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Introducing PCM into the **Gambia's cold chain to address post-harvest loss and other waste across the primary sector**

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Deliverable A: Detailed Work Plan, M&E Plan, Gender Assessment & Action Plan





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Project	Introducing Phase Change Materials into The Gambia's cold chain to address post harvest loss and other waste across the primary sector
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1. Introduction and Project Overview

1.1. Project Context and Objectives

The Gambia faces severe food insecurity and climate change impacts, which are compounded by substantial post-harvest losses reaching up to 40% for perishable goods like fruits, vegetables, and fish - sectors which are vital to the national economy and employ over 70% of the labour force. Addressing these critical cold-chain gaps is essential for economic stability and rural livelihoods, but progress is severely hindered by several specific, systemic barriers. Primarily, there is a severe lack of accessible, reliable, and affordable cooling technologies, a problem worsened by unreliable rural grid connections and the prohibitive upfront costs of conventional battery-reliant solar systems. Furthermore, stakeholders lack the necessary technical expertise in sustainable cooling practices, technology maintenance, and post-harvest business models. Finally, these challenges are compounded by gender inequality; even though women play a major role in horticulture, poultry farming, and fisheries, they face systemic limits in accessing climate-resilient technology, financing, and training opportunities.

Premise of this Initiative

- *Limited access to reliable, and affordable cooling technologies for preserving perishable products;*
- *Rural communities face unreliable and costly grid connections, and solar systems are often unaffordable due to high upfront costs (especially batteries);*
- *Stakeholders do not have the technical expertise in sustainable cooling practices, technology maintenance, and business models for post-harvest management.*
- *Women, who play a major role in horticulture, poultry farming, and fisheries, have limited access to technology, financing, and training opportunities.*

In order to overcome these barriers, the project concept centres on introducing and validating solar-powered Phase Change Material (PCM) cooling technologies. PCM technology stores thermal energy directly, providing stable cold storage for agricultural, fisheries, and poultry products without relying on continuous supply of grid electricity or expensive battery storage. By deploying this technology, the project aims to extend product shelf-life, increase farmer and fisher incomes, and build local capacity to withstand climate shocks.

OBJECTIVE & SCOPE

The overall objective of the technical assistance is to strengthen the resilience of The Gambia's food systems and reduce post-harvest losses across the agriculture, fisheries, and poultry sectors through the introduction of sustainable PCM-based cooling technologies.

To achieve this objective, the response plan has identified five key tasks to be implemented over a 15 month period.

Feasibility and Site Selection: Develop a feasibility study that includes technical

assessments, a cost-benefit analysis and site selection for PCM deployment.

Piloting the Technology: Validate and pilot the PCM-based cooling technologies in selected rural locations in close consultations with local stakeholders. This will include direct engagement with the primary project proponent, the Mbolo Association alongside targeted sector-specific cooperatives, associations and women's groups.

Capacity Building: Implement targeted training programmes and awareness campaigns to build local technical capacity, with a specific focus on empowering women and smallholder producers to operate and maintain the technology.

Policy and Financial Structuring: Support national policy development, establish technology standardization efforts, and identify sustainable business and financing mechanisms to enable the broader commercial adoption of PCM systems.

National Scale-up: Organize a closure workshop to share the lessons learned from the pilot phase and propose actionable strategies and roadmaps for scaling up the technology across the country.

The kickoff meeting (virtual) for the project was held on March 31, 2026, engaging key stakeholders including the CTCN, the National Designated Entity (NDE), and the Mbolo Association (the project proponent. The objective of the kick off meeting was to introduce all project members, align expectations on project scope and deliverables, clarify roles and responsibilities, and agree on immediate next steps and communication arrangements. The presentation made during the meeting, including introduction of the implementing team, methodology and approach to implement the collaboration is included as a stand alone Appendix to this report. The detailed meeting notes and a summary of the discussions have been added as Annexure-1.

1.2. Context of this Report

An overview of the activities undertaken in this technical assistance is illustrated in the logical flow diagram below. This chart demonstrates how the foundational feasibility assessments and physical pilot deployments systematically build upon one another to ultimately deliver the national scale-up roadmap

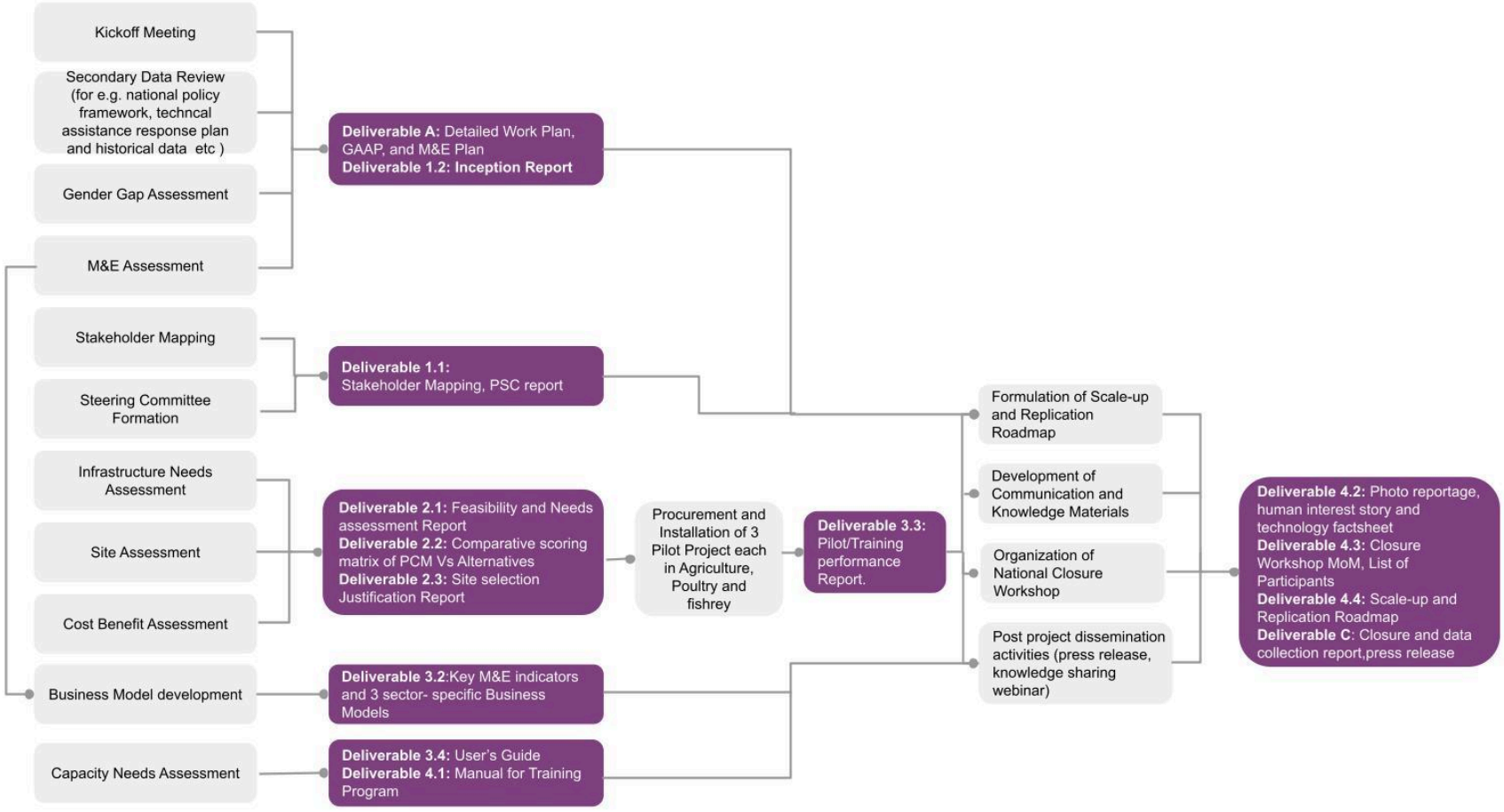


Figure 1*: Logical flow diagram of the project*

This Inception Report represents the primary deliverable for Activity A (Pre-Implementation Phase). As shown in the above figure, Its development involved a preliminary desk review of secondary information, including the national policy framework, the technical assistance response plan, and historical data from projects addressing similar problem statements - specifically, post-harvest losses compounded by climate change impacts and aflatoxin contamination, restricting export of produce to profitable markets. A list of the reviewed documents is provided in Annexure-2.

Based on this preliminary review and informed by these contextual findings, which clearly demonstrate the unviability of conventional, grid-dependent refrigeration for rural producers, the technical approach has been revisited, specifically in the context of three of the project's five core tasks, which must be initiated immediately following the inception activities.

The contents of this report include:

- **Section 2 : Technical Approach** covering
  - **Feasibility and Pilot Implementation (Task 1 and 2):** A detailed review of prospective Phase Change Material (PCM) technical solutions, an outline of potential business and financial models, and the proposed methodology for technology and site selection.
  - **Capacity Building and Stakeholder Engagement (Task 3):** The strategic approach for mobilizing local partners, engaging community stakeholders, and delivering targeted training programs.
- **Section 3: Implementation Methodology & Project Management Frameworks:** The finalized detailed work plan, project budget.
- **Section 4: Cross Cutting Frameworks :** Monitoring & Evaluation (M&E) plan, and the Gender Assessment and Action Plan (GAAP).

2. Technical Approach

This section outlines the strategy for deploying Phase Change Material (PCM) cooling solutions to address rural cold-chain gaps, informed by the available technical solutions and business and financial models. It also includes the proposed approach for meaningful stakeholder engagement and targeted capacity building to ensure sustainable local ownership.

Together, this addresses three out of the five key tasks identified in the response plan (See Textbox in Section1), i.e feasibility and site selection, pilot implementation, stakeholder engagement and capacity building. These three tasks are the foundational tasks which will inform the remaining two key tasks i.e policy and financial structuring and strategy for national scale up.

2.1. Prospective Technical Solutions

Phase Change Materials (PCMs) are substances that store and release thermal energy during the process of phase transformation — primarily from solid to liquid (**melting**) and liquid to solid (**solidification**). When the temperature rises, a PCM absorbs heat and melts (stores energy). When the temperature drops, it releases that stored latent heat and solidifies. PCMs preserve their latent heat without any change in physical or chemical properties over thousands of cycles. PCMs offer a significantly higher energy storage capacity compared to conventional materials. They can store up to 50 kWh/m³, which is five to fourteen times more than conventional sensible-heat storage materials.

Key point - PCM Vs Conventional Cooling

PCM-based cold chain systems are operationally simpler once deployed — particularly in terms of power independence, passive temperature maintenance, and reduced mechanical maintenance. However, they are technically more complex in terms of initial PCM selection, encapsulation requirements, and managing thermal conductivity limitations. For regions having limited cold storage infrastructure, PCMs offer a compelling simpler alternative to conventional cold chain infrastructure, particularly for small-scale storage applications.

Selection of PCM is based on; range of operating temperatures, degree of super cooling, energy density and thermal conductivity, corrosion resistance, physical and chemical stability, volume change and vapor pressure, ease of availability and cost.

TYPES OF PHASE CHANGE MATERIALS

PCMs are available in three broad categories:

1. ***Organic PCMs*** *– Including paraffinic PCMs (e.g., paraffin wax) and non-paraffinic PCMs such as fatty acids, esters, glycols, and alcohols.*
2. ***Inorganic PCMs*** *– Including salt hydrates and metallics.*
3. ***Eutectic PCMs*** *– Mixtures that can be organic-organic, inorganic-inorganic, or organic-inorganic.*

In the specific context of sectors in focus for the current technical assessment, a range of applications are given below. Health safety aspects regarding PCM application have been identified along with mitigation strategies. Health and safety risks regarding PCM application are well documented, and

specific strategies and standard operating procedures are available to manage these risks during project implementation.

*Table1: **PCM Applications & Health and safety aspects***

Challenges	**Poultry**: Perishable products which are required to be maintained at temperatures of 0-4o^{C} for fresh products and -18YC for frozen products. **Fishery**: Fish and seafood are among the most temperature-sensitive food products, requiring temperatures of 0°C to 2°C for fresh fish and -18°C to -30°C for frozen products. The fishing industry often operates in remote locations far from reliable power infrastructure. **Horticulture** (e.g mango): Horticultural products have varying temperature sensitivities. Products like mangoes are moderately sensitive to cold and require a storage temperature range of 4–8°C. Storing mangoes below this range causes chilling injury, while temperatures above it accelerate ripening and spoilage. **Crosscutting**: Power outages during storage; temperature fluctuations during transportation.
PCM Solutions	➔ **Poultry** **Cold Chain Packing**: PCM-integrated insulated boxes and containers (using salt hydrates like HS01 or organic PCMs like OM03) can maintain temperatures during transportation without continuous refrigeration. **Refrigerated Trucks**: PCM panels installed in refrigerated trucks can maintain low temperatures even during power loss, reducing spoilage during transit. PCM in the refrigerated truck is a reliable process of cold storage because it can have very low melting points and have high latent heat of melting. **Processing plant cooling**: PCMs can be used in poultry processing facilities to maintain consistent cooling during peak demand periods, reducing energy costs. **Eutectic plates**: Eutectic PCM plates (typically freezing at -18°C to -21°C) can be used in poultry cold rooms to provide backup cooling during compressor downtime. ➔ **Fishery** **On board vessel cooling:** PCM-based cooling systems on fishing vessels can maintain fish freshness without the need for large mechanical refrigeration systems, reducing fuel consumption. **Ice Replacement Technology:** PCMs with melting points near 0°C (such as HS01 with a melting point of 0°C and latent heat of 350 kJ/kg) can replace conventional ice, offering longer-lasting cooling with less mess and weight. **Fish Transport Containers:** PCM-lined insulated containers maintain the cold chain from port to market, especially in developing countries with poor cold chain infrastructure. PCM has been tested under extremely low, extremely high, and alternating temperature transportation situations, making it reliable for fish transport. **Solar powered cold storage for fishing communities**: PCM-based solar cold storage units are being deployed in coastal fishing communities, combining solar energy with PCM thermal storage to provide off-grid refrigeration. ➔ **Mangoes** **Mango-Specific Cold Storage Using OM03:** OM03, with a melting point of 3.5°C and latent heat of 229 kJ/kg, is particularly well-suited for mango storage. Its operating temperature range aligns closely with the 4–8°C requirement for moderately cold-sensitive fruits like mangoes. OM03's organic base material and thermal stability of ~2000 cycles make it a reliable long-term solution for mango cold storage facilities. **Precooling facilities**: After harvest, mangoes carry significant field heat. PCM-integrated pre-cooling systems can rapidly reduce this heat before storage or

	transport, extending shelf life and preserving quality. **Cold chain for export:** For export-quality mangoes requiring transport over long distances, PCM-lined insulated **containers** maintain the 4–8°C range throughout air and sea freight, preventing both chilling injury (below 4°C) and premature ripening (above 8°C). PCM has been incorporated into cold chain insulated containers with temperature-controlled transportation for the range of 2 to 8°C. **Solar Powered Cold Storage;** Solar-powered PCM cold storage units can be deployed in rural mango-growing regions without reliable electricity, using solar energy during the day and PCM thermal storage to maintain cooling overnight — directly addressing the cold storage shortage. **Mango processing facilities :** PCMs can regulate temperatures in mango processing plants (for pulp, juice, and dried mango production), ensuring consistent product quality and reducing energy costs during peak processing seasons. **Post harvest handling:** PCM-based portable cool boxes can be used at the farm gate level to maintain mango quality from the point of harvest to the collection center, reducing post-harvest losses that are particularly high in India's mango supply chain.
Health and Safety Considerations	**Toxicity & Food Safety** ● PCMs used across all three sectors must be non-toxic and food-safe, as any leakage could contaminate meat, fish, or produce and pose serious public health risks. ● Aflatoxin B1 production in stored produce is a food safety concern that can be exacerbated by temperature fluctuations — making stable PCM performance critical for food safety. **Flammability** ● Paraffin-based PCMs, though non-corrosive, carry moderate flammability risks in enclosed processing and storage facilities (poultry plants, fish processing units, mango cold stores) where heat sources may be present **Corrosiveness** ● Salt hydrate PCMs can be corrosive resulting in degradation of packaging over a period of time resulting in food contamination ● Non paraffin organic PCMs are mildly corrosive and need proper management in hot tropical climates, where elevated ambient temperatures can cause decomposition and release of harmful by-products. **Pathogen Risk arising from contamination** **Thermal cycling instability** ● Salt hydrate are unstable over repeated thermal cycles which can result in in consistent temperature maintenance ● PCM performance degrades over time ● PCM selection should match the temperature requirements of the produce **Encapsulation and chemical stability** ● Proper encapsulation (microencapsulation) of PCMs is essential across all sectors to prevent direct contact with produce and ensure chemical and thermal stabilization **Worker health and safety** ● Workers handling PCMs — particularly salt hydrate PCMs — must be protected from corrosive spills and exposure by using appropriate personal protective equipment, imparting training on safe handling procedures and rolling out safety protocols in case of PCM leakage

It is evident that PCMs can be used across a wide range of fields. A few case studies are presented in the following section.

2.2. Potential Business and Financial Models

The following case studies are presented as illustrative examples of early outlines of the sector-specific business models (e.g., cooperatives, pay-per-use) and financial strategies that can be explored to ensure the long-term sustainability and maintenance of the PCM units post-pilot.

Case Study: Siaya County Solar-Powered Refrigeration Pilot

- **Location**: Kenya (Lake Victoria region).
- **Funding**: Climate and Clean Air Coalition (CCAC)..
- **Problem**:
  - Fish and agricultural produce in the Lake Victoria region spoil rapidly due to a systemic lack of accessible, climate-resilient community cold storage infrastructure.
  - Traditional off-grid solar refrigeration relies heavily on lithium-ion batteries, which have severely short lifespans and are prohibitively expensive to regularly replace.
  - Local farmer and fisher cooperatives lack the essential capital to independently procure and maintain these advanced, battery-dependent cooling technologies.
- **Solution**:
  - The pilot deploys off-grid, solar-powered cold rooms that utilize PCM thermal energy storage.
  - The PCM plates freeze solidly during peak sunlight hours and slowly release cooling overnight, allowing the facility to operate 24/7 on just 6-7 hours of daily sun.
  - The project operates entirely under a cooperative business model, empowering local associations to collectively manage the asset and share the generated economic benefits.
- **Economic Implications**: Substantially lowers long-term capital and replacement costs by completely removing lithium-ion batteries from the system architecture.
- **Business Model**: A community-led cooperative framework executed in tandem with local governments and technology providers to ensure grassroots sustainability.
- **Key Performance Indicators (KPIs) & Impact**: 5 metric tonnes capacity per room; projected to cut local food waste by 30% and increase cooperative incomes by 25-40% upon scale-up.

Case Study: Koolboks

- **Location**: Nigeria
- **Funding**: Efficiency for Access Research and Development Fund, Nigerian Sterling Bank, and various donors.
- **Core Problem**:
  - Low-income populations and small businesses face high upfront costs that make traditional, reliable refrigeration infrastructure completely unaffordable.
  - The lack of stable grid electricity forces businesses to rely on expensive, polluting diesel generators to keep perishable goods cool.

  - These compounding energy and equipment barriers lead to food spoilage, restrict income growth and limited economic independence for women.
- **Solution**:
  - Koolboks provides decentralized, solar-powered refrigerators integrated with PCM "ice batteries" that deliver up to three days of autonomous cooling. The solar-powered refrigerators range in capacity between 158 and 540 liters.
  - This hardware operates entirely independent of the electrical grid and utilizes highly energy-efficient compressors to maximize cooling retention.
  - The technology is paired with a remote monitoring system and a digital PAYGo platform to manage usage, maintenance, and payment processing seamlessly.
- **Economic Implications**: Service fees are as low as USD 10 per month, while energy-efficient equipment saves users up to 40% on electricity costs compared to diesel generators.
- **Business Model**: Operates primarily on a Lease-to-own (70%) and Cooling-as-a-Service (CaaS) (30%) framework utilizing PAYGo tokens for daily, weekly, or monthly access.
- **Key Performance Indicators (KPIs) & Impact**: 90 signed CaaS contracts in 2020; created 155 jobs for women; helped 220 women fish traders increase income by 43%; avoided 15,400 metric tonnes of CO_2.

Case Study: TechEmerge Sustainable Cooling Pilots

- **Location**: Nigeria.
- **Funding**: IFC's TechEmerge program in partnership with Kobo360.
- **Problem**:
  - Temperature-controlled logistics are energy-intensive and severely constrained by unpredictable national power infrastructure.
  - The local market is cost-sensitive, making it difficult for domestic agricultural (fruits and vegetables) and retail sectors to adopt modern, climate-smart cold chain technologies.
  - There is a significant disconnect between global cooling innovators and local Nigerian adopters, as standard global technologies cannot simply be dropped into Nigeria's deeply cost-sensitive market without being adapted for affordability.
- **Solution**:
  - The TechEmerge program competitively matched global technology innovators with local Nigerian logistics, agriculture, and retail companies to run localized pilots.
  - The initiative field-tested cutting-edge PCM solutions such as enhanced polymer panels for cold rooms and solar-powered reefer trucks in real-world operational conditions.
  - This hands-on matchmaking approach decisively proved commercial viability, bridged technical capacity gaps, and establishes lasting B2B partnerships for regional scale-up.
- **Economic Implications**: Prioritizes highly cost-effective innovations specifically designed to penetrate and succeed in Nigeria's cost-sensitive economic environment.
- **Business Model**: A structured B2B matchmaking and commercial partnership model designed to de-risk field testing and rapidly scale proven solutions.
- **Key Performance Indicators (KPIs) & Impact**: Specifically targets a 30-40% reduction in overall energy consumption and a 40% reduction in electricity and fuel usage for refrigerated transport.

Case Study: Freshbox

- **Location**: Kenya.
- **Problem**:
  - Operating standard "Pay-As-You-Store" models requires managing thousands of volatile micro-transactions, making daily revenue collection difficult and labor-intensive for the service provider.
  - The constant opening and closing of cold room doors by hundreds of daily micro-users severely compromises the internal temperature stability of the refrigeration unit.
  - Relying purely on small-scale daily rentals exposes the cooling service provider to exceptionally high financial risk if local market attendance suddenly drops.
- **Solution**:
  - FreshBox deploys modular, pre-assembled walk-in cold rooms (WICRs) ranging from 0.5 to 3 tonnes that are delivered directly to sites ready for immediate use.
  - To provide reliable thermal energy storage and maintain cooling during power gaps, FreshBox incorporates packed eutectic PCM solutions in tubes that hang from the ceiling of their cold rooms.
  - The company actively shifts its operational focus away from individual micro-vendors toward larger B2B clients on long-term contracts, significantly reducing door-opening frequencies and stabilizing internal temperatures.
- **Economic Implications**:
  - Customers are offered tier-based monthly rental fees: USD 300 for a 0.5-tonne WICR (20 crates capacity), USD 450 for a 1.5-tonne WICR (50 crates capacity), and USD 550 for a 3-tonne WICR (100 crates capacity).
  - Commercial Framework & Business Model: Operates primarily via a B2B Monthly Rental model, alongside Lease-to-own options (12-month contracts, currently representing 55% of their customers) and direct upfront equipment sales (30% of customers).
- **Key Performance Indicators (KPIs) & Impact**: Effectively mitigates financial and operational risk by securing larger, contracted B2B customers on a long-term basis, moving away from the challenges of daily micro-collections

2.3. Approach for Technology Selection

A **Multi-Criteria Decision Analysis (MCDA)** framework for a structured evaluation is proposed to be used for two primary purposes: **technology comparison** and **pilot site selection**.

Technology Comparison

The MCDA framework will be used to compare Phase Change Material (PCM) systems against other conventional and renewable cooling alternatives, such as solar direct-drive fridges, evaporative coolers, ice-box cold rooms, solar PV plus battery systems, and traditional ice-pack chests. The technologies will be evaluated, scored, and ranked based on a set of criteria which indicatively includes the following

- Lifecycle cost
- Energy dependency
- Maintenance requirements
- Resilience under climate stress
- Gender accessibility
- Greenhouse gas (GHG) impacts

This process will be informed based on field visits and discussions with the project proponent and will yield a comparative scoring matrix to justify the selection of the most appropriate technology for deployment.

Pilot Site Selection

To identify the most suitable locations for pilot installations, the MCDA framework will be used to evaluate prospective sites based on a five-axis model:

- **Technical Infrastructure:** Evaluates the site's physical readiness, road access, and proximity to markets.
- **Climate Resilience:** Assesses the site's exposure and vulnerability to climate hazards such as heat stress, saltwater intrusion, and flooding.
- **Community Capacity:** Examines local governance readiness, the strength of cooperatives, and the community's overall willingness to adopt new technologies and preparedness to receive capacity building and maintain the required documentation,
- **Equity & Inclusion:** Analyzes the opportunities for women's economic empowerment and ensuring equitable benefit sharing.
- **Economic Potential:** Looks at the demand for preservation services, market access, and the overall pathway to long-term financial self-sufficiency.

Sites that score highly across all five of these interconnected axes will be selected to receive the procurement budget allocation for pilot deployment.

2.4. Stakeholder Engagement Strategy

In the context of the project objectives, the stakeholder engagement strategy aims to build mutual trust and ensure meaningful and effective engagement by fostering local ownership of the relevant processes. Our efforts will be directed toward working collaboratively with stakeholders through continuous consultation, ensuring inclusiveness, respecting cultural sensitivities, and obtaining required consent, with cultural understanding remaining central to all interactions. Our overarching approach to this engagement strive to adhere to international donor standards and guiding frameworks, including those of the CTCN and the Adaptation Fund.

Based on the discussions during the kick off meeting and subsequent review of the response plan, our understanding is that the engagement will be carried out at three levels

- The Project Steering Committee (PSC) will act as the central Technical Working Group for the project. Its core composition will comprise the National Designated Entity (NDE) and the Project Proponent, who will collaborate directly with the CTCN and the Implementing Partner to execute the project's objectives;
- The direct beneficiaries from the pilot intervention and proposed scale up

In Section 3.3 we have carried out a large mapping of stakeholders based on which a proposed composition of the PSC has been suggested. The terms of reference of the PSC has also been

proposed. The specific engagement methodologies with PSC and communication protocol with PSC are also outlined in Section 3.

For engagement with the direct beneficiaries in a meaningful and effective way, our strategy will aim to proactively address and mitigate any existing or potential project issues arising from land use and community acceptance of new cooling facilities. Based on the initial gender assessment (Section 4.2) we recognise that strategic engagement is pivotal for ensuring gender equity in access to cooling technologies, building local technical capacity for sustainable maintenance, and addressing concerns over energy reliability in rural areas. During field consultations, issues raised by stakeholders will be systematically categorized into real and perceived concerns such as apprehensions over technology maintenance or cultural perceptions regarding resource usage to ensure they are adequately understood and addressed.

A grievance handling mechanism will be established during the first meeting of PSC to safely, ethically, and confidentially receive, process, and resolve complaints or concerns from the community and stakeholders.

2.5. Approach for Capacity Building

The successful adoption of Phase Change Material (PCM) cooling technology in The Gambia hinges on robust local capacity, particularly because local stakeholders, farmers, and extension workers are currently unfamiliar with this system. To bridge this knowledge gap and ensure long-term sustainability, the capacity-building strategy will employ a comprehensive and gender-responsive approach, combining hands-on technical instruction, continuous mentorship, and localized business development.

- **Frequency of Training**: To ensure users are not overwhelmed by the new technology, capacity building will be structured as a continuous process rather than a one-off event. During the 6-month pilot phase, the project proponent and other local operators will receive phased, intensive support. This will consist of weekly hands-on training and support during the first two months, transitioning to bi-weekly support in months three and four, and monthly check-ins during months five and six after pilot implementation.
- **How? -Targeted Hands-On Technical Training**: PCM technology differs significantly from conventional grid-tied or battery-reliant refrigeration, training will focus heavily on the "battery-free" nature of the systems. The project will aim to deploy a "Train-the-Trainer" approach alongside direct hands-on instruction for local technicians, and end-users. Training modules will cover unit assembly, initial set-up, safe daily operation, optimal loading and unloading practices, energy-saving techniques, and first-level troubleshooting. Additionally, specialized instruction on safe handling procedures and safety protocols in the unlikely event of PCM leakage will also be covered.
- **Localized and Accessible Knowledge Products:** Recognizing that a significant educational barrier exists with up to 62% of rural Gambian women having no formal schooling, the delivery methods will heavily prioritize visual, practical, and highly accessible formats. A practical User's Guide will be developed, detailing technology specifications, routine maintenance schedules, and lessons learned from the pilot. Crucially, all training materials, factsheets, and user manuals will be translated into the predominant local languages of the pilot areas to maximize usability and local ownership.
- **Business, Entrepreneurial, and Post-Harvest Management Skills:** Since the success of this initiative rests on stakeholders understanding on how to monetize the technology, capacity-building activities will include targeted entrepreneurial training to help users operate the PCM units under viable business models, such as cooperatives or Public-Private

Partnerships (PPPs). Beneficiaries will be trained in tracking financial impacts (such as maintenance costs and revenue increases from avoiding distress sales), market negotiation, and best practices in post-harvest handling for the agriculture, fisheries, and poultry sectors.

- **Gender-Responsive Training Delivery:** In alignment with the Gender Assessment and Action Plan (GAAP), all capacity-building efforts will mandate a minimum 50% female participation rate. Women-led organizations will be prioritized as the primary trainees and operators of the pilot sites. Training schedules, locations, and delivery methods will be specifically tailored to accommodate women's time poverty and socio-cultural constraints, ensuring they transition from passive beneficiaries to empowered technology owners and operators.

3. Implementation Methodology

This section outlines the step-by-step operational plan to execute the technical assistance across its four core phases: mobilization, feasibility assessment, pilot deployment, and national scale-up.This section encompasses

- the detailed work plan,
- a large mapping of the stakeholders,
- the proposed governance framework including membership of the project steering committee (PSC) including terms of reference,
- a task wise budget,
- the reporting and communication protocols, reflecting the discussions during the kick off meeting, and
- our proposed quality assurance and risk management framework.

3.1. Detailed Work Plan

This work plan serves as the primary governance instrument for the Technical Assistance (TA), providing the framework required to achieve the state objectives. A "systems approach" has been adopted from the onset, incorporating the requirements for national scale-up (Phase 4) into the early planning stages. By keeping the focus on identifying replication pathways and institutional barriers in Month 1, the approach seeks to avoid the "pilot-only" trap and work towards the transition from a localized demonstration to a sustainable national infrastructure model.

The following implementation roadmap covers the 15-month period, beginning March 31, 2026, and is designed to meet the rigorous requirements of the AFCIA II program and the Adaptation Fund. The detailed work plan is included in Annexure-3 and as a stand alone spreadsheet.

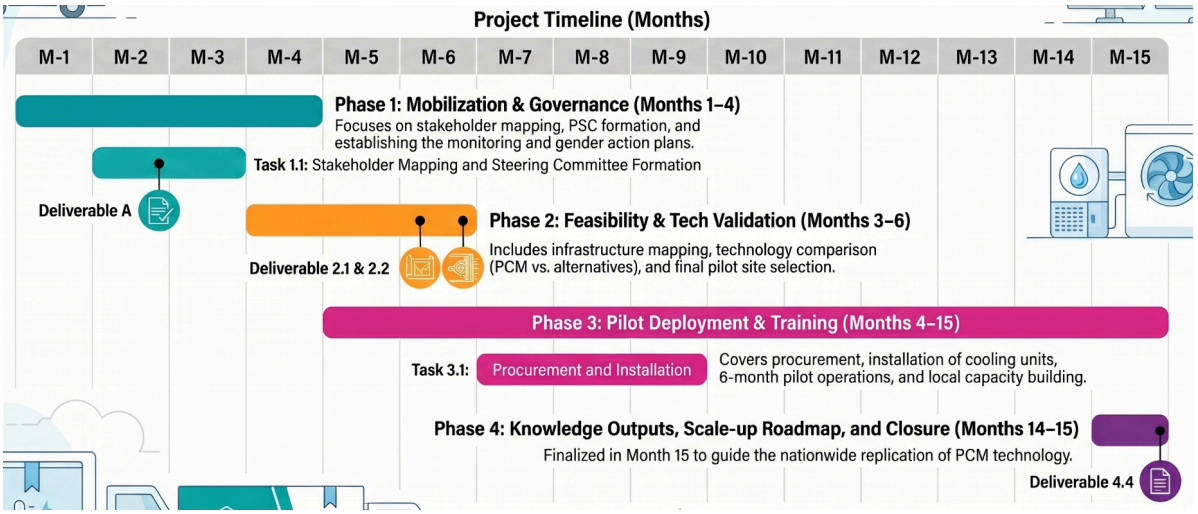


Figure 2*: Summary of Work Plan*

The project's critical path is firmly anchored by the mandatory submission of the draft inception report on April 18, 2026 and the final version on May 8, 2026. Other activities on the critical path include the formal establishment of the Project Steering Committee (PSC), the execution of feasibility studies for the three pilot projects, and the subsequent equipment procurement and installation processes.

Furthermore, to optimize project delivery, we have proposed rearranging the schedule for specific activities outlined in the Terms of Reference. Specifically:

- **Activity 3.2** (Defining Monitoring Indicators and Business Models) will be executed concurrently with the **Activity 2** assessments.
- The **Manual for the Training Program (Deliverable 4.1)** will be formally integrated into **Activity 3.3** (Pilot Operation and Training).
- A new deliverable—**Deliverable 4.4: Scale-up and Replication Roadmap**—will be explicitly added to correspond with **Activity 4.1**.

3.2. Large Mapping of Stakeholders

We have identified three groups of stakeholders :

- **Directly Affected Stakeholders:** Those who are directly affected, either positively or negatively, by the implementation of the PCM project. These include the Mbolo Association (the project proponent), smallholder farmers, fishers, poultry producers, women's cooperatives, and local communities where the technology will be piloted.
- **Interested Stakeholders:** Those who play an intermediary role, possess technical or administrative authority, and can influence the project's outcome. These include government organizations (e.g., MECCNAR/NDE, Ministry of Agriculture, MOTIE), regulatory and public sector organizations (e.g., FSQA, TGSB, GIEPA), the CTCN Secretariat, the Project Steering Committee, NGOs, private sector investors, and potential financiers (e.g., local commercial banks, Multilateral Development Banks).
- **External Stakeholders:** Those who do not have any direct involvement in the pilot implementation but can still be affected by the project's outcomes. For the PCM project, these stakeholders include residential communities, domestic consumers, the hospitality sector (hotels, supermarkets, restaurants), transport unions, and input suppliers.

The following criteria have been considered to determine the specific approach for engaging the identified stakeholders:

Expertise	**Contribution (Value)**: Does the stakeholder have specific information, local context, or technical expertise (e.g., regarding post-harvest handling or existing cold chain gaps) that can be useful for the project? **Legitimacy**: How legitimate is the stakeholder's claim for engagement? How much influence does the stakeholder have over local adoption or national policy?
Willingness	**Willingness to Engage**: How willing and ready is the stakeholder (e.g., local communities, women-led agribusinesses) to engage with and adopt the new technology?.
Value	**Influence**: Clarify "who" they influence (e.g., other farming cooperatives, non-governmental organizations (NGOs), consumers, local investors, or government bodies). **Necessity of Involvement**: Is this an entity who could derail or delegitimize the process if they were excluded from the engagement?.

The identified stakeholders mapped based on the above approach include the following:

*Table2: **Identified Stakeholders***

Stakeholder classification	Stakeholder Group	Identified Stakeholder	Concerns
Directly Affected stakeholders	Primary Producers & End-Users	Smallholder farmers, artisanal fishers, poultry producers, and women-led cooperatives	Experiencing 20-35% post-harvest losses due to high temperatures (30-38°C) and lack of cold chain infrastructure; lack of reliable electricity or affordable cooling alternatives; lack of technical expertise to operate and maintain new technologies.
Directly Affected stakeholders 2	Project Proponent	The Mbolo Association	Specific operational challenges and needs; ensuring the technology is tailored to local realities; securing the financial sustainability and maintenance capacity to run the PCM units successfully after the 6-month pilot.
Interested	Government Ministries & Regulators	• MECCNAR (NDE) • Ministry of Agriculture, Livestock and Food Security • Gambia Livestock and Marketing Agency • National Agricultural Research Institute • Ministry of Fisheries and Water Resources _ Department of Fisheries • Ministry of Petroleum, Energy and Mines_ Department of Energy/ NAWEC • Ministry of Trade, Industry, Regional Integration and Employment • Food Safety and Quality Authority (FSQA) • The Gambia Investment and Export Promotion Agency • Ministry of Higher Education, Research, Science and Technology (MoHERST) - National Research and Innovation Fund (NRIF)	Embedding PCM technology into national climate and agricultural policies; ensuring food safety, hygiene, and quality standards for domestic and export markets; creating an enabling business environment to attract private investment for national scale-up.
Interested	Project Governance & Donors	• CTCN Secretariat • Project Steering Committee (PSC)	Delivering high-impact, actionable results within strict timelines without project extensions; ensuring at least 50% female participation and gender mainstreaming,; establishing rigorous M&E and a clear national replication roadmap,.
Interested	Financial Institutions & Investors	• Local commercial banks, Microfinance Institutions (MFIs), Multilateral Development Banks (MDBs), IFIs,.	The bankability and financial viability of the proposed business models (e.g., pay-per-use, cooperatives) for scaling up,; high perceived risks associated

Stakeholder classification	Stakeholder Group	Identified Stakeholder	Concerns
		• (The National Association of Cooperative Credit Unions of The Gambia (NACCUG)	with agricultural financing; lack of collateral from smallholders,.
Interested	Trade & Professional Associations	• Gambia Chamber of Commerce and Industry (GCCI) • GAMFIDA (Fisheries), • NaLOA (Livestock) • Gambia Investment and Export Promotion Agency (GIEPA) • National Coordinating Organization of Farmers Association The Gambia (NACOFAG)	Bridging coordination and information gaps across the value chains; creating digital and physical networking opportunities for economic operators; improving private sector capacity.
External	Value Chain Intermediaries	• Transporters, aggregators, middlemen (banbanas), and retail market vendors	High physical losses and quality degradation during transit due to lack of insulated transport or cold boxes,; price instability and lack of aggregation/storage space at local and weekly (lumo) markets.
External	Institutional & Domestic Consumers	• Hotels, supermarkets, restaurants, and domestic households.	Food safety, traceability, and hygiene; need for a consistent, year-round supply of high-quality fresh produce rather than dealing with cycles of glut and scarcity,.

3.3. Governance Framework - Project Steering Committee

The NDE will lead the formation of the PSC based on the above stakeholder longlist, and engage the project proponent for this purpose. Based on the relevance to the PCM Pilots, a shortlist of priority stakeholders is given below. The membership of the PSC is capped at 8 members (excluding the NDE and the Project Proponent). A potential short list of members based on their relevance and influence are as follows:

- **Ministry of Agriculture :** Primary institutional partner for horticultural policy, extension services, and land tenure. Provides supervisory guidance and strategic oversight via the Steering Committee for scaling cooling solutions. Including representation from
  - **Gambia Livestock and Marketing Agency (GLMA) :** A key policy and strategy actor within the Gambian chicken value chain
  - **National Agricultural Research Institute (NARI)/ Horticulture Research Directorate:** Conducts adaptive research, technology validation, and technical peer reviews. Responsible for mapping equipment and establishing sector-specific performance benchmarks.
  - **Horticultural Development Board** : to provide a sustained, centralized focus for all national efforts to transform The Gambia's horticulture sector, serving as a mechanism to move away from a fragmented, project-by-project approach and bridge the gap between agriculture and the private sector
- **Department of Fisheries**: This is the primary technical department responsible for planning, managing, and developing the fisheries sector, including coordinating with the national sanitary and phytosanitary (SPS) system for food safety and quality
- **Trade Representatives** :

    - National Coordinating Organization of Farmers Association The Gambia (NACOFAG)
    - National Association of Artisanal Fisheries Operators (NAAFO)
    - The Gambia Artisanal Fisheries Development Association (GAMFIDA)
    - The Association of Gambian Fishing Companies (TAGFC)
    - TRY Women Oyster Association
- **Energy stakeholders**
    - Fandema Vocational Training Centre
- **Lenders** : Mobilize financial resources and identify financing mechanisms to support long-term scale-up and bankability post-pilot. Potential representatives may be from
    - The National Association of Cooperative Credit Unions of The Gambia (NACCUG)
    - Gambia Incentive-based Risk Sharing System for Agricultural Lending (GAMIRSAL)

The Project Steering Committee (PSC) will function as the Technical Working Group (TWG) to streamline decision-making within the 15-month implementation window. This dual role ensures that technical recommendations receive immediate high-level administrative clearance. The PSC will be responsible for the technical review and approval of all deliverables from the initial MCDA to the final Scale-up Roadmap.

Draft Terms of Reference for The PSC

A. Purpose:

The Project Steering Committee (PSC) is the primary governance and oversight body for technical assistance. It provides strategic direction, ensures accountability, facilitates coordination among key stakeholders, and supports the effective and efficient delivery of project outputs and outcomes.

The PSC serves as the principal forum through which the implementing partner reports on progress, receives guidance, and obtains approvals necessary for the continued implementation of the project.

B. Objectives:

The specific objectives of the PSC are to:

- Provide strategic oversight of the technical assistance, ensuring that implementation remains aligned with the project's objectives, the national context, and the priorities of the Adaptation Fund and CTCN;
- Review and approve key project deliverables, work plans, and significant changes to the implementation approach;
- Facilitate coordination among national government institutions, the implementing partner, the Mbolo Association (proponent), and other relevant stakeholders;
- Monitor progress against the approved work plan and monitoring and evaluation (M&E) framework;
- Provide guidance on emerging challenges, risks, and opportunities encountered during implementation;
- Ensure accountability for the achievement of project results;
- Champion gender mainstreaming and ensure that gender considerations are systematically integrated across all project activities;
- Support knowledge sharing and facilitate connections between the project and broader

national, regional, and international initiatives;
- Advise on scale-up pathways and help mobilize resources and partnerships for the broader adoption of PCM technology in The Gambia.

C. Composition of the Committee:

Add <<TABLE>> List of members

The NDE shall serve as the Chairperson of the PSC. The Chairperson shall: a) Preside over all the PSC meetings; b) ensure that the meetings are conducted in an orderly and productive manner; c) Facilitate consensus-based decision making among PSC members; d) Sign off on PSC meeting minutes and approved deliverables; and e) Represent the PSC in communications with CTCN and the Adaptation Fund.

In the absence of the NDE representative, the Chairperson role shall be delegated to the Adaptation Fund Focal Point.

The Implementing Partner shall serve as the Secretary of the PSC in a non-voting capacity and will be responsible for a) Prepare and circulate meeting agendas, background documents, and draft deliverables in advance of each meeting; b) Record and circulate meeting minutes within five (5) working days of each meeting; c) Maintain a register of PSC decisions, action items, and follow-up status; d) Serve as the primary point of contact for PSC administrative matters.

The CTCN Secretariat shall participate in PSC meetings in an observer capacity. The CTCN observer shall: a) Provide guidance on CTCN policies, procedures, and reporting requirements; b) Advise on alignment with CTCN's broader knowledge management and dissemination activities; c) Facilitate connections between the project and other CTCN-supported initiatives in the region; and d) Review and provide feedback on key deliverables prior to formal PSC approval.

Each PSC member institution shall designate an alternate representative who may attend and participate in PSC meetings in the absence of the primary representative. Alternate representatives shall have the same rights and responsibilities as primary representatives. The names and contact details of alternate representatives shall be communicated to the PSC Secretary in writing within 30 days of the PSC's establishment.

The PSC may invite observers or guest presenters to specific meetings on an ad hoc basis, subject to agreement by the Chairperson. Observers and guests may participate in discussions but shall not have voting rights. Potential observers may include: Representatives from IFIs, MDBs, financial institutions, technical experts and ministries with relevant mandates.

Any changes to PSC membership shall be communicated in writing to the PSC Secretary and the Chairperson at least 14 days in advance. Changes shall be formally noted in the minutes of the next PSC meeting. The PSC shall maintain a current membership register at all times.

D. Roles and Responsibilities of PSC Members

All PSC members are collectively responsible for:

- Attending PSC meetings regularly and actively participating in discussions;
- Reviewing project documents, reports, and deliverables submitted for PSC consideration in advance of meetings;
- Providing timely, constructive, and informed feedback on project progress and

deliverables;
- Supporting the implementing partner in accessing information, data, and stakeholders necessary for project implementation;
- Championing the project within their respective institutions and networks;
- Maintaining confidentiality of sensitive project information as appropriate;
- Declaring any conflicts of interest that may arise in relation to project decisions.

In addition to the collective responsibilities above, the NDE shall:

- Provide overall national leadership and political support for the technical assistance;
- Ensure alignment of the project with national climate adaptation strategies, agricultural policies, and development priorities;
- Facilitate access to government data, institutions, and stakeholders necessary for project implementation;
- Lead the review and approval of key project deliverables;
- Coordinate with other government ministries and agencies to ensure coherent national engagement with the project;
- Support the development of policy recommendations and standardization efforts arising from the project;
- Champion the scale-up of PCM technology within national government planning and budgeting processes.
- Coordinate all logistical arrangements for PSC meetings.

The AF focal point shall :

- Ensure alignment of the project with The Gambia's Adaptation Fund portfolio and national adaptation priorities;
- Facilitate reporting to the Adaptation Fund on project progress and results;
- Support the identification of financing pathways for PCM technology scale-up through the Adaptation Fund and related mechanisms;
- Advise on compliance with Adaptation Fund fiduciary standards and environmental and social safeguards.

The project proponent (Mbolo) shall :

- Represent the interests and priorities of the primary project beneficiaries in PSC deliberations;
- Represent the interests of the AF Focal point as outlined above;
- Provide ground-level feedback on project implementation, including challenges encountered and lessons learned;
- Facilitate community engagement and stakeholder consultations at the pilot sites;
- Support the implementing partner in conducting needs assessments, site selection, and pilot monitoring;
- Participate actively in capacity building activities and take ownership of PCM systems following installation;
- Report to the PSC on community-level progress and any issues requiring PSC attention.

The CTCN Secretariat shall :

- Provide guidance on CTCN technical assistance policies, procedures, and quality standards;
- Review and provide feedback on key deliverables, including the feasibility study, M&E plan, and closure report;

- Facilitate connections between the project and CTCN's global network of technology experts and implementing partners;
- Support knowledge management and dissemination activities, including the closure webinar and press release;
- Monitor overall project compliance with CTCN requirements and the approved Response Plan.

The implementing partner shall :

- Report to the PSC on project progress, achievements, challenges, and risks at each meeting;
- Submit all deliverables to the PSC for review and approval in accordance with the agreed timeline;
- Implement PSC decisions and recommendations in a timely manner;
- Provide technical expertise and analysis to inform PSC deliberations.

E. Decision Making Process

The PSC shall operate on the basis of the following decision-making principles:

- **Consensus**: The PSC shall strive to reach decisions by consensus wherever possible. Consensus is defined as the absence of sustained objection by any voting member;
- **Transparency**: All decisions shall be clearly documented in meeting minutes, with the rationale for each decision recorded;
- **Accountability**: All PSC members shall be accountable for decisions made collectively by the PSC;
- **Timeliness**: The PSC shall make decisions in a timely manner to avoid delays in project implementation.
- In the event that consensus cannot be reached, decisions shall be made by a simple majority vote of voting members present. Each voting member shall have one vote. The Chairperson shall have a casting vote in the event of a tie. The Implementing Partner, as Secretary, shall not have voting rights. A quorum for decision-making shall require the presence of at least three (3) voting members, including the Chairperson or their designated alternate.
- The following categories of decisions shall require formal PSC approval:
    - Approval of major deliverables (feasibility study, comparative technology matrix, site selection report, pilot reports, user's guides, scale-up roadmap, closure report);
    - Approval of significant changes to the project scope, timeline;
    - Prioritization of pilot sectors in the event that budget constraints prevent implementation of all three pilots;
    - Approval of the closure and data collection report.

F. Meeting Arrangements

The PSC shall meet on a monthly basis after its constitution. Meetings shall be conducted in a hybrid format, combining virtual participation (via video conferencing) with in-person attendance where feasible. In-person meetings shall be held in the Greater Banjul Area. Key in person meetings shall be held at the following milestones;

- Review Meeting M-6 (Sep-26) : Review progress; assess risks; approve deliverable (Deliverable 2.1, 2.2, 2.3 and 3.2)

- Review Meeting M-9 (Dec-26): Review progress of pilot implementation and approve deliverables (Deliverable 3.1)
- Review Meeting M-15 (May-27): Closure meeting to review and approve closure reports and agree upon scale up commitments

The implementing partner shall be responsible for meeting preparation (Circulating agenda, background documents and deliverables at least 2 days before each meeting); Preparing progress report for each meeting covering activities completed since the last meeting, activities planned for the next period, key risks and issues, and any decisions required from the PSC; Preparing and circulating the draft minutes of the the PSC meeting.

G. Communication Protocol

All formal PSC communications shall be directed through the PSC Secretary (Implementing Partner). The Secretary shall maintain a current contact list for all PSC members and alternates. The communication protocol shall be as follows:

- Routine communications (meeting notices, document circulation, action item follow-up): Email, with a response expected within three (3) working days;
- Urgent communications (time-sensitive decisions, critical issues): Phone or WhatsApp, followed by written confirmation by email;
- Formal approvals: Written sign-off by the Chairperson, communicated by email and recorded in the PSC register.

H. Dissolution of PSC

The PSC shall be established at the commencement of the technical assistance and shall remain in operation till the end of the implementation period, concluding with the closure meeting in Month 15. The PSC shall be formally dissolved following the approval of the Closure and Data Collection report at the Month 15 meeting.

3.4. Budget

The task wise budget is included as Annexure -4.

3.5. Reporting and Communication protocols

To ensure accountability, operational efficiency, and complete transparency among the Project Steering Committee (PSC), the National Designated Entity (NDE), the Project Proponent (Mbolo Association), and the Implementing Partner, the project establishes distinct protocols for formal reporting and day-to-day communications.

The project mandates structured reporting at specific milestones to ensure donor compliance and technical oversight.

- **Mandatory Project Deliverables**: The Implementing Partner must submit key deliverables for PSC review and approval, including Deliverable A (the Inception Report, Detailed Work Plan, M&E Plan, and Gender Assessment and Action Plan), Deliverable B (PSC meeting reports), and Deliverable C (the Closure and Data Collection report, alongside end-of-project communication materials).

- **Ongoing Progress Reporting**: For each scheduled PSC meeting, the Implementing Partner is responsible for preparing a formal progress report. This report will detail the activities completed since the last meeting, activities planned for the upcoming period, key risks and issues, and any specific decisions required from the PSC.

In order to maintain operational efficiency while ensuring complete transparency among the governing body (project steering committee), the following communication rules are established for the project's execution:

- **Direct Execution Communication**: The Implementation Partner, the NDE, and the project proponent (Mbolo Association) shall communicate directly with one another regarding the day-to-day execution and operational details of the project.
- **PSC Inclusion**: In order to ensure the PSC remains fully informed of project progress, information to the PSC will be done upon endorsement by the PSC. We recommend that email correspondence with PSC is managed by the NDE rather than the project proponent or implementation partner.
- **Administrative Exclusions**: The only exceptions to the above rule are purely administrative matters. Correspondence regarding financial invoicing or formal complaints must be excluded from the general PSC communications and handled directly between the relevant administrative parties.

3.6. Quality Assurance and Risk Management Framework

Our quality assurance framework operates at three levels:

Individual deliverable quality control	• All reports and deliverables will be reviewed by the Team Leader before submission; • Technical deliverables will be peer-reviewed by Technical Expert • Gender-related content will be reviewed by Gender Expert • All deliverables will be submitted to the CTCN and NDE for review and comment before finalization.
Process quality assurance	• Monthly Steering Committee meetings will provide ongoing oversight and course correction; • Regular internal team meetings (weekly during intensive phases, bi-weekly during monitoring phases) will ensure coordination and early identification of issues; • Field visits to pilot sites at key milestones will verify implementation quality.
External quality assurance	• CTCN Secretariat review of all major deliverables; • NDE sign-off on all deliverables before submission to CTCN;

Identified risks and mitigation plan is as follows:

*Table3**: Risk Matrix***

Risk	Likelihood	Impact	Mitigation Strategy
Delays in stakeholder engagement including formation of PSC due to competing priorities	Medium	Medium	Early engagement and relationship building; flexible scheduling; virtual participation options
Delay in completion of feasibility study and business model	Medium	High	Early initiation of the feasibility study and identifying potential hosts

Risk	Likelihood	Impact	Mitigation Strategy
Requirement for identifying a project host with commitment to implement the pilot, undergo training, and share outcomes for scale up.	Medium	High	Engage with the project proponent and PSC to identify credible project hosts
PCM equipment procurement delays	Medium	High	Early initiation of procurement process; identification of multiple suppliers; contingency budget for expedited shipping, support from PSC for import related clearances.
Budget constraints limiting pilot scope	Medium	Medium	Clear prioritization criteria agreed with PSC; phased implementation approach; identification of co-financing opportunities
Poor performance of PCM systems in field conditions	Low	High	Rigorous technical specifications; commissioning tests; close monitoring during initial operation; supplier warranty requirements
Limited local technical capacity for PCM maintenance	Medium	High	Comprehensive training program; user-friendly maintenance guides; establishment of supplier support network; training of local technicians
Low participation of women in training activities	Medium	High	Gender-sensitive scheduling and location selection; women-only training sessions where appropriate; engagement of women's group leaders as champions
Political or institutional changes affecting project support	Low	Medium	Broad stakeholder engagement across multiple institutions; documentation of commitments; NDE leadership of project governance

4. Cross Cutting Frameworks

4.1. Monitoring and Evaluation Plan

The Monitoring and Evaluation (M&E) plan provides a structured framework to track the project's progress, ensuring the timeliness and appropriateness of the implementation. It establishes specific, measurable, achievable, relevant, and time-bound (SMART) indicators that are directly aligned with the AFCIA results tracker. Crucially, this M&E framework serves as the primary mechanism for donor accountability under the AFCIA II program and provides a critical "return of experience" for the Africa Centre of Excellence on Sustainable Cooling. The detailed M&E plan has been included as Annexure-5 (and as a stand alone document).

The proposed M&E indicators table is as follows:

*Table4: **M&E Indicators***

Output	Indicator (SMART)	Expected Result	Frequency
Capacity Building	Number of stakeholders (gender-disaggregated) trained in O&M.	150 stakeholders certified.	Post-training
Tech Performance	Number of days per month with stable internal storage temperature.	100% stability during pilot.	Daily/Monthly
Economic Impact	Cost-benefit ratio of PCM vs. Baseline (measured in USD and Dalasi).	ROI > 1.5 within 2 years.	Quarterly
Product Value	Increase in product shelf-life (measured in days).	> 50% increase vs. baseline.	Monthly
National Scaling	Number of financial institutions engaged in the closure workshop.	Min. 3 MDBs/IFIs engaged.	Month 15

4.2. Project Impact

The challenge:

The Gambia's primary sector is under siege by climate-induced waste. Post-harvest losses reach 40% for perishables, while aflatoxin contamination—driven by improper storage causes yield losses between 10% and 70%. Furthermore, coastal rice fields face a 30% yield reduction due to salinity intrusion. With 70% of the labor force dependent on agriculture, these vulnerabilities represent a systemic threat to national stability.

Anticipated Impact:

The objective of this technical assistance is to strengthen the resilience of The Gambia's food systems by introducing sustainable, solar-powered cooling technologies based on Phase Change Materials (PCM) across the agriculture, fisheries, and poultry sectors. By deploying this decentralized, electricity-independent cold chain infrastructure, the project anticipates the following impacts:

Quantitative impacts	Qualitative impacts
• Reduction in Post-Harvest Losses: Decrease the severe post-harvest loss rate for perishable goods from up to 40% down to approximately 10–15%. • Technology Deployment: Successful procurement, installation, and testing of 3 sector-specific PCM cooling pilot projects (one each for the agriculture, fisheries, and poultry sectors). • Greenhouse Gas (GHG) Emission Reductions: Avoidance of GHG emissions by substituting typical diesel-powered cold rooms (which emit approximately 2.5–3 tCO_2 per year per unit) with zero-emission PCM-solar systems. • Equitable Gender Participation: Achieve a minimum 50% female participation rate across all project consultations, capacity-building training programs, and decision-making bodies.	• Enhanced Rural Livelihoods and Economic Empowerment: Significant increases in income for rural farmers, coastal fisherwomen, and poultry producers by extending product shelf-life and allowing them to negotiate better market prices rather than being forced into immediate distress sales. • Climate Resilience: Bolstered adaptive capacity of Gambian food systems against climate-induced stressors, such as rising temperatures and dry spells, using a cooling technology that does not rely on expensive batteries or an unreliable rural electricity grid. • Gender Equality and Social Inclusion: Direct empowerment of women-led organizations by creating formal jobs, bypassing traditional land-collateral barriers for financing, and providing gender-equitable access to climate-resilient technologies. • Capacity Building and Knowledge Transfer: Strengthened local technical expertise through targeted training programs, the development of localized user-friendly manuals, and the establishment of sustainable, community-level business and maintenance models

Narrative Story:

In the humid heat of rural Gambia, the lack of reliable energy makes traditional refrigeration a luxury that the primary sector cannot afford. For women-led horticulture groups and coastal fishers, the setting sun often signals the beginning of spoilage and economic loss. This project introduces Phase Change Material (PCM) technology-a revolutionary "thermal battery." Unlike traditional systems that rely on expensive, high-maintenance chemical batteries, PCM units store solar energy as latent heat during the day to maintain stable, chilled temperatures throughout the night. This battery-free approach is a game-changer for the Gambian context, bypassing the rural energy gap and the high costs of grid connection. By leveraging the Mbolo Association's existing solar multifunctional platforms, we are not just providing cooling; we are installing a resilient economic foundation. This transition from traditional, ineffective storage to PCM-based solar cooling ensures that a woman farmer's hard work is preserved, allowing her to access higher-value markets and secure her family's future in an increasingly unpredictable climate.

4.3. Gender Assessment and Action Plan (GAAP)

To directly address the systemic gender disparities and vulnerabilities women face in The Gambia's agricultural and coastal fisheries sectors, the project integrates a comprehensive Gender Equality and Social Inclusion (GESI) Strategy, overseen by a dedicated National Gender Expert,.

The strategy ensures that gender-responsive mechanisms are embedded throughout the technical assistance lifecycle. It mandates at least 50% female participation across all decision-making levels (including the Project Steering Committee) and prioritizes women-led organizations, such as the Mbolo Association, as the primary owners and operators of the pilot sites. Furthermore, the project's capacity-building efforts and business models are specifically tailored to bypass traditional barriers for

women, such as the lack of land collateral, poor access to finance, and heavy reliance on male-targeted extension services,,. Ultimately, this approach aims to transform women from passive beneficiaries into empowered technology owners and energy leaders.

The detailed Gender Assessment and Action Plan has been included as Annexure-6 and as a stand alone document).

5. ANNEXES

5.1. ANNEXURE-1: MINUTES OF KICK OFF MEETING

Project	Introducing Phase Change Materials (PCM) into the Gambia's cold chain to address post-harvest loss and other waste across the primary sector
Date	31 Mar 2026
Location/ Link	PCM in The Gambia - project Kick off Call
Objective	Kick Off Meeting
Participants	CTCN : Sharone Molly (Project Manager from CTCN) Robinson Mugo (Global Project Manager for Africa) NDE : Sambou Kitneh, Senior Climate Change Officer, MECCNAR, NDE for CTCN, NFP for UNFCCC for The Gambia Proponent: malang@m-bolo.org Implementation Partner: Nisha Menon Srikant Kasturi Balakumaran M Absentees : Nadege Trocellier, CTCN
Attached Files	The Gambia PCM Kick off Agenda .pdf ; 5964_Kick off meeting_310326.pptx
Executive Summary	• **Steering Committee Dual Role & Formation** The National Designated Entity (NDE) will lead the formation of the Project Steering Committee (PSC) based on a longlist provided by the implementation partner. The committee is capped at a maximum of 8 members (in addition to the NDE and the Mbolo Association) and will officially double as the Technical Working Group responsible for reviewing and approving all technical recommendations. • **Inception Report.** The Inception Report and work plan must be submitted by **April 18, 2026**. The NDE indicated that this report must be submitted **prior** to the finalization of the Steering Committee so it can be circulated early to relevant Ministries for buy-in. • **Pilot Design Strategy** The project will leverage the Mbolo Association's existing solar multifunctional platforms and their network of trained female energy entrepreneurs. It was decided that the technical cooling solutions can be either stationary or mobile, depending on what best serves the need. • **Early Integration of Scale-up Planning** The project must adopt a systems approach immediately. This mandates that the requirements for the final phase—Activity 4, which involves the national scale-up roadmap and replication pathways—must be addressed from the very outset of the project, rather than waiting until the end. • **Execution Communication Protocol**: The Implementation Partner, NDE, and Mbolo Association are authorized to communicate directly regarding daily project execution. However, they must copy the entire Steering Committee on all execution-related correspondence (explicitly excluding administrative issues like invoicing or complaints). • **Strict Timelines** The CTCN established that time extensions are not desirable. The project must yield actionable results within the planned timeframe, relying heavily on timely decision-making and strong national ownership from the NDE.
Detailed Discussions	• **CTCN Opening Remarks & Project Expectations**

	○ **High-Impact Results:** The engagement is expected to deliver high-impact outcomes characterized by strong national ownership, actionable deliverables, and a clear pathway for national replication and scale-up. ○ **Timely Execution & Ownership**: Emphasized the critical importance of active stakeholder engagement, strong ownership by the National Designated Entity (NDE), and timely decision-making. Time extensions for the project are not desirable. ○ **Sustainability & Systems Approach:** The Implementation Partner must provide a clear sustainability plan adopting a systems approach. The requirements and goals of Activity 4 (Scale-up Roadmap and Closure) must be factored in from the very beginning of the project. ● Project Proponent (The Mbolo Association) Inputs ○ **Leveraging Existing Infrastructure**: The project should potentially leverage the existing solar multifunctional platforms and the established network of women currently being trained as energy entrepreneurs. These assets could serve as a foundational lever for designing the pilot installations. ○ **Flexibility**: The proposed cooling solutions can be either stationary or mobile, depending on what best serves the community's needs. ● Following presentations made by CTCN and the implementation partner, suggestions received from NDE and project proponent for inclusion in the inception report are listed below under the action items. ● Project Steering Committee (PSC) Formation ○ **Inception Report Circulation**: The NDE requested that the Inception Report be prepared and submitted prior to the finalization of the Steering Committee. This will allow the report to be circulated among representatives of relevant Ministries and key stakeholders for early buy-in. ○ **Committee Composition:** The NDE will lead the formation of the Project Steering Committee based on a stakeholder longlist provided by the Implementation Partner. ○ **Membership details:** The committee will consist of a maximum of 8 members, plus the NDE and the Project Proponent. Selection must ensure adequate gender representation and include prospective lenders or financial stakeholders. ○ **Dual Function:** The Steering Committee will also function as the Technical Working Group, responsible for reviewing and approving all technical recommendations. ● Administrative & Communication Guidelines ○ **Letters of Support:** The NDE will provide a formal letter of support for the project, which may be supplemented by an additional letter from the CTCN. ○ Timeline: The final Inception Report, including the detailed work plan, must be submitted by April 18, 2026. ○ **Communication Protocol:** The Implementation Partner, NDE, and Mbolo Association are authorized to communicate directly regarding project execution. The entire Steering Committee must be copied on all execution-related correspondence (excluding administrative matters such as invoicing or formal complaints)
Action Items	Table below

Action Item	Owner	Timeline
Circulate the meeting notes to all stakeholders.	Implementation Partner	ASAP
Ensure the Inception Report explicitly includes the following elements: ● A description of prospective technical solutions. ● A clear strategy detailing how local partners will be involved. ● Potential business and financial models for project sustainability. ● Health and safety aspects related to the technology. ● A clear methodology for determining the most suitable technology (e.g., Multi-Criteria Decision Analysis). ● A comprehensive Stakeholder Engagement Plan covering government actors and end-beneficiaries. ● Detailed types of capacity-building activities, keeping in mind that local stakeholders are currently unfamiliar with Phase Change Material (PCM) technology. ● A longlist of critical stakeholders to assist the NDE in selecting members for the Steering Committee. ● Terms of Reference (ToR) for the Project Steering Committee. ● A formalized communication protocol.	Implementation Partner	18-Apr-26
Share the following templates and reference documents with the Implementation Partner: ● Monitoring & Evaluation (M&E) Plan template (aligned with the AFCIA results tracker). ● Gender Assessment and Action Plan (GAAP) template, specifically as it applies to energy systems. ● "Return of Experience" documentation from similar projects implemented in The Gambia or across Africa (e.g., insights from the Africa Centre of Excellence on Sustainable Cooling).	CTCN	As soon as they are available

5.2. Annexure-2: List of Documents Reviewed

1. Project Appraisal Document: Inclusive and resilient Agriculture value chain development project (GIRAV)
2. The National Horticulture Sector Strategy – NHSS (2020-2024)
3. Gambia Agriculture Transformation Programme 2020-2030 - Final Report
4. Baseline Study and Vulnerability Assessment Consultancy for LIFE-AR
5. Capacity Assessment of Existing National Conflict Early Warning and Early Response Systems in The Gambia: Draft Report - UNDP
6. Chicken Value Chain Analysis in the Gambia
7. Curriculum on Poultry Production, Processing and Marketing
8. Fruit and Horticulture Processing in the Gambia, project profile for Gambia Investment and Export Promotion Agency (GiEPA)
9. Gambia Policy Sector Overview - FAO
10. Gambia Agriculture Transformation Program 2020-2030
11. Overview of the Fisheries Sector in the Gambia
12. Pineapple Market Analysis in the Gambia
13. Poultry Processing in The Gambia - GiEPA
14. Background and Overview of The Resilience of Organizations for Transformative Smallholder Agriculture Project (ROOTS)
15. Capacity Building and Strengthening of Ward Disaster Management Committees in Kanifing Municipal Council (KMC) and West Coast Region (WCR)
16. Scoping Study to Assess the Status of Existing Peace Structures to Guide the Establishment of a Peace and Reconciliation Commission (PRC) in The Gambia - UNDP
17. Analysis of Political,Security and Demographic Changes of the Gambia
18. Development of a National Protection and Human Security Profile/Situation Assessment and Analysis (Research Report)

5.3. Annexure-3: Detailed Work Plan

Phase/ Task/ Activity	Start Date	End Date	Status	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
Phase 1: Mobilization, Governance, and Work Planning	30/03/2026	31/03/2026	Completed	■														
Task A: Pre-Implementation & Governance Groundwork	01/04/2026	21/04/2026	In Progress		■													
Mobilization and internal project kickoff	01/04/2026	21/04/2026	In Progress		■													
Draft Detailed Work Plan with activities, deliverables, and deadlines.	01/04/2026	21/04/2026	In Progress		■													
Develop the M&E Plan using CTCN templates.	01/04/2026	21/04/2026	In Progress		■													
Conduct baseline Gender Assessment.	01/04/2026	21/04/2026	In Progress		■													
Draft the Gender Action Plan.	01/04/2026	21/04/2026	In Progress		■													
Formulate the Initial Impact Description.	01/04/2026	21/04/2026	In Progress		■													
Submit draft inception report	21/04/2026	21/04/2026	In Progress		■													
Technical peer review	21/04/2026	30/04/2026	Planned		■													
Deliverable A: Detailed work plan, M&E plan, gender assessment, and gender action plan	30/04/2026	30/04/2026	Planned		■													
Task 1.1: Stakeholder Mapping and Steering Committee Formation	01/04/2026	31/05/2026	In Progress		■	■												
Identify a comprehensive list of stakeholders	01/04/2026	21/04/2026	In Progress		■													
Draft the TOR for the PSC	01/04/2026	21/04/2026	In Progress		■													
Consult with NDE and Project Proponent	22/04/2026	30/04/2026	Planned		■													

Phase/ Task/ Activity	Start Date	End Date	Status	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
Facilitate finalization of PSC	22/04/2026	31/05/2026	Planned		▮	▮												
Validate the stakeholder mapping with the PSC.	22/04/2026	30/04/2026	Planned		▮													
Initiate regular monthly/hybrid progress meetings.	01/06/2026	30/06/2027	Planned				▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮
Deliverable 1.1: Large mapping of stakeholders, potential list of PSC participants, and TOR of PSC	21/04/2026	21/04/2026	In Progress		▮													
Deliverable B: PSC Meeting Notes	01/06/2026	30/06/2027	Planned				▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮
Task 1.2 & 1.3: Kick-Off and Inception Meetings	31/03/2026	30/06/2026	In Progress	▮	▮	▮	▮											
Organize and execute a virtual kick-off meeting with all project members.	31/03/2026	31/03/2026	Completed	▮														
Present the implementing team, methodology, work plan, and roles during the kick-off.	31/03/2026	31/03/2026	Completed	▮														
Exchange national strategy, study, and regulatory reference documents.	31/03/2026	03/04/2026	Completed	▮	▮													
Develop concept notes for the pilot projects	01/04/2026	21/04/2026	In Progress		▮													
Organize and execute an Inception Meeting	21/04/2026	30/05/2026	Planned		▮	▮												
Validate and confirm implementation timelines with the PSC.	22/04/2026	30/04/2026	Planned		▮													
Deliverable 1.2: Kick-off meeting report with agenda, participant list, concept notes and reference documents	01/04/2026	30/06/2026	In Progress		▮	▮	▮											

Phase/ Task/ Activity	Start Date	End Date	Status	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
Phase 2: Feasibility, Needs Assessment, and Technology Validation	01/05/2026	31/08/2026	Planned			▮	▮	▮	▮									
Task 2.1: Conducting Detailed Feasibility & Needs Assessments	01/05/2026	31/07/2026	Planned			▮	▮	▮										
Map existing cold chain infrastructure (warehouses, walk-in coolers, etc.).	01/05/2026	30/06/2026	Planned			▮	▮											
Analyze traditional post-harvest handling and identify critical cooling gaps.	01/05/2026	30/06/2026	Planned			▮	▮											
Assess technical infrastructure and environmental constraints (grid reliability, solar resource quality, water availability).	01/05/2026	30/06/2026	Planned			▮	▮											
Assess local technical capacity and institutional readiness for equipment maintenance.	01/05/2026	30/06/2026	Planned			▮	▮											
Analyze cultural and behavioral factors affecting technology adoption.	01/05/2026	30/06/2026	Planned			▮	▮											
Conduct loss causality analysis and quantify post-harvest losses by sector (agriculture, fisheries, poultry).	01/05/2026	30/06/2026	Planned			▮	▮											
Execute qualitative assessments: Semi-structured interviews with aggregators and retailers.	01/05/2026	30/06/2026	Planned			▮	▮											
Execute Participatory Rural Appraisals (PRAs) with women's groups, farmers, and fishers.	01/05/2026	30/06/2026	Planned			▮	▮											
Assess specific operational needs and challenges of the Proponent.	01/05/2026	30/06/2026	Planned			▮	▮											

Phase/ Task/ Activity	Start Date	End Date	Status	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
Preparation of feasibility and needs assessment report	01/07/2026	31/07/2026	Planned					▮										
Deliverable 2.1: Feasibility & needs assessment report	31/07/2026	31/07/2026	Planned					▮										
Task 2.2: Technology Comparison (PCM vs. Alternatives)	01/05/2026	31/08/2026	Planned			▮	▮	▮	▮									
Identify alternative conventional & RE based cooling technologies.	01/05/2026	31/07/2026	Planned			▮	▮	▮										
Conduct detailed cost-benefit analysis comparing PCM technology to business-as-usual and other alternatives.	01/08/2026	31/08/2026	Planned						▮									
Develop a Multi-Criteria Decision Analysis (MCDA) framework.	01/08/2026	31/08/2026	Planned						▮									
Deliverable 2.2: Comparative scoring matrix of PCM with other cooling technologies	31/08/2026	31/08/2026	Planned						▮									
Task 2.3: Feasibility Study for Pilot Site Selection	01/05/2026	31/08/2026	Planned			▮	▮	▮	▮									
Conduct physical field visits and data collection at prospective sites.	01/05/2026	30/05/2026	Planned			▮												
Assess need if any for structural integrity enhancement/ safety enhancement	01/05/2026	30/05/2026	Planned			▮												
Evaluate sites based on 5 axes: Technical Infrastructure, Climate Resilience, Community Capacity, Equity & Inclusion, and Economic Potential.	01/06/2026	31/07/2026	Planned				▮	▮										
Assess logistical considerations, security, and land availability.	01/06/2026	31/07/2026	Planned				▮	▮										

Phase/ Task/ Activity	Start Date	End Date	Status	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
Conduct an in-depth Environmental and Social Risks Assessment (ESRA) for the sites.	01/06/2026	31/07/2026	Planned				▮	▮										
Generate high-resolution maps and detailed profiles for selected sites.	01/06/2026	31/08/2026	Planned				▮	▮	▮									
Detailed cost estimation and techhno economic analysis	01/06/2026	31/08/2026	Planned				▮	▮	▮									
Business model for the pilot project	01/06/2026	31/08/2026	Planned				▮	▮	▮									
Deliverable 2.3: Finalized List of Sites & Selection Justification Report.	31/08/2026	31/08/2026	Planned						▮									
Phase 3: Pilot Deployment, Testing, Capacity Building, and Business Models	01/06/2026	31/05/2027	Planned				▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮
Task 3.1: Procurement and Installation	01/08/2026	30/11/2026	Planned						▮	▮	▮	▮						
Define precise technical specifications for the PCM cooling units (fisheries, poultry, agriculture).	01/08/2026	31/08/2026	Planned						▮									
Manage the procurement process.	01/08/2026	30/09/2026	Planned						▮	▮								
Conduct structural integrity checks and site-specific safety assessments prior to hardware placement.	01/10/2026	31/10/2026	Planned								▮							
Install PCM cooling systems (passive cold storage, transport containers, charging freezers) at the 3 pilot sites.	01/10/2026	30/11/2026	Planned								▮	▮						
Test functionality, conduct stress-testing of temperature stability, and formally commission the units.	01/10/2026	30/11/2026	Planned								▮	▮						
Deliverable 3.1: Installation and pilot testing reports.	30/11/2026	30/11/2026	Planned									▮						

Phase/ Task/ Activity	Start Date	End Date	Status	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
Task 3.2: Defining Indicators and Business Models	01/06/2026	31/08/2026	Planned				■	■	■									
Define specific economic, social, and environmental monitoring indicators fror each pilot	01/06/2026	31/08/2026	Planned				■	■	■									
Establish baseline data and set expected performance results for each indicator.	01/06/2026	31/08/2026	Planned				■	■	■									
Perform Operations and Maintenance (O&M) cost analysis for the installed units.	01/06/2026	31/08/2026	Planned				■	■	■									
Develop three sector-specific business models (e.g., cooperative, pay-per-use, PPP frameworks).	01/06/2026	31/08/2026	Planned				■	■	■									
Validate the formulated business models with local stakeholders.	01/07/2026	31/08/2026	Planned					■	■									
Deliverable 3.2: Key M&E indicators and 3 sector-specific business models.	31/08/2026	31/08/2026	Planned						■									
Task 3.3 & 3.4: Pilot Operation, Training, and User Guides	01/11/2026	31/05/2027	Planned									■	■	■	■	■	■	■
Operate the 3 pilot systems for a mandatory minimum of 6 months.	01/11/2026	30/04/2027	Planned									■	■	■	■	■	■	
Monitor core metrics: internal storage temperature stability, cooling autonomy after power outages, energy consumption.	01/11/2026	30/04/2027	Planned									■	■	■	■	■	■	
Provide intensive weekly capacity building to the Proponent	01/12/2026	31/01/2027	Planned										■	■				
Provide bi-weekly support.	01/02/2027	31/03/2027	Planned												■	■		
Provide monthly support and check-ins.	01/04/2027	31/05/2027	Planned														■	■

Phase/ Task/ Activity	Start Date	End Date	Status	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
Provide on-demand technical support and troubleshooting.	01/12/2026	31/05/2027	Planned										▮	▮	▮	▮	▮	▮
Draft sector-specific User Guides (covering operation, routine maintenance, and troubleshooting).	01/04/2027	30/04/2027	Planned														▮	
Draft Training Program Manuals.	01/04/2027	30/04/2027	Planned														▮	
Deliverable 3.3: Piloting/training performance reports	01/12/2026	31/05/2027	Planned										▮	▮	▮	▮	▮	▮
Deliverable 3.4 : User's Guide	30/04/2027	30/04/2027	Planned														▮	
Deliverable 4.1 : Manual for Training Program	30/04/2027	30/04/2027	Planned														▮	
Phase 4: Knowledge Outputs, Scale-up Roadmap, and Closure	01/04/2027	19/06/2027	Planned														▮	▮
Task 4.1: Formulate Scale-up and Replication Roadmap	01/04/2027	30/04/2027	Planned														▮	
Analyze opportunities and geographic areas for national replication of PCM technology.	01/04/2027	30/04/2027	Planned														▮	
Updation of business plan	01/04/2027	30/04/2027	Planned														▮	
Identify financing pathways (local banks, MDBs, IFIs, World Bank, GCF) to structure bankable projects.	01/04/2027	30/04/2027	Planned														▮	
Define institutional and policy integration actions for the MECCNAR and Ministry of Agriculture.	01/04/2027	19/06/2027	Planned														▮	▮
Develop recommendations for national technical standards and regulations for cold-chain interoperability.	01/04/2027	19/06/2027	Planned														▮	▮

Phase/ Task/ Activity	Start Date	End Date	Status	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
Deliverable: **4.4** Scale-up and Replication Roadmap.	19/06/2027	19/06/2027	Planned															
Task 4.2: Develop Communication and Knowledge Materials	01/04/2027	15/05/2026	Planned															
Compiling photographs which capture the installation and operational impact of pilots	01/05/2026	28/02/2027	Planned			▮	▮	▮	▮	▮	▮	▮	▮	▮	▮			
Produce a human-interest story detailing the socio-economic impact on beneficiaries (especially women).	01/04/2027	30/04/2027	Planned														▮	
Develop a non-technical PCM technology factsheet and booklet.	01/04/2027	30/04/2027	Planned														▮	
Format knowledge products to adhere to CTCN branding guidelines.	01/05/2027	31/05/2027	Planned															▮
Deliverable 4.2: Photo reportage, human-interest story, and technology factsheet.	31/05/2027	31/05/2027	Planned															▮
Task 4.3 & Task C: National Closure Workshop and Project Closure	01/04/2027	15/05/2026	Planned															
Organize a high-profile National Closure and Investment Workshop.	01/04/2027	15/05/2026	Planned															
Prepare presentation materials summarizing project results, M&E metrics, and the scale-up vision.	01/04/2027	30/04/2027	Planned														▮	
Conduct workshop sessions connecting stakeholders with private sector investors, MDBs, and IFIs.	01/05/2027	15/05/2026	Planned															
Collate all raw and processed M&E data collected throughout the project lifecycle.	01/04/2027	19/06/2027	Planned														▮	▮

Phase/ Task/ Activity	Start Date	End Date	Status	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15
Prepare the final CTCN Closure and Data Collection Report, including updated impact descriptions and lessons learned.	17/05/2027	19/06/2027	Planned															■
Conduct post-project dissemination activities (press release, knowledge-sharing webinar).	17/05/2027	19/06/2027	Planned															■
Deliverable 4.3: Closure workshop minutes, List of Participants	19/06/2027	19/06/2027	Planned															
Deliverable C: Closure and data collection report, press release	19/06/2027	19/06/2027	Planned															

CTCN: Climate Technology Centre and Network
ESRA: Environmental & Social risk assessment
GAAP: Gender Assessment and Gender Action Plan
GCF : Global Climate Fund
IFI : International Financial Institution
M&E : Monitoring and Evaluation
MCDA: Multi Criteria Decision Analysis
MDB: Multilateral Development Bank
MECCNAR : Ministry of Environment, Climate Change and Natural Resources
NDE: National Designated Agency
O&M : Operation and Maintenance
PCM: Phase Change Material
PPP: Public Private Partnership
PSC : Project Steering Committee
PRA: Participatory Rural Appraisal
RE : Renewable Energy
TOR: Terms of Reference

5.4. Annexure-4: Task Wise Budget

Output/ Activity	Consultants Fee + Direct Cost	PSC Meetings	Workshop	Pilot	Total
Mandatory Output: Development of the work plan and related communication documents	4,881.25				4,881.25
Work plan					
Monitoring and evaluation plan					
Impact description document (initial and final version)					
Gender Assessment and Action plan is developed					
Closure and Data Collection Report and Knowledge sharing webinar on the results of the TA, hosted by the CTCN					
Output 1: Developing A Steering Committee.	10,834.00	4,900.00	2,500.00		18,234.00
Activity 1.1: Introduce a Steering Committee (SC).					
Activity 1.2: Kick-off and Regular hybrid meetings					
Output 2: Feasibility Assessment & Technology Validation	52,055.00				52,055.00
Activity 2.1: Conducting a detailed feasibility study for PCM technology					
Activity 2.2 Compare PCM systems with other available cooling technologies.					
Activity 2.3 Conduct Site Assessments for Pilot Installations					
Output 3:Pilot Implementation (PCM Cooling Units)	34,680.00			34,500.00	69,180.00
Activity 3.1: Procurement for the PCM and construction					
Activity 3.2: Implement pilots across agriculture, fisheries, and poultry sectors.					
Output 4: Capacity Building and Knowledge Transfer including a Closure Workshop	23,875.00	2,400.00	4,000.00		30,275.00
Activity 4.1: Deliver training programs for farmers, fishers, women's cooperatives					
Activity 4.2: Closure report with set of recommendations for scale-up					
	126,325.25	**7,300**	**6,500**	**34,500**	**174,625.25**

5.5. ANNEXURE-5: M&E PLAN

Basic Information	
Title of response plan	Introducing Phase Change Materials (PCM) into the Gambia's cold chain to address post-harvest loss and other waste across the primary sector.
Technical assistance reference number	2025000014
Country/ countries	The Gambia
NDE focal point and organisation	Mr. Sambou Kinteh Senior Climate Change Officer, The Gambia Ministry of Environment Climate Change and Natural Resources (MECCNAR)
Sector(s) addressed	Agriculture, Poultry and fisheries
Technologies supported	Sustainable solar-powered cooling technologies based on Phase Change Materials (PCM)
Implementation period and total duration	15 Months
Total budget for implementation	Maximum estimated budget as per the resource plan is USD 180,000
Designer of the response plan	NDE
Implementer of response plan	Veolia | Engineering & Consulting |India

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection	(F) Comments
Output 1: Developing a mapping of stakeholders and a Steering Committee	Number of stakeholders mapped; Successful establishment of the Steering Committee; Execution of kick-off and inception meetings.	Deliverable 1.1: Large mapping of stakeholders and List of participants to the Steering Committee, a constitution document. Deliverable 1.2: Kick-off meeting report with list of participants, agenda, concept notes, list of reference documents etc.	Review of mapping reports, constitution documents, and meeting minutes (including agendas and participant lists) collected during the inception phase.	Challenge: Ensuring gender balance and adequate representation from vulnerable groups, as well as engaging all relevant entities effectively.
Activity 1.2: Kick-off (online) and regular hybrid meetings	Successful execution of the kick-off meeting; frequency of regular hybrid progress meetings.	Presentation of the consulting team, work plan, expected results, and identification of key stakeholders; Exchange of reference documents.	Meeting minutes, agendas, and participant lists (NDE, NDA, CTCN, ministries, communities).	Must involve organizations working on gender and vulnerable populations.

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection	(F) Comments
Activity 1.3 Inception Meeting	Execution of an in-person inception meeting within the Greater Banjul Area (GBA).	Finalization of stakeholder mapping and the Terms of References of the Steering Committee.	Headcount and meeting reports from the in-person meeting.	PSC members will be paid a DSA of 30 USD, and transport will be covered for those travelling from outside Banjul.
Output 2: Feasibility & Needs Assessment and Technology Validation	Number of feasibility/needs assessments conducted; Number of cooling technologies compared; Number of sites identified.	Deliverable 2.1: Feasibility & needs assessments. Deliverable 2.2: Comparative matrix of PCM with other cooling technologies. Deliverable 2.3: List of sites.	Field visits, data collection, community meetings, and technical/economic cost-benefit analysis conducted during the assessment phase.	Challenge: Accurately mapping infrastructure limitations, environmental/climate risks (e.g., flooding, salt intrusion), and local cultural perceptions.
Activity 2.1: Conducting detailed feasibility & needs assessments for PCM technology	Identification of infrastructure, technical, cultural, and environmental constraints.	Clear understanding of the Mbolo Association's needs and the viability of PCM technology under local climate risks.	Desk research and consultations with the Mbolo Association and local communities.	Must clarify the specific challenges and needs of the Mbolo Association.
Activity 2.2: Compare PCM Systems with other Available Cooling Technologies.	Development of a comparative matrix scoring and ranking different technologies.	A detailed cost-benefit analysis comparing PCM technology to business-as-usual and other available cooling technologies.	Technical and economic comparisons against solutions like solar direct-drive fridges, evaporative coolers, and solar PV + battery systems.	Will be used to justify the selection of the technology and inform broader deployment strategies.
Activity 2.3: Feasibility study to identify most suitable sites for pilot Installations	Number of pilot sites selected across agriculture, fisheries, and poultry sectors.	Finalized list of optimal pilot locations based on technical feasibility, climate vulnerability, and community readiness.	Field visits, infrastructure mapping, demand analysis, and participatory community meetings (women's groups, farmers, fishers).	The implementing partner will consult with the NDE to identify relevant focal points; travel costs for focal points will be covered.
Output 3: Piloting and testing PCM cooling solutions	Number of PCM units procured/installed; Number of business models developed; Number of user guides produced.	Deliverable 3.1: Installation and pilot testing reports. Deliverable 3.2: Define key indicators for M&E and their respective business models. Deliverable 3.3: Piloting and getting trained in PCM solar technology. Deliverable 3.4: Users' guide.	Procurement records, installation reports, and tracking of M&E indicators over a 6-month piloting period and beyond.	Assumption: The maximum amount available for piloting should not exceed 20% of the total budget.

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection	(F) Comments
Activity 3.1: Procurement for PCM and construction	Definition of ToRs for PCM solutions; Number of units purchased and installed.	Successful procurement and installation of PCM equipment across the 3 targeted sectors.	Procurement logs, installation reports, and Steering Committee reviews.	If 3 pilots cannot be implemented within the 20% budget cap, sectors will be prioritized by the Steering Committee
Activity 3.2: Defining Monitoring Indicators and a Business model for the maintenance of PCM technology under the 3 sectors that will be piloted.	3 sector-specific business models defined; Number of M&E indicators established.	Baselines, expected results, and tracking of real impacts (costs, benefits, product shelf-life, and selling prices).	Data tracking over 6 months of implementation by the IP, and at 1, 2, 3-4, and 5-years post-implementation by the Project Proponent.	Must include expected increased revenues and maintenance costs to ensure the sustainability of the technology.
Activity 3.4: Redact a user´s guide of the technology for the 3 sectors	1 practical Users' guide redacted based on the 6-months piloting.	A comprehensive manual outlining technology specifications, maintenance requirements, lessons learnt, and good practices.	Document compilation and validation following the 6-month pilot phase.	Designed to ensure efficient technology use across the 3 sectors.
Output 4: Scaling up roadmap and Closure Workshop	Development of a replication strategy; Volume of knowledge materials generated; Execution of the closure workshop.	Deliverable 4.1: Manual for training program. Deliverable 4.2: Photo reportage, story, technology factsheet. Deliverable 4.3: Minutes of closure workshop with list of participants.	Document validation of the roadmap and communication materials; Headcount and meeting minutes at the closure workshop.	Assumption: The 6-month pilot yields successful data to formulate bankable post-pilot business models for national scale-up.
Activity 4.1: Formulate a roadmap that could help the Mbolo Association to scale up the technology.	1 Scaling-up roadmap developed.	Clear pathways defined for post-pilot business models (e.g., revolving funds or public-private partnerships).	Document review and validation.	Crucial step to ensure long-term financial viability and technology replication.
Activity 4.2: Develop Communication and Knowledge materials	1 photo reportage; 1 story; 1 technology booklet/factsheet produced.	High-quality communication and KMS materials ready for government promotion of the technology.	Review of media outputs produced by a local professional photographer.	Materials must be developed in English and translated into the local languages of the pilot areas.

Impact Statement	
Challenge	The Gambia faces severe food insecurity, exacerbated by climate change and massive post-harvest losses reaching up to 40% in perishable goods. A critical barrier is the lack of accessible, reliable, and affordable cooling technologies in rural areas. Compounded by unpredictable rainfall, rising temperatures, and highly unreliable, expensive rural energy infrastructure, these high losses severely threaten national food security, economic stability, and the livelihoods of farmers
CTCN assistance	• Conduct feasibility studies and technical assessments for Phase Change Material (PCM) cooling deployment. • Validate and pilot solar-powered PCM cooling technologies across agriculture, fisheries, and poultry sectors. • Build local capacity and empower women through targeted training programs and business models. • Support policy development and identify financing mechanisms to scale up the technology
Anticipated impact	• Post-harvest losses significantly reduced to 10-15%. • Measurable increase in incomes for rural farmers and fishers. • Avoided GHG emissions by replacing diesel-powered cold storage
Anticipated co-benefits from the TA	• The TA will generate significant economic and social co-benefits by creating sustainable jobs and business opportunities within the targeted value chains. It will reduce dependence on expensive, unreliable fossil fuels and ice, while improving overall food safety, product quality, and nutritional security for the population
Gender aspects of the TA	• Yes, the TA will be supported by a detailed Gender Assessment and Gender Action Plan (GAAP), overseen by a dedicated National Gender Expert. Expected benefits include empowering women-led groups through prioritized pilot deployments, tailored capacity-building training, and equitable financial support mechanisms. This ensures active participation, job creation, and enhanced income for women in rural primary sectors
Anticipated contribution to NDC	• Energy mitigation: Replaces diesel and inefficient grid cooling with solar-powered PCM, directly lowering emissions. • Agriculture mitigation: Reduces post-harvest losses, avoiding embedded agricultural emissions (methane, fertilizers). • Adaptation: Strengthens climate-resilient cold chains for communities.
The narrative story	The Gambia's economy heavily relies on agriculture, fisheries, and poultry, which employ over 70% of the rural labor force and contribute significantly to the national GDP. However, the country faces a critical food insecurity challenge, compounded by severe climate change impacts such as rising temperatures, erratic rainfall, and saltwater intrusion. These climate-induced stressors are worsened by staggering post-harvest losses of up to 40% for perishable goods. A primary barrier driving these losses is the severe lack of adequate, reliable, and affordable cold chain infrastructure. In rural areas, the electricity grid is highly unreliable and costly, making conventional refrigeration impractical and forcing reliance on expensive diesel generators or forcing farmers to sell produce immediately at reduced prices. To address these mitigation and adaptation barriers, this CTCN technical assistance will introduce sustainable, solar-powered Phase Change Material (PCM) cooling technologies. By storing thermal energy without relying on continuous grid electricity or expensive batteries, PCM

Impact Statement	
	technology provides an affordable, decentralized solution to preserve food, boost incomes, and build a resilient food system
Contribution to SDGs	• SDG 2 (Zero Hunger): By introducing sustainable cooling technologies, the TA will address post-harvest losses and improve food preservation, thereby enhancing food security and promoting sustainable agriculture. • SDG 5 (Achieve gender equality): to achieve gender equality and empower all women and girls the TA will actively support women's cooperatives such as Mbolo Association. • SDG 7 (Affordable and Clean Energy): The TA promotes renewable energy sources by deploying solar-powered PCM cooling systems, providing rural communities with affordable, reliable, and modern off-grid energy services. • SDG 13 (Climate Action): The project strengthens the adaptive capacity of farmers, fishers, and women's cooperatives against climate-related hazards, and integrates climate measures into national policies to reduce GHG emissions.

5.6. Annexure- 6 : Gender Assessment & Action Plan

1. GAAP Overview and Context:

Project Details	Title of technical assistance	Introducing Phase Change Materials (PCM) into the Gambia's cold chain to address post-harvest loss and other waste across the primary sector
	TA Response Plan Reference Number	2025000014
	Implementing partner	Veolia | Engineering & Consulting| India
	Country(ies)	The Gambia
GAAP purpose	Brief overview of the technical assistance objectives	The overall objective of this technical assistance is to strengthen the resilience of The Gambia's food systems by introducing sustainable cooling technologies based on Phase Change Materials (PCM) to reduce post-harvest losses in the agriculture, fisheries, and poultry sectors. The specific objectives include: ● Developing a feasibility study that includes technical assessments, cost-benefit analysis, and site selection for PCM deployment. ● Validating and piloting PCM-based cooling technologies in selected rural locations in close consultation with local stakeholders. ● Building local capacity through targeted training programs and awareness campaigns, with a specific focus on empowering women and smallholder producers. ● Supporting policy development, standardization efforts, and identifying financing mechanisms to facilitate the broader adoption of PCM technologies. ● Organizing a closure workshop to disseminate lessons learned and propose strategies for scaling up the technology at the national level
	How gender mainstreaming aligns with the TA goals	Women play a major role in horticulture, poultry farming, and fisheries but face significant technological and financial barriers. Gender mainstreaming aligns with the TA by prioritizing women-led groups in pilot deployments, providing targeted training on PCM cooling technologies, and developing business models that enhance gender-equitable climate resilience and economic empowerment.
Stakeholder engagement	List of stakeholders (e.g., government agencies, local organizations, community groups)	Ministry of Environment Climate Change and Natural Resources (MECCNAR), The Mbolo Association, farmers, fishers, women's cooperatives, and local communities where PCM will be piloted
	Gender responsive representation demonstrating how women	The project mandates a minimum 50% participation rate for women in consultations, capacity-building, and decision-making (Steering Committee). It utilizes separate

	and marginalized groups are involved at each level	Participatory Rural Appraisals (PRAs) and focus groups for women to understand gender-specific constraints.
Contact details	Point of contact for GAAP (Gender expert) implementation (Name, email, phone number)	Emily Sarr National Gender Expert emilysarr@yahoo.com

2. Gender Assessment

- Overview of the Gender Context

Brief analysis of gender roles, norms, and dynamics in the target region/sector	In Gambia, patriarchal socio-cultural norms heavily influence gender dynamics, creating significant disparities in the economy and daily life. Women are vital to the country's primary sectors, constituting 67% of the agricultural labor force compared to just 33% for men. There is a distinct gender division of labor: men predominantly cultivate cash crops such as groundnuts, maize, and millet, while women focus heavily on lowland rice, small-scale horticulture (vegetables), and the rearing of small ruminants and poultry. Furthermore, women play a crucial role in fisheries, particularly as coastal women processors handling post-harvest activities. Despite their extensive economic participation, women's empowerment and voice in policy-making remain weak, and they are chronically underrepresented in key rural institutions and cooperatives. Educational constraints also heavily impact women, with 62% of Gambian women having no schooling compared to 49% of men.
A comprehensive analysis of gender barriers/necessities in the specific sector, i.e. energy, water, food systems, etc.	Within the agricultural, fisheries, and energy sectors, women face severe systemic barriers. Access to land is primarily governed by customary law, meaning women typically only obtain seasonal "user rights" through their husbands or communities, preventing them from planting perennial crops or making long-term agribusiness investments. In fact, only 4.4% of women are sole owners of land. Access to finance is extremely limited; because women lack land collateral and face high interest rates, only 9% of rural women possess a bank account. Consequently, women mostly rely on grants from development programs. Furthermore, agricultural extension and advisory services are predominantly geared toward men as the heads of households, leaving women without the necessary training, modern technologies, and equipment. In the context of post-harvest management and climate technologies (such as Phase Change Materials or cold chain infrastructure), women are highly vulnerable to post-harvest losses because they lack storage facilities and face time poverty. Introducing climate and cooling technologies requires addressing these constraints by ensuring technologies are affordable, accessible without traditional land collateral, and accompanied by targeted capacity-building that accommodates women's educational levels and time burdens.

- Gender assessment

Aspect	Issues to be addressed	Findings	Sources of data
Access and use	Do women and men have equitable access to climate technologies, resources, and services provided through the TA?	Women do not have equitable access due to deep-rooted economic and customary barriers. Only 4.4% of women have sole ownership of land, limiting their ability to provide collateral for credit to purchase technologies. Only 9% of rural women have bank accounts. Furthermore, public extension services and male-targeted extension services also restrict access.	Word Bank project appraisal document for GRIVA project
	Are there gender-specific barriers to access these technologies or resources (e.g., cultural, social, economic, legal and policy framework)?	Yes, there are major gender-specific barriers. Legally and culturally, land is governed by customary law, meaning women typically only receive temporary "user rights" and cannot plant perennial crops or make long-term investments; only 4.4% of women are sole land owners. Economically, this lack of land collateral, combined with high interest rates, means only 9% of rural women have bank accounts, severely limiting their access to finance for technologies. Socially, agricultural extension and advisory services are heavily geared toward male household heads, leaving women without the necessary technical information or training. Furthermore, 62% of Gambian women have no schooling, creating a significant educational barrier to adopting new technologies	CTCN Response Plan
	How does the TA address the barriers described in the general analysis in 2.2	The Technical Assistance (TA) addresses these barriers by prioritizing women-led groups such as the Mbolo Association for pilot deployments, training, and financial support mechanisms. It implements a Gender Equality and Social Inclusion (GESI) Strategy that actively designs gender-responsive business models to generate income and reduce women's time poverty without requiring traditional collateral. Additionally, the project utilizes Phase Change Material (PCM) cooling technology, which bypasses the barrier of unreliable rural electricity, and specifically tracks gendered impacts such as time saved and income gains.	CTCN Response Plan
Participation	Are gender experts involved in all stages of the TA? Or Are	Yes, a dedicated National Gender Expert s integrated into the project team. Her responsibilities span the entire project	CTCN Response Plan

Aspect	Issues to be addressed	Findings	Sources of data
	consultations with women´s and gender rights organisations considered?	lifecycle, including conducting gender assessments, designing inclusive training programs, and ensuring gender mainstreaming is applied consistently across all activities. The project works closely with women's cooperatives, notably the Mbolo Association, which is the primary project proponent. The methodology also mandates separate focus group discussions specifically for women (e.g., female farmers and coastal women fish processors) during Participatory Rural Appraisals to ensure their unique post-harvest roles and constraints are fully understood and integrated into the project design	
	What best practices can enhance women's participation in the TA?	Key best practices applied to enhance women's participation include aiming for a minimum 50% participation rate for women in all consultations, data collection, and decision-making bodies, such as the project Steering Committee. Additionally, conducting separate women-only focus groups ensures safe spaces for women to share their specific challenges. Providing training materials and user guides translated into predominant local languages also directly addresses the high female illiteracy rate, ensuring women can fully participate and benefit	CTCN Response Plan
Leadership	Do women have leadership positions in climate technology and the specific sector?	Currently, women's voice in policy-making is weak, and their representation in leadership positions within key rural institutions and cooperatives is scant due to longstanding socio-cultural norms and educational constraints. The TA actively works to change this dynamic by engaging women-led organizations, ensuring equitable representation on the Steering Committee, and focusing on empowering women through targeted training and capacity-building to take on operational and business leadership roles in the new cold chain infrastructure	Word Bank project appraisal document for GRIVA project CTCN Gender Mainstreaming Guidelines for Energy Sector Projects
Scaling-up and transfer	Are the training materials and delivery methods designed to address gender-specific needs or challenges?	Yes, the TA develops user-friendly manuals and inclusive training programs tailored specifically for the end-users. Recognizing the significant educational gaps (where the majority of rural women have no formal schooling), a core project strategy is to translate user guides and training materials	Word Bank project appraisal document for GRIVA project

Aspect	Issues to be addressed	Findings	Sources of data
		into the predominant local languages used across the pilot sites to maximize accessibility and usability for women	
	Are financial mechanisms or models in place to ensure accessibility for women and marginalized groups;	Yes, the project conducts detailed feasibility studies to identify and test diverse, tiered financial models. It explores cooperative ownership models, pay-per-use systems, and lease agreements to ensure that women and smallholder groups can access the cooling services without being burdened by prohibitive upfront capital costs or the need for traditional land collateral	CTCN Response Plan
	Is the technology easily maintained and operated by local communities?	Yes, PCM-based cooling technology is specifically chosen because it is electricity-independent, modular, portable, and climate-resilient, making it highly appropriate for rural Gambian communities. To guarantee long-term local operation, the project includes comprehensive pre-deployment testing, the development of sector-specific user manuals, and hands-on capacity building involving local engineers and end-users.	CTCN Response Plan

3. Gender Action Plan

- Outline

Beneficiaries	**Direct beneficiaries**: Women farmers, coastal fisherwomen, poultry producers, and women-led cooperatives (such as the Mbolo Association) participating in the Phase Change Material (PCM) cooling pilot. The target is for at least 50% of direct beneficiaries to be women. **Indirect beneficiaries**: Rural communities, households, local extension workers, and regional markets benefiting from enhanced food security and reduced post-harvest losses.
Challenge	Women in The Gambia face systemic barriers to adopting climate tech, including lack of land collateral, limited financial access, and male-targeted extension services. These inequalities restrict access to reliable cooling technologies, leaving women highly vulnerable to severe post-harvest losses, climate-induced temperature rises, and unreliable energy, thereby threatening their livelihoods, income, and food security
Summary of gender-responsive TA implementation	The TA integrates a Gender Equality and Social Inclusion (GESI) strategy by prioritizing women-led groups (like the Mbolo Association) for PCM pilot deployments. It overcomes traditional collateral barriers by designing gender-responsive cooperative and Public-Private Partnership (PPP) business models. Furthermore, it provides targeted, accessible training in local languages to accommodate women's educational levels, directly addressing their post-harvest constraints and reducing time poverty
Output statements	• Number of women trained to use, monitor, and maintain PCM climate technologies. • Number of women with improved access to livelihood assets (specifically, PCM

	cooling infrastructure). • Percentage increase in income for women due to reduced post-harvest losses and improved product quality. • Expected direct and indirect beneficiaries disaggregated by gender (Target: At least 50% female participation in all TA phases, pilot deployments, and decision-making bodies)
Outcome statement	**Short-term**: Enhanced technical capacity and knowledge among women producers regarding sustainable PCM cooling systems and post-harvest management. **Medium-term**: Successful deployment and operation of solar-powered PCM cooling systems by women-led groups, leading to significantly reduced food waste and improved market access. **Long-term**: Enhanced rural livelihoods, economic empowerment for women, and improved overall food system resilience to climate change in Gambia, driven by equitable access to clean, decentralized cooling technologies.

- Gender Responsive Activities[2]

Activities	Indicator	Expected Result	Data collection[3]	Comments
Activity 1: Add title from the Response Plan				
Activity 1: Developing a mapping of stakeholders and a Steering Committee	Number of women and gender experts participating in the Steering Committee and stakeholder consultations	Minimum 50% participation rate for women in decision-making bodies and consultations	Head count and participant lists at meetings/workshops, collected per event. Ensure all data is gender-disaggregated	Assumption: Women representatives from cooperatives (like Mbolo Association) are available to participate. Challenge: Societal gender norms may discourage women from speaking up in mixed groups, requiring targeted invitations and active facilitation.
Activity 2: Feasibility & Needs Assessment and Technology Validation	Number of gender-specific constraints identified; Number of separate women-only focus groups held	At least One comprehensive feasibility study and site selection report that fully integrates women's specific cultural/financial constraints and identifies optimal locations for women-led groups	Participatory Rural Appraisals (PRAs), gender-disaggregated household surveys, and key informant interviews conducted during the assessment phase	Assumption: Organizing separate focus groups will provide a safe space for women to voice their unique post-harvest challenges. Challenge: Gathering accurate data on women's informal roles in the cold chain might be difficult.

[2] These expected results will be revised and compared to the closure report at the end of the technical assistance)
[3] Ensure data is gender-disaggregated.

Activities	Indicator	Expected Result	Data collection[3]	Comments
Activity 3: Piloting and testing PCM cooling solutions	Number of women-led groups receiving/testing PCM technology; Number of gender-responsive business models developed	3 pilots implemented (agriculture, fisheries, poultry) prioritizing women-led groups; 3 sector-specific business models defined to accommodate women's lack of traditional collateral.	Pilot performance reports, financial tracking, and M&E datasets collected at 6 months, 1 year, and up to 5 years post-implementation	Assumption: Cooperative and PPP models will effectively bypass these collateral requirements. Challenge: Women's lack of secure land ownership (only 4.4% are sole owners) and bank accounts restricts traditional financing.
Activity 4: Scaling up Roadmap and Closure Workshop	Number of women trained to use, maintain, and monitor PCM technologies; Increase in income/time saved for women	At least 50% of trainees are women; 1 practical User's Guide produced in local languages; 1 scaling-up roadmap incorporating gender	Post-training evaluation surveys, training attendance sheets, and endline economic impact surveys. Ensure data is gender-disaggregated.	Assumption: Providing visual, practical training and translating user guides into predominant local languages will successfully overcome educational barriers. Challenge: High female illiteracy rates (62% of women have no schooling).

- Post implementation Impact assessment

Question	Response Options	Details/ Comments
How did gender relations impact the project implementation	Not at all, rarely, a lot, etc	*Implementer to provide a brief explanation if needed.]*
Did the project identify interventions to address gender gaps in access, use, and transfer of climate technology?	Explain	*Implementer to provide a brief explanation if needed.]*
Had your project impacted women?	Not at all, rarely, a lot, etc	*Implementer to provide a brief explanation if needed.]*
How did your project impact women?	By adapting climate tech to women's needs By training women Other (please specify)	*Implementer to provide a brief explanation if needed.]*
Success stories on gender and climate technologies	*[Provide examples of success stories related to gender inclusion and climate tech.]*	*[Implementer to share relevant case studies or experiences.]*