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 assistance for solar based irrigation business model 'pay as you irrigate' for women empowerment, water management and food security in Mozambique
Technical assistance reference number	4700024008
Country / countries	Mozambique
NDE organisation	António Jorge Raul Uaissone, Ministry of Science and Technology
NDE focal point	Universidade Pedagógica de Maputo
NDE contact information	Cell: +258 84 3097592 Email:
Proponent focal point and organisation	Arsénio José Mindú Deputy Director for Research and Post-graduation Arsenio.mindu@gmail.com Av. Trabalho, 4040, Maputo - Mozambique
Designer of the response plan	*CTCN*
Implementer(s) of technical assistance	Practica and HUB
Beneficiaries	Smallholder farmers in Pangalata association. Ministry of Agriculture and Rural Development in Mozambique Ministry of Science and Technology in Mozambique

	National Irrigation Institute Ministry of Gender, Children and Social Action Energy Fund (FUNAE) Agricultural extension workers from Serviço Distrital de Atividades Economicas (SDAE)
Sector(s) addressed	Water
Technologies supported	Irrigation efficiency and information systems.
Implementation start date	(15/01/2023)
Implementation end date	(30/03/2025)
Total budget for implementation	*224, 450 USD.*
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	The following main activities and outputs have been delivered during the course of this technical assistance: 1. Establishing proper coordination mechanisms to ensure overall objectives were reached. 2. Conduct a field mission to select a farmer's association suitable for the implementation of the technical assistance. 3. Analyse the current irrigation practices in the selected association. 4. Design an appropriate solar irrigation system. 5. Develop the cost estimation of the solar irrigation system designed . 6. Desing, in concertation with the beneficiaries, the pay-as-you-irrigate business model targeting especially women. 7. Develop dissemination materials, including a final workshop, to increase users' and investors' awareness of SPIS and the business model. The main deliverables of this technical assistance include: 1. Stakeholder mapping of the relevant actors in the Solar Powered Irrigation sector in Maputo and surroundings. 2. One report assessing current irrigation practices in the Pangalata association (including methodology for future replication). 3. One detailed design of a solar irrigation system for the Pangalata association (including methodology, online tools links for future replication). 4. One cost estimation for the designed irrigation system, (including fact sheets and templates for future replication. 5. One Pay-as-you-irrigate business model targeting smallholder farmers (including Excel file to be modified and replicated in the future). 6. Set of dissemination materials (presentation, video and flyer), to increase users' and investors' awareness of SPIS and the Pay-as-you-irrigate business model.
Methodologies applied to produce outputs and products	*Some of the methodologies and approaches followed during this technical assistance encompass:* • Participatory workshops to gather information form the working group. • Field transects walks to evaluate the current conditions of the association

	• Field visits to exemplify the design of the irrigation system • Cost Estimation of the solar irrigation system • Fact sheets to make a comparison of different technologies and its appropriateness to the conditions in Pangalata
Reference to knowledge resources	NA
Deviations	At the beginning of the Technical Assistance there was a need for urgent clarification on the scope of the project. The project proponent (Universidade Pedagógica) had understood that the contracted activities included the rehabilitation of the water source (borehole) and the installation of the solar powered irrigation system (SPIS). The second issue that was solved was the fact that the technical assistance was designed to be implemented in the fields of the Mubobo Association in the Moamba District. However, during the first field assessments conducted by the consortium expert team, it was concluded that there were no technical conditions to do irrigation in the beforementioned association (water quantity and quality was not favourable for a sustainable irrigation system). Due to the high costs, it was not realistic to construct more boreholes to satisfy the water demands. For the same reason it was also unrealistic to install desalination technologies. Building a dam in the seasonal stream was also unrealistic since the water flow throughout the year is insufficient. More information can be found in deliverable 1.2. Inception meeting report. The terms of reference had to be modified and an extra activity was included. The objective of this extra activity was to conduct a technical assessment to identify suitable associations to implement the technical assistance. As the budget assigned to this TA was not increased, the consortium in consultation with the project proponent adjusted the activities and deliverables of Output 6 (dissemination and communication). The updated version includes the preparation of all the communication materials, but only implementing one final workshop targeting donors and investors.
Anticipated follow-up activities and next steps	The expected following activities of this technical assistance are: • A funding proposal will be drafted by the project proponent with support from CTCN to pilot and test the solar powered irrigation system that has been design, including the testing of the pay-as-you-irrigate business model. • The project proponent and the NDE will push for the communication materials already prepared to be shared widely with different stakeholders in Mozambique.

2. Lessons learned

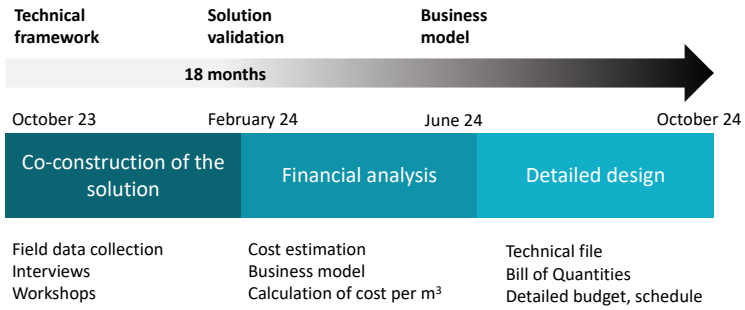
	Lessons learned	**Recommendations**
Lessons learned from the CTCN TA process	• *Continuous and good communication with the CTCN was key for the successfully implementation of the TA.*	*Recommendations include* • *Expectations with the involved parties (community, project proponent, NDE, CTCN) need to be managed since the beginning of the process.*

	• *The stakeholder working group complained about the fact of having too many separate consultations throughout the process.*	• *Streamline the process in the terms of Reference, avoid the process of having many consultations with the farmers, especially if they are not seeing any tangible outputs from this project.*
Lessons learned related to climate technology transfer	• *(Solar) smallholder irrigation has an enormous potential to be upscaled in Mozambique* • *Water quality and quantity is understood in very different terms by the different stakeholders. This affects enormously in the selection of sites to implement irrigation systems. This translates in systems that are installed for failure since the beginning, as water might not be enough.* • *There is a big communication gap between technology suppliers and smallholder farmers, not everyone knows how to access the technologies, or does not have the financial means to do so.*	*Recommendations include:* • *Water availability and quality is key when selecting a community to do irrigation. Therefore, assessing the aforementioned constrains should be the beginning of any intervention.* • *Direct capacity building, and long-term coaching and technical support are required for many different actors in the solar irrigation chain.* • *There is a need to support the development of the solar irrigation sector holistically in Mozambique, with the inclusion of micro-finance institutions that can provide credit to smallholder farmers to access technologies.*

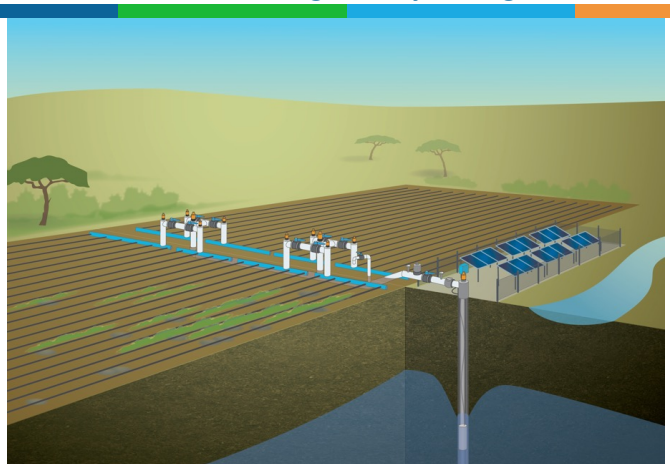
3. Illustration of the TA and photos

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.

The course of the technical assistance: co-design



Solar Powered Irrigation System- general overview

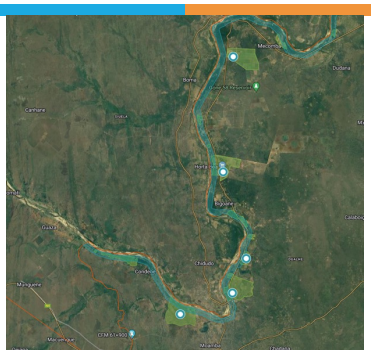


Key elements

- 5 ha irrigated area (2 systems 2.5 ha each)
- Borehole 8 inches
- 22 m^3/h & 41 m Total Dynamic Head (TDH)
- Submersible pump, diameter up to 6 inches (Lorentz PSk2-7 C-SJ30 or Grundfos SPE 30-5
- Horticulture production
- Drip line (1 liter per hour per emitter; @30 cm) (Netafim streamlineX or Irritec P0)
- Fence securing the solar panels
- Single tap to obtain water from the system

Key selection criteria to ensure sustainability

- Water availability & quality
- Land ownership
- Organizational capacities
- Easy access & proximity to markets
- Farming experience
- Previous investments
- Knowledge on irrigation
- Active women in group



The approach: Farmer-Led Irrigation Development

- Farmer chooses investments, crops, irrigation management methods, etc. Private initiative
- Irrigation of value-added off-season crops
- Simple equipment and infrastructure
- Increase in irrigated area (income)
- Continuous off-season practice from March to October
- Irrigation modernization + catalyst

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.

Challenge	Mozambique is vulnerable to climate change, being systematically affected by extreme events such as floods, cyclones, and droughts. Putting at risk the food security of smallholder farmers. Women are among those who are most vulnerable whereas men can more easily find supplemental work to make up for lower income, women must rely much more on climate-sensitive 'natural capital' for their livelihoods. The need to embrace climate-smart water solutions for smallholder farmers in Mozambique is eminent. Poverty is still a huge challenge in Mozambique, to convince women to adopt SPIS, the solution aims to address the challenge of malnutrition through improved productivity and household consumption.
CTCN Assistance	- Benchmark of Solar Powered Irrigation Systems (SPIS) - Analysis of the demand side as well as the supply side of a fit-for-purpose SPIS for the commune of Mubobo, in Mozambique. - Configuration of the SPIS to be implemented in the commune of Mubobo, in Mozambique. - Definition of a 'pay as you irrigate' business model targeting smallholder farmers. - Disseminate the SPIS and the 'pay as you irrigate' business model with future users, investors and national/municipal officers
Anticipated impact	- 10 members of Pangalata association in Moamba, Mozambique using a SPIS through a 'pay as you irrigate' business model, at least 5 of them being women. - 20 private sector suppliers and banking institutions have participated in the workshop to raise awareness on the SPIS and the 'pay as you irrigate' business mode in Mozambique.
Co-benefits: Achieved or anticipated co-benefits from the TA	The co-benefits for this project include but are not limited to: -Raise awareness on the role of the local solar irrigation partners to develop the market chain for distribution and maintenance targeting unbanked smallholder farmers. -Identification of strategic partners with public and private actors within the solar irrigation market to scale up the 'pay as you irrigate' business model.
Gender aspects of the TA	Women are among those in Mozambique who are most vulnerable to food insecurity and the negative effects of climate change in agriculture. For that reason, the technical assistance included gender inclusive efforts corresponding to the expectations of the partners. A gender expert provided technical assistance to ensure a good inclusion of women in the activities of the project and make sure that their perspectives were well represented in the outputs and deliverables of the project. As well as to guide the key gender empowerment and financial inclusion component of the technical assistance. Throughout the consultations, it was key to ensure consultation and inclusion of the female beneficiaries through adequate gender models and focus group discussions to make sure that the best SPIS configuration and payment model are designed focusing on women's capacities, strengths and needs.
Anticipated contribution to NDC	The technical assistance contributes to the National Determined contribution (NDC). Specifically, to:

	4.6.1.3.1 Increasing the resilience of agriculture and livestock, by making available appropriate technologies and inputs to climate change. Dissemination of improved technologies for agricultural production. 4.6.2.3.1 Development of low carbon agricultural practices, by promoting renewable energy use for irrigation/water pumping systems. 4.6.1.2.1.8 Promotion of low water consumption systems and waste reduction, by promoting low water consumption systems and reducing the existing waste of water in agriculture.
The narrative story	Mozambique's Ministry of Science and Technology requested assistance through the CTCN to address the lack of climate-smart solutions to address the lack of access to water which threatens smallholder farmers productivity and increasing droughts in the country. The use of SPIS is seen as one of the main solutions for farmers to increase their food security and reduce their reliance on fossil fuels.. The agricultural sector in Mozambique does not completely lack technologies and technical capacity building activities to enhance irrigation practices, with SPIS also becoming readily available on the market. However, the current SPIS market introductions and donor-driven initiatives are not often scaling. They are not modified to meet the context of Mozambican farmers, and especially women irrigators. Solar-powered irrigation remains excessively expensive and complex to procure, design, install and maintain for smallholder farmers, with the associated risk of over dimensioning and unsustainable groundwater abstraction. This also has to do with the fact that little has been done in terms of business models and finance of SPIS. There is not yet scientifically or technically sound evidence in Mozambique that these SPIS kits are financially sustainable in the long run. The technical assistance focuses on benchmarking SPIS technologies that could be implemented in Mozambique to provide a sustainable and efficient means of irrigation for smallholder farmers. Through an innovative financial modal 'pay as you irrigate' that can enable unbanked smallholder farmers to implement SPIS in a sustainable way.
Contribution to SDGs A complete list of SDGs and their targets is available here: https://sustainabledevelopment.un.org/partnershiip/register/	The technical assistance contributes directly to the following SDGs: **SDG 1:** End poverty in all its forms everywhere. Specifically target 1.5 '…build resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate -related extreme events, and other economic, social and environmental shocks and disasters…' **SDG 6:** Ensure availability and sustainable management of water and sanitation for all. Specifically target 6.4 '…substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals…and substantially reduce the number of people suffering from water scarcity' **SDG 13:** Take urgent action to combat climate change and its impacts. Specifically target 13.b.1 '… number of least developed countries receiving support in technology and capacity building…. For effective climate change-related planning…including focusing on women, youth and local and marginalized communities.*, including SDG13, with a few sentences for each SDG concerned.*

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*
Total number of events organized by proponents and implementing partners	*6 events in total*	
Number of participants in events organized by proponents and implementing partners	*151*	1. *Ministry of Agriculture and Rural Development in Mozambique (Ministério da Agricultura e Desenvolvimento Rural)* 2. *Ministry of Science and Technology in Mozambique (Ministério da Ciência, Tecnologia e Ensino Superior)* 3. *Energy Fund- FUNAE (Fundo de Energia)* 4. *Suppliers of (solar) Irrigation Systems- Primordial & Agrohorizonte.* 5. *Local extensionists in Mubobo in direct contact with the farmers* 6. *Local smallholder farmers in the Mubobo commune (including representatives of farmer's organizations)* 7. *Operators of prepaid drinking water systems and/or technology payment models, e.g. Kickstart, who are developing a pay-as-you-use model for their manual pumps for smallholder farmers in Mozambique;* 8. *Community-based saving groups. Grupos de Poupanças.*

		9. *Financial institutions- providing microcredits for development. Grupo GAPI* 10. *NGOs involved in promoting climate-smart agriculture in the South of Mozambique;* 11. *Government agencies working with Irrigation policies (INIR)* 12. *Staff from universities and research institutes who generate knowledge and provide technical support to government agencies. Universidade Pedagógica de Maputo.*
a) Number of men	*102*	*See above*
b) Number of women	*77*	*See list above*
Number of climate technology RD&D related events	*1*	*Final workshop to present the results of the technical assistance*
Number of participants in climate technology RD&D events	*37*	*See list of participant organizations above.*
a) Number of men	*21*	*See list above*
b) Number of women	*16*	*See list above*
Number of training organized by proponents and implementing partners	*5*	1. *Inception workshop* 2. *1st review of technical design* 3. *2nd & final review of technical design* 4. *1st review of business model* 5. *2nd & final review of business model*
Number of participants in trainings organized by proponents and implementing partners	114	See list below
a) Number of men	67	
b) Number of women	47	
Total number of institutions trained	*12*	*See list below*
a) Governmental (national or subnational)	**4**	1. *Ministry of Agriculture and Rural Development in Mozambique (Ministério da Agricultura e Desenvolvimento Rural)* 2. *Ministry of Science and Technology in Mozambique (Ministério da Ciência, Tecnologia e Ensino Superior)*

		3. *Energy Fund- FUNAE (Fundo de Energia)* 4. *National Irrigation Institute (INIR)*
b) Private sector (bank, corporation, etc.)	**2**	1. *Suppliers of (solar) Irrigation Systems- Primordial & Agrohorizonte.* 2. *Microcredit institutions (GAPI)*
c) Nongovernmental (NGO, University, etc.)	**6**	1. *Universidad Pedagogica de Maputo* 2. *Local smallholder farmers in the Mubobo commune (including representatives of farmer's organizations)* 3. *Operators of prepaid drinking water systems and/or technology payment models, e.g. Kickstart, who are developing a pay-as-you-use model for their manual pumps for smallholder farmers in Mozambique;* 4. *Community-based saving groups. Grupos de Poupanças.* 5. *NGOs involved in promoting climate-smart agriculture in the South of Mozambique (Oxfam, Resilience)*
Percentage of participants reporting satisfaction with CTCN training (from CTCN training feedback form)	NA	Satisfaction was perceived **high**, but the CTCN training feedback from was not used to measure
Percentage of participants reporting increased knowledge, capacity and/or understanding as a result of CTCN training (from CTCN training feedback form)	NA	*Participants were positive about the topics presented and discussed in the workhops, but this was not measured with CTCN training feedback forms*
a) Percentage of men	NA	
b) Percentage of women	NA	
Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	*22*	
a) Number of communication materials, including news releases, newsletters, articles, presentations, social media postings, etc.	3	6.1 *Flyer for final workshop in Portuguese* 6.2 *Promotion video in Portuguese and English*

		6.3 Project presentation for final workshop
b) Number of tools and technical documents strengthened, revised or developed	19	Output 1: Stakeholder mapping (2 deliverables) Output 2: Analyze the current irrigation practices in Pangalata (4 deliverables) Output 3: consult the stakeholders and review the SPIS design (4 deliverables) Output 4: Define a cost estimation of the SPIS (6 deliverables) Output 5: Define a pay as you irrigate business model (3 deliverables)
c) Number of other information materials strengthened, revised or created (For example training and workshop reports, Power Points, exercise docs etc.)	NA	*List the name of the documents*
Total number of policies, strategies, plans, laws, agreements or regulations supported by the assistance	*NA*	*No policies, strategies, plans or laws were created nor supported.*
a) Adaptation related	NA	*List the type and name of documents supported*
b) Mitigation related	NA	*List the type and name of documents supported*
c) Both adaptation- and mitigation related	NA	*List the type and name of documents supported*
Anticipated number of policies, strategies, plans, laws, agreements or regulations proposed, adopted or implemented as a result of the TA	*NA*	
a) Adaptation related	**NA**	*List the type of documents anticipated to be proposed, adopted or implemented*
b) Mitigation related	**NA**	*List the type of documents anticipated to be proposed, adopted or implemented*
c) Both adaptation- and mitigation related	**NA**	*List the type of documents anticipated to be proposed, adopted or implemented*
Anticipated number of technologies transferred or deployed as a result of CTCN support	*1*	*Solar Powered Irrigation Systems*
Anticipated number of collaborations facilitated or enabled as a result of technical assistance	*1*	
a) Number of South-South collaborations	NA	*List the names of the organisations (excluding the CTCN or TA implementers)*
b) Number of RD&D collaborations	NA	*List the names of the organisations (excluding the CTCN or TA implementers)*
c) Number of private sector collaborations	1	*Universidad Pedagogica de Maputo, Banco Comercial de Investimentos (BCI), and the Pangalata farmers group*

Number of countries with strengthened National System of Innovation as a result of CTCN support	1	*Mozambique*
Insert any additional indicators here		

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)*	*Total number (numerals only, no rounding or abbreviations)*	*Total number (numerals only, no rounding or abbreviations)*
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	*NA*	NA
Baseline emissions Describe baseline scenario, baseline candidates, emission factors and emissions calculated	NA	NA
Methodology Explain the method or process of verifying the indicator and how data was gathered	NA	NA
Assumptions Describe assumptions made during calculation and quantification of GHG reductions	NA	NA

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)	NA
Ecosystems and biodiversity Anticipated increased ecosystem resilience (areas with increased resistance to climate-induced disturbances and with improved recovery rates)	NA
Economic Anticipated increased economic resilience (e.g. less reliance on vulnerable economic sectors or diversification of livelihood)	NA
Health and wellbeing Anticipated increased health and wellbeing of target group (e.g. improved basic health, water and food security)	NA

Core indicator 3	**Anticipated number of direct and indirect beneficiaries as a result of the TA**	
	Quantitative value	**Means of verification**
Total beneficiaries	*Direct: 30* *Indirect: 8050*	
Number of adaptation beneficiaries	Direct: 30 Indirect: 8050	*Direct: Smallholder farmers that conform the Pangalata farmer's association that are direct beneficiaries of this TA* Indirect: smallholder farmers registered at SDAE Moamba, that benefit indirectly from this TA
Number of mitigation beneficiaries	NA	*Describe calculation methods and assumptions made*
Number of adaptation-and mitigation beneficiaries	NA	*Describe calculation methods and assumptions made*

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	NA	NA	NA	NA
Anticipated amount of public funding mobilised from international/ regional sources	NA	NA	NA	NA
Anticipated amount of private funding mobilised from national/domestic sources	NA	24,201	Banco Comercial de Investimentos (BCI) participated- Energy Credit Line	BCI has a credit line targetting green energies. However, this credit line still needs to be accepted by FUNAE, the national energy regulator institution.
Anticipated amount of private funds mobilised from international/regional sources	NA	NA	NA	NA

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.