
3) New stream of income for local government, who will be the owner and operator of the facility, with the sales of heat, electricity and organic fertilizer

Circular use of resource (waste to energy) achieved and productivity in local agriculture improved with the use of organic fertilizer.

Past and on-going efforts to address the problem (up to half a page):

To tackle the livestock manure management issue, the Environmental Protection Law(2014) has imposed the following requirements to the concentrated livestock areas: (i) Ensure environmental hygiene for residential areas; (ii) Collection and treatment of liquid and solid waste and compliance with waste management regulations; (iii) Animals' barns must be cleaned periodically; ensuring disease prevention and control; (iv) Dead animals caused by epidemics must be managed in accordance to the regulations on hazardous waste management and disease prevention. Similarly, the following regulations have assigned responsibilities to relevant actors:

- Vietnam National Technical Regulation No. 62 - MT:2016/BTNMT on livestock wastewater standard is enacted with Circular No. 04/2016/TT-BTNMT (QCVN: 62). The content of this regulation stipulates the maximum allowable value of wastewater pollution parameters in animal husbandry when discharging into wastewater receiving sources; responsibilities of state management agencies on environment in guiding, inspecting and supervising the implementation of this regulation.

In addition to the legal mandates mentioned above, efforts to diffuse and distribute adequate technology has also been put in place. Anaerobic treatment using biogas plant system was identified as priority technology in Vietnams Technology Needs Assessment (2012) and also in research to develop/finalize Animal Husbandry Law (2019)[4]. According to the research, applied rate of biogas facility using pig manure as its feed (Household level) is about 10.32% as of 2018, and applied rate of biogas facility using each pig and cow manure (Farm level) are individually about 26.25% and 19.89% as of 2018. The goal was set to increase its applied rate by 20%, by 2030. To secure financial support to act towards its goal, MARD has been actively communicating with IFC to secure funding on Biogas program for livestock industry[5].

Specific technology[6] barriers (up to one page):

As described above, national government of Vietnam has been taking legal/institutional actions to resolve soil/water resource contamination issue while contributing to national mitigation goal, but as stated in its NDC(2020), there are still difficulties and challenges left in applying relevant

[4] MARD(2019), Support for Ministry of Agriculture and Rural Development (MARD) of Vietnam to finalize the Animal Husbandry Law

[5] MARD(2022), ICF commits to support Vietnam in developing green low carbon agriculture

[6] *"**any equipment, techniques, practical knowledge and skills** needed for reducing greenhouse gas emissions and adapting to climate change" (Special Report on Technology Transfer, IPCC, 2000)*

technologies. Some of the specific barriers to the selected technology identified by the requesting party are as below:

1) Most of husbandry in Vietnam are small and not concentrated, which make the collecting process challenging
2) No incentive mechanism put in place to encourage the management and recycling of livestock manure
3) Lack of experts, know-how to operate the facility and lack of equipment to develop the facility
4) Limited awareness on the community level regarding the benefits of livestock manure management and use of organic fertilizers in the context of agricultural production, living improvement, environmental protection, and climate change adaptation and mitigation.

To address the above stated barriers, the requested technical assistance will (1) conduct field research and survey to identify possible/most efficient logistics to collect manures, (2) suggest incentive program(draft) to further facilitate livestock manure management industry to commercial level benchmarking relevant programs, (3) hold capacity building events targeting local workforce, and (4) develop communication products covering the technical information and social/environmental benefits of the facility and hold awareness raising events targeting the local residents. Detailed breakdown of the solution matching the barriers identified and activities planned are as below:

Identified Barriers	**Suggested Solutions**	**Activities (of the TA Requested) linked to the Suggested Solutions**
1) Manure collecting process is challenging	- Conduct field research and local survey to identify the logistics	Selection of Pilot site - develop appropriate criteria to assess the feasibility of the logistics - conduct field research and survey to assess if the locations meet the required level of selected criteria
2) No incentive mechanism put in place	- Suggest incentive program(draft) benchmarking successful cases	Building local network - identify local stakeholders - conduct research on relevant laws/regulations, incentive program, training program, etc. put in place
3) Lack of expertise in technical level	- Hold capacity building events targeting local workforce	- develop a proposal on how to better facilitate deployment and transfer of the suggested technology - communicate the proposal with the local stakeholders through capacity building events
4) Lack of awareness in community level	- Develop communication products covering the technical information and social/environmental benefits of the facility - Hold awareness raising events targeting the residents	Enhancement of awareness/capacity in local residents - Develop communication product covering the benefits and importance of livestock manure management, sustainable agriculture practice, etc. - distribute the communication products developed - hold awareness raising, capacity building events targeting the local residents

Sectors:

Please indicate the main sectors related to the request:

☐ Coastal zones	☐ Early Warning and Environmental Assessment	☐ Human Health	☐ Infrastructure and Urban planning
☐ Marine and Fisheries	☐ Water	☒ Agriculture	☐ Carbon fixation
☐ Energy Efficiency	☐ Forestry	☐ Industry	☒ Renewable energy
☐ Transport	☒ Waste management		

Please add other relevant sectors:

Cross-sectoral enablers and approaches:

Please indicate the main cross-sectoral enablers and approaches

☒ Communication and awareness	☐ Economics and financial decision-making	☒ Governance and planning	☒ Community based
☐ Disaster risk reduction	☐ Ecosystems and biodiversity	☐ Gender	

Technical assistance requested (up to one page):

The key objectives of the requested technical assistance are to (1) select pilot site, (2) build local network to streamline the process, (3) conduct pre-feasibility study to analyze technical, financial feasibility and potential environmental impact of the requested project, and (4) implement capacity building project targeting the local residents to enhance awareness and understanding of the technology.

To (1) Select the pilot site, appropriate criteria will be first drafted (e.g., number of livestock and amount of manure generated daily, logistical infrastructure to collect input resources and distribute output resources, level of awareness of the technology within the local community, etc.). Then, research and local survey against the set of criteria will follow to identify the suitable candidate site. Key deliverable of the Activity (1) is the set of candidate sites.

To (2) Build local network, identification of key stakeholders through desk research, consultation from local consultant and engineers will be conducted. If necessary, review of relevant regulations, policies, and program will be done to propose how to better facilitate deployment and transfer of the suggested technology, in the context of institutional support and government-private sector cooperation. The proposal will be communicated with the stakeholders through capacity building events such as seminars and workshops. Key deliverable of the Activity (2) is the list of local stakeholders and network built and initial discussion kicked-off.

In (3) Conducting pre-feasibility study, factors affecting the technical effectiveness and financial feasibility of the project (e.g., amount and type of manure generated, logistical infrastructure, size and capacity of the facility, local fee range of livestock manure treatment and subsidy rate applied, local fee range of the renewable electricity, market price of organic fertilizer, etc.) Key deliverable of the Activity (3) is the feasibility of the suggested project analyzed and key factors affecting the effectiveness and feasibility of the suggested project identified.

To (4) Enhance awareness and capacity of local residents, communication products of the pilot project will be developed and distributed. Also, open seminars covering the benefits and importance of livestock manure management, sustainable agriculture practice, etc. will be held. Key deliverable of the Activity (4) is educational/promotional/communication products developed and local residents' understanding of the suggested technology enhanced.

Technical support of the industry includes the following activities:

- Implementing feasibility study and synthesize the report, including evaluation a biogas plant.
- Detail design of the pilot biogas plant with demonstration of waste to energy technology including drawing, capacity, location and estimated cost, etc.
- Developing plan for monitoring and observing the implementation of the project with demonstration of the technology
- Capacity building to train the employee working in biogas plant and local /central governor and local residents.

Expected timeframe:

Selection of Pilot site will be done within the first three months. Network building and stakeholder identification will be done within the first six months. Pre-feasibility study will be completed by the 8th month, and capacity building activities will be implemented by the end of the project (12th month).

Activities	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Site Selection for the Establishment of a Biogas Generation Pilot Complex												
1.1: Development of criteria for Site Selection												
1.2: Selection of the two final target sites based on field research/investigation												
2. Build local networks and stakeholders for Establishment of a Pilot Complex												
2.1: Analyze government stakeholders and build coordination networks												
2.2: Review of governmental support programs and Development of an Improvement Proposal												
2.3: Communicate the proposal with the relevant stakeholders												
3. Pre-Feasibility Study (Economic Feasibility, Environmental Impact Analysis, Risk Analysis) on the Biogas Generation Plant												
3.1: Technical·Economic Feasibility Study												
3.2: Develop a Draft Plan to Establish a Pilot Complex & Conduct Environmental Impact Analysis												
4. Raise awareness and local management capacity												
4.1: Develop communication and training programs for staff and people												
4.2: Development of Capacity Building Program to Improve Awareness												
5. Reporting (Initial, Mid-term, Final Reports)												

Anticipated gender and other co-benefits from the technical assistance:

In agricultural sector, the best way to treat livestock manure is to promote livestock manure treatment and biogas power generation, using anaerobic digestion technology. It not only manages the livestock manure but also reduces amount of livestock manure, costs for waste treatment, the green house gas emission as replacing fossil fuels through renewable energy production.

In the case of 100 ton livestock manure treatment facility per day, it is estimated that the biogas plant replaces fossil fuels by the electricity generation of 4,205kWh/day and heat of 8,300Mcal/day, reduces the greenhouse gas by about 4,000 tons of CO_2 and livestock manure by 36,500 tons per year.

Environmental and socio-economic benefit :
The success of this TA project will contribute to achieve Vietnam's reduction target in the 2050 Net-zero target on climate change. In addition, the success of the project will draw the best solution in livestock manure treatment at biogas plants of Vietnam.

Key stakeholders:	
Key stakeholders	**Role to support the implementation of the technical assistance**
National Designated Entity:	Provide expertise during implementation and share examples

Ministry of Natural Resources and Environment (MONRE)	from similar situations.
Request Applicant, Main counterpart: Department of Livestock Production, Ministry of Agriculture and Rural Development (MARD)	Implementing agency

Alignment with national priorities (up to 2000 characters including spaces):

Reference document	
Nationally Determined Contribution (NDC	Vietnam has set goal of reducing 32.8 Mt CO2-eq by 2030 in Agriculture sector, 25.8 Mt CO2-eq of which solely from international support (Reduction contribution by sectors, p. 16/46, NDC 2020) In the NDC, (i) applying management and technology solutions in husbandry, and (ii) applying technology to treat and reuse by-products and waste in livestock production were selected as prioritized methodology to achieve mitigation goal in agriculture sector (Measures to achieve GHG reduction in different sectors, p.15/46, NDC 2020)
Technology Needs Assessment	'Anaerobic manure digestion to produce biogas fuels' technology was selected as one of the prioritized technologies in agriculture sector (TNA Mitigation p.45/169) 'Organic fertilizer from agricultural residues/by-products' technology was selected as one of the prioritized technologies in agriculture sector (TNA Adaptation p.35/189)

Development of the request (up to 2000 characters including spaces):
Please describe how the request was developed at the national level and the process used by the NDE to approve the request before submitting it (who initiated the process, who were the stakeholders involved and what were their roles?) and describe any consultations or other meetings that took place to develop and select this request, etc.

Background documents and other information relevant for the request:
1. MARD (2019), Support for Ministry of Agriculture and Rural Development (MARD) of Vietnam to finalize the Animal Husbandry Law (https://www.ccacoalition.org/en/resources/support-ministry-agriculture-and-rural- development-mard-vietnam-finalize-animal-husbandr-0)
2. USDA (2021), Vietnam Livestock Market Update (https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Vetnam%20Livestock%20Market%20Update_Hanoi_Vietnam_12-13-2021.pdf)
3. Viet Nam (2020), Updated Nationally Determined Contribution (https://unfccc.int/sites/default/files/NDC/2022-06/Viet%20Nam_NDC_2020_Eng.pdf)
4. MARD (2022), ICF commits to support Vietnam in developing green low carbon agriculture (https://www.mard.gov.vn/Pages/error.aspx?requestUrl=https://www.mard.gov.vn/en/Page/ifc-commits-to-support-vietnam-in-developing-green-low-carbon-agriculture.aspx).

OPTIONAL: Linkages to Green Climate Fund Readiness and Preparatory Support
The CTCN is collaborating with the GCF in order to facilitate access to environmentally sound technologies that address climate change and its effects, including through the provision of

readiness and preparatory support delivered directly to countries through their GCF NDA. These actions are in line with the guidance of the GCF Board (Decision B.14/02) and the UNFCCC, particularly paragraphs 4 and 7 of 14/CP.22 that addresses Linkages between the Technology and the Financial Mechanisms[7].
The CTCN is therefore implementing some of its technical assistance using GCF readiness funds accessed via the country's NDA. Any application for GCF support, including the amount of support provided, is subject to the terms and conditions of the GCF and should be developed in conjunction with the NDA.

Please indicate whether this request has been identified as preliminarily eligible by the NDA to be considered for readiness support from the GCF.

☐ Initial engagement: The GCF NDA of the requesting country has been engaged in the design of this request and the NDA will be involved in the further process leading to an official agreement for accessing GCF readiness support.

☐ Advanced engagement (preferred): The GCF NDA of the requesting country has been directly involved in the design of this request and is a co-signer of this request, the signature indicating provisional agreement to use readiness national funds to support the implementation of the technical assistance.

NDA name:
Date:
Signature:

Monitoring and impact of the assistance:

By signing this request, I affirm that processes are in place in the country to monitor and evaluate the technical assistance provided by the CTCN. I understand that these processes will be explicitly identified in the CTCN Response Plan and that they will be used in the country to monitor the implementation of the technical assistance following standard CTCN procedures.
I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

Signature:

NDE name: Pham Van Tan
Date: 16 December 2022
Signature:

THE COMPLETED FORM SHALL BE SENT TO THE CTCN@UNEP.ORG
The CTCN is available to answer all questions and provide guidance on the application process.

[7] Please see:
https://unfccc.int/files/meetings/marrakech_nov_2016/application/pdf/auv_cop22_i8b_tm_fm.pdf