Technical Assistance Closure Report Template

Objective of the technical assistance (TA) Closure Report:

- To communicate publicly in one document a summary of progress made and lessons learned during the TA towards the anticipated impact (sections 1-4).
- To document qualitative and quantitative data collected during TA, for use in donor and UN reporting (Annex 1).

Steps for completing the TA closure report:

1. The lead TA implementer submits the closure report at the end of the technical assistance as a final deliverable. The TA closure report will capture outputs, outcomes and impacts of all activities conducted under the TA. Please copy and summarise relevant material from previous TA outputs/deliverables and the Response Plan, as relevant.
2. A CTCN Manager will review and revise the closure report before final approval by the CTCN Deputy Director.

Important note on public and internal use of the closure report:
Once approved by the CTCN Deputy Director, the TA closure report will be a public document available on the CTCN website www.ctc-n.org. Selected content will be used for targeted communication activities. Annex 2 is for internal use only and will not be publicly available.

Closure Report for CTCN Technical Assistance

1. Basic information

Title of response plan	**Technical Capability Enhancement to Promote Waste-to-Energy Technology in Viet Nam**
Technical assistance reference number	**2021000007**
Country / countries	Viet Nam
NDE organisation	Ministry of Natural Resources and Environment
NDE focal point	Mr. Pham Van Tan, Deputy Director General, Department of Climate Change
NDE contact information	pvtan11@gmail.com
Proponent focal point and organisation	Mr. Nguyen Thanh Yen, Deputy of Waste Management Department, Vietnam Environment Administration (VEA), Ministry of Natural Resources and Environment (MONRE)
Designer of the response plan	*Name, organization, email*
Implementer(s) of technical assistance	● Global Environment Centre Foundation (GEC) ➢ Mr. MOTODA Tomoya ➢ Dr. TANAKA Shinichi ➢ Ms. YAMAGUCHI Kaoru ● Vietnam Waste Planning Co., Ltd. ➢ Mr. WADA Hideki ➢ Ms. Le Minh Ngoc

	➢ Ms. Nguyen Huong Giang ● Hitachi Zosen Corporation ➢ Mr. YAMAZAKI Hiroyoshi ➢ Mr. SAKAKIBARA Koji ➢ Mr. SUZUKI Yoshiharu ● Clean Authority of TOKYO ➢ Ms. MATSUURA Chiyoko ➢ Mr. HOKIMOTO Masanori ➢ Mr. OSAJIMA Tamotsu ➢ Mr. SAWADA Yoshihiro ● Vietnam National University of Hanoi ➢ Ms. Huong Thu Nguyen
Beneficiaries	● Ministry of Natural Resources and Environment (MONRE) of Viet Nam ➢ Waste Management Department ● Local authorities in Viet Nam ➢ 63 provinces (Department of Natural Resources and Environment (DONRE))
Sector(s) addressed	Waste management
Technologies supported	Incineration of waste and Municipal solid waste
Implementation start date	06/08/2021
Implementation end date	31/03/2022
Total budget for implementation	USD 124,000 (pro bono support from the Ministry of the Environment, Japan (MOEJ)
Description of delivered outputs and products as well as the activities undertaken to achieve them. In doing so, review the log frame of the original response plan and refer to it as appropriate	● Country Assessment Report (CAR): The current status of waste management practices including waste generation volume and existing treatment methods were investigated. In addition, the waste management technology analysis was made through the comparisons of pros and cons of various waste management technologies/methods (incineration (stoker furnace, fluidized-bed furnace), melting, gasification (including plasma), carbonization, methane fermentation, composting, and sanitary landfilling). The parameters for the technology comparison include GHG mitigation effects and GHG emissions from the technology application/operation. ➢ The stoker furnace-type incineration technology plus the electricity generation is proposed as the most proven technology applicable to Viet Nam as a referential typical WtE technology. ➢ The online meeting was held to report and explain the CAR contents, on 9 December 2021. ● Draft WtE Technology Criteria: For the promotion to introduce a typical WtE technology (i.e., WtE of stoker furnace-type incineration + electricity generation), the technical and technological requirements were identified, based on a plenty of experiences and knowledge of Japan. ● Online training: 3-day online training course were held from 1 to 3 March 2022. The lecturers were from the

	project implementation team, that is, GEC, Clean Authority of TOKYO (CAT), Hitachi Zosen Corp., and the gender expert (Ms. Huong Thu Nguyen, Lecturer, Department of Anthropology, Vietnam National University, Hanoi). Vietnam Waste Planning Co., Ltd. was also served as a commentator. Around 180 trainees were registered and more than 100 trainees actually participated. 13 lecture presentations were provided. ● WtE technology evaluation handbook for local authorities in Viet Nam: The results of the WtE technology comparison analysis and the detailed explanations of the draft WtE criteria were incorporated into the Handbook. The Handbook is an easy-to-read and easy-to-understand material with the phased approach (project formulation phase, planning phase, construction phase and operation phase). ● Final Workshop: The applicant and the implantation team confirmed the outputs and the products abovementioned, and discussed about the next steps and the possible future cooperation.
Methodologies applied to produce outputs and products	- Literature survey and research, - Technology comparison analysis with identified comparative parameters, - Experience-based presentations (lectures)
Reference to knowledge resources	N/A
Deviations	● Instead of Activity 4.2 'In-class training' and Activity 4.3 'On-site training', 3-day online training course was provided due to the expansion of COVID-19 Omicron valiant. ● The handbook was developed as a draft due to the delays caused from the expansion of COVID-19 Omicron valiant. ● The final workshop focused on the discussions for the future steps to deployment of WtE technology in Viet Nam, instead of the output reports.
Anticipated follow-up activities and next steps	● The handbook will be reviewed and then distributed by the applicant to local authorities in Viet Nam, in order to deepen their understandings on WtE technology development and deployment. ● The WtE technical criteria will be a kind of national regulation, after the official discussions in Viet Nam. ● According to MONRE's requests, the project team will provide technical supports to the extent of possible capacities.

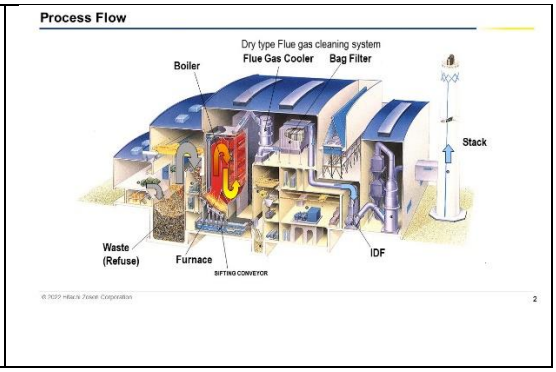
2. Lessons learned

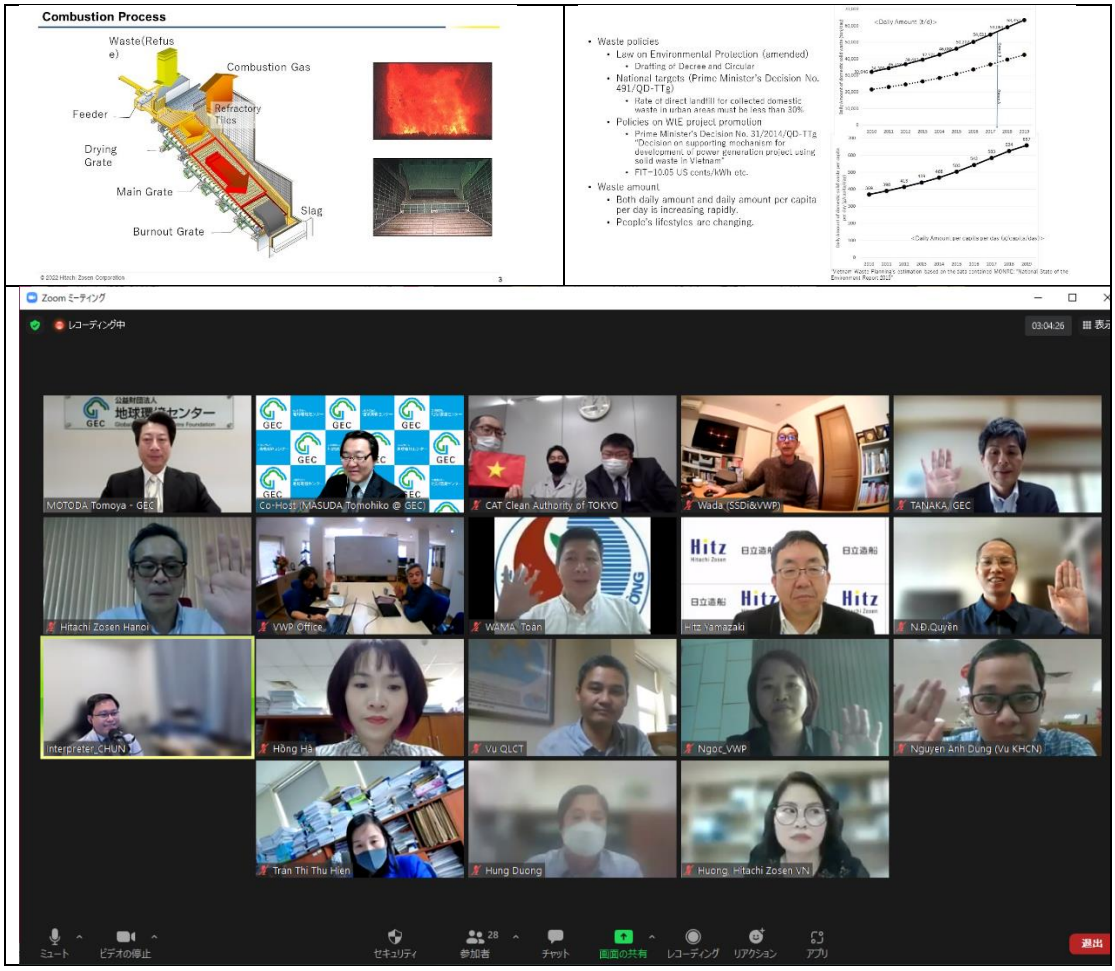
	Lessons learned	**Recommendations**
Lessons learned from the CTCN TA process	Local language is essential to disseminate the information and to discuss in detail, in	Translation and/or interpretation should be prepared, with abundant financial resources. Also it should be

	particular in Viet Nam. Many Vietnamese are difficult to communicate in English, even in written format. In addition, any documents in the governments should be translated into local language. However, for non-Vietnamese, it is impossible to recognize whether such local language translation is correct/right or not. In particular, only online communication via teleconference and emails is more difficult.	noted that the translation process takes some time, which may lead the delay of the project progress.
Lessons learned related to climate technology transfer	The climate technology transfer should be realized by not only that technology itself but by related areas and factors. For example, the deployment of the Waste-to-Energy technology must be considered with the waste management policy, the future projection (due to the necessary long construction time), the air and water pollution regulations, and the surrounded residents consensus.	Wider range consideration and long-term perspectives are recommended.

3. Illustration of the TA and photos

For communication purposes, please provide 2-4 Power Point slides, including illustrations or charts, describing barriers, opportunities, methodology, activities, outputs and achieved results. The illustrations must be copied into the TA Closure report but must also be delivered as power point files. Also, please provide at least five high-resolution pictures in jpg format, capturing technical assistance. The pictures should illustrate how the TA has impacted the lives of the beneficiaries in particular and the communities in general.





4. Impact Statement

The information in the table below will be used to communicate results and anticipated impacts of this technical assistance publicly. Please copy information from impact statement developed in the M&E Plan and update as relevant.

Impact Statement	
Challenge	Viet Nam is facing an urgent issue of appropriate waste management practice with 3R technologies, in order to address the dramatic increase of solid waste generation. In this context and the climate change context, one possible and desirable option for appropriate waste treatment is incineration with energy generation, that is, waste-to-energy (WtE) technology. However, Viet Nam does not have sufficient experience in evaluating such advanced technology, with only two precedential cases have been undertaken, which were provided by international suppliers. Viet Nam has to develop their own capacity to evaluate the technological components, to ensure the technological, environmental and social safeguard level. The international support for such capacity development is needed.
CTCN assistance	• Conduct analyses on the current waste emissions and the current waste management practices including adopted technologies.

	The comparison assessment of various solid waste management technologies including waste-to-energy (WtE) technologies, and the most reliable WtE technology is proposed as a first step to deploy the suitable waste management technology in Viet Nam. • Develop draft technology evaluation criteria for Waste-to-Energy (WtE) applicable to Viet Nam. The draft criteria stipulate the requirements for formulating, planning, constructing and operating a typical WtE plant, in order to achieve the continued safe and stable operation and to avoid/minimize the environmental pollution. • Develop a practical handbook to be used by local governments upon their evaluation processes, and provide training for local government officials.
Anticipated impact	It will promote climate mitigation technology for solid waste treatment, which will address methane (CH4) emissions and CO2 emissions in the country. Since the technology of waste-to-energy with combustion is complex, right application is vital for long-term operation. This TA will also contribute to deepening the national understandings, in particular, of governmental and administrative staff to appropriately evaluate the rightness before and during the operation. They will understand the importance of the WtE plant development and planning as well as its operation with the emission monitoring and the operation control by securing the stable operation with complete incineration. They will also understand the importance of the consensus with residents nearby the plant, their approvals, and the information disclosure.
Anticipated co-benefits from the TA	It will contribute to the reduction of final disposal wastes, which will be sent to the final landfill sites. Then the existing landfill sites' lifetime will prolong, to avoid the new construction. The surrounding environments including public health will improve by the stabilized final waste (ash) through combustion treatment. It will abate the risks of explosions and/or fires at the landfill sites. Younger generation will obtain the environmental education opportunities.
Gender aspects of the TA	Waste-to-Energy technology will bring easy-to-segregate practice of domestic solid waste. Women who usually work for waste segregation at households will be free from it, which cause the risk reduction exposing to harmful and/or hazardous wastes.

	In addition, when WtE plants are increasingly constructed, job opportunities including environmental education staff will be provided, especially for women.
Anticipated contribution to NDC	• Develop waste management planning and enhance waste management capacity; promote reducing, reusing and recycling waste; • Research and apply advanced waste treatment technologies; deploy modern waste treatment technology in urban and rural areas; strengthen the management and treatment of industrial and household wastewater; • Utilise landfill gas and solid waste combustion for power generation. (Source: "Intended Nationally Determined Contribution of Viet Nam", II. GHG Mitigation Component, 2.5. Measures to achieve the GHG emissions mitigation targets of the INDC, (7) Waste management)
The narrative story	With the dramatic increase of solid waste generation in Viet Nam due to the economic growth, Viet Nam government has promulgated a number of regulations for waste management. However, more advanced modern waste treatment technology is desired to achieve 3R (reduce, reuse and recycle), and the Vietnamese Ministry of Natural Resources and Environment (MONRE) has established, in collaboration with the Ministry of the Environment, Japan (MOEJ), the joint committee on solid waste management, and discussed how to promote the deployment of the effective waste treatment technology. The joint committee has considered the Waste-to-Energy (WtE) technology as one of suitable solution options. However, less technical capacity and less experiences for WtE technology exist in Viet Nam. In addition, no technological criteria for appropriate WtE technology evaluation exist so far. In order to accelerate the promotion of WtE technology introduction, the MONRE would like to develop the WtE technological criteria which can be used for local governments to apply the WtE evaluation. Due to the lack of capacity to develop such criteria and to train local government officials-in-charge in Viet Nam, the CTCN technical assistance will support the development of WtE technological criteria and the training of personnel-in-charge of local governments and other relevant institutions, to dissemination of WtE applications in Viet Nam.

Contribution to SDGs	• Goal 3: Ensure healthy lives and promote well-being for all at all ages • Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all • Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation • Goal 13: Take urgent action to combat climate change and its impacts

Annex 1 Technical assistance data collection

Please add quantitative and qualitative values for the indicators selected in the M&E plan and monitored throughout the technical assistance in the tables below. Indicators which have been monitored in addition to the proposed indicators below may be added at the end of table A. Non-relevant indicators should be left blank.

A. Output and outcome indicators

Indicator Please note indicators below highlighted as **anticipated**	**Quantitative value** *Numerals only; disaggregates must sum to the total*	**Qualitative description** *List the various elements corresponding to the quantitative value as well as timelines and responsible institutions*
Report on the analysis of waste management technologies		A part of "Country Assessment Report" contains the technological features (including merits and demerits) of applicable waste management technologies, projection of future deployment in Viet Nam, and GHG emission mitigation effects in Viet Nam.
Number of people who receive information on waste management technologies, etc. through this report.		Through MONRE to estimate how many government officials and others will receive this report.
Report on the assessment of current waste management practices		A part of "Country Assessment Report" contains the status-quo of waste emissions in Viet Nam (some regional distribution is assessed).
Number of people who receive information on waste management technologies, etc. through this report		To be distributed by MONRE to relevant stakeholders including 63 province governments and other ministries.
An online meeting on Viet Nam country assessment of waste management status and technologies, presented to relevant Vietnamese stakeholders		An online meeting outlining the findings from the Activities 2.1 and 2.2 was held on 9 December 2021.
Number of people who attend the webinar	28	
a) Number of men	20	
b) Number of women	8	
A draft of Waste-to-Energy (WtE) technological criteria for promoting appropriate WtE technology deployment in Viet Nam		The draft WtE technological criteria are approved by the applicant (MONRE Waste Management Department). They will use it for the Vietnamese waste management policies/regulations in order for Vietnamese local governments to

		evaluate appropriately the proposed WtE plants.
A handbook for local government officials in charge of waste management technology evaluation/selection.		A handbook will help local government officials in charge of waste management evaluating the proposed WtE plant and its technological requirements.
Number of local governments (or the officials-in-charge) who receive the handbook (including electric version)	63	The handbook will be distributed to Vietnamese local governments (at least 63 provinces) by MONRE.
GHG emission reduction as the result of introduction of WtE plants	5 million tCO2e/year	If solid waste of 1,000 tons/day would be fed into a WtE plant, electricity of 96,516MWh/year would be generated. Therefore, when 70% of solid waste emission of 61,000 ton/day would be treated by WtE technology, GHG of around 5 million tCO2e in annual average would be reduced in Viet Nam.
Number of participants in the 3-day online training, held from 1st to 3rd March 2022	182	The implementation of the training was changed to online method due to the world-wide expansion of the Omicron variant of the COVID-19, so that the only one time training could be done. On-site training (including field tour) was also changed to the virtual tour by using DVD/video material.
a) Number of men	112	
b) Number of women	70	
Number of participants in the online meeting held on 9th March 2022	32	
a) Number of men	25	
b) Number of women	7	
Anticipated number of policies, strategies, plans, laws, agreements or regulations proposed, adopted or implemented as a result of the TA	1	
a) Adaptation related	0	
b) Mitigation related	1	National regulation on Waste-to-Energy technology (anticipated)
c) Both adaptation- and mitigation related	0	
Anticipated number of technologies transferred or deployed as a result of CTCN support	4	· Integrated solid waste management · Industrial solid waste · Municipal solid waste · Incineration of waste
Anticipated number of collaborations facilitated or enabled as a result of technical assistance	3<	
a) Number of South-South collaborations	0	
b) Number of RD&D collaborations	0	
c) Number of private sector collaborations	3<	JFE Engineering Corporation, Takuma Co., Ltd., China Everbright Environment Group Limited

B. Core impact indicators

Please fill in the tables for anticipated impacts of the CTCN assistance. Every technical assistance should contribute to at least one of the indicators below. For guidance on how to report on core indicators see the 'M&E Guidance Document for TA Implementers'.

Core indicator 1	**Anticipated metric tons of CO_2 equivalent (CO_2e) emissions reduced or avoided as a result of CTCN TA** *Please add your calculations in word or excel format as an Annex to this Closure Report, where applicable.*	
	Anticipated metric tons of CO_2e reduced or avoided as a result of the TA **on annual basis**	Anticipated metric tons of CO_2e reduced or avoided as a result of the TA **in total**
Quantitative value *(emissions reductions)*	*191,740*	*2,876,100*
Unit	tCO_2e	tCO_2e
GHG assessment boundary (project emissions) Identify expected post-TA activities, associated effects and assess boundary for quantification of GHG emission reductions	**Boundary:** (1) Landfill sites (in the case of WtE facility is not constructed); (2) WtE facility: Solid waste is incinerated, and the waste heat is utilized for electricity generation through boiler and steam turbine. Some of the generated electricity is used on site. (2') Transport for solid carrying-in and ash carrying-out is not included in the boundary. (3) Electricity grids: Some of the electricity generated by WtE facility replaces the existing grid electricity generated by thermal power plants. **Project emissions:** 106,353tCO2e/year - Combustion of fossil carbon contained in waste associated with incineration: 88,622tCO2e/year - N2O from combustion of waste associated with incineration: 6,581tCO2e/year - Electricity consumption by the WtE facility: 10,766tCO2/year - Auxiliary fossil fuel consumption: 384tCO2/year	**Boundary:** Same as left **Project emissions:** 15 times of annual project emissions **Project duration:** 15 years planned (from the start of the operation)
Baseline emissions Describe baseline scenario, baseline candidates, emission factors and emissions calculated	**Baseline scenario:** All solid waste is dumped directly to the open landfill site, where organic contents in the dumped solid waste are anaerobically decomposed to release methane gas into the atmosphere. The methane emissions	**Baseline Scenario:** Same as left **Baseline emissions:** 15 times of annual project emissions (For detailed calculation, see Appendix.)

	are calculated by the application of the First-Order Decay (FOD) model. **<u>Other baseline candidates:</u>** (i) Solid waste is composted by the aerobic digestion. (ii) Solid waste is incinerated. (= Part of the project scenario) **<u>Baseline emissions:</u>** 298,093tCO2/year (average) - Decomposition of solid waste at MSW at landfill sites: 265,953tCO2/year (average) - Electricity generation at existing power plants: 32,140tCO2/year	
Methodology Explain the method or process of verifying the indicator and how data was gathered	**<u>Methodology applied:</u>** The JCM methodology (JCM MM-AM001_ver01.0) "Power generation and avoidance of landfill gas emission through combustion of municipal solid waste" **<u>How to collect data:</u>** - waste composition: sampling investigation and analysis in a regular basis; - electricity generation and sales, and fuel consumption: provided by meters equipped with the WtE facility	
Assumptions Describe assumptions made during calculation and quantification of GHG reductions	The parameters specified in the FOD model have to be selected in accordance with Vietnamese situation. The data of waste composition should be collected both in the dry and the rainy seasons, because of the possible seasonal variation. Therefore, the average value calculated from the dry season data and the rainy season data should be considered as the representative data of the waste composition.	

Core indicator 2	**Anticipated increased economic, health, well-being, infrastructure and built environment, and ecosystems resilience to climate change impacts as a result of technical assistance** *Please provide a **qualitative** description of the anticipated impacts on the categories below*
Infrastructure and built environment Anticipated increased infrastructure resilience (avoided/mitigated climate induced damages and strengthened physical assets)	The lifetime of the existing landfill sites will be prolonged, due to the substantial reduction of dumped waste. Thanks to the introduction of WtE facility (waste incineration treatment), the final waste (i.e. ash) to be delivered to the landfill sites will be decreased.
Ecosystems and biodiversity Anticipated increased ecosystem resilience (areas with increased resistance to climate-induced disturbances and with improved recovery rates)	N/A
Economic Anticipated increased economic resilience (e.g. less reliance on	N/A

vulnerable economic sectors or diversification of livelihood)	
Health and wellbeing Anticipated increased health and wellbeing of target group (e.g. improved basic health, water and food security)	The WtE facility introduction will reduce the risk of exposures to the harmful and/or hazardous materials contained in solid waste. Bad odor at the landfill sites will be reduced.

Core indicator 3	**Anticipated number of direct and indirect beneficiaries as a result of the TA**	
	Quantitative value	**Means of verification**
Total beneficiaries	*Total number*	
Number of adaptation beneficiaries		*N/A*
Number of mitigation beneficiaries		
Number of adaptation-and mitigation beneficiaries		

Core indicator 4	**Anticipated amount of funding/investment leveraged (USD) as a result of TA (disaggregated by public, private, national, and international sources, as well as between anticipated/confirmed funding)**			
	Quantitative value confirmed *in USD*	**Quantitative value anticipated** *in USD*	**Qualitative description** *List the institutions, timelines, and description or title of the investment*	**Methods** *Describe methods used for quantification of funds leveraged*
Total funding	*Total number in USD (numerals only, no rounding or abbreviations)*	*Total number in USD (numerals only, no rounding or abbreviations)*		
Anticipated amount of public funding mobilised from national/domestic sources				
Anticipated amount of public funding mobilised from international/ regional sources				
Anticipated amount of private funding mobilised from national/domestic sources				

Anticipated amount of private funds mobilised from international/regional sources				

Annex 2 (for internal use – to be filled in by the CTCN)

CTCN evaluation

This section will be completed by the relevant CTCN Technology Manager.

- Evaluation of the timeliness of the TA implementation as measured against the timeline included in the response plan;
- Evaluation of TA quality as defined in the response plan;
- Overall performance of the Implementers;
- Overall engagement of the NDE and Proponent;
- Lessons learned on the CTCN process and steps taken by the CTCN to improve.