

GEF-8 PROJECT IDENTIFICATION FORM (PIF)

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General Project Information

Project Title

The agri-food industrial cold chain in Tunisia

Region

Africa

GEF Project ID

12315

Country(ies)

Tunisia

Type of Project

MSP

GEF Agency(ies):

UNDP

GEF Agency ID

10527

Executing Partner

The National Agency for Energy Conservation

Executing Partner Type

Government

GEF Focal Area (s)

Climate Change

Submission Date

3/30/2026

Project Sector (CCM Only)

Technology Transfer/Innovative Low-Carbon Technologies

Taxonomy

Influencing models, Transform policy and regulatory environments, Demonstrate innovative approaches, Strengthen institutional capacity and decision-making, Stakeholders, Private Sector, Capital providers, Financial intermediaries and market facilitators, SMEs, Large corporations, Civil Society, Academia, Non-Governmental Organization, Type of Engagement, Participation, Consultation, Partnership, Information Dissemination, Communications, Strategic Communications, Public Campaigns, Awareness Raising, Behavior change, Capacity, Knowledge and Research, Knowledge Exchange, Knowledge Generation, Learning, Capacity Development, Innovation, Gender Equality, Gender Mainstreaming, Gender results areas, Women groups, Beneficiaries, Sex-disaggregated indicators, Gender-sensitive indicators, Access to benefits and services, Knowledge Generation and Exchange, Participation and leadership, Climate Change, Focal Areas, Climate Change Mitigation, Renewable Energy, Sustainable Urban Systems and Transport, Financing, Technology Transfer, Energy Efficiency

Type of Trust Fund

GET

Project Duration (Months)

48

GEF Project Grant: (a)

2,639,726.00

GEF Project Non-Grant: (b)

0.00

Agency Fee(s) Grant: (c)

250,774.00

Agency Fee(s) Non-Grant (d)

0.00

Total GEF Financing: (a+b+c+d)

2,890,500.00

Total Co-financing

16,150,000.00

PPG Amount: (e)

PPG Agency Fee(s): (f)

100,000.00	9,500.00
PPG total amount: (e+f)	Total GEF Resources: (a+b+c+d+e+f)
109,500.00	3,000,000.00

Project Tags

CBIT: No NGI: No SGP: No Innovation: No Competitive Window: No

Project Summary

Provide a brief summary description of the project, including: (i) what is the problem and issues to be addressed? (ii) what are the project objectives, and if the project is intended to be transformative, how will this be achieved? (iii), how will this be achieved (approach to deliver on objectives), and (iv) what are the GEBs and/or adaptation benefits, and other key expected results. The purpose of the summary is to provide a short, coherent summary for readers. The explanation and justification of the project should be in section B “project description”. (max. 250 words, approximately 1/2 page)

Tunisia’s agri-food sector relies heavily on cooling across the value chain—from collection and storage to processing and transport—yet much of the existing infrastructure is inefficient, energy-intensive, and fragmented. This results in high greenhouse gas (GHG) emissions, increased energy costs, and significant post-harvest food losses. Key barriers include weak enabling frameworks, limited technical capacity, lack of data, and constrained access to finance for energy-efficient and low-carbon technologies.

The project aims to reduce GHG emissions in Tunisia’s agri-food cold chain by promoting energy-efficient and renewable energy-based cooling solutions, while enabling large-scale adoption through improved market and financing conditions. It is structured around three core components: (1) strengthening the enabling environment through improved policies, data, and coordination mechanisms; (2) demonstrating and validating energy-efficient and low-carbon cooling technologies across key segments of the cold chain; and (3) establishing financial mechanisms and market conditions to support scale-up and replication.

By addressing regulatory, technical, and financial barriers in an integrated manner, the project is expected to catalyze private sector investment, enhance institutional and technical capacity, and promote systemic transformation of the cold chain. Demonstration activities and knowledge generation will support replication and inform national strategies, contributing to Tunisia’s energy transition and climate commitments under its NDC and national energy strategy.

The project is estimated to deliver direct emission reductions of approximately **275,180tCO₂eq** over its lifetime, primarily through energy efficiency improvements, renewable energy deployment, and optimization of cold chain logistics, including transport. These reductions are calculated based on electricity savings from energy-efficient technologies, renewable energy generation offsetting grid emissions, and improved efficiency in mobile refrigeration systems. The project is expected to directly benefit approximately 10,000 people, including 6,000 men and 4,000 women, across the agri-food cold chain, including workers in agri-food and transport companies, technicians and service providers, farmers and cooperatives, as well as public officials involved in policy and regulation, with additional indirect benefits through improved food quality and reduced losses.

Indicative Project Overview

Project Objective

To reduce greenhouse gas emissions in Tunisia’s agri-food industrial cold chain by promoting energy-efficient and low-carbon cooling technologies, mobilizing investment in sustainable cooling solutions, and scaling up innovative financing and market mechanisms.

Project Components

1. Creating the enabling framework and conditions for increased energy efficiency and integrating renewable energy solutions in the agri-food cold chain in Tunisia

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing (\$)	Co-financing (\$)
400,000.00	300,000.00

Outcome:

1. Strengthened policy, regulatory, and institutional frameworks supported by knowledge generation and dissemination of best practices, enabling the deployment of energy-efficient and low-carbon cooling solutions and the integration of renewable energy across Tunisia’s agri-food cold chain

Output:

1.1 Development of a National Sustainable Cooling Roadmap for the agri-food sector, including cold chain baseline assessment, demand projections, and technology mapping.

1.2 Comprehensive assessment of policy, market, and technological barriers to energy-efficient cooling in the agri-food cold chain, informing regulatory reforms and the adoption of sustainable cooling regulations.

1.3 Establishment of a multi-stakeholder coordination platform to support policy dialogue and sector coordination across the agri-food cold chains.

1.4 Strengthening the capacity of local authorities and service providers to implement, enforce, and monitor sustainable cooling measures, in line with the national policies supported by the Multilateral Fund.

1.5 Gender-responsive Knowledge management and awareness initiatives implemented to document, disseminate, and promote best practices on sustainable and energy-efficient cold chain solutions and the advancement of gender equality.

2. Demonstrating and validating the technical and financial feasibility of energy efficient and renewable energy-based cold chains

Component Type	Trust Fund
Investment	GET
GEF Project Financing (\$)	Co-financing (\$)
1,200,000.00	11,697,500.00

Outcome:

2. Energy-efficient and low-carbon cooling technologies demonstrated and validated across the agri-food cold chain, from harvest to market, in Tunisia.

Output:

2.1 Energy audits and technical feasibility assessments conducted to identify priority demonstration opportunities across the cold chain, from collection points to cold storage, processing, and refrigerated logistics.

2.2 Demonstration of energy-efficient and solar-based cooling technologies across key segments of the agri-food cold chain identified in Output 2.1.1, including pre-cooling at collection points, cold storage, food processing, and refrigerated transport.

2. Demonstrating and validating the technical and financial feasibility of energy efficient and renewable energy-based cold chains

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing (\$)	Co-financing (\$)
200,000.00	400,000.00

Outcome:

2. Energy-efficient and low-carbon cooling technologies demonstrated and validated across the agri-food cold chain, from harvest to market, in Tunisia.

Output:

2.3 Lessons learned and performance data from demonstrations (Output 2.1.2) synthesized to inform the scale-up of energy-efficient and renewable energy-based cooling solutions across Tunisia's agri-food cold chain.

2.4 Technical capacity for sustainable cold technologies is increased.

3. Creating the financial conditions for scale-up and replication

Component Type	Trust Fund
Investment	GET
GEF Project Financing (\$)	Co-financing (\$)
600,000.00	2,697,500.00

Outcome:

3. Financial mechanism(s) and market conditions strengthened to enable large-scale investment in energy-efficient and renewable energy-based cooling solutions in Tunisia's agri-food cold chain.

Output:

3.1 Assessment and design of financial mechanisms to support investment in energy-efficient cold chain technologies, including credit facilities, blended finance instruments, and risk-sharing mechanisms.

3.2 - Development of a pipeline of bankable investment projects for energy-efficient cold storage, refrigeration systems, and renewable energy-powered cooling solutions in the agri-food sector.

3.3 Pilot implementation of Cooling-as-a-Service (CaaS) Business Model to reduce upfront investment costs for SMEs.

3.4 Technical support and policy recommendations for energy pricing structures and incentives schemes that encourage energy efficiency and optimized operation of refrigeration systems.

3.5 - Capacity building for financial institutions, investors, and project developers to assess, structure, and finance investments in energy-efficient and renewable energy-powered cooling technologies.

M&E

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing (\$)	Co-financing (\$)
114,025.00	200,000.00

Outcome:

4. Effective management of project activities in line with UNDP and GEF M&E and SES policies

Output:

Output 4.1 A participatory and gender-inclusive M&E plan is developed and implemented, including an independent midterm review and terminal evaluation.

Component Balances

Project Components	GEF Project Financing (\$)	Co-financing (\$)
1. Creating the enabling framework and conditions for increased energy efficiency and integrating renewable energy solutions in the agri-food cold chain in Tunisia	400,000.00	300,000.00
2. Demonstrating and validating the technical and financial feasibility of energy efficient and renewable energy-based cold chains	1,200,000.00	11,697,500.00
2. Demonstrating and validating the technical and financial feasibility of energy efficient and renewable energy-based cold chains	200,000.00	400,000.00
3. Creating the financial conditions for scale-up and replication	600,000.00	2,697,500.00
M&E	114,025.00	200,000.00
Subtotal	2,514,025.00	15,295,000.00

Project Management Cost	125,701.00	855,000.00
Total Project Cost (\$)	2,639,726.00	16,150,000.00

Please provide justification

NA

PROJECT OUTLINE

A. PROJECT RATIONALE

Briefly describe the current situation: the global environmental problems and/or climate vulnerabilities that the project will address, the key elements of the system, and underlying drivers of environmental change in the project context, such as population growth, economic development, climate change, sociocultural and political factors, including conflicts, or technological changes. Describe the objective of the project, and the justification for it. (Approximately 3-5 pages) see guidance here

Current situation: context, drivers, and environmental challenges

Total greenhouse gas (GHG) emissions in Tunisia were about 45.1 MtCO₂eq in 2024^[1], of which 32.7 MtCO₂eq (72.5%) is from fossil fuels and industry. This level of emissions is following a steady upward trend. It is the energy mix (oil and gas) that drives the emissions in Tunisia. The energy sector is in a structural deficit, with domestic production falling short of increasing demand since 2001, reaching a record 65% in 2025, and continuing to grow. In terms of energy security, this means that national production only covers 35% of demand. This deficit needs to be covered through imports, which weighs heavily on the balance of payments, with the commercial energy balance deficit reaching 11.1 billion Tunisian Dinars in 2025 (about 3770 million USD)^[2].

The transport and buildings sectors lead in terms of total final energy consumption (35% and 33% respectively), closely followed by the industrial sector with 25%. The consumption of electricity is led by the buildings sector, with more than 50%, mostly driven by the need for air conditioning and heating. These put increasing strain on the electricity system, particularly during summer peak periods, driven largely by air conditioning. Cooling alone accounts for approximately 60% of summer peak demand (total peak demand reaching a record 4.8 GW in 2025), making it the primary driver of the rapid increase in peak electricity consumption. In addition to demand increase from the residential sector, a second important driver is the use of cooling in the industrial sector, including the agri-food industry, where needs for cooling and power for operating an expanding cold chain based mostly on refrigeration for agri-food processing and storage, continue to grow.^[3]

This pronounced seasonality creates significant structural constraints on the national electricity grid, requiring costly investments in peak capacity that are often carbon-intensive and inefficient. At the same time, it increases dependence on imported fossil fuels and exposes the energy system to supply and price volatility. With climate change expected to intensify cooling needs in the coming decades, these pressures are expected to grow further, increasing vulnerabilities for households, businesses, and critical sectors such as the agri-food industry that depend on reliable refrigeration and cold storage. In this context, improving the efficiency of cooling technologies and promoting sustainable cooling solutions have become an important priority for strengthening energy security, enhancing climate resilience, and supporting sustainable economic development.

Electricity generation in Tunisia is predominantly based on natural gas (94.5%), of which approximately 45% is imported, increasing the vulnerability of the electricity system to supply disruptions and price volatility. To address these challenges, Tunisia adopted a new energy strategy in 2023 that aims to increase the share of renewable energy in electricity production to 35% in 2030 and 50%

in 2035, while improving energy efficiency by 30% as compared to the 2021 baseline.^[4]⁴ The strategy aims to increase the electrification of the economy (reaching 30% of final energy consumption in 2035, up from 24% in 2021). Demand-side management remains a strong pillar, with targets to reduce primary energy demand by 30% by 2030 and 37% by 2035 relative to a BaU scenario. The country has also strengthened its climate commitment under its updated Nationally Determined Contribution (NDC 3.0), targeting a 46.2% reduction in greenhouse gas emissions intensity by 2030 compared to 2010 levels. Improving energy efficiency in cooling systems and managing growing cooling demand will therefore play an important role in supporting Tunisia's energy transition and climate mitigation objectives.

Electricity Consumption and Cooling^[5]⁵

The agri-food sector is highly electricity-intensive, driven largely by the stringent temperature requirements of the supply chain.

Total Electricity Consumption: The agri-food industry in Tunisia consumes approximately 600 GWh of electricity annually (combining high, medium, and low-tension connections).

Cooling and Refrigeration: The production of cold is the single largest driver of electrical demand in this sector. About 25% of the industry's total electricity—roughly 150 GWh per year—is dedicated specifically to powering refrigeration plants, cold storage facilities, and freezing installations^[6]⁶.

Given the significant share of electricity consumption associated with refrigeration and cold storage, improving the energy performance of cooling systems represents an important opportunity to reduce electricity demand and associated greenhouse gas emissions in the agri-food sector. Energy-efficient refrigeration technologies, improved system design, and better operational practices can substantially reduce electricity consumption while maintaining the strict temperature control required across the cold chain.

Characteristics of the Existing Cold Chain

The Tunisian cold chain and agri-food refrigeration sector is characterized by aging infrastructure and a highly fragmented market.

Market Fragmentation: Tunisia has nearly 800 stationary cold storage facilities, but the vast majority —roughly 75%—are operated by small enterprises employing fewer than 10 people. This fragmentation often means smaller capital reserves for equipment upgrades. This market structure also limits operators' ability to invest in modern, high-efficiency refrigeration systems and advanced energy management practices.

Average Age and Lifespan: While specific national census data on equipment age fluctuates, commercial and industrial refrigeration systems in the region are frequently pushed well beyond their optimal 15 to 20-year lifespans. It is common to find facilities operating aging compressor racks that are kept functional through continuous patching and recharging rather than full system replacements.

Quality and Efficiency: The overall energy efficiency of the existing stock is relatively low. The market is heavily reliant on older equipment utilizing synthetic refrigerants (F-gases like HFCs), including HFCs with high Global Warming Potential (GWP). As these older systems age, they frequently suffer from minor refrigerant leaks and degraded thermal insulation, forcing compressors to run longer and consume significantly more electricity to maintain target temperatures. As a result, there is significant potential to reduce electricity consumption in the agri-food cold chain through the introduction of more energy-efficient refrigeration technologies, improved system design, and enhanced maintenance and operational practices.

Transport Infrastructure: The 'mobile' cold chain includes over 4,500 controlled-temperature vehicles^[27]. However, about a third (1,500) of these are passively insulated rather than actively refrigerated, which presents a weak link in maintaining an unbroken cold chain from farm to processing plant.

The potential for Energy Efficiency Measures in Cold Chains

The intersection of energy efficiency and renewable energy offers a massive opportunity for cost reduction and decarbonization in Tunisia's agri-food sector. Because refrigeration often accounts for 35% to over 50% of a food processing or cold storage facility's total electricity bill, targeted upgrades can yield substantial financial returns. By modernizing legacy equipment and optimizing daily operations, facilities can typically reduce their refrigeration energy consumption by **35% to 45%**. These improvements also represent an important opportunity to reduce electricity demand and associated greenhouse gas emissions from the agri-food cold chain, contributing to Tunisia's climate mitigation objectives.

Energy efficiency measures in cold chains may include:

- **Variable Speed Drives (VSDs):** Retrofitting VSDs on compressors, evaporators, and condenser fans allows the equipment to dynamically adjust its output to match the actual cooling demand, rather than running at full, energy-intensive capacity continuously.
- **Smart Automation and Controls:** Implementing automated systems and electronic expansion valves enables precise temperature monitoring and real-time system optimization. This reduces human error, limits unnecessary defrost cycles, and prevents energy waste from over-cooling.
- **LED Lighting Upgrades:** Traditional lighting generates ambient heat, forcing the refrigeration system to work harder to maintain target temperatures. Switching to LEDs designed for sub-zero temperatures can cut lighting energy consumption by up to 75% while virtually eliminating this unwanted thermal load.

Beyond individual technologies, adopting integrated energy management approaches that combine equipment upgrades, improved system design, and optimized operational practices can further enhance the energy performance of cold storage facilities and support sustained reductions in electricity consumption.

Tunisia's abundant solar resources make its industrial sector an ideal candidate for renewable energy integration, for example:

- **Solar Photovoltaic (PV) Integration:** Installing rooftop solar PV systems on large cold storage warehouses directly offsets the facility's massive electrical draw during peak daylight hours (which coincides with the highest cooling demand). When paired with battery storage, facilities can further manage peak demand charges and enhance operational resilience against grid fluctuations. Such systems can play an important role in reducing the carbon intensity of electricity used in refrigeration while helping facilities manage operational costs.
- **Solar Thermal Cooling:** There is a proven, localized history of using solar heat to drive industrial cooling processes. As early as 2008, Tunisia implemented its first solar cooling installation—a thermal absorption refrigeration system used specifically to cool wine. Broader initiatives, such as the MEDISCO project, have also tested and optimized solar-thermally driven cooling concepts specifically for the Mediterranean agro-industry.
- **Decentralized Solar Cold Storage:** For smaller producers or off-grid agricultural areas, standalone solar-powered cold storage units are becoming increasingly viable. These units eliminate the reliance on expensive, polluting diesel generators and drastically reduce post-harvest food loss before the produce even reaches larger industrial processing centres. In addition to improving energy performance, decentralized solar cooling solutions can strengthen the resilience of agricultural supply chains by improving cold chain reliability and reducing dependence on fossil fuel-based power sources.

Given the aging stock and high energy costs, industry experts and energy audits identify several high-impact areas for modernization in cold chains. These opportunities provide a clear pathway to reduce electricity consumption and improve the overall energy

performance of the agri-food cold chain, while supporting Tunisia's efforts to reduce greenhouse gas emissions from the energy sector.

- **Transitioning to Natural Refrigerants:** Phasing out high-GWP synthetic F-gases in favour of natural refrigerants (such as ammonia, CO₂, or hydrocarbons). Modern systems designed for natural refrigerants are not only future-proofed against tightening environmental regulations (in line with the Kigali Amendment of the Montreal Protocol) but can also, in many cases/applications, achieve high energy efficiency. In addition to reducing the climate impact associated with refrigerants, modern refrigeration systems using natural refrigerants are often designed with improved thermodynamic performance, contributing to lower electricity consumption. The current project does not plan to work on this directly – as this is a priority of the projects supported by the Multilateral Fund for the Montreal Protocol - but rather will align with any ongoing work in the sector by others to avoid duplication.
- **Addressing the 'Weak Links' in Logistics:** Upgrading the transport fleet from passively insulated trucks to actively refrigerated vehicles equipped with real-time digital temperature dataloggers and to convert currently refrigerated trucks to lower-emitting technology. This directly addresses the high rates of post-harvest food loss that plague the regional agricultural sector. Improving temperature control and monitoring during transport can also enhance the overall efficiency and reliability of the cold chain, reduce product losses, and improve supply chain performance.
- **Decentralized, Solar-Powered Pre-Cooling:** Implementing standalone, solar-powered cold storage units directly at agricultural harvesting sites. Rapidly removing the 'field heat' from produce immediately after harvest drastically extends shelf life and reduces the load on larger, downstream industrial refrigeration plants. Such decentralized cooling solutions can also reduce reliance on fossil fuel-based electricity and support the integration of renewable energy into agricultural value chains.
- **System-Level Retrofits:** For facilities not ready for a complete overhaul, retrofitting existing systems with Variable Speed Drives (VSDs) on compressors and evaporators, alongside automated electronic controls, offers the fastest return on investment. These system-level improvements represent cost-effective entry points for many facilities and can deliver immediate reductions in electricity consumption while preparing operators for more comprehensive technology upgrades in the future.

Drivers of greenhouse gas emissions

Climate change: rising temperatures, especially during the summer, lead to increased demand for cooling. In a highly urbanized country like Tunisia (over 72%), with an aging population, this demand is increasingly met through air conditioning in the residential sector and industrial cooling in the agri-food and health/pharmaceutical sectors. With more than 94% of electricity being generated from natural gas, this will lead to higher emissions. As cooling demand increases, electricity consumption during peak summer periods is expected to rise significantly, further increasing the carbon footprint of the power system in the absence of efficiency improvements and greater integration of renewable energy. In the agri-food sector, rising temperatures are also increasing the need for reliable refrigeration, cold storage, and temperature-controlled transport to preserve food quality and reduce post-harvest losses, making sustainable and energy-efficient cold chain development a critical priority.

Increasing energy demand: energy demand, including electricity, is steadily rising in Tunisia, despite significant promotion of energy efficiency and sufficiency measures. Sectors important for the economy, including tourism, industrial production, and agriculture, are increasingly dependent on electricity. Because of the high carbon content of electricity, this drives higher emissions. This trend highlights the importance of improving energy efficiency across key sectors, including industry and agri-food value chains, to reduce the growth in electricity demand and associated emissions.

Fossil-fuel-based energy system: as mentioned above, the energy system is mostly dependent on fossil fuels. Since electricity is produced mostly from natural gas (94.5%), the emissions are likely to increase substantially, also driven by the increasing rate of electrification of end uses. With any further development of the system, with additional capacity being planned, higher emissions are inevitable. Without significant improvements in energy efficiency and diversification of the energy mix through renewable energy deployment, the continued growth in electricity demand is likely to translate directly into higher greenhouse gas emissions.

Population growth: Tunisia's current population is about 12.5 million people, and although annual growth has slowed to about 0.6 – 0.8%, it continues a slowly upward trajectory. The country is highly urbanized (over 72%) and is undergoing a demographic transition with a rapidly aging population, more vulnerable to climate change and higher temperatures, and requiring increasingly more healthcare. The combined effect is a projected growth in energy consumption and demand that continues to be mostly met with fossil fuels, leading to higher emissions. Urbanization and demographic change are also expected to increase demand for

cooling services in residential buildings, healthcare facilities, and industrial processes, including a growing need for refrigeration, cold storage, and temperature-controlled logistics, particularly in the agri-food sector.

The combined effect of these drivers will fuel demand for air conditioning and cooling, further stressing the electricity system, with a particularly strong impact from the expansion of cold chain infrastructure required to ensure food preservation, safety, and supply continuity. To increase energy security (reduce dependence on imported fossil fuels) and to decarbonize the energy/electricity sector, the country must reduce energy demand and increase the share of renewable energy. These drivers are interlinked and mutually reinforce each other. Addressing these drivers will therefore require a combination of measures, including improved energy efficiency, modernization of cooling technologies, and greater integration of renewable energy solutions across key sectors such as industry and agri-food processing, with a specific emphasis on sustainable and energy-efficient cold chain systems rather than solely on air conditioning.

Future Narratives and System Dynamics

To better understand the need for the proposal intervention, it is useful to examine how demographic trends, economic development, and energy policies might interact to shape the future energy demand and greenhouse gas emissions in Tunisia, with a particular focus on the agri-food cold chain.

Scenario A: Business as usual – Inefficient refrigeration systems and limited pre-cooling infrastructure at collection points mean that post-harvest food losses remain high, wasting energy embedded downstream the agri-food cold chains while generating avoidable GHG emissions. As cold chain demand peaks in summer, the electricity grid will come under increasing strain. If demand is not managed and additional generation capacity is insufficient, this will lead to more brownouts and eventually blackouts during peak demand, disproportionately affecting cold storage operators. This will have economic consequences, reduce growth and may affect the agri-food industry, leading to stagnation or recession, and increased unemployment. Climate change will further exacerbate this, as rising temperatures increase the need for space cooling and industrial refrigeration, driving higher electricity demand. Greenhouse gas emissions will rise, and the country won't be able to meet its NDC 3.0 targets. Energy security will continue to decline as the share of imported fossil fuels increases, further stressing the economy. This scenario will also have significant negative impacts on food security and the agri-food sector's economic resilience. A vicious cycle will get progressively worse. In addition, the absence of a differentiated approach to cold chain development—tailored to specific crop requirements—will further reduce system effectiveness. For highly perishable crops, the lack of decentralized pre-cooling solutions at collection points will accelerate spoilage, while for others, insufficient temperature-controlled transport will be the critical bottleneck. Similarly, the imbalance between decentralized and centralized cooling infrastructure will limit efficiency gains across value chains. Addressing these challenges requires crop-specific and value chain-specific interventions, and engagement with specialized institutions such as Wageningen University & Research could provide critical technical guidance during the project preparation phase.

Scenario B. An economy-only focus - A potential future might be based on policies that prioritize economic development above all else, which would focus primarily on expanding energy to meet growing demand, without addressing structural inefficiencies of the cold chain. Investments in cold storage capacity would be driven by volume and market access instead of energy or environmental performance, potentially locking in fossil fuel-dependent infrastructure. While Scenario B would address short-term barriers, it would do so with high energy and carbon intensity. Post-harvest losses would remain high due to the lack of improved pre-cooling, undermining the economic case for investments in cold chains. GHG emissions will continue to rise unabated. The opportunity to transform cold chains into a driver of low-carbon growth would be missed, and the country wouldn't be able to meet its NDC 3.0 targets.

Scenario C: Green scenario - If the country adopts robust energy efficiency and renewable energy measures, specifically targeting the agri-food cold chain, it will be possible to fundamentally transform the sector's energy and climate performance while delivering economic and food security improvements. Deploying highly efficient, renewable-based cooling systems across the cold chain would simultaneously reduce food losses and lower GHG emissions. Lower, more predictable operating costs could improve the competitiveness of the Tunisian agri-food industry and potentially enable it to compete in premium markets while addressing domestic food security. In addition, the natural alignment between solar irradiation and cooling needs, driven by higher ambient temperatures, makes it an ideal entry point for integrating solar power into Tunisian cold chains. This scenario positions cold chains as a lever for supporting the accomplishment of Tunisia's NDC 3.0 targets.

Important exogenous drivers of relevance are expected to evolve and will impact each scenario. As explained above, the drivers of climate change are likely to exacerbate current pressures on the electricity grid and on the food supply chain. Projected temperature increases, reduction in rainfall/increasing droughts, and increasing extreme weather events all create significant risk for the agri-food sector, both the production side, as well as the processing and handling of food. Tunisia's agri-food cold chain faces a convergence of climate-related pressures that are already materializing and will intensify significantly by 2030–2050:

- **Thermodynamic stress:** higher ambient temperatures increase refrigeration energy demand and equipment failure risk across all cold chain nodes.
- **Energy insecurity:** an electricity grid already at capacity, fueled predominantly by imported fossil gas, faces growing climate-driven peak demand just as supply reliability is under pressure.
- **Product flow volatility:** more erratic harvests create boom-bust cycles that undermine cold chain economics and matching of capacity to throughput.
- **Accelerated spoilage risk:** compressed post-harvest time windows and higher field temperatures raise losses in the unrefrigerated first mile.
- **Export market pressure:** rising EU standards demand more rigorous cold chain compliance precisely when Tunisia's capacity to deliver it is under strain.

The fundamental challenge is that Tunisia's cold chain was already underdeveloped relative to the demands placed on it, and climate change is simultaneously increasing those demands while degrading the energy and agricultural foundations on which the cold chain depends. Without substantial investment in energy-resilient cold storage (particularly solar-powered decentralized facilities), precooling infrastructure at the farm level, and grid modernization, the conditions necessary to contain post-harvest losses will remain unmet. As a result, those losses will increase materially, compounding the production losses already projected for the upstream agricultural sector.

Achieving such a transition will require targeted interventions to modernize and improve the energy efficiency of agri-food cold chains and promote the integration of renewable energy solutions. The proposed project will support this transition by addressing key technological, financial, and capacity barriers within the agri-food cold chain sector.

Baseline Scenario and Existing Barriers

The Baseline: Absence of the Project

Tunisia has traditionally focused on and achieved important progress in increasing energy efficiency in the building sector. Key achievements include the introduction of mandatory energy labelling (since 2004 for refrigerators^[8] and 2009 for air conditioners^[9]), the adoption and gradual strengthening of Minimum Energy Performance Standards (MEPS)^[10]¹⁰ to eliminate inefficient appliances, as well as the modernization of national testing infrastructure and the implementation of the E-label digital system (*E-tiquette*). The country has rolled out thermal regulations for buildings, with more than 12 million m² now compliant, and carried out more than 2,100 energy audits in the industrial, tertiary, and residential sectors. Tunisia has also begun the transition to low-GWP refrigerants such as R32 and R290, and has launched several flagship programs, including PROMOCLIM (target 5,000 high-efficiency, low-GWP air conditioners by 2030), TEEP (replacement of 10,000 public building air conditioners), PEEB Cool (replacement of 60,000 units in schools, hospitals, and public buildings), and PROMO-ISOL (thermal insulation for 65,000 homes). Tunisia also joined the Cooling Pledge at COP28, achieving around 70% of its initial targets and positioning itself as a regional leader in sustainable cooling. These initiatives have primarily focused on cooling in the residential and public building sectors, while industrial cooling systems and cold chain infrastructure—particularly in the agri-food sector—have received comparatively limited attention.

Furthermore, Tunisia ratified the Kigali Amendment to the Montreal Protocol in August 2021, committing to a gradual phase-down of hydrofluorocarbons (HFCs) based on their global warming potential (GWP). This commitment places the country on a defined reduction pathway that requires transitioning to low-GWP alternatives, strengthening regulatory frameworks, and enhancing monitoring and reporting systems. It also reinforces the need for integrated sustainable cooling strategies that balance refrigerant transition with rising cooling demand, improved energy efficiency, and the affordability and accessibility of cooling technologies.

To consolidate these gains and intensify action, the country is now launching the National Cooling Action Plan (NCAP), developed by ANME with the support of the African Development Bank (AfDB) and the United Nations Environment Programme (UNEP). The NCAP will provide an integrated national roadmap for sustainable cooling, covering the residential and tertiary, industrial and

agricultural sectors, refrigerated transport, refrigerant management and recovery, public buildings and district cooling, building codes and passive strategies, as well as cold chain development for food and pharmaceuticals. A flagship initiative of NCAP is the Bab Saadoun district heating and cooling network, which has the potential to reduce heating and cooling energy consumption by up to 50%. While the NCAP represents an important step toward a coordinated national strategy for sustainable cooling, it focuses primarily on diagnostics, planning, and strategic studies rather than financing the implementation of cooling technologies and infrastructure upgrades.

The energy strategy from 2023^{[11]¹¹}, mentioned earlier, was built around three programs of energy transition: i) promotion of renewable energy; ii) promotion of new technologies, including in transport/e-mobility; and iii) acceleration of energy efficiency and energy sufficiency. This strategy closely aligns with Tunisia's commitments under the Paris Agreement and its NDC 3.0, which targets a 46.2% reduction in GHG emissions by 2030 compared to the 2010 baseline.

Within the energy efficiency pillar, the strategy identifies several priority actions to be undertaken in the short to medium-term (2025-2035). Several of these priorities target the industrial sector, including its use of cooling:

- encourage/incentivize shifting cooling production/refrigeration to off-peak hours (night, lower carbon intensity);
- promoting the pooling/sharing of utility production (energy, cooling, water etc.) in industrial zones/parks;
- boosting investment in energy efficiency; and
- promoting energy certification for Large Energy-Consuming Enterprises and encouraging the implementation of Energy Management Systems (EMS) based on the ISO 50001 standard.

These identified priorities are at the proposal stage but have not yet been implemented. The NCAP will provide a national integrated roadmap for sustainable cooling. This plan will be developed over the coming 12 months and consists of several stages, starting with a diagnostic/mapping of cooling demand by sector and region, an inventory of existing equipment and performance assessment, and assessing the socio-economic needs of households and SMEs. The results of this initial diagnosis phase are expected to be used to develop priority technical and strategic studies, including cooling demand projections under different climate scenarios, analysis of impacts on the electrical grid, assessment of regulatory and institutional gaps, economic modeling and identification of future investment programs, and pre-feasibility studies for major projects. This diagnostic phase is expected to provide an analytical foundation for future investments in sustainable cooling technologies across sectors.

The scope of the NCAP is broad, targeting the entire economy, covering the residential and tertiary, industrial and agricultural sectors, refrigerated transport, refrigerant management and recovery, public buildings and district cooling, building codes and passive strategies, as well as cold chain development for food and pharmaceuticals. Its funding is limited and only allows for the formulation of the plan and several preparatory studies, but not the implementation of recommended measures. As a result, the implementation of many of the priority actions identified under the NCAP will require additional financial and technical support.

Work on the residential and building sector is ongoing through programs such as thermal regulations for buildings, focusing on the public building sector (TEEP, PEEB, PROMOCLIM), including a shift toward the use of low GWP refrigerants, as referenced above. Some diagnostic work has been done on cooling in the agri-food and pharmaceutical industrial sector, including feasibility assessments of cold storage technologies in the sector, based on energy audits undertaken in a sample of companies active in the sector^{[12]¹²}. The conclusion from these early studies was that the potential for introducing cold storage technology was greatest in the agri-food sector. However, there has been no comprehensive approach to the entire agri-food industrial cold chain, covering all stages from receiving the agricultural products at the plant for processing, the processing needs for cooling, the transport from the collection point or production plant to commercial retail distribution to the end consumer.

An initial feasibility assessment of the integration of cold storage^{[13]¹³} technologies into industry was undertaken in 2020^{[14]¹⁴}. The assessment evaluated different technological options to improve the efficiency of industrial cooling systems and reduce electricity demand. It focused on three main types of refrigeration technology to produce cooling: vapor-compression

refrigeration, gas engine heat pumps, and absorption chillers. The use of natural gas-based technologies for the production of positive refrigeration can be used in Tunisia (Absorption or GHP), it allows at least 10% energy savings, costs less expensive to invest, costs less to operate (gas price = 4 times cheaper than the price of electricity), reduces the electrical power required, reduces the investments of the STEG, makes it possible to recover heat from the waste energy and finally reduces greenhouse gases.

The study further assessed the feasibility of integrating three different **cold storage technologies**: cold water storage (can store about 10 kWh/m³), ice storage (48 - 58 kWh/m³), and encapsulated Phase Change Material (PCM) nodules for cold storage (40-60 kWh/m³). The most widely used are cold water and ice storage, as they are generally more cost-efficient, highly reliable, and present many application opportunities, especially in the agri-food industry. In Tunisia, a small number of companies in the agri-food industry use ice storage technology, especially in the beverage, ice, and dairy sectors. The study estimated the maximum potential capacity for cold storage in the agri-food industry (for their industrial process needs, excluding its electricity consumption for air conditioning) to be about 19 GWh. Considering that the use of cold storage could lead to 8% electricity savings, this would translate into a potential reduction of about 714 tCO₂eq emissions per year, or 14,280 tCO₂eq over the 20-year lifespan of the technology. These findings highlight the significant potential for improving energy efficiency and reducing greenhouse gas emissions through the wider adoption of cold storage technologies in the agri-food sector.

To achieve the reduction of greenhouse gas emissions through energy efficiency measures in industrial cooling in the agri-food sector cold chain, including the promotion of cold storage technologies and the promotion of integrated approaches combining energy efficiency and renewable energy solutions, several outcomes will have to be achieved:

- The **enabling regulatory and policy conditions** need to be in place to promote greater energy efficiency in the use of cooling in the agri-food industrial sector. The baseline regulatory framework has a sound foundation, but there are specific gaps that need to be addressed. There is, for example, no energy certification mechanism for large energy-consuming enterprises, and there are no MEPS for the most commonly used equipment in the cold chain. Existing policies and regulatory frameworks primarily address residential and commercial cooling equipment, while specific standards and performance requirements for industrial refrigeration systems remain limited.
- **Technical solutions and capacity are in place**, and their effectiveness has been demonstrated to facilitate investment in more energy-efficient cooling solutions. Innovative cold storage technologies and energy efficiency measures need to be available and understood by the industrial actors, predominantly private sector companies, before they can invest in these upgrades in their industry. Unfamiliarity with these new technologies is a barrier to increased uptake, as are data and information gaps. Demonstration and piloting of the most promising technologies and processes, and approaches, like the use of energy management systems (EMS) and an integrated cold chain approach, in the Tunisian context is an essential precondition for any scale-up in the longer term. Capacities of the local industry need to be strengthened to efficiently design, adopt, and deploy new technologies. Most companies currently don't use EMS and lack the capacity for systematic data collection to optimize energy use in their operations and production processes. Limited availability of specialized technical expertise and service providers further constrains the deployment of advanced refrigeration technologies in the sector.
- **Adequate financing on reasonable terms needs to be in place** that is readily accessible for companies that want to invest. Cold chain equipment requires long-lasting assets that are capital-intensive. Local production capacity is virtually non-existent, so most, if not all, will have to be imported at considerable cost. The Tunisian Energy Transition Fund (FTE) is well capitalized on a sustainable basis, but its investment guidelines need to be updated to reflect these new opportunities. Options for effective incentives need to be assessed and designed to encourage investment in the sector. Many agri-food companies are small and medium enterprises with limited access to capital and face difficulties prioritizing energy efficiency investments over core production investments.

Without targeted interventions, the modernization of cooling technologies in Tunisia's agri-food sector is expected to remain slow due to high capital costs, limited awareness of available technologies, and insufficient financial incentives. As a result, electricity consumption associated with industrial cooling will continue to increase, placing additional pressure on the national electricity system and contributing to higher greenhouse gas emissions.

Fit with Current Investment Landscape The project is designed to complement, not duplicate, the investments currently underway:

- **NCAP**: The National Cooling Action Plan (NCAP), currently under development with a budget of USD 300,000, is led by the National Agency for Energy Conservation (ANME) with support from UNEP through the Cool Coalition (MENA region) and the African Development Bank (AfDB). It aims to establish a national strategic framework for sustainable and energy-efficient cooling by assessing current and future demand across key sectors, including buildings, industry, and cold chains, while

identifying priority actions to promote high-efficiency, low-GWP technologies. Through sectoral analyses, stakeholder mapping, and policy recommendations, the NCAP strengthens Tunisia’s analytical and regulatory foundation for sustainable cooling and directly complements the Agri-Food Industrial Cold Chain project by guiding priority interventions and supporting coordinated strategies to improve energy efficiency and reduce emissions.

- Cooling-related projects and initiatives:** Tunisia’s efforts to phase down high-GWP refrigerants are supported through a combination of funding sources, including the Multilateral Fund (MLF)^{[15]¹⁵} for the Implementation of the Montreal Protocol, as well as bilateral cooperation and international foundations. In this context, the initiatives described below are supported through bilateral and foundation-based financing mechanisms. Several projects that aim at the phaseout of high GWP refrigerants and promote the adoption of low GWP alternatives are underway. The most recently approved MLF project^{[16]¹⁶} (“Pilot project to enhance energy efficiency in the residential air-conditioning manufacturing sector in Tunisia in the context of HFC phase-down” – for an amount of US \$ 1,441,675 to be implemented by UNIDO), aims to support the transition toward energy-efficient residential air conditioning technologies, while progressively reducing the use of HFCs in manufacturing processes, and to strengthen technical and industrial capacities in environmentally friendly technologies. It focuses on several companies manufacturing residential air conditioners locally. The project would assist enterprises with product design, modifications to manufacturing facilities, and technical capacity-building to enable the manufacture of more energy-efficient equipment. Several initiatives, including the Tunisian Green Cooling Programme (USD 600,000, implemented by ANME with support from GIZ and the ClimateWorks Foundation), are part of a broader, coordinated approach to promote sustainable and energy-efficient cooling in Tunisia. These initiatives, alongside the ANME - IKI-supported project, are funded through bilateral cooperation and international foundations and operate in parallel to MLF-supported activities. They reflect a strategic alignment in which the government has integrated the environmental dimension of refrigerant gases, particularly the reduction of high-GWP substances, into its cooling transition agenda. In this context, ANME works closely with the Ministry of Environment, notably through ANPE, to ensure coherence between technology choices, regulatory frameworks, and environmental objectives. Through activities such as capacity building, technician training, and pilot projects promoting low-GWP refrigerants (e.g., R32, R290), these initiatives contribute to strengthening technical expertise, market readiness, and the availability of a qualified workforce. Together, they complement the Agri-Food Industrial Cold Chain project by creating an enabling environment for the large-scale deployment of sustainable cooling technologies in Tunisia.
- GTA – Green Transition Accelerator – IKI funded:** The Green Transition Accelerator (GTA), a proposed regional initiative with a budget of USD 5 million, is expected to be implemented from 2026 to 2030 by ANME in partnership with IKI, Guidehouse, and UNDP, and the International Institute of Refrigeration, among other partners. Participation in the initiative remains subject to confirmation by ANME and UNDP, pending further clarification of roles and responsibilities in the implementation of activities. It supports the deployment of sustainable cooling solutions in high energy-demand industries, particularly in the food and pharmaceutical sectors, by promoting energy-efficient and resilient cold chains that reduce greenhouse gas emissions and food losses. Through demonstration projects involving manufacturers, logistics providers, storage operators, and retailers, GTA is expected to showcase innovative technologies while also strengthening the regulatory and financial landscape by enabling policymakers and financial institutions to recognize sustainable cold chain solutions as viable green investments. The initiative is intended to directly complement the Agri-Food Industrial Cold Chain project in Tunisia by piloting advanced cooling technologies and improving policy and financing conditions to scale up energy-efficient refrigeration and cold chain systems across the agri-food sector.
- Government-funded programs (PROMOCLIM, TEEB, PEEB Cool, PROMO-ISOL)** The Tunisian government is implementing a comprehensive and coordinated set of initiatives to accelerate the transition toward energy-efficient and sustainable cooling across sectors. Through flagship programs such as TEEP EE (KfW/FTE), PEEB COOL (GIZ, AFD, GCF), PROMOCLIM (AfDB), and the national energy labelling scheme, large-scale efforts are underway to modernize cooling equipment, improve building performance, and strengthen regulatory frameworks. While these initiatives do not specifically target the agri-food cold chain, they remain highly relevant as they address air-conditioning systems and provide proven examples of certification, labeling, and minimum energy performance standards (MEPS) successfully implemented in the country. These efforts are further complemented by innovative projects such as the Bab Saadoun district cooling system and national thermal regulations, which collectively reduce energy demand and promote high-efficiency technologies. Beyond investments, the government is also advancing financing mechanisms, market transformation, and capacity building to ensure long-term impact. Together, these actions demonstrate a strong national commitment to sustainable cooling and establish a solid technical, regulatory, and financial foundation that supports the decarbonization of industrial cold chains in Tunisia.

The Gap: None of these ongoing investments focuses solely on the agri-food industry, nor do they take a comprehensive cold chain approach. They will undertake several diagnostic studies to identify gaps in the policies and regulatory framework and provide more detailed data. Still, they will not fund investment in the agri-food sector to implement any recommendations. This project targets this gap. The project is aligned with these baseline initiatives, will use their studies, and will build on their findings and address any gaps. The current project will also invest in demonstrations of the new technologies and approaches to be promoted.

Key Barriers to Achieving Outcomes

The transition to preferred scenario C is blocked by foundational barriers that the baseline activities are not addressing and that the proposed project aims to remove:

1. **Policy and Regulatory Barriers:** regulatory frameworks addressing energy efficiency in cooling are primarily designed for the residential and commercial sectors and do not sufficiently cover industrial refrigeration systems and cold chains. MEPS for imported cooling technology (production and storage) are limited in scope and need updates. The current electricity tariff structure does not provide incentives for shifting production to off-peak hours. There is no energy certification mechanism for large energy-consuming enterprises. Standardized performance contracts for energy management, energy or cooling-as-a-service, with detailed standardized specification (“cahier de charges”) are not available. There are currently no integrated policies or instruments addressing the entire cold chain, from agricultural production and transport to processing and storage.
2. **Technical and Data Barriers:** There is insufficient information on cooling and pre-cooling demand in the agri-food cold chain, on the existing stock of installed equipment and infrastructure, its quality, age, and energy consumption. The transport link of the chain is particularly weak, but detailed characteristics are not available. Technical capacity for designing, installing, operating, and maintaining sustainable cooling technologies (cold storage, cold production) is insufficient. The use of EMS is not common, limiting the potential for more rational energy use and achieving energy savings. Awareness of advanced cooling technologies and integrated cold chain solutions remains limited among industrial actors, particularly SMEs.
3. **Financial Barriers:** High upfront costs for equipment and a domestic financial sector that is unfamiliar with financing energy efficiency make it difficult to secure capital. There are no financial derisking instruments (e.g., guarantees, subsidies) to make energy-efficient cold chain technologies and infrastructure commercially viable, and investors face significant currency risks associated with importing technology, deterring investment. The FTE is well capitalized but lacks specific guidelines for targeting investment/funding of the agri-food cold chain. In addition, companies often lack reliable information on expected energy savings and return on investment from modern cold chain technologies, which increases perceived investment risks.
4. **Market Barriers:** The market for energy-efficient technology in the industrial cooling sector, including agri-food cold chains, is undeveloped. Cold chain technologies are predominantly imported, as there is virtually no local manufacturing capacity. The current market is highly fragmented, with some 800 stationary cold storage facilities, of which 75% are operated by small companies with fewer than 10 employees. This fragmentation often means smaller capital reserves for equipment upgrades. The local market ecosystem for sustainable cooling technologies, including specialized engineering services, technology suppliers, and maintenance providers, is still emerging.
5. **Institutional and Coordination Barriers:** Cold chains in Tunisia cut across several sectors, including energy, agriculture, industry, transport, and health, and involve multiple public institutions. Coordination mechanisms across these sectors remain limited, which makes it difficult to design and implement integrated policies addressing the entire cold chain. In addition, institutional capacities for monitoring cooling demand, energy use, and technology performance remain limited, constraining evidence-based policymaking and investment planning.

Enabling Conditions: Despite the barriers described above, several enabling conditions create a favorable environment for advancing sustainable and energy-efficient cooling solutions in Tunisia’s agri-food sector:

- **Strong National Policy Framework:** Tunisia has established a comprehensive policy framework supporting energy transition and climate mitigation. The national energy strategy adopted in 2023 prioritizes the development of renewable energy, electrification of end uses, and the acceleration of energy efficiency and energy sufficiency measures across key sectors of the economy. These priorities are aligned with Tunisia’s commitments under the Paris Agreement and the country’s NDC 3.0, which targets significant reductions in greenhouse gas emissions by 2030 through improvements in energy efficiency and the decarbonization of the energy system.
- **Established Institutional Capacity:** Tunisia has well-established institutions with extensive experience in implementing energy efficiency policies and programs. ANME has a strong track record in developing regulatory frameworks, conducting energy audits, implementing incentive schemes, and supporting energy efficiency investments in buildings and industry.

The National Ozone Office, within the Ministère de l'Équipement, de l'Aménagement du Territoire et du Développement Durable, has been coordinating the implementation of projects ensuring the compliance with the Montreal Protocol, with the support of the Multilateral Fund. This institutional capacity provides a solid foundation for advancing sustainable cooling solutions in the industrial sector.

- **Development of the National Cooling Action Plan (NCAP):** Tunisia is currently developing its NCAP, led by ANME with support from international partners. The NCAP aims to establish an integrated national roadmap for sustainable cooling across sectors, including buildings, industry, refrigerated transportation, and agricultural cold storage chains. The plan will provide critical diagnostic analysis, data on cooling demand, and strategic recommendations that can support the identification and prioritization of sustainable cooling investments.
- **Existing Financial Mechanisms for Energy Transition:** Tunisia has established financial instruments to support energy transition investments, notably the FTE, which finances energy efficiency and renewable energy initiatives. While the fund's current investment guidelines do not yet specifically target industrial cooling technologies, the existence of this mechanism provides a strong foundation that could be adapted to mobilize financial incentives and support investments in sustainable cooling solutions. This takes place within the broader context of Tunisia's Integrated National Financing Framework (INFF), which aims to align public and private financing flows with national sustainable development priorities and can provide an overarching structure to better integrate and scale up financing for sustainable cooling, including cold chain investments in the agri-food sector.
- **High Renewable Energy Potential:** Tunisia benefits from strong solar resources, creating favorable conditions for integrating renewable energy solutions into cooling systems and cold storage infrastructure. The deployment of solar photovoltaic systems, particularly in industrial facilities with high daytime electricity demand for cooling, offers significant opportunities to reduce electricity costs and associated greenhouse gas emissions.
- **Growing Demand for Cold Chain Development in the Agri-Food Sector:** The agri-food sector is a strategic pillar of Tunisia's economy and increasingly relies on cold chain infrastructure to ensure product quality, reduce post-harvest losses, and strengthen competitiveness in domestic and export markets. This growing demand creates strong incentives for adopting more energy-efficient and sustainable cooling technologies across the cold chain.

Project Objective and Justification

Project objective:

To reduce greenhouse gas emissions in Tunisia's agri-food industrial sector by promoting energy-efficient and low-carbon cooling technologies, mobilizing investment in sustainable cooling solutions, and scaling up innovative financing and market mechanisms.

Justification for the selected approach. Cooling and **refrigeration** play a critical role in several sectors, including **food production**, health services, and indoor **environmental quality**. In the agri-food sector, refrigeration is required at multiple stages of the value chain, including production, processing, conservation, transport, storage, and distribution. Reliable cold chains are necessary to ensure food safety, reduce post-harvest losses, and support the development of the agri-food industries and tourism. However, refrigeration systems can be highly energy-intensive and represent a significant share of electricity consumption in the sector. Improving the **energy efficiency** of refrigeration systems and introducing sustainable cooling technologies, therefore, represent important opportunities to reduce operating costs, strengthen the competitiveness of the agri-food sector, and reduce greenhouse gas emissions.

Enduring outcomes: the project's outcomes will be sustained beyond its lifetime through systematic changes in policy, market conditions, and investment practices. Energy efficiency improvements in industrial cooling systems will reduce operational costs for agri-food companies, creating strong economic incentives to maintain and replicate these investments. The project will support improvements to the policy and regulatory framework governing industrial cooling and energy efficiency, which will be anchored within existing government institutions with strong implementation capacity. In addition, financial mechanisms and investment guidelines developed under the project will facilitate continued investment in energy-efficient cooling technologies after project completion. **The exogenous risk factors identified in the future scenarios section have informed the resilience based/ adaptive management design of the project.**

Potential for replication and scale-up: By demonstrating the technical and economic viability of energy-efficient cooling technologies and integrated cold chain solutions, the project will create a foundation for broader replication across Tunisia's agri-food sector. Lessons learned and policy reforms supported by the project will facilitate scaling up sustainable cooling investments nationwide.

[1] [Climate Change Tracker](#) accessed 3 March 2026

[2] https://www.energiemines.gov.tn/fileadmin/docs-u1/Conjoncture_énergétique__décembre_2025.pdf

[3] A definition of cold chains the approach employed by the project is provided at the end of the Project Rationale. Experts define an agri-food cold chain as an integrated network of temperature-controlled pre-cooling facilities, packhouses, transportation vehicles, cold storage facilities, and distribution centers designed to maintain the safety, quality, and quantity of food.

[4] [Stratégie Énergétique de la Tunisie à l'Horizon 2035](#), Ministère de l'Industrie, des Mines et de l'Énergie, April 2023

[5] While electricity represents a major operational cost, the *overall* energy consumption of the sector is much broader due to its massive thermal requirements. The agri-food industry relies heavily on these fossil fuels to generate heat for essential processes like pasteurization, cooking, drying, and evaporation. Consequently, the sector's total energy footprint is substantially larger than its electrical footprint alone. The current project focuses on the cold chain, which is electricity-driven.

[6] Sources include [IEA](#), [ANME](#), and GIZ reports

[7] The source of information used here is [iifir.org](#); although a bit dated (2013), it seems to be the most recent available; these data could be updated during the PPG, or during the project.

[8] Decree No. 2004-2145 of 2 September 2004

[9] Decree of the Minister of Industry, Energy and Small and Medium-Sized Enterprises and the Minister of Trade and Crafts of 21 April 2009

[10] since 2012, only room air conditioners of EE class 1, 2 or 3 have been allowed to be placed on the market (source: ANME).

[11] [Stratégie Énergétique de la Tunisie à l'Horizon 2035](#), Ministère de l'Industrie, des Mines et de l'Énergie, April 2023

[12] Identification et promotion de Nouvelles mesures d'Efficacité Énergétique dans le secteur industriel – Diagnostic des procédés actuels et potentiel d'efficacité énergétique (2012); Plan d'Actions (2014); Projet APEET – Étude du potentiel de diffusion des technologies du stockage du froid pour l'industrie tunisienne – rapport de diagnostique (2020); SUNREF/Expertise France: Projets prioritaires de maîtrise de l'énergie dans la branche des industries agroalimentaires (2021).

[13] Cold storage is a form of energy storage for later use. Thus, cold storage is typically carried out when the cost of primary (electrical) energy is cheaper whereas the destocking of stored cold is carried out during peak periods when the cost is higher expensive. This capability is particularly relevant for managing electricity demand during peak periods, which are increasingly driven by cooling needs during the summer months. Advantages include a reduction of peak electricity demand, it improves energy efficiency of refrigeration systems, increases operational flexibility of cooling systems and reduces environmental impacts.

[14] Projet APEET/GIZ – Étude du potentiel de diffusion des technologies du stockage du froid pour l'industrie tunisienne – rapport de diagnostique (2020)

[15] While the above initiatives reflect important progress under the Montreal Protocol and Kigali Amendment framework, this project does not directly intervene in that regulatory space. Its role is to complement, not duplicate, these efforts by focusing on the decarbonization of the agri-food cold chain, while maintaining alignment with the broader cooling transition agenda in Tunisia.

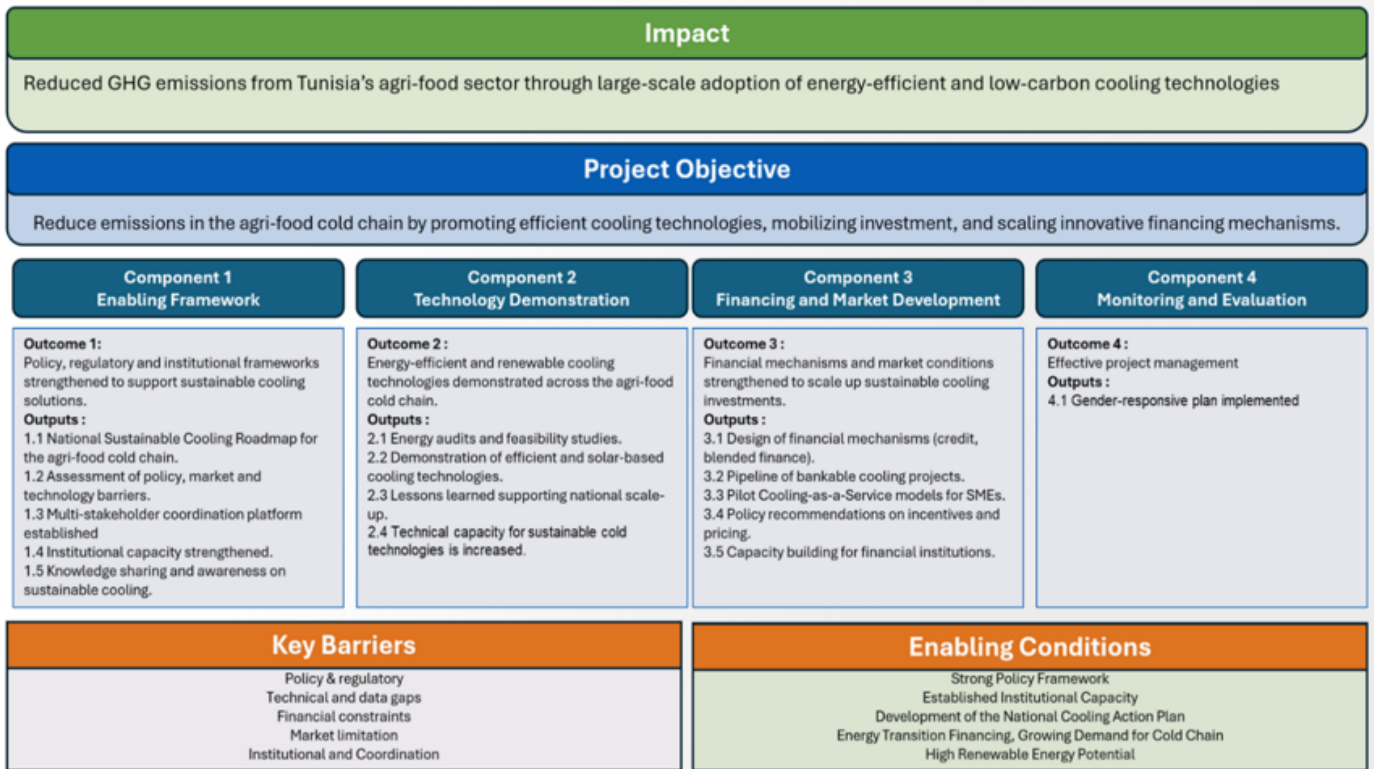
[16] Approved by the MLF at its 97th meeting, Montreal, December 2025

B. PROJECT DESCRIPTION

Project description

This section asks for a theory of change as part of a joined-up description of the project as a whole. The project description is expected to cover the key elements of good project design in an integrated way. It is also expected to meet the GEF's policy requirements on gender, stakeholders, private sector, and knowledge management and learning (see section D). This section should be a narrative that reads like a joined-up story and not independent elements that answer the guiding questions contained in the PIF guidance document. (Approximately 3-5 pages) see guidance here

Theory of Change – the Agri-Food Cold Chain In Tunisia



Theory of change

The project addresses rising GHG emissions associated with cooling demand in Tunisia's agri-food industrial sector, where temperature control is essential across the value chain of perishable products – from harvest to markets. Much of the existing cold chain infrastructure relies on aging, energy-intensive equipment using high-GWP refrigerants, leading to high electricity consumption and avoidable emissions. Tunisia has a strong policy commitment to energy efficiency and climate mitigation. Existing policies include mandatory MEPS and incentive programs supporting energy efficiency investments. In parallel, the country is implementing the Kigali Amendment to the Montreal Protocol, aiming to phase down high-GWP refrigerants and promote low-GWP alternatives.

The project assumes that the Tunisian agri-food sector will respond positively to improved market conditions for energy-efficient cooling technologies. At the same time, significant technological improvements in cold production and storage systems have been successfully deployed internationally and can deliver substantial energy savings if adopted locally.

The agri-food cold chain is complex and involves multiple stakeholders across multiple stages. Reducing GHG emissions across this chain requires coordinated action between government partners, private sector operators, and local farming communities. This means promoting energy-efficient and low-carbon cooling technologies, mobilizing investment in sustainable solutions, and developing the financing and market mechanisms needed to scale them up. The project will facilitate this coordination by establishing a structured stakeholder dialogue platform to support policy coherence and coordinated action.

Key drivers of transformational change:

- **Technological innovation:** the project will introduce energy-efficient cooling technologies and cold storage solutions, strengthen the use of energy management systems, and demonstrate integrated cold chain approaches adapted to the Tunisian agri-food sector.
- **Private sector engagement:** the agri-food cold chain is largely driven by private sector actors. The project is designed to reduce barriers to private investment in energy-efficient cooling technologies through technical assistance, demonstration projects, and improved access to financing mechanisms, while supporting improved food quality, safety, and reduced post-harvest losses.

- **Policy and regulatory improvements:** The project will strengthen the enabling framework for sustainable cooling by supporting the development of updated standards, regulatory instruments, and policy measures that promote energy-efficient refrigeration technologies and better cold chain management.
- **Mobilization of investment:** The project will help mobilize financing for sustainable cooling technologies by supporting the development of investment guidelines, financial incentives, and risk-mitigation mechanisms that can facilitate private sector investment in energy-efficient cold chain infrastructure.

Several barriers limit the uptake of energy-efficient cooling technologies and a comprehensive cold chain approach in Tunisia. These include: **regulatory and policy framework, technical and data barriers** (general lack of up to date data, basic information on existing stock and its energy use, cooling needs across the chain, lack of awareness/familiarity with new technologies affecting confidence to invest, limited capacity of cooling technicians to design, install and operate equipment, limited use of EMS), **financial barriers** (high upfront cost of equipment upgrades, very limited access locally to capital to finance any upgrades, financial sector is not familiar with opportunities for financing energy efficiency upgrades, many of the companies involved have limited ability to access financing, there are no targeted incentive mechanisms to spur investment), and **market barriers** (very fragmented, dominated by many small players with limited access to capital, in general insufficient awareness of the opportunities offered by investing in cleaner and more efficient cold chains).

The theory of change adopted postulates that removal and/or lowering of these barriers will catalyze investments in energy-efficient cooling technologies and improved cold chain management practices. By strengthening enabling policies, improving technical capacity, and facilitating access to financing, the project will create the conditions necessary for market transformation in the agri-food cold chain.

The ToC applied to this project addresses key barriers through the achievement of four interrelated components, further elaborated below:

Component 1 - Creating the enabling framework and conditions for increased energy efficiency and integrating renewable energy solutions in the agri-food cold chain in Tunisia

Component 2 – Demonstrating and validating the technical and financial feasibility of energy-efficient and renewable energy-based cold chains

Component 3 – Creating the financial conditions for scale-up and replication

Component 4 – Monitoring and Evaluation (M&E)

The ToC diagram shows that the project's long-term impact is reduced GHG emissions from Tunisia's agri-food sector through the adoption of energy-efficient cooling technologies. Achieving this impact requires several intermediate outcomes, including strengthened policies, increased technical capacity, and improved access to financing for cold chain investments.

- Energy-efficient cold production and storage technologies currently face multiple barriers, making them less competitive than the baseline, which limits scaling and financing.
- **IF** the UNDP-GEF project provides gender-sensitive technical and financial assistance in introducing more energy-efficient cooling technology, delivery models, innovative financing modalities, while applying a comprehensive cold chain approach, and helps strengthen the institutional capacity to design, adopt, and implement policy and regulatory frameworks conducive to private investment in an energy-efficient agri-food cold chain
- **THEN**, Tunisia will have an enabling environment for private investments, commercially viable energy-efficient agri-food value chains, enhanced institutional and human capacities, and increased local expertise.
- **THEN**, these conditions will drive private sector investments, supporting energy-efficient and lower carbon-emitting agri-food cold chains, **RESULTING** in significant global environmental benefits through GHG emission reduction and local sustainable development gains.

The ToC incorporates key external levers, including policy support for energy efficiency, climate mitigation commitments in the updated NDC, and regulatory frameworks that support private participation. By addressing these key barriers, this project will significantly advance Tunisia's energy transition and climate mitigation commitments.

Key internal drivers supporting project success include: (1) demand for cooling from the agri-food industry; (2) successful coordination of market actors to introduce cleaner and more efficient technology in commercial value chains; (3) knowledge of best practice business delivery models.

Adopting a cold chain approach^[1]¹⁷

The project proposes an integrated cold chain approach for the agri-food industry. An agri-food cold chain is an integrated network of temperature-controlled pre-cooling facilities, packhouses, vehicles, cold storage facilities, and distribution centers designed to maintain the safety, quality, and quantity of food. It is estimated that at least 25% of fresh food produced in developing countries is lost due to the lack of a cold chain.^[2]¹⁸



Figure 1. Agri-food cold chains

https://undp-my.sharepoint.com/personal/manar_shehadeh_undp_org/Documents/Desktop/10527_Tunisia-PIF%20Cooling_260513.docx - ftn2

Efficient agricultural cold chains play an important role in supporting economic development, improving food security, and reducing food losses. In North Africa, it is estimated that approximately two-thirds of food losses occur during production, handling, storage, processing, and distribution, highlighting the importance of improving cold chain infrastructure and management across the entire supply chain.^[1] For these reasons, the proposed project adopts an integrated cold chain approach to promote energy-efficient and low-carbon cooling solutions across the agri-food sector in Tunisia. By combining technological innovation, improved logistics, policy support, and private sector engagement, the project aims to demonstrate sustainable cold chain models that can be replicated and scaled across the country.

By adopting a systemic **cold chain approach** to address emissions across the entire agri-food value chain, the project will first identify opportunities to minimize cooling needs through passive non-energy-based measures (“sufficiency”). It will then address remaining cooling needs in the most efficient way possible through energy-efficient technology improvements. Finally, opportunities to integrate renewable energy solutions into the cold chain will be identified, helping further decarbonize the system. This allows for optimization of the use of energy along the chain, leading to an overall reduction in energy use (and therefore a decrease in greenhouse gas emissions) and better, more consistent outcomes in terms of food quality (safety, health) and quantity (reduction of losses). This will benefit every actor involved, from the farmer to the end consumer.

This more systemic approach will also ensure **greater policy coherence** at the national level. The cold chain stages span a range of sectors (e.g., agriculture, energy, transport, industry, health) that are governed by existing laws and policies, which are typically formulated and enforced in a siloed manner, with thematic ministries taking responsibility for aspects of the cold chain that fall under their respective jurisdiction. While the current project specifically focuses on energy use and efficiency, approaching the problem from a cold chain perspective forces interdisciplinary coordination with other key affected stakeholders.

A comprehensive cold chain approach is new for Tunisia and has not been applied before. Lessons learned will inform knowledge products and replication in other sectors and countries. **As a first-of-a-kind innovation**, it is important to fully document lessons learned to inform knowledge products that can help disseminate the experience, facilitate and accelerate uptake throughout the agri-food cold chain, and serve as an example for other cold chains to emulate, such as the medicines and pharmaceutical products cold chain. The project aims to create an online knowledge platform for discussion and exchange, designed to inform practitioners, as well as the wider public, about the benefits of a more energy-efficient cold chain. Knowledge management is especially important

because of the innovative nature of the project and the potential for informing and sharing best practices with other countries and future projects in the agri-food sector, as well as other relevant cold chains.

Building and strengthening the **capacity of project partners** across the agri-food cold chain will be crucial for obtaining sustainable outcomes. Capacity building support has been embedded throughout the project and incorporated into the various outputs and activities under each outcome, instead of presenting it as a standalone outcome. Capacity building support will be tailored to the specific needs of the various stakeholders.

The project will adopt a **gender-responsive approach** to ensure equitable participation and benefits. Women and men are involved at each stage of agri-food cold chains in different ways, so it is important to assess how gender roles and power dynamics shape their respective access to resources, technologies, and decision-making opportunities across the chain. This goes beyond a simple “gender sensitive” approach and aims to be at least “gender-responsive”. It is proposed that a gender analysis be conducted during the PPG phase to identify opportunities to enhance gender equality and mitigate risks of exclusion or unequal distribution of benefits between women and men by examining gender roles, power dynamics, and context-specific challenges. Based on that analysis, a gender action plan will be formulated to translate the findings into concrete, time-bound activities with clear outputs, indicators, and responsibilities to address the challenges identified.

Stakeholder Engagement

Please note that more information is provided in Table 1 about relevant stakeholders to the project:

Government: The Ministry of Industry, Energy and Mines, in particular the National Energy Management Agency (ANME) and its Directorate in charge of Energy Efficiency in the industrial sector, will be the key government partner and main implementing entity. It will lead to further development of the policy and regulatory framework that will enable the promotion of energy efficiency measures in the agri-food cold chain. The Ministry of Finance will also be involved as a key partner, given its role in the oversight and management of the Energy Transition Fund, which is jointly managed with ANME and represents a central national financial mechanism to support energy efficiency and renewable energy investments. Other important partners that will be involved are the Ministry of Agriculture (quality control of agricultural products, sanitary and veterinary control of animal products), Ministry of Commerce (Directorate of quality and consumer protection for control of food products that are imported and locally produced, control of conservation conditions in cooled storage facilities, control of conservation of perishable products for sale in retail and bulk, and control of the conditions of cold transport of perishable products); Ministries of transport and of industry, Ministry of Public Health (Direction de l’Hygiène et de la Protection de l’Environnement).

Other governmental institutes, like API (Agency for Promotion of Industry and Innovation), INNORPI (Institut National de la Normalisation et de la Propriété Industrielle), the National Environmental Protection Agency (l’ANPE: Agence National de la Protection de l’Environnement) for the regulation and certification of refrigerants, the National Federation of Agri-Food (FENAAL-UTICA), le CTA (Centre Technique Agro-Alimentaire) for technical assistance to businesses in the sector and certification, PACKTEC (Centre Technique de l’Emballage et du Conditionnement).

STEG – National Electric and Gas Utility; will be involved as a key stakeholder for the reform of the tariff structure to create incentives for shifting the production of cooling to off-peak hours.

Private Sector: the agri-food industrial sector is dominated by private companies. They will be the principal beneficiaries of the project, and several will be selected for demonstration projects to pilot the adoption of new technologies and processes in the Tunisian context. This would include trucking companies involved in the mobile cold chain.

Technology and Service Providers: manufacturers, suppliers, and engineering firms specializing in refrigeration systems, cold storage infrastructure, insulation, and monitoring technologies will be engaged. Their participation will support the demonstration and deployment of energy-efficient solutions adapted to the Tunisian agri-food sector.

Farmers/cooperatives: to be selected as pilot/demonstrations of improved cooling at the collection stage of the chain, including pre-cooling storage facilities and pack houses near production sites.

Research and Academic Institutions: Universities and technical research centers will support technical assessments, capacity building, and knowledge generation related to energy efficiency and sustainable refrigeration technologies in the agri-food cold chain.

Other stakeholders include the international donor community that is active in the sector in Tunisia, including UNIDO, UNEP, African Development Bank, AFD, and GIZ. Financial institutions, including commercial banks, will also be important stakeholders in the project. Given that cold chain modernization and energy efficiency upgrades require significant capital investments, these institutions will play a key role in facilitating access to finance and supporting the scaling-up of the technologies and business models demonstrated under the project.

The agri-food industrial sector is dominated by private companies that harvest, collect, ship, handle, process, transform, package, distribute, and sell food products. They are perhaps the single most important stakeholder group that will be impacted by the project. Beyond being recipients of technical support, private sector companies are also key potential investors and financiers of enhanced cold chain infrastructure in Tunisia, and the project will actively seek to mobilize their capital alongside public and international funding. As such, they will be closely involved throughout the preparation and implementation of the project. Private companies in the agri-food sector will be consulted during the PPG phase regarding their current operations, energy consumption, cooling needs, and details on their equipment. Several companies have already participated in earlier assessments of the potential for energy efficiency improvements and integration of renewable energy solutions based on energy audits. Some of the feasibility assessments did not focus specifically on cooling technologies but took a more comprehensive look at the companies' energy use and requirements to identify opportunities for EE and RE. Demonstration projects will help de-risk investments and catalyze broader private sector adoption of efficient cooling technologies. By demonstrating the financial viability of low-carbon cooling solutions, the project aims to unlock private sector financing and stimulate market-driven investment in sustainable cold chain upgrades. For example, 20 companies in the canning industry participated in walk-through energy audits, and another 20 companies from other agri-food divisions (grains and derivatives, dairy and derivatives, beverages, sugar and derivatives, meat, oils)^[1]. A representative sample of companies, along with the cold chain, will be selected to participate in demonstrations of the feasibility (technical and financial) of proposed energy efficiency improvements and renewable energy solutions.

By reducing energy consumption and promoting the transition to EE technologies, the project will generate global environmental benefits by achieving significant GHG emission reductions. These benefits will contribute directly to the objectives of the GEF Climate Change Mitigation focal area and support Tunisia's commitments under the Paris Agreement and its NDC 3.0.

Project description (objective, components, outcomes, and outputs)

Project objective:

To reduce greenhouse gas emissions in Tunisia's agri-food industrial cold chain by promoting energy-efficient and low-carbon cooling technologies, mobilizing investment in sustainable cooling solutions, and scaling up innovative financing and market mechanisms.

The project is organized in four components that will deliver four interrelated outcomes: i) strengthened policy, regulatory, and institutional frameworks—supported by knowledge generation and dissemination—enable the deployment of energy-efficient and low-carbon cooling solutions and the integration of renewable energy across Tunisia's agri-food cold chain; ii) energy-efficient and low-carbon cooling technologies are demonstrated and validated as technically and financially viable solutions across key segments of the agri-food cold chain; iii) financial mechanisms and market conditions are strengthened to facilitate investment, scaling up, and replication of sustainable cooling solutions in the sector; and iv) effective monitoring, evaluation, and knowledge management systems are in place to support adaptive management, learning, and replication of project results.

Component 1 – Creating the enabling framework and conditions for increased energy efficiency and integrating renewable energy solutions in the agri-food cold chain in Tunisia

This component aims to strengthen the policy, regulatory, and institutional framework, supported by improved data, knowledge, and coordination mechanisms, to enable energy efficiency and renewable energy solutions in Tunisia's agri-food cold chain. By improving governance structures, creating key sectoral insights (including cooling demand, existing technologies, and SME needs), and ensuring coherent institutional arrangements, the project will foster a more stable and informed environment for increased investment, especially from the private sector.

The current regulatory framework does not sufficiently address the specific needs and characteristics of the agri-food cold chain, which constitutes a barrier to scaling up energy-efficient and low-carbon cooling solutions. This component addresses this gap by supporting the development and adoption of targeted policies, standards, and incentive mechanisms, informed by evidence and aligned across relevant sectors and institutions.

A well-established regulatory enabling framework will provide the foundation for sustainable energy development and facilitate private sector participation. However, the success of this component depends on key assumptions, including continued government commitment to energy efficiency and the capacity of institutions to implement and enforce policies. Risks include slow policy development and implementation, limited enforcement, and coordination challenges across the diverse stakeholders involved in the cold chain.

Outcome 1 – Strengthened policy, regulatory, and institutional frameworks supported by knowledge generation and dissemination of best practices, enabling the deployment of energy-efficient and low-carbon cooling solutions and the integration of renewable energy across Tunisia’s agri-food cold chain

The project will deliver a comprehensive set of outputs designed to establish an enabling environment for sustainable cooling across Tunisia’s agri-food cold chain. These outputs combine evidence-based planning, regulatory strengthening, institutional coordination, and knowledge dissemination to address systemic barriers and unlock investment.

Output 1.1 *Development of a National Sustainable Cooling Roadmap for the agri-food sector, including cold chain baseline assessment, demand projections, and technology mapping.*

This output will support the development of a comprehensive National Sustainable Cooling Roadmap tailored to Tunisia’s agri-food sector. The roadmap will be grounded in a detailed baseline assessment of the cold chain, including mapping of cooling demand across key value chain segments, as well as inventory and performance analysis of existing cooling infrastructure and technologies. It will also include demand projections to assess future cooling needs under different growth and climate scenarios.

Furthermore, the roadmap will incorporate a technology mapping exercise to identify and prioritize suitable energy-efficient, low-carbon cooling solutions, including options for integrating renewable energy at various stages of the cold chain. The roadmap will serve as a strategic planning tool to guide policy development, investment decisions, and coordinated action among stakeholders, ensuring a structured and evidence-based transition toward sustainable cooling in the agri-food sector.

Output 1.2 *Comprehensive assessment of policy, market, and technological barriers to energy-efficient cooling in the agri-food cold chain, informing regulatory reforms and the adoption of sustainable cooling regulations.*

This output will support a detailed assessment of the key barriers limiting the uptake of energy-efficient and sustainable cooling solutions across Tunisia’s agri-food cold chain. The analysis will cover policy and regulatory gaps, including policy coherence and cross-sectoral institutional arrangements that may hinder deployment, market constraints, financial and investment barriers, and technological limitations, with particular attention to the needs and challenges faced by SMEs.

Based on this assessment, the project will support the design and adoption of targeted regulatory and policy measures to promote sustainable cooling. These may include MEPS, labeling schemes, improved integration with building codes, and strengthened compliance and enforcement mechanisms. This output will contribute to the development of technical standards, testing procedures, and specifications for cooling equipment, supporting a more robust and enabling regulatory environment.

Output 1.3 *Establishment of a multi-stakeholder coordination platform to support policy dialogue and sector coordination across the agri-food cold chain.*

This output will establish an inclusive and structured coordination platform that brings together key stakeholders across the agri-food cold chain, including government entities, private-sector actors, financial institutions, and industry associations. Given the fragmented nature of the cold chain, the platform will play a critical role in facilitating dialogue, aligning priorities, and ensuring coordinated implementation of policies and interventions. It will also serve as a mechanism for continuous engagement, knowledge exchange, and consensus-building, helping to address cross-sectoral challenges and support the long-term sustainability of project outcomes.

Output 1.4 *Strengthening the capacity of local authorities and service providers to implement, enforce, and monitor sustainable cooling measures, in line with the national policies supported by the Multilateral Fund.*

This output will focus on enhancing the technical, regulatory, and operational capacities of local authorities and service providers involved in the agri-food cold chain. Targeted capacity-building activities will support the effective implementation, enforcement, and monitoring of sustainable cooling measures at the local level, in alignment with national policies supported by the Multilateral

Fund for the Implementation of the Montreal Protocol. This will include training, technical assistance, and the development of practical tools and guidelines tailored to municipalities, inspectors, and private operators. By strengthening these capacities, the project will help ensure that sustainable cooling practices are effectively operationalized, compliance is improved, and results are sustained beyond the project's lifetime.

Output 1.5 *Gender-responsible knowledge management and awareness initiatives implemented to document, disseminate, and promote best practices on sustainable and energy-efficient cold chain solutions and the advancement of gender quality.*

Adopting a cold chain approach to reducing GHG emissions in the agri-food sector is a novel and first-of-its-kind intervention in Tunisia. It is therefore critical to systematically capture and document lessons learned throughout project implementation. As a first-of-a-kind innovation, these lessons will be translated into knowledge products that support the dissemination of experience, facilitate replication, and accelerate the uptake of sustainable cooling solutions across the agri-food cold chain, and serve as a model for other sectors, such as pharmaceuticals. The project will go beyond gender-sensitive reporting to also capture and analyze lessons learned and best practices in advancing gender equality and women's empowerment. This includes documenting successful gender-responsive actions and gender mainstreaming efforts within the project, and ensuring these insights are integrated into knowledge products for wide dissemination.

The online knowledge platform is intended for continuous discussion and exchange among stakeholders and to raise awareness among sector professionals as well as the wider public about the benefits of a more energy-efficient cold chain. It will be a critical instrument to facilitate and accelerate the replication and scaling up of the tested approaches in the future.

Component 2 – Demonstrating and validating the technical and financial feasibility of energy-efficient and renewable energy-based cold chains

While Component 1 focuses on creating the enabling conditions to attract and promote investment at the national level, Component 2 will focus on identifying, demonstrating, and validating the feasibility of specific energy efficiency and renewable energy options along the cold chain in selected facilities, to lay the foundation for concrete investment in the agri-food cold chain. The project will co-finance several demonstrations in selected facilities (to be determined during the PPG stage), with most of the funding coming from the private sector companies that own and operate the facilities.

This component will also build the required capacity in the agri-food industry to design, develop, implement, and operate improvements to the cooling infrastructure, complementing the institutional capacity built under Component 1, which is mandated with oversight and enforcement of the regulatory framework. This component involves close collaboration and coordination with existing public and private financial actors, financing initiatives, and future partners active in Tunisia's agri-food cold chain.

Outcome 2 – Energy-efficient and low-carbon cooling technologies demonstrated and validated across the agri-food cold chain, from harvest to market, in Tunisia

This outcome will support the identification, demonstration, and validation of energy-efficient and solar-based cooling solutions across key segments of Tunisia's agri-food cold chain. Through targeted energy audits and technical feasibility assessments, priority investment opportunities will be identified across collection points, cold storage, processing facilities, and refrigerated logistics. The project will then implement demonstration projects to validate the technical and financial viability of these solutions under local conditions. Lessons learned and performance data generated from these demonstrations will be systematically captured and synthesized to inform replication and scaling-up efforts nationwide. In parallel, the project will strengthen technical capacity to support the design, installation, operation, and maintenance of sustainable cooling technologies. This outcome directly contributes to Tunisia's national energy transition efforts, including its energy strategy, updated NDC, and ongoing work on the National Cooling Action Plan, by bridging the gap between policy ambition and practical implementation. Outcome 2 will be achieved through the following outputs:

Output 2.1 *Energy audits and technical feasibility assessments conducted to identify priority demonstration opportunities across the cold chain, from collection points to cold storage, processing, and refrigerated logistics.*

The project will, to the extent possible, build on recent energy audits conducted in selected companies and update them, while also financing new audits for additional facilities across the agri-food cold chain. These audits will be comprehensive, covering buildings, food processing equipment, cold production, and storage systems to identify opportunities for energy savings and improved performance.

The audits will also explore opportunities for integrating renewable energy solutions. Pre-feasibility analyses will be conducted to estimate technical potential, investment costs, and implementation timelines, thereby identifying priority demonstration opportunities across the cold chain—from collection points to storage, processing, and refrigerated transport.

Output 2.2 *Demonstration of energy-efficient and solar-based cooling technologies across key segments of the agri-food cold chain identified in Output 2.1, including pre-cooling at collections, cold storage, food processing, and refrigerated transport*

All demonstration activities under this output will focus on energy efficiency and the integration of renewable energy. Refrigerant selection and transition will remain consistent with Tunisia's existing obligations under the Montreal Protocol's Kigali Amendment, and no activities will duplicate or substitute for MLF-eligible interventions. Moreover, the work in this output will be closely coordinated with Component 3, particularly efforts to pilot innovative business models such as Cooling-as-a-Service (CaaS), to support the scalability and long-term sustainability of the solutions demonstrated.

Building on the opportunities identified under Output 2.1, this output will finance and implement selected interventions to demonstrate their technical and financial viability in the Tunisian context. These demonstrations will cover multiple segments of the cold chain, including collection points, cold storage facilities, food processing units, and refrigerated transport. At the System-Level, interventions will include retrofitting existing cooling systems with Variable Speed Drives (VSDs) on compressors and evaporators, combined with automated electronic control systems to optimize performance and deliver rapid return on investment. The project will also promote the widespread adoption of Energy Management Systems, providing operators with the tools and real-time data needed to better monitor, manage, and optimize energy consumption across their facilities.

Further interventions will support the expanded use of cold storage technologies, enabling the shifting of cold production to off-peak hours when electricity supply is less carbon-intensive, thereby reducing peak demand and overall emissions. The project will also promote more energy-efficient cold production technologies, including vapor-compression refrigeration systems, gas engine heat pumps, and absorption chillers.

Attention will also be given to the transport segment of the cold chain, which has been identified as a “weak” and fragmented link. The project will demonstrate the conversion of currently inefficiently refrigerated trucks to adopt more efficient cooling technology and the upgrading of the transport fleet from passively insulated trucks to actively refrigerated vehicles equipped with real-time digital monitoring systems. These interventions will directly address high levels of post-harvest food losses and improve the reliability and quality of cold chain logistics. Where technically and financially feasible, the project will also explore opportunities to pilot electric refrigerated vehicles for new fleet additions, with a view to reducing fossil fuel dependence in the transport segment over the longer term.

Output 2.3 *Lessons learned and performance data from demonstrations (Output 2.1.2) synthesized to inform the scale-up of energy-efficient and renewable energy-based cooling solutions across Tunisia's agri-food cold chain.*

Building on the demonstration activities implemented under Output 2.2, this output will systematically capture, analyze, and synthesize technical and financial performance data, as well as lessons learned from each demonstration site. Key findings will be consolidated into practical guidance materials, such as best practice guides, technical briefs, and replication roadmaps, documenting the conditions under which demonstrated solutions proved most effective and the barriers that required mitigation. These outputs will directly feed into Component 3, providing the evidence base needed to design and deploy the financial mechanism, investment frameworks, and business models required to scale up and replicate successful interventions across Tunisia's agri-food cold chain.

Output 2.4 *Technical capacity on sustainable cold technologies is increased*

The existing capacity of cooling technicians in Tunisia is limited and represents a key barrier to the large-scale adoption of energy-efficient and sustainable cold chain solutions. This output will support targeted training programs to strengthen the capacity of technicians to design, install, operate, and maintain modern cooling technologies, including cold storage and cold production systems.

Emphasis will be placed on building local operation and maintenance capacity to ensure the long-term sustainability of demonstrated investment. Hardware deployment will be paired with hands-on and practical training, while efforts will also be made to strengthen local supply chains for critical components and spare parts, to prevent minor technical faults from leading to system failures.

A detailed needs assessment of required technical training will be undertaken during the PPG phase to identify capacity gaps across different stakeholders and ensure that training interventions are well-targeted and aligned with project needs, including linkages with capacity-building efforts under other project components.

Component 3 – Creating the financial conditions for scale-up and replication

This component addresses key financial barriers hindering investment in energy-efficient and renewable energy-based cooling solutions in Tunisia's agri-food cold chain, including high upfront capital costs, limited access to local financing, and the lack of targeted incentive mechanisms. These barriers currently limit investment to large companies with sufficient resources, limiting broader sector transformation and slowing scale-up across the value chain.

While many energy efficiency investments are financially viable, they remain underutilized due to these barriers. This component will focus on reducing investment risks and improving access to finance, particularly for SMEs, and needs and opportunities vary considerably across the cold chain: from larger industrial companies involved in the processing and packaging of food products to the small-scale actors across the cold chain, from farmers to processors and logistics providers.

This component will build on existing financial mechanisms wherever possible, with particular emphasis on assessing and strengthening the role of the FTE. Although well-capitalized and effective in other sectors, the FTE currently lacks tailored instruments and guidelines to support investments in the agri-food cold chain sector. This component will address this gap while also exploring innovative financing models and incentive structures to unlock private sector investment and enable large-scale replication.

Outcome 3 – Financial mechanism(s) and market conditions strengthened to enable large-scale investment in energy-efficient and renewable energy-based cooling solutions in Tunisia's agri-food cold chain.

This outcome focuses on improving access to finance, strengthening financial institutions' capacity, and creating enabling market conditions to support the widespread adoption of energy-efficient and renewable energy-based cooling technologies.

Output 3.1 *Assessment and design of financial mechanisms to support investment in energy-efficient cold chain technologies, including credit facilities, blended finance instruments, and risk-sharing mechanisms.*

This output will assess existing financial mechanisms and design targeted instruments to address key investment barriers. A central focus will be on reviewing and assessing the FTE's capacity to support and encourage investments in the agri-food cold chain. While the FTE has a long and effective track record in supporting energy efficiency in buildings and appliances, it currently lacks sector-specific guidelines and instruments.

Building on this assessment, the project will propose enhancements to expand the FTE's role as a key financial mechanism for transforming the sector. This includes exploring targeted capex subsidies, concessional credit lines, blended finance instruments, and risk-sharing mechanisms to reduce upfront costs and improve access to finance. Inspired by existing subsidy schemes in other sectors, the project will identify practical options to adapt and extend these approaches to the cold chain.

The diagnosis study evaluated the potential for increasing the adoption of cold storage technologies in the agri-food cold chain referenced earlier^[2]. It identified import duties as a critical financial barrier, increasing the cost of imported equipment and technology considerably and making them financially non-viable. This could be addressed with targeted partial or complete exemptions for certain types of equipment. This output will analyze in detail the feasibility of these measures and explore alternative tax incentives to overcome existing financial barriers to economically and financially viable investments in the agri-food cold chain.

Output 3.2 *Development of a pipeline of bankable investment projects for energy-efficient cold storage, refrigeration systems, and renewable energy-powered cooling solutions in the agri-food sector.*

This output will support the development of a pipeline of bankable investment projects based on the technical opportunities identified under Component 2. It will translate energy audits, feasibility studies, and demonstration results into investment-ready proposals, including technical designs, cost estimates, and financial models.

The pipeline will cover a wide range of investments across the cold chain, including cold storage, refrigeration systems, pre-cooling facilities, and renewable energy-powered solutions. It will also address key financial barriers identified in previous analyses, such as

high equipment costs linked to import duties and taxes. The project will assess the feasibility of targeted fiscal incentives, including partial or full exemptions for priority technologies, to improve the financial viability and competitiveness of investments.

Output 3.3 *Pilot implementation of Cooling-as-a-Service (CaaS) Business Model to reduce upfront investment costs for SMEs.*

This output will pilot innovative business models to address the high upfront capital costs for cooling, which are the primary barrier for rural farmers. Instead of expecting individual farmers to purchase their own off-grid units, the project will test the implementation of a **Pay-As-You-Store or CaaS model**. Whereby a specialized private operator or cooperative owns and maintains the centralized solar cold room, and local farmers pay a daily or weekly fee per crate of produce stored.

This approach shifts the financial risk away from the smallholders and improves the system's efficiency, while improving affordability and access to cooling services. Solar-PV powered pre-cooling is identified as an appropriate technology at the farm level and will be integrated into the model.

The project will work with Farming Producer Organizations and cooperatives to support the establishment of collection sites, pre-cooling, and pack houses powered by solar PV (rooftop) and incorporating passive cooling techniques such as shading, climate-conscious design of facility design, and green roofs.

Output 3.4. *Technical support and policy recommendations for energy pricing structures and incentives schemes that encourage energy efficiency and optimized operation of refrigeration systems.*

Today in Tunisia, grid-scale storage is very limited. The study referenced in 3.1 above will explore the potential of cold storage as an indirect electrical storage resource and its broader contribution to grid efficiency. Beyond preserving food, cold storage can play a strategic role in grid management: it reduces peak demand through load clipping. It is estimated that each MW of installed cold storage refrigeration capacity can provide approximately 0.4 MW of flexible demand reduction during peak grid events, by suspending compressor operation without compromising stored product temperature.

Output 3.5 *Capacity building for financial institutions, investors, and project developers to assess, structure, and finance investments in energy-efficient and renewable energy-powered cooling technologies.*

This output will target financial institutions and lenders who are currently unfamiliar with financing energy efficiency in general and in the agri-food sector in particular. Capacity is limited in assessing credit applications for this type of investment, and as a result, access to financing is limited and, if available, on onerous terms. Under this output, targeted training of selected financial institutions that are most likely to fund the agri-food sector will build capacity for assessing loan applications for energy efficiency investments in the agri-food industrial sector, to increase awareness about opportunities and familiarity with technologies, and allow for better risk assessments. A more detailed assessment of the training needs in the sector will be undertaken during the PPG phase.

Component 4. Monitoring and Evaluation

Outcome 4. Effective management of project activities in line with UNDP and GEF M&E and SES policies

In alignment with GEF-8 and UNDP POPP guidelines, Monitoring and Evaluation (M&E) activities under this grant will ensure continuous learning, adaptive management, and accountability throughout the project lifecycle. The M&E framework will include three key activities: (i) an inception workshop, which will validate project strategies, finalize the results framework, and align stakeholder roles and responsibilities; (ii) systematic project monitoring, leveraging UNDP's tools and methodologies to track progress against indicators, capture lessons learned, and inform adaptive management through regular reporting and oversight mechanisms; and (iii) mandatory midterm review (MTR) and terminal project evaluation (TE), which will assess performance, outcomes, and sustainability, ensuring compliance with both GEF and UNDP standards. Further, the TE will include gender-specific results and track progress in the implementation of the gender Action Plan (GAP) (to be developed during the PPG). These activities will be underpinned by a participatory approach, ensuring that all relevant stakeholders, including government agencies, civil society, and private sector partners, contribute to and benefit from knowledge generated through the project's implementation.

Output 4.1 *A participatory and gender-inclusive M&E plan is developed and implemented, including an independent midterm review and terminal evaluation.*

Global Environmental Benefits

The Project will contribute to the Climate Change Mitigation Objective of the Global Environment Facility by reducing GHG emissions from the agri-food industrial cold chain in Tunisia through the promotion of energy efficiency and the integration of renewable energy solutions. The project is expected to deliver direct lifetime GHG emission reduction of approximately **275,180 metric tons of CO₂** over 20 years. The consequential lifetime reductions of emissions will be estimated during the PPG stage.

The adoption of a systemic cold chain approach enables emissions reduction across several stages of the agri-food value chain, including food collection, storage, processing, transport, and distribution. Additional emissions reduction will result from reduced food losses, as improved cooling infrastructure and cold chain management will enhance product preservation and reduce spoilage. Avoiding food losses reduces the embedded energy and emissions associated with agricultural production, processing, and transport. Emission reductions will also be achieved through the adoption of energy-efficient cooling technologies and improved operational practices within the facilities. These improvements will reduce electricity consumption associated with refrigeration and cold storage operations.

The integration of renewable energy solutions, such as solar-powered cooling systems for cold storage facilities, will further reduce emissions by replacing grid electricity generated from fossil fuels. The project will also address the logistics segment of the cold chain, which presents significant potential for energy savings in the transport of temperature-controlled products between the production, processing, and distribution stages. More detailed calculations of direct and indirect emission reductions will be carried out at the PPG stage, including bottom-up estimates of market transformation effects and replication potential.

The energy sector is the main driver of GHG emissions in Tunisia, and demand for cooling, including in the agri-food industry, is projected to increase substantially by 2030 under the baseline scenario. By improving the efficiency and sustainability of cooling systems, the project will help decouple growth in cooling demand from associated emissions.

The project will generate global environmental benefits through measurable reductions in greenhouse gas emissions, while also demonstrating scalable solutions for decarbonizing agri-food cold chains that can be replicated in other countries facing similar challenges.

Stakeholder Engagement and Partnerships

The project will involve many stakeholders across the agri-food cold chain, as initially identified in the project rationale section. Because the project adopts a cold chain approach, the range of stakeholders is very diverse and large. This adds a level of complexity to the project and will require close coordination to ensure that all synergies are leveraged to maximum effect. Stakeholder engagement will be a central element of project preparation and implementation. During the PPG phase, a more detailed stakeholder analysis will be conducted to identify all relevant actors, assess their roles and interests, and determine appropriate modalities for their participation in the project. This process will inform the development of a Stakeholder Engagement Plan (SEP), which will define mechanisms for consultation, information sharing, and participation throughout the project lifecycle. This analysis will include the development of a stakeholder engagement plan (SEP).

Given the strong role of private sector actors in the agri-food cold chain—including food processors, storage operators, logistics providers, and transport companies—the project will actively engage these stakeholders to ensure that proposed solutions respond to market realities and support the uptake of energy-efficient and low-carbon cooling technologies.

In addition, a gender analysis will be carried out at the PPG stage to assess gender roles, participation, and potential barriers related to energy use and employment within the agri-food cold chain. Based on the analysis, a Gender Action Plan (GAP) will be formulated to ensure that project activities promote gender equality and enable equitable participation of women and men in project design, implementation, and benefits.

The key stakeholder groups identified so far are:

Table 1. Stakeholder table

Stakeholder	Role in the project development and implementation	Benefits from Project Results and Outcomes
National Agency for Energy Conservation (Agence Nationale de Maitrise de l'Energie, ANME)	The National Agency for Energy Conservation (ANME) is the lead institution responsible for the design and implementation of the project. ANME's mandate is to develop and implement Tunisia's national energy management policies, with a strong focus on energy	Strengthens ANME's leadership in sustainable cooling by improving energy efficiency, enabling NCAP implementation, and mobilizing investment to scale low-GWP solutions across Tunisia's agri-food and

	<p>efficiency, renewable energy, and the energy transition. ANME will implement the project, manage grant co-financing through the Energy Transition Fund, host the Project Management Unit, and chair the Project Steering Committee to ensure effective coordination among stakeholders.</p>	<p>industrial cold chains, reducing emissions, costs, and post-harvest losses.</p>
<p>The Ministry of Industry, Energy and Mines</p>	<p>The Ministry of Industry, Energy and Mines will ensure that sustainable cooling interventions in industrial and agro-industrial value chains align with Tunisia's industrial and energy strategies, while supporting policy dialogue, coordination with industrial stakeholders, and the integration of project results into national regulatory frameworks.</p>	<p>Strengthens the Ministry of Industry, Energy and Mines' leadership in Tunisia's energy transition by advancing energy-efficient, low-carbon industrial cooling, reducing energy demand and operating costs while boosting competitiveness and supporting delivery of national climate and energy targets.</p>
<p>Ministry of Agriculture, Water Resources and Maritime Fisheries</p>	<p>The Ministry plays a key role in ensuring that project interventions related to sustainable cooling in agri-food value chains are aligned with national agricultural priorities. Through its directorates responsible for agricultural production, post-harvest management, fisheries, and aquaculture, the Ministry supports coordination with sector stakeholders and ensures that project activities respond to sector-specific needs.</p>	<p>Strengthens agri-food value chains through improved cooling and logistics, reducing post-harvest losses while enhancing food quality, safety, and distribution efficiency.</p>
<p>Ministry of Environment and National Agency for Environmental Protection (ANPE)</p>	<p>The Ministry of Environment ensures that project activities contribute to Tunisia's environmental and climate objectives. Through the Directorate General for Sustainable Development and the National Agency for Environmental Protection (ANPE), including its National Ozone Unit, the Ministry supports environmental integration, monitoring, regulatory compliance, and alignment with international environmental agreements such as the Montreal Protocol.</p>	<p>Strengthens the Ministry of Environment and ANPE's capacity to deliver Tunisia's climate and environmental objectives by enforcing climate-friendly refrigerant management aligned with the Montreal Protocol and the Paris Agreement, reducing high-GWP emissions and leakage risks while improving environmental compliance across the cooling and cold-chain sectors.</p>
<p>Ministry of Trade and Export Development in Tunisia</p>	<p>Through its Directorate of Quality and Consumer Protection, the Ministry regulates food distribution systems and ensures compliance with quality and consumer protection standards. Its responsibilities include monitoring storage, transport, and retail conditions for perishable products and overseeing programs to modernize food distribution infrastructure.</p>	<p>Strengthens the Ministry of Trade and Export Development (Directorate of Quality and Consumer Protection) by enhancing cold-chain quality control and enforcement across storage, transport, and retail, improving food safety, consumer protection, and the reliability of perishable-goods distribution for domestic and export markets.</p>
<p>Ministry of Finance</p>	<p>The Ministry of Finance ensures sustainable cooling interventions align with national fiscal and public investment priorities, enabling effective financing mechanisms for energy efficiency and low-carbon technologies and integrating these solutions into broader strategies to cut energy costs, improve spending efficiency, and strengthen economic resilience amid Tunisia's energy deficit.</p>	<p>Strengthens the Ministry of Finance's ability to steer and de-risk investment in energy-efficient cooling by aligning fiscal incentives and public financing tools (including the Energy Transition Fund) to unlock private capital; reducing energy subsidies/deficits while supporting competitiveness in agri-food and industry.</p>
<p>Agency for Promotion of Industry and Innovation (APII)</p>	<p>APII is responsible for supporting industrial development and innovation. It works with technology startups and supports companies in their growth. Its role includes promoting innovative projects, facilitating access to financing, and strengthening links among economic actors. It plays a key role in Tunisia's entrepreneurial ecosystem.</p>	<p>Strengthens APII's role in driving industrial upgrading and innovation by accelerating the adoption and diffusion of energy-efficient cooling technologies and modern cold-chain solutions; boosting SME competitiveness while mobilizing private investment in greener industrial infrastructure.</p>
<p>The Agricultural Investment Promotion Agency (APIA)</p>	<p>APIA promotes investment and modernization in agriculture through incentives, technical support, and financing mechanisms, with a strong focus on post-harvest management and cold chain infrastructure.</p>	<p>Strengthens APIA's role in accelerating agricultural modernization and investment by supporting bankable, energy-efficient cold-chain projects (pre-cooling, cold storage, logistics), reducing post-harvest losses while improving product quality and market access for farmers and agri-businesses.</p>

INNORPI (Institut National de la Normalisation et de la Propriété Industrielle)	INNORPI supports the project by setting and enforcing national standards, certification, and conformity assessment for refrigeration, energy efficiency, and cold-chain management, ensuring that the cooling technologies promoted meet recognized quality and performance requirements and strengthen industrial competitiveness.	Strengthens INNORPI's role in driving standardization and quality infrastructure by developing and enforcing technical standards, testing and certification for energy-efficient and climate-friendly cooling equipment; improving market conformity, consumer confidence, and export competitiveness across Tunisia's cold-chain industries.
Development partners (EU, AfDB, GIZ, IKI)	Development partners support baseline initiatives and contribute through coordination, knowledge exchange, and alignment with international climate and development objectives.	Support development partners' (EU, AfDB, GIZ, IKI) ability to advance Tunisia's climate and energy-transition agenda by aligning support around a scalable model for energy-efficient, low-carbon cooling and resilient agri-food cold chains, delivering measurable GHG reductions, reduced food loss, and replicable financing and policy solutions.
Farmers/ cooperatives	Farmers and agricultural cooperatives are key stakeholders in the project as primary producers within agri-food value chains where cooling and cold storage solutions are critical for preserving product quality. Their activities are directly affected by post-harvest handling conditions, including access to refrigeration and cold chain infrastructure. The adoption of improved cooling technologies can help reduce post-harvest losses, improve product value, and strengthen market access for agricultural producers. Engaging farmers and cooperatives will therefore be essential to ensure that project interventions respond to field needs and support the effective uptake of sustainable cooling practices.	Strengthens farmers' and cooperatives' incomes and resilience by improving access to reliable, affordable cold-chain services (pre-cooling, storage, transport), reducing post-harvest losses while preserving quality and enabling better prices and market access.
Civil Society Organisations / Local Associations	Civil society organizations, local associations, and professional bodies will be involved during the PPG phase to ensure inclusive participation, raise awareness, and build capacity on sustainable cooling and cold-chain practices, while strengthening dialogue with professionals and supporting participatory monitoring and evaluation during implementation.	Support civil society organisations' and local associations' ability to support an inclusive and community-driven cold-chain transition by raising awareness, building local capacities, and mobilizing citizen engagement around energy-efficient, sustainable cooling; helping reduce food losses while improving food quality and resilience for local communities.
Training institutions Réhabilitation du Centre Sectoriel de Formation en Énergétique	Training institutions are key to building a skilled national workforce for sustainable cooling by providing vocational training, certification, and engineering education that spreads best practices, supports technology uptake, and ensures long-term performance of cooling solutions in industrial and agricultural sectors.	Enables training institutions to develop specialized curricula and certification programs on sustainable cooling and refrigeration, aligned with industry needs, and builds a skilled workforce for emerging refrigeration and cold-chain jobs to ensure long-term performance of efficient cooling systems in Tunisia.
Private sector	Private sector actors are central to designing, delivering, and maintaining sustainable cooling and cold-chain infrastructure, and—through public-private partnerships—help mobilize investment and apply best practices to scale energy-efficient, climate-friendly solutions across Tunisia's industrial and agri-food value chains.	Strengthens private sector competitiveness by reducing energy and logistics costs through energy-efficient, climate-friendly cooling upgrades; improving product quality and compliance, unlocking investment and new business opportunities across Tunisia's agri-food cold chain.

[1] Projet APEET/GIZ – Étude du potentiel de diffusion des technologies du stockage du froid pour l'industrie tunisienne – rapport de diagnostique (2020); SUNREF/Expertise France: Projets prioritaires de maîtrise de l'énergie dans la branche des industries agroalimentaires (2021).

[2] Projet APEET/GIZ – Étude du potentiel de diffusion des technologies du stockage du froid pour l'industrie tunisienne – rapport de diagnostique (2020)

https://undp-my.sharepoint.com/personal/manar_shehadeh_undp_org/Documents/Desktop/10527_Tunisia-PIF%20Cooling_260513.docx - ftn2

[1] Mmereki, D., David, V.E., & Brownell, A.H.W. (2024). The management and prevention of food losses and waste in low- and middle-income countries: A mini-review in the Africa region. Waste Management & Research. SAGE Publications.

[1] Information in this section is mostly derived from “Cold chains in developing economies – a techno-socio-economic structural development challenge”, background paper by Toby Peters, World Bank, December 2019”; and from “Promoting food security and safety via cold chains – technology options, cooling needs and energy requirements, GIZ, 2016

[2] Peters, T (2019). Cold-chains in developing economies: A techno-socio-economic structural development challenge. World Bank.

Coordination and Cooperation with Ongoing Initiatives and Project.

Does the GEF Agency expect to play an execution role on this project?

If so, please describe that role here. Also, please add a short explanation to describe cooperation with ongoing initiatives and projects, including potential for co-location and/or sharing of expertise/staffing

Coordination with relevant ongoing initiatives and projects

The proposed project on sustainable cooling and energy-efficient cold chains in the agri-food sector represents an innovative initiative in the Tunisian context. While several actions related to energy efficiency and refrigeration technologies have been implemented in the past, particularly by the National Agency for Energy Conservation, these interventions have generally addressed cross-cutting themes such as energy efficiency policies, equipment standards, or sectoral energy management programs rather than focusing directly on cooling systems within industrial and agro-industrial value chains. As such, this project introduces a more integrated and sector-focused approach that specifically targets refrigeration, cold storage, and cold chain management as strategic components for improving energy efficiency, reducing greenhouse gas emissions, and strengthening agri-food competitiveness in Tunisia.

The initiative, therefore, builds upon and complements a range of existing national programs and initiatives related to energy efficiency, climate mitigation, and refrigeration technologies. Tunisia has developed several structured programs over the past two decades to improve the regulatory and institutional framework governing energy efficiency and cooling equipment. Tunisia has implemented regulatory measures related to the energy labeling and control of electrical equipment and appliances, including those used for cooling and refrigeration systems. These programs, coordinated by ANME in collaboration with technical institutions, aim to improve market oversight and promote the adoption of energy-efficient equipment. Similarly, the Thermal Regulation Program for Buildings has played an important role in establishing energy performance standards for buildings, which directly influence cooling demand and the efficiency of air-conditioning and refrigeration systems. By building on these regulatory frameworks and institutional initiatives, the proposed project will help consolidate and scale up existing efforts by focusing specifically on energy-efficient cooling technologies and cold chain systems in the agri-food sector. The following section, therefore, presents a mapping of ongoing projects and initiatives that are directly or indirectly related to the objectives of this project and with which coordination and cooperation will be pursued during implementation.

On the other hand, several distinct projects directly linked to this proposal are currently ongoing. Table 2 summarizes these initiatives, providing a clear overview of potential synergies and complementary aspects, and Table 3 provides a comprehensive list of all ongoing MLF Projects in Tunisia:

Table 2. Ongoing projects and Initiatives

Project	Budget	Executing entities	Objective/focus
Transition Energétique dans les Etablissements Publics (Ongoing)	21,8M USD	ANME – KfW + FTE	The Energy Transition in Public Establishments (TEEP EE) program, implemented by ANME with support from KfW Development Bank and the Energy Transition Fund, aims to improve energy efficiency in public buildings, particularly through the deployment of efficient air-conditioning systems. A key component includes replacing more than 10,000 outdated air-conditioning units with high-efficiency class-1 systems. The program provides valuable experience in upgrading cooling equipment at scale, which can support the current GEF project by promoting high-efficiency cooling technologies.
Tunisian Green Cooling Programme (Ongoing)	600,000 USD	ANME – GIZ / Climate works foundation	The Tunisian Green Cooling Programme, implemented by ANME with support from Deutsche Gesellschaft für Internationale Zusammenarbeit and the ClimateWorks Foundation, promotes energy-efficient and climate-friendly refrigeration and air-conditioning technologies. The program supports the transition to low-GWP refrigerants such as R32 and R290 through capacity building, training of technicians, and pilot demonstrations. These activities strengthen technical capacities and market readiness for sustainable cooling technologies, providing useful experience for the current GEF project.
National Energy Labelling Program for Refrigerators and Air Conditioning Equipment (Ongoing)	2M USD	ANME – CETIME With technical support from AFD, EU, and UNIDO	The National Energy Labelling Program for Refrigerators and Air-Conditioning Equipment, implemented by ANME in collaboration with CETIME and supported by partners such as the French Development Agency, the European Union, and the United Nations Industrial Development Organization, establishes energy performance standards for cooling appliances. Since 2004, Tunisia has implemented energy labeling regulations and progressively restricted low-efficiency air-conditioning systems, supported by national testing laboratories for refrigerators and air conditioners. This program has significantly improved the efficiency of cooling equipment and provides a regulatory foundation for decarbonizing the current GEF project.
District heating and cooling (DHC) BEB SAADOUN (Ongoing)	10 million USD	ANME AfDB Ministry of Health	<p>The Bab Saadoun District Heating and Cooling (DHC) Project, led by ANME with support from AfDB and international partners, aims to develop a centralized heating and cooling network serving the Bab Saadoun medical complex in Tunis. The project introduces district cooling technologies and centralized chilled-water systems to replace individual cooling equipment, improving energy efficiency and reducing greenhouse gas emissions.</p> <p>Beyond technological innovation, the project contributes to strengthening the regulatory and institutional framework for sustainable cooling in Tunisia, including technical standards and governance models for district cooling systems. The experience gained from this initiative provides valuable insights for the current GEF project, particularly in the deployment of efficient cooling technologies and the development of enabling frameworks for large-scale sustainable cooling infrastructure.</p>
National Cooling Action Plan (NCAP) (Ongoing)	300,000 USD	ANME UNEP Cool Coalition- MENA region AfDB	<p>The preparation of Tunisia's National Cooling Action Plan (NCAP), led by ANME with support from UNEP, Cool Coalition (MENA region), and AfDB, aims to establish a national framework for sustainable and energy-efficient cooling. The NCAP assesses current and future cooling demand across key sectors including buildings, industry, and cold chains, and identifies priority actions to promote low-GWP and high-efficiency cooling technologies.</p> <p>By providing sectoral analysis, stakeholder mapping, and policy recommendations, the NCAP strengthens the national policy and analytical foundation for sustainable cooling. This initiative directly complements the current GEF project by helping identify priority intervention areas and supporting coordinated strategies to improve cooling efficiency and reduce emissions.</p>

Project	Budget	Executing entities	Objective/focus
Green Transition Accelerator (GTA) (Concept selected, in preparation, regional)	5M USD	ANME-IKI Guidehouse, UNDP, IIR, other regional partners (for confirmation)	<p>GTA supports the deployment of sustainable cooling solutions in industries with high cooling energy demand, particularly in the food and pharmaceutical sectors. The initiative promotes energy-efficient and resilient cold chains to reduce greenhouse gas emissions and food losses through demonstration projects involving manufacturers, logistics providers, storage facilities, and retailers.</p> <p>GTA also supports improvements in the regulatory framework and financing mechanisms by enabling policymakers and financial institutions to recognize sustainable cold chain technologies as eligible green investments. The initiative complements the current GEF project by piloting innovative cooling technologies and strengthening policy and financing conditions for scaling up energy-efficient refrigeration and cold chain systems in Tunisia's agri-food sector.</p>
Thermal and Energy Renovation Program for Buildings and the PROMO-ISOL Program (Ongoing)	109M USD	ANME- FTE	<p>The Thermal and Energy Renovation Program for Buildings and the PROMO-ISOL Programme, implemented by ANME with support from the FTE, work together to improve the energy performance of Tunisia's building stock. The Thermal Regulation establishes minimum thermal performance standards for new buildings, with compliance verified during the building permit process.</p> <p>PROMO-ISOL complements this regulatory framework by offering financial incentives for roof insulation in existing and newly built individual homes, combining grants covering up to 25% of installation costs with subsidised bank credit. By reducing energy demand for heating and cooling across both new and existing buildings, the two programmes contribute to more efficient use of air-conditioning systems and strengthen Tunisia's policy framework for energy-efficient cooling. They therefore provide an important foundation for the project by promoting efficient cooling technologies and supporting the development of stronger policy frameworks for sustainable cooling solutions across sectors.</p>
Programme for Energy Efficiency in Buildings (PEEB) Cool (FP194) (Ongoing, regional)	246M EUR (GCF) 1.5B EUR total	ANME - AFD	<p>PEEB Cool is implemented by ANME with support from AFD and GIZ, and financial support from the GCF. It is implemented in 11 countries, including Tunisia, and aims to promote energy-efficient and climate-resilient building design, construction, and operation. The program combines an investment facility managed by AFD, offering concessional loans and technical assistance to public and private project owners, with an enabling facility managed by GIZ to strengthen policy frameworks, green building codes, and local capacities.</p> <p>In Tunisia, the program supports the renovation of tourism and hospitality training centers while promoting bioclimatic design and the adoption of low-GWP cooling technologies. PEEB Cool's substantial investment creates a strong enabling environment for the current GEF project, as the policy frameworks, financing mechanisms, and technical capacities developed for buildings can be adapted to accelerate the transition to low-emission cooling technologies in the agri-food sector.</p>
The Energy Classification Program for Electric Motors and Transformers (low, medium and high power)	40,000 USD	ANME - CETIME	<p>The Energy Classification Program for Electric Motors and Transformers, implemented by ANME in collaboration with CETIME aims to assess the Tunisian market for electric motors and define energy performance requirements and regulatory standards for these products.</p> <p>The program supports the development of efficiency standards and regulatory measures promoting high-efficiency motors and transformers used in industrial systems. By improving the performance of electric motors and compressors, the initiative contributes to enhancing the efficiency of industrial refrigeration and cooling installations. It therefore provides a technical foundation for the current GEF project, which relies on efficient electrical systems to improve cold chain energy performance.</p>

Project	Budget	Executing entities	Objective/focus
Project META : Mise en œuvre d'une Transition Énergétique Tunisienne Accélérée (Ongoing)	6,9M USD	ANME - GIZ	<p>The META Project “Accelerated Tunisian Energy Transition”, implemented by ANME with support from GIZ, aims to accelerate the decarbonization of the Tunisian economy by supporting companies in assessing their carbon footprint and developing energy transition action plans. The program provides technical assistance for carbon assessments, energy diagnostics, and decarbonization roadmaps, while also supporting the certification of decarbonization experts and the development of technical guidelines for low-carbon strategies. This initiative complements the current GEF project by strengthening the capacity of industries to measure and reduce emissions and by supporting the integration of energy-efficient cooling and refrigeration technologies into industrial decarbonization strategies.</p>
Tunisia Green Industrialization Hub	8 M USD	ANME – UNIDO	<p>This project supports the systemic transformation of hard-to-abate industries by establishing a virtual center that facilitates policy development, capacity building, technology transfer, and the preparation of a pipeline of decarbonization projects. It aims to strengthen Tunisia’s institutional, technical, and financial capacities to support low-carbon industrial development.</p> <p>Key outputs include the development of sectoral decarbonization roadmaps, capacity building for policymakers and industry actors, and the creation of a public +private partnership platform to mobilize investment in low-carbon technologies. The initiative complements the current GEF project by strengthening the enabling environment for industrial decarbonization and supporting the adoption of energy-efficient cooling and refrigeration technologies in industrial and agri-food value chains.</p>

Table 3. Tunisia MLF funding ongoing projects:

AGENCY	PROJECT_TITLE	STATUS	TOTAL GRANT
UNIDO	HCFC phase-out management plan (stage II, first tranche) (refrigeration servicing sector)	Ongoing	\$428,000.00
UNEP	HCFC phase-out management plan (stage II, second tranche)	Ongoing	\$113,000.00
UNIDO	HCFC phase-out management plan (stage II, second tranche)	Ongoing	\$413,705.00
UNIDO	Extension of institutional strengthening project (phase X: 3/2024-2/2027)	Ongoing	\$701,029.00
UNIDO	Pilot project to maintain and/or enhance the energy efficiency of replacement technologies and equipment in the context of HFC phase-down (non-investment activities) (decision 91/65)	Ongoing	\$185,300.00
UNIDO	Kigali HFC implementation plan (stage I, first tranche) (residential RAC manufacturing sector)	Ongoing	\$1,091,164.00
UNIDO	Kigali HFC implementation plan (stage I, first tranche) (servicing sector)	Ongoing	\$418,370.00
UNIDO	Kigali HFC implementation plan (stage I, first tranche) (PMU)	Ongoing	\$123,892.09
UNEP	Kigali HFC implementation plan (stage I, first tranche) (servicing sector)	Ongoing	\$56,500.00
UNIDO	Preparation of an HCFC phase-out management plan (stage III) (Overarching)	Ongoing	\$64,200.00
UNIDO	Preparation of a national inventory of banks of waste-controlled substances and development of a national plan for the management of these substances (decision 91/66)	Newly approved	\$96,300.00
UNIDO	Project to enhance energy efficiency in the context of HFC phase-down in the residential air-conditioning manufacturing sector (decision 94/60)	Newly approved	\$1,441,675.00
UNEP	HCFC phase-out management plan (stage II, third tranche)	Newly approved	\$27,120.00
UNIDO	HCFC phase-out management plan (stage II, third tranche) (PMU)	Newly approved	\$16,050.00
UNIDO	HCFC phase-out management plan (stage II, third tranche)	Newly approved	\$112,350.00

Core Indicators

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO₂e (direct)	275180	0	0	0
Expected metric tons of CO₂e (indirect)	0	0	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO₂e (direct)				
Expected metric tons of CO₂e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO₂e (direct)	275,180			
Expected metric tons of CO₂e (indirect)				
Anticipated start year of accounting	2026			
Duration of accounting	20			

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)	40,338,000			

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
Solar Photovoltaic	6.70			
Wind Power	1.00			

Indicator 11 People benefiting from GEF-financed investments

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	4,000			
Male	6,000			
Total	10,000	0	0	0

Explain the methodological approach and underlying logic to justify target levels for Core and Sub-Indicators (max. 250 words, approximately 1/2 page)

For energy efficiency in agri-food industries, including cold chains, estimates are based on energy audits conducted in 40 companies (2021). While total energy savings are significant, the analysis focuses on electricity savings relevant to cooling. These amount to approximately 9.68 GWh/year, resulting in about 4,531 tCO₂eq/year using a grid emission factor of 0.468 kgCO₂/kWh. Additional savings from cold storage optimization (load shifting and efficiency gains) contribute to an estimated 714 tCO₂eq/year. Together, this yields a conservative estimate of 5,245 tCO₂eq/year, or 104,900 tCO₂eq over 20 years, including around 1,317 tCO₂eq/year directly linked to cooling improvements.

For renewable energy, the same audits identify a total potential generation of 13.329 GWh/year from solar PV and limited wind capacity (7.744 MW installed). Applying the same emission factor results in avoided emissions of approximately 6,238 tCO₂eq/year, or 124,760 tCO₂eq over 20 years.

For the transport (mobile cold chain), a baseline assessment estimates emissions of about 26,500 tCO₂eq/year from diesel-powered refrigeration units across a fragmented fleet. Efficiency improvements—such as eutectic plates for small vans, electric standby systems, and digital optimization—could reduce emissions significantly. The total technical mitigation potential is estimated at approximately 11,379 tCO₂eq/year; however, the project adopts a conservative attribution factor of 20%, resulting in 2,276 tCO₂eq/year, or 45,516 tCO₂eq over 20 years.

Overall, the total estimated direct emission reduction from the project is 275,180 tCO₂eq over 20 years, based on aggregated results from EE, RE, and transport interventions *. Calculations rely on measured or estimated energy savings and renewable generation, converted into emissions reductions using Tunisia’s grid emission factor and standard diesel emission coefficients.

The estimated GHG emission reductions are as follows:

- Direct total energy savings: 11,205 MWh
- Total direct GHG emission reductions: 275,180 tCO₂eq over 20 years.

Full details are available in Annex G.

*The estimates of EE and RE interventions are based on fairly accurate energy audits of agri-food businesses. The estimate for the emissions reduction from the transport intervention is softer and hence we applied attribution factor of 20% on this potential emissions reduction only.

Key Risks

	Rating	Explanation of risk and mitigation measures
CONTEXT		
Climate	Low	<p>Risks: The project is not considered highly vulnerable to climate related hazards that could directly compromise its outcomes. Activities focus primarily on improving the energy efficiency and decarbonization of existing agri food cold chain infrastructure, rather than on climate sensitive natural resource extraction or large scale infrastructure development. While rising temperatures and increasing frequency of heatwaves may affect cooling demand patterns, these trends reinforce rather than undermine the project rationale</p> <p>Mitigation: Mitigation measures are embedded in the project design through the promotion of energy efficient and climate resilient cooling technologies, including solar powered and decentralized solutions that reduce dependence on grid reliability and fossil fuel imports. Site selection and technical design will consider local climate conditions, and the project’s MRV system will track performance under varying climatic conditions, allowing for adaptive management where necessary.</p>

Environmental and Social	Moderate	<p>Risks: The project is assessed as presenting a moderate environmental and social risk, reflecting the nature, scale, and location of the planned interventions. Environmental and social impacts are expected to be localized, temporary, and reversible, mainly linked to equipment upgrades/retrofitting and the limited installation of solar PV systems. Key risks relate to occupational health and safety during installation and servicing, the generation and handling of waste (including end of life refrigeration and cooling equipment), and battery waste associated with PV systems. Mitigation: These risks will be managed through clear technical guidelines and procedures; compliance with national regulations; targeted capacity building for technicians and operators; and monitoring and supervision at demonstration sites, including arrangements for safe collection, storage, and disposal/recycling of waste.</p>
Political and Governance	Low	<p>Risks: Tunisia does not face active conflict or major security risks that could threaten project implementation. However, changes in political priorities, institutional mandates, or administrative procedures could affect the pace of policy reforms or inter-institutional coordination required to support sustainable cooling in the agri-food sector. Mitigation: This risk is mitigated through strong alignment with national strategies on energy transition, climate mitigation, and agri food development, as well as through close engagement with established institutions such as ANME. The project emphasizes regulatory strengthening, institutional capacity building, and stakeholder ownership, which together help insulate project outcomes from short term political changes. Continuous dialogue with government counterparts and transparent governance arrangements will further reduce residual risk.</p>
INNOVATION		
Institutional and Policy	Low	<p>Risks: The project introduces innovative policy, regulatory, and coordination approaches to address sustainable cooling across the entire agri-food cold chain. There is a potential risk that institutional fragmentation, overlapping mandates, or limited enforcement capacity could slow the adoption or effectiveness of new standards, incentives, and coordination mechanisms. Mitigation: Mitigation measures include sustained policy dialogue, technical assistance to relevant institutions, and the establishment of a multi stakeholder coordination platform that brings together energy, agriculture, industry, transport, and finance actors. The Stakeholder Engagement Plan will define clear roles and responsibilities, promote inclusive participation, and strengthen coordination across levels of governance, thereby reducing institutional uncertainty and enhancing policy coherence.</p>
Technological	Moderate	<p>Risks: The project will demonstrate and promote energy efficient and low carbon cooling technologies that, while proven internationally, may face operational or adoption challenges in the Tunisian context. Risks include limited local technical capacity for installation and maintenance, unfamiliarity with advanced systems, and potential performance gaps if technologies are not properly adapted to local conditions. In addition, some advanced cooling technologies may not yet be readily available in the local or regional market,</p>

		<p>requiring time to identify suitable suppliers, develop supply chains, and ensure access to spare parts and servicing. Furthermore, unlike more standardized markets such as air conditioning, cold chain solutions in the agri-food sector must be tailored to specific crops, value chains, and local operating conditions, increasing the complexity of technology selection, deployment, and scaling. Mitigation: These risks will be mitigated through careful, context-specific technology selection based on feasibility assessments, energy audits, and value chain analysis tailored to different crops and cold chain needs, as well as early engagement with technology suppliers to identify suitable solutions, support market entry, and ensure availability of equipment, spare parts, and servicing. Hands on training for technicians and operators, and close involvement of experienced technology providers. Demonstration projects will serve as learning platforms, allowing for iterative improvement and adaptation before broader replication. Continuous monitoring of technical performance will enable early identification and resolution of operational issues, while lessons learned will inform the progressive scaling and localization of technologies within the Tunisian market in Tunisia.</p>
Financial and Business Model	Moderate	<p>Risks: The financial mechanisms and business models promoted by the project may not mobilize sufficient private investment or may face limited uptake, particularly among SMEs. High upfront costs, perceived investment risks, and limited access to credit could constrain scaling. Mitigation: Mitigation measures include the development of bankable project pipelines, targeted support to the Energy Transition Fund (FTE), capacity building for financial institutions, and the demonstration of viable business models with clear economic and environmental returns. Evidence generated through MRV on cost savings, energy efficiency gains, and GHG reductions will be used to build investor confidence and support replication.</p>
EXECUTION		
Capacity	Low	<p>Risks: The project involves a wide range of actors with varying levels of technical, institutional, and managerial capacity, particularly at the local level and among SMEs. Limited experience with integrated cold chain approaches, energy management systems, and MRV could affect implementation quality and speed. Mitigation: The risk will be mitigated by strengthening institutional and technical capacities through targeted training, technical assistance, and continuous support to implementing partners at the national and local levels. Clear governance arrangements, enhanced coordination mechanisms, and capacity-building programs for involved stakeholders will ensure effective operational readiness. During the PPG phase, a Stakeholder Engagement Plan will be developed to define roles, responsibilities, and consultation mechanisms, facilitating inclusive participation and coordination among all stakeholders. The project will also reinforce monitoring and evaluation capacities by developing standardized tools, digital data systems, and an MRV framework that supports adaptive management. Close supervision and collaboration with experienced technical partners will further ensure that activities are well carried out and aligned with expected outcomes.</p>

Fiduciary	Moderate	<p>Risks: The fiduciary risk is considered potential, assuming that national procurement and financial management procedures are followed. Indeed, delays or inefficiencies could occur if these procedures are applied without adaptation to project requirements Mitigation: During the PPG phase, management and fiduciary arrangements will be carefully reviewed to identify the most appropriate modalities for project implementation. The Implementing Partner will undergo capacity assessments to evaluate financial capacity, internal controls, and risk management systems. This process will help ensure compliance with GEF standards, optimize resource use, and minimize potential delays while strengthening accountability and transparency</p>
Stakeholder	Moderate	<p>Risks: Given the diversity and fragmentation of stakeholders across the agri food cold chain, there is a potential risk that inadequate engagement could reduce ownership or limit the sustainability of outcomes. However, this risk is assessed as low due to the strong emphasis placed on stakeholder engagement in project design Mitigation: The Stakeholder Engagement Plan will guide inclusive, continuous, and gender responsive participation throughout the project lifecycle. Multistakeholder dialogue mechanisms will ensure that concerns are addressed, local knowledge is incorporated, and broad ownership is maintained.</p>
Other		
Overall Risk Rating	Moderate	<p>The overall risk level of the project is assessed as moderate, considering the scope and nature of the proposed interventions, the absence of large-scale or irreversible impacts, and the robustness of the mitigation measures embedded in the project design. Project activities focus primarily on upgrading and retrofitting existing agri-food cold chain infrastructure and promoting energy-efficient and low-carbon cooling solutions, without involving large-scale construction, land acquisition, or expansion into new sites. As a result, environmental and social risks are localized, temporary, and manageable through standard mitigation measures. Climate-related risks, while acknowledged, are not expected to compromise project outcomes and instead reinforce the project’s strategic relevance. Political, institutional, and governance risks remain low due to strong alignment with national priorities and close engagement with established institutions. Although certain innovation-related, technological, financial, and capacity risks are present, these are considered manageable through targeted capacity building, demonstration activities, stakeholder engagement, and a robust monitoring, reporting, and verification framework. After consideration of these mitigation measures, residual risks remain within the acceptable risk appetite of the GEF and UNDP, thereby justifying an overall moderate risk rating at the PIF stage</p>

C. ALIGNMENT WITH GEF-8 PROGRAMMING STRATEGIES AND COUNTRY/REGIONAL PRIORITIES

Describe how the proposed interventions are aligned with GEF- 8 programming strategies and country and regional priorities, including how these country strategies and plans relate to the multilateral environmental agreements.

Confirm if any country policies that might contradict with intended outcomes of the project have been identified, and how the project will address this.

For projects aiming to generate biodiversity benefits (regardless of what the source of the resources is - i.e., BD, CC or LD), please identify which of the 23 targets of the Kunming-Montreal Global Biodiversity Framework the project contributes to and explain how. (max. 500 words, approximately 1 page)

Project alignment with the GEF-8 Climate Change Focal Area Objective:

The Tunisia agri-food industrial cold chain project is well aligned with the GEF-8 Climate Change Focal Area Strategy and Associated Programming. The Project fits under 'Pillar I: Promote innovation, technology development and transfer, and enabling policies for mitigation options with systemic impacts' and specifically objective 1.1 of the GEF-8 Climate Change Focal Area Strategy: Accelerate the efficient use of energy and materials (CCM-1-1).

The integration of renewable-based systems into agri-food cold chains also aligns with objective 1.2 of the GEF-8 Climate Change Focal Area Strategy: Enable the transition to decarbonized power systems (CCM-1-2). Rather than treating renewable energy integration as an optional add-on, the project embeds it as a cross-cutting element across its components, recognising that decarbonizing the agri-food cold chain requires dealing with both energy efficiency and the energy source simultaneously.

At the facility level, the project supports the integration of renewable energy systems (most likely solar PV) into cold storage and processing facilities across key agri-food value chains, reducing dependence on fossil-fuel-based grid electricity and lowering the carbon intensity of cooling operations. Demonstration investments will showcase technically and financially viable models for renewable-powered cold chains, generating replicable evidence for wider market uptake.

Beyond the facility level, the project engages with Tunisia's enabling environment for decarbonized power and is in line with Tunisia's targets to achieve 35% of electricity from renewable sources by 2030. By strengthening the policy and institutional conditions for distributed renewable energy uptake in the agri-food sector, the project contributes to systemic change in how cooling demand is met at the national level, directly supporting the transition to decarbonized power systems that CCM-1-2 seeks to enable.

Dedicated indicators for renewable energy integration will be developed during the PPG phase, including targets for renewable-powered cold chain facilities and associated electricity generation capacity.

Specifically, GEF-8 supports:

In the built environment: The GEF will support the adoption of a new generation of energy efficiency policies and green building codes that are in line with updated NDCs and LTSSs. The GEF will continue to support financial and fiscal instruments, mechanisms, and business models, including those promoting "energy as a service" approaches, that can scale up and aggregate demand for energy efficiency products and services. The GEF will also support roadmaps that propose an integrated approach to buildings, from materials, new building energy codes and performance, integration of renewable energy, and net-zero building standards and demonstrations, with an enhanced focus on public buildings and social housing. This support would also include necessary capacity development for monitoring and enforcement of policies and green building codes.

In cooling: Cooling accounts for almost 20% of the global electricity demand today and is expected to grow to 37% by 2050 under business-as-usual scenarios. In this area, the GEF will focus on the wide adoption and implementation of new energy efficiency standards and look for synergies with other programs, including maximizing the climate benefits of actions to implement the Kigali Amendment of the Montreal Protocol. This may include grant schemes to subsidize the costs for early adopters and support for new technologies such as district cooling, super-efficient cooling appliances, deployment of digitalization and energy management systems, and innovation in cold chains with linkages to food security, water, and health.

Project contribution to the Sustainable Development Goals (SDGs)

The proposed project will significantly contribute to several SDGs, aligning with Tunisia's NDC and energy targets. The project will contribute to SDG 7 on affordable and clean energy by improving EE in the agricultural cold chain. It will support SDG 13 (Climate Action) by reducing emissions associated with the cooling demand and strengthening Tunisia's climate mitigation efforts. Through improved cold chain efficiency and reduced food losses, the project will contribute to SDG 12 (Responsible

Consumption and Production) and SDG 2 (Zero Hunger) by enhancing food preservation, reducing waste, and improving the reliability of food supply chains. In addition, the project will support SDG 9 (Industry, Innovation, and Infrastructure) by encouraging the adoption of modern, energy-efficient cooling technologies and innovative business models in the agri-food sector. Capacity-building activities and engagement with farmers, cooperatives, and private sector actors will also contribute to SDG 8 (Decent Work and Economic Growth) by strengthening technical skills, promoting sustainable industrial practices, and improving the competitiveness of the agri-food industry.

Alignment with national plans, priorities, and strategies

Tunisia has adopted a new energy strategy in 2023 that aims for an increase in the share of renewable energy in electricity production to 35% in 2030 and 50% in 2035, and to increase energy efficiency by 30% as compared to the reference year 2021. It has further committed to increasing its GHG emission reduction target to 45% by 2030 (reduction of energy intensity compared to 2010) in its updated NDC (2021). In addition, Tunisia ratified the Kigali Amendment to the Montreal Protocol in 2021, committing to a gradual phase-down of HFCs and reinforcing the transition toward low-GWP refrigerants in the cooling sector. The strategy aims to increase the electrification of the economy (reaching 30% of final energy consumption in 2035, up from 24% in 2021). Demand management remains a strong pillar of the energy transition approach: the strategy aims for an overall reduction in demand for primary energy in the order of 30% in 2030 and 37% in 2035, as compared to the BaU scenario. Tunisia has further started work on its National Cooling Action Plan. The project is well aligned and informed by these national plans, priorities, and strategies.

In this regard, energy efficiency is a central pillar, supported by national programmes that prioritize reducing energy consumption in high-demand uses such as industrial cooling and air conditioning, particularly in buildings and public establishments. These orientations were further emphasized during the Ministerial Council on Energy Transition (April 2023), which called for scaling up efficiency measures and accelerating actions targeting cooling demand as a key lever for reducing peak electricity consumption and system pressure. The project is fully consistent with national priorities and translates these strategic orientations into concrete action in one of the most energy-intensive and climate-relevant segments of the economy: industrial refrigeration and cold chains, while also supporting the ongoing development of the National Cooling Action Plan.

Beyond climate and energy objectives, the project is strongly aligned with Tunisia's Industrial and Innovation Strategy Horizon 2035 (Strategy 4.0), which aims to modernize the industrial fabric, promote innovation, strengthen technological capabilities, and enhance competitiveness in strategic sectors such as agri-food. By introducing advanced, energy-efficient refrigeration technologies, improving process performance, and supporting better operation and maintenance practices, the project contributes directly to industrial upgrading and technology diffusion. It also fosters innovation by encouraging the adoption of new solutions, strengthening linkages between industry and technical expertise, and generating demand for a more qualified workforce in areas such as installation, servicing, monitoring, and optimization of cooling systems. In doing so, the project acts as a concrete lever for implementing Tunisia's industrial transformation agenda, supporting productivity gains, improved product quality, and better integration into value chains.

The project is equally aligned with Tunisia's long-term food security vision toward 2035, which places increasing emphasis on resilience, efficiency, and reduction of food losses and waste. National priorities highlight the need to strengthen preservation systems, improve storage and logistics infrastructure, and reduce post-harvest losses across the agri-food value chain. By enhancing the performance and reliability of industrial refrigeration and cold chain systems, the project directly contributes to these objectives: it helps extend product shelf life, improve food safety and quality, stabilize supply, and significantly reduce losses throughout processing, storage, and distribution stages. This contribution is particularly important in the context of climate variability and growing pressure on food systems.

Overall, the project sits at the intersection of three key national priorities—energy transition, industrial modernization, and food security. By combining energy efficiency, low-emission technologies, industrial upgrading, and improved preservation systems, it tangibly operationalizes Tunisia's strategic ambitions, supporting decarbonization while strengthening economic competitiveness and the resilience of the agri-food sector.

D. POLICY REQUIREMENTS

Gender Equality and Women's Empowerment:

We confirm that gender dimensions relevant to the project have been addressed as per GEF Policy and are clearly articulated in the Project Description (Section B).

Yes

Stakeholder Engagement

We confirm that key stakeholders were consulted during PIF development as required per GEF policy, their relevant roles to project outcomes and plan to develop a Stakeholder Engagement Plan before CEO endorsement has been clearly articulated in the Project Description (Section B).

Yes

Were the following stakeholders consulted during project identification phase:

Indigenous Peoples and Local Communities:

Civil Society Organizations: Yes

Private Sector: Yes

Provide a brief summary and list of names and dates of consultations

Key stakeholders were consulted during the development of the PIF in line with GEF policies. The preparation of this project concept took place in a particular context, as the Government of Tunisia initiated the development of this proposal following the non-approval of a previously submitted concept. Given the relatively short timeframe available to develop the new proposal, the consultation process followed a pragmatic and targeted approach, building on ongoing national dialogue platforms and consultation processes led by the National Agency for Energy Conservation (ANME).

In this context, the preparation of the PIF relied primarily on close coordination with ANME, which has been leading national discussions on sustainable cooling and energy efficiency. Consultation meetings were conducted with ANME's technical directorates responsible for energy efficiency in the industrial, transport, and buildings sectors, ensuring alignment with national policies related to cooling demand management and energy performance.

Beyond internal coordination, ANME has already engaged a broad range of stakeholders across the cooling and cold chain ecosystem. As reflected in the consultation table below, these discussions involved representatives from key government institutions, technical centers, private sector companies, and sectoral organizations active in agri-food processing, fisheries, and refrigeration technologies. These included consultations with the Directorate General of Agro-Food Industries at the Ministry of Industry, the Technical Center for Agri-Food Industries, the National Agency for Environmental Protection, the Ministry of Agriculture, Water Resources and Maritime Fisheries (fisheries cold chain), the International Institute of Refrigeration, as well as major private sector actors such as Délice, SFBT, Poulina Group Holding, and export-oriented agro-food companies.

These consultations allowed ANME to gather practical insights from industries relying heavily on refrigeration and cold storage systems, including dairy, beverages, fisheries, and date exports. Discussions focused on key challenges related to cooling technologies, energy efficiency, cold chain infrastructure, and the adoption of environmentally friendly refrigerants.

The stakeholder engagement process will be further expanded during the Project Preparation Grant (PPG) phase through additional consultations with relevant ministries, technical institutions, private sector actors, and civil society organizations, as well as the preparation of a comprehensive Stakeholder Engagement Plan to guide project implementation.

Stakeholder	Date	Participants
Directorate General of Agro-Food Industries – Ministry of Industry: Government directorate responsible for the development and regulation of agro-food industries and food processing sectors in Tunisia.	23 November 2025	Ms. Hamida – Director General of Agro-Food Industries; Mr. Mbarek – Senior Officer, Directorate General of Agro-Food Industries; Ms. Rim Dridi – Director of Fruit Activities; Representatives of the National Agency for Energy Conservation (ANME)
Technical Center for Agro-Food Industries (CTAA): National technical center providing research, testing, and technical support to improve competitiveness and quality in the food industry.	25 November 2025	Mr. Sami Ayachi – Technical Expert; Representatives of ANME

VACPA Group – Boujbel Group (Date Export Sector): Private sector company involved in processing, packaging, and export of Tunisian dates.	22 December 2025	Representatives of the Date Export Sector; ANME representatives
Interprofessional Group for Food Preserves: Sector organization representing companies involved in processed and preserved food products.	9 December 2025	Director / Technical representatives of the Interprofessional Group for Food Preserves; ANME representatives
National Agency for Environmental Protection: National authority responsible for environmental regulation and implementation of international environmental agreements.	2 January 2026	Mr. Youssef Hammami – Environmental Expert, National Ozone Officer for Tunisia; ANME representatives
Ministry of Agriculture, Water Resources and Maritime Fisheries – Cold Chain / Fisheries Sector: Government authority responsible for fisheries management and seafood value chains, including cold storage and transport.	2 January 2026	Mr. Karim Hammami – Fisheries Cold Chain Specialist; ANME representatives
International Institute of Refrigeration: an international scientific organization dedicated to refrigeration, cooling technologies, and energy-efficient systems.	2 January 2026	Ms. Yosr Allouch – Technical Representative; ANME representatives
BIOSCA TAMA – Industrial Production Center (El Fejja Industrial Zone) : Industrial company operating production facilities requiring refrigeration and cold storage systems.0	2 January 2026	Mr. Bassem Ben Abdallah – Industrial Facility Manager; ANME representatives
Interprofessional Group for Fisheries Products (GIPP): Public organization supporting the development and regulation of Tunisia’s fisheries sector.	2 January 2026	Director / Technical representatives of GIPP; ANME representatives
POULINA Group Holding: Major Tunisian industrial group active in poultry production and agro-food industries.	27 February 2026	Senior management / technical representatives of POULINA Group; ANME representatives
Délice – Milk Processing and Dairy Products Company: Leading dairy processing company producing milk and dairy products in Tunisia.	12 January 2026	Technical and operations managers responsible for refrigeration and cold storage; ANME representatives
SFBT Group : Major Tunisian beverage and food production company requiring industrial cooling systems.	19 January 2026	Industrial and energy management representatives; ANME representatives
Tunisian Confederation of Industry, Trade and Handicrafts National organization representing private sector companies across industry, trade, and services.	11 February 2026	Mr. Loumi – Private Sector Representative; Mr. Anis Gharbi – Private Sector Representative; ANME representatives
Agency for the Promotion of Industry and Innovation Public agency promoting industrial investment, innovation, and modernization of industrial sectors.	27 February 2026	Director General of APII; Representatives of the Regional APII Center; ANME representatives

(Please upload to the portal documents tab any stakeholder engagement plan or assessments that have been done during the PIF development phase.)

Private Sector

Will there be private sector engagement in the project?

Yes

And if so, has its role been described and justified in the section B project description?

Yes

Environmental and Social Safeguard (ESS) Risks

We confirm that we have provided indicative information regarding Environmental and Social risks associated with the proposed project or program and any measures to address such risks and impacts (this information should be presented in Annex D).

Yes

Overall Project/Program Risk Classification

PIF	CEO Endorsement/Approval	MTR	TE
Medium/Moderate			

E. OTHER REQUIREMENTS

Knowledge management

We confirm that an approach to Knowledge Management and Learning has been clearly described in the Project Description (Section B)

Yes

ANNEX A: FINANCING TABLES

GEF Financing Table

Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	Grant / Non-Grant	GEF Project Grant(\$)	Agency Fee(\$)	Total GEF Financing (\$)
UNDP	GET	Tunisia	Climate Change	CC STAR Allocation: CCM-1-1	Grant	2,639,726.00	250,774.00	2,890,500.00
Total GEF Resources (\$)						2,639,726.00	250,774.00	2,890,500.00

Project Preparation Grant (PPG)

Is Project Preparation Grant requested?

true

PPG Amount (\$)

100000

PPG Agency Fee (\$)

9500

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	Grant / Non-Grant	PPG(\$)	Agency Fee(\$)	Total PPG Funding(\$)
UNDP	GET	Tunisia	Climate Change	CC STAR Allocation: CCM-1- 1	Grant	100,000.00	9,500.00	109,500.00
Total PPG Amount (\$)						100,000.00	9,500.00	109,500.00

Please provide justification

Sources of Funds for Country Star Allocation

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Sources of Funds	Total(\$)
UNDP	GET	Tunisia	Climate Change	CC STAR Allocation	571,000.00
UNDP	GET	Tunisia	Biodiversity	BD STAR Allocation	849,001.00
UNDP	GET	Tunisia	Land Degradation	LD STAR Allocation	1,579,999.00
Total GEF Resources					3,000,000.00

Indicative Focal Area Elements

Programming Directions	Trust Fund	GEF Project Financing(\$)	Co-financing(\$)
CCM-1-1	GET	2,639,726.00	16150000
Total Project Cost		2,639,726.00	16,150,000.00

Indicative Co-financing

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Recipient Country Government	ANME	In-kind	Recurrent expenditures	450000
Recipient Country Government	ANME -FTE	Grant	Investment mobilized	5700000
Recipient Country Government	UNEP-AFDB	Grant	Investment mobilized	300000
Recipient Country Government	ANME - Guidehouse -IKI	Grant	Investment mobilized	3000000
Recipient Country Government	ANME -AFDB	Loans	Investment mobilized	6700000

Total Co-financing				16,150,000.00
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Describe how any "Investment Mobilized" was identified

Project outcomes Type of co-financing Amount (USD) Description of sources of co-financing

Outcome 1 Grant 300,000 Covering government investments aimed at strengthening the regulatory and institutional framework in support of the implementation of the National Cooling Action Plan (NCAP), through initiatives implemented by the United Nations Environment Programme (UNEP) and the Cool Coalition, with financing provided by the African Development Bank (AfDB).

Outcome 2 Private sector investments 12,400,000 Supporting private sector investments in equipment upgrading and the implementation of cooling projects under programme contracts with ANME, to improve industrial energy efficiency. These efforts are notably supported through the PROMOCLIM programme financed by the African Development Bank (AfDB), as well as the PROMOISOL initiative financed by the Energy Transition Fund (FTE), through dedicated financial mechanisms implemented in partnership with Tunisian commercial banks. Together, these schemes provide targeted financial support for the deployment of energy-efficient and low-emission cooling technologies.

Outcome 3 Grant 3,000,000 Covering the contribution of the Green Transition Accelerator (GTA) project, implemented by ANME and Guidehouse with the support of UNDP, through the closely related "Creating the Financial Conditions for Scale-up and Replication" initiative financed by the International Climate Initiative (IKI).

M&E In-kind 200,000 Covering M&E sharing using government staff, platforms, and venues

PMC In-kind 250,000 Covering Government staff contributing to the project and premises hosting the Project Management Unit (For 5 years)

TOTAL 16,150,000

ANNEX B: ENDORSEMENTS

GEF Agency(ies) Certification

GEF Agency Type	Name	Date	Project Contact Person	Phone	Email
GEF Agency Coordinator	Ms. Nancy Bennet				nancy.bennet@undp.org
Project Coordinator	Amal Aldababseh				amal.al dababseh@undp.org

Record of Endorsement of GEF Operational Focal Point (s) on Behalf of the Government(s):

Name	Position	Ministry	Date (MM/DD/YYYY)
SABRIA BNOUNI	GEF Operational Focal Point	Ministry of Environment, Tunisia	3/18/2026

ANNEX C: PROJECT LOCATION

Please provide geo-referenced information and map where the project interventions will take place



ANNEX D: ENVIRONMENTAL AND SOCIAL SAFEGUARDS SCREEN AND RATING

(PIF level) Attach agency safeguard screen form including rating of risk types and overall risk rating.

Title

10527-Tunisia- PreSESP_cooling_GEF8T V2 SH

ANNEX E: RIO MARKERS

Climate Change Mitigation	Climate Change Adaptation	Biodiversity	Land Degradation
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Principal Objective 2

No Contribution 0

No Contribution 0

No Contribution 0

ANNEX F: TAXONOMY WORKSHEET

ANNEX F: TAXONOMY WORKSHEET

Level 1	Level 2	Level 3	Level 4
<input checked="" type="checkbox"/> Influencing models			
	<input checked="" type="checkbox"/> Transform policy and regulatory environments		
	<input checked="" type="checkbox"/> Strengthen institutional capacity and decision-making		
	<input type="checkbox"/> Convene multi-stakeholder alliances		
	<input checked="" type="checkbox"/> Demonstrate innovative approaches		
	<input type="checkbox"/> Deploy innovative financial instruments		
<input checked="" type="checkbox"/> Stakeholders			
	<input type="checkbox"/> Indigenous Peoples		
	<input checked="" type="checkbox"/> Private Sector		
		<input checked="" type="checkbox"/> Capital providers	
	Community-Based	<input checked="" type="checkbox"/> Financial intermediaries and market facilitators	
		<input checked="" type="checkbox"/> Large corporations	
		<input checked="" type="checkbox"/> SMEs	
		<input type="checkbox"/> Individuals/Entrepreneurs	
		<input type="checkbox"/> Non-Grant Pilot	
		<input type="checkbox"/> Project Reflow	
	<input type="checkbox"/> Beneficiaries		
	<input type="checkbox"/> Local Communities		
	<input checked="" type="checkbox"/> Civil Society		
		<input type="checkbox"/> Community Based Organization	
		<input checked="" type="checkbox"/> Non-Governmental Organization	
		<input checked="" type="checkbox"/> Academia	

		<input type="checkbox"/> Trade Unions and Workers Unions	
	<input checked="" type="checkbox"/> Type of Engagement		
		<input checked="" type="checkbox"/> Information Dissemination	
		<input checked="" type="checkbox"/> Partnership	
		<input checked="" type="checkbox"/> Consultation	
		<input checked="" type="checkbox"/> Participation	
	<input checked="" type="checkbox"/> Communications		
		<input checked="" type="checkbox"/> Awareness Raising	
		<input type="checkbox"/> Education	

45

		<input checked="" type="checkbox"/> Public Campaigns	
		<input checked="" type="checkbox"/> Behavior Change	
<input checked="" type="checkbox"/> Capacity, Knowledge and Research			
	<input type="checkbox"/> Enabling Activities		
	<input checked="" type="checkbox"/> Capacity Development		
	<input checked="" type="checkbox"/> Knowledge Generation and Exchange		
	<input type="checkbox"/> Targeted Research		
	<input checked="" type="checkbox"/> Learning		
		<input type="checkbox"/> Theory of Change	
		<input type="checkbox"/> Adaptive Management	

		<input type="checkbox"/> Indicators to Measure Change	
	<input checked="" type="checkbox"/> Innovation		
	<input checked="" type="checkbox"/> Knowledge and Learning		
		<input checked="" type="checkbox"/> Knowledge Management	
		<input checked="" type="checkbox"/> Innovation	
		<input checked="" type="checkbox"/> Capacity Development	
		<input checked="" type="checkbox"/> Learning	
	<input checked="" type="checkbox"/> Stakeholder Engagement Plan		
<input checked="" type="checkbox"/> Gender Equality			
	<input checked="" type="checkbox"/> Gender Mainstreaming		
		<input checked="" type="checkbox"/> Beneficiaries	
		<input checked="" type="checkbox"/> Women groups	
		<input checked="" type="checkbox"/> Sex-disaggregated indicators	
		<input checked="" type="checkbox"/> Gender-sensitive indicators	
	<input checked="" type="checkbox"/> Gender results areas		
		<input type="checkbox"/> Access and control over natural resources	
		<input checked="" type="checkbox"/> Participation and leadership	
		<input checked="" type="checkbox"/> Access to benefits and services	
		<input checked="" type="checkbox"/> Capacity development	
		<input checked="" type="checkbox"/> Awareness raising	
		<input checked="" type="checkbox"/> Knowledge generation	
<input type="checkbox"/> Focal Areas/Theme			
	<input type="checkbox"/> Integrated Programs		

		<input type="checkbox"/> Commodity Supply Chains (²² Good Growth Partnership)	
			<input type="checkbox"/> Sustainable Commodities Production
			<input type="checkbox"/> Deforestation-free Sourcing
			<input type="checkbox"/> Financial Screening Tools
			<input type="checkbox"/> High Conservation Value Forests
			<input type="checkbox"/> High Carbon Stocks Forests
			<input type="checkbox"/> Soybean Supply Chain
			<input type="checkbox"/> Oil Palm Supply Chain
			<input type="checkbox"/> Beef Supply Chain
			<input type="checkbox"/> Smallholder Farmers
			<input type="checkbox"/> Adaptive Management
		<input type="checkbox"/> Food Security in Sub-Saharan Africa	
			<input type="checkbox"/> Resilience (climate and shocks)
			<input type="checkbox"/> Sustainable Production Systems
			<input type="checkbox"/> Agroecosystems
			<input type="checkbox"/> Land and Soil Health
			<input type="checkbox"/> Diversified Farming
			<input type="checkbox"/> Integrated Land and Water Management
			<input type="checkbox"/> Smallholder Farming
			<input type="checkbox"/> Small and Medium Enterprises
			<input type="checkbox"/> Crop Genetic Diversity
			<input type="checkbox"/> Food Value Chains
			<input type="checkbox"/> Gender Dimensions
			<input type="checkbox"/> Multi-stakeholder Platforms
		<input type="checkbox"/> Food Systems, Land Use and Restoration	
			<input type="checkbox"/> Sustainable Food Systems
			<input type="checkbox"/> Landscape Restoration
			<input type="checkbox"/> Sustainable Commodity Production
			<input type="checkbox"/> Comprehensive Land Use Planning
			<input type="checkbox"/> Integrated Landscapes
			<input type="checkbox"/> Food Value Chains
			<input type="checkbox"/> Deforestation-free Sourcing
			<input type="checkbox"/> Smallholder Farmers

		<input type="checkbox"/> Sustainable Cities	
			<input type="checkbox"/> Integrated urban planning
			<input type="checkbox"/> Urban sustainability framework
			<input type="checkbox"/> Transport and Mobility
			<input type="checkbox"/> Buildings
			<input type="checkbox"/> Municipal waste management
			<input type="checkbox"/> Green space
			<input type="checkbox"/> Urban Biodiversity
			<input type="checkbox"/> Urban Food Systems
			<input type="checkbox"/> Energy efficiency
			<input type="checkbox"/> Municipal Financing
			<input type="checkbox"/> Global Platform for Sustainable Cities
			<input type="checkbox"/> Urban Resilience
	<input type="checkbox"/> Biodiversity		
		<input type="checkbox"/> Protected Areas and Landscapes	
			<input type="checkbox"/> Terrestrial Protected Areas
			<input type="checkbox"/> Coastal and Marine Protected Areas
			<input type="checkbox"/> Productive Landscapes
			<input type="checkbox"/> Productive Seascapes
			<input type="checkbox"/> Community Based Natural Resource Management
		<input type="checkbox"/> Mainstreaming	
			<input type="checkbox"/> Extractive Industries (oil, gas, mining)
			<input type="checkbox"/> Forestry (Including HCVF and REDD+)
			<input type="checkbox"/> Tourism
			<input type="checkbox"/> Agriculture & agrobiodiversity
			<input type="checkbox"/> Fisheries
			<input type="checkbox"/> Infrastructure
			<input type="checkbox"/> Certification (National Standards)
			<input type="checkbox"/> Certification (International Standards)
		<input type="checkbox"/> Species	
			<input type="checkbox"/> Illegal Wildlife Trade
			<input type="checkbox"/> Threatened Species
			<input type="checkbox"/> Wildlife for Sustainable Development

			<input type="checkbox"/> Crop Wild Relatives
			<input type="checkbox"/> Plant Genetic Resources
			<input type="checkbox"/> Animal Genetic Resources
			<input type="checkbox"/> Livestock Wild Relatives
			<input type="checkbox"/> Invasive Alien Species (IAS)
		<input type="checkbox"/> Biomes	
			<input type="checkbox"/> Mangroves
			<input type="checkbox"/> Coral Reefs
			<input type="checkbox"/> Sea Grasses
			<input type="checkbox"/> Wetlands
			<input type="checkbox"/> Rivers
			<input type="checkbox"/> Lakes
			<input type="checkbox"/> Tropical Rain Forests
			<input type="checkbox"/> Tropical Dry Forests
			<input type="checkbox"/> Temperate Forests
			<input type="checkbox"/> Grasslands
			<input type="checkbox"/> Paramo
			<input type="checkbox"/> Desert
		<input type="checkbox"/> Financial and Accounting	
			<input type="checkbox"/> Payment for Ecosystem Services
			<input type="checkbox"/> Natural Capital Assessment and Accounting
			<input type="checkbox"/> Conservation Trust Funds
			<input type="checkbox"/> Conservation Finance
		<input type="checkbox"/> Supplementary Protocol to the CBD	
			<input type="checkbox"/> Biosafety
			<input type="checkbox"/> Access to Genetic Resources Benefit Sharing
	<input type="checkbox"/> Forests		
		<input type="checkbox"/> Forest and Landscape Restoration	
			<input type="checkbox"/> REDD/REDD+
		<input type="checkbox"/> Forest	
			<input type="checkbox"/> Amazon
			<input type="checkbox"/> Congo
			<input type="checkbox"/> Drylands
	<input type="checkbox"/> Land Degradation		
		<input type="checkbox"/> Sustainable Land Management	

			<input type="checkbox"/> Restoration and Rehabilitation of Degraded Lands
			<input type="checkbox"/> Ecosystem Approach
			<input type="checkbox"/> Integrated and Cross-sectoral approach
			<input type="checkbox"/> Community-Based NRM
			<input type="checkbox"/> Sustainable Livelihoods
			<input type="checkbox"/> Income Generating Activities
			<input type="checkbox"/> Sustainable Agriculture
			<input type="checkbox"/> Sustainable Pasture Management
			<input type="checkbox"/> Sustainable Forest/Woodland Management
			<input type="checkbox"/> Improved Soil and Water Management Techniques
			<input type="checkbox"/> Sustainable Fire Management
			<input type="checkbox"/> Drought Mitigation/Early Warning
		<input type="checkbox"/> Land Degradation Neutrality	
			<input type="checkbox"/> Land Productivity
			<input type="checkbox"/> Land Cover and Land cover change
			<input type="checkbox"/> Carbon stocks above or below ground
		<input type="checkbox"/> Food Security	
	<input type="checkbox"/> International Waters		
		<input type="checkbox"/> Ship	
		<input type="checkbox"/> Coastal	
		<input type="checkbox"/> Freshwater	
			<input type="checkbox"/> Aquifer
			<input type="checkbox"/> River Basin
			<input type="checkbox"/> Lake Basin
		<input type="checkbox"/> Learning	
		<input type="checkbox"/> Fisheries	
		<input type="checkbox"/> Persistent toxic substances	
		<input type="checkbox"/> SIDS : Small Island Dev States	
		<input type="checkbox"/> Targeted Research	
		<input type="checkbox"/> Pollution	
			<input type="checkbox"/> Persistent toxic substances
			<input type="checkbox"/> Plastics
			<input type="checkbox"/> Nutrient pollution from all sectors except wastewater

			<input type="checkbox"/> Nutrient pollution from Wastewater
		<input type="checkbox"/> Transboundary Diagnostic Analysis and Strategic Action Plan preparation	
		<input type="checkbox"/> Strategic Action Plan Implementation	
		<input type="checkbox"/> Areas Beyond National Jurisdiction	
		<input type="checkbox"/> Large Marine Ecosystems	
		<input type="checkbox"/> Private Sector	
		<input type="checkbox"/> Aquaculture	
		<input type="checkbox"/> Marine Protected Area	
		<input type="checkbox"/> Biomes	
			<input type="checkbox"/> Mangrove
			<input type="checkbox"/> Coral Reefs
			<input type="checkbox"/> Seagrasses
			<input type="checkbox"/> Polar Ecosystems
			<input type="checkbox"/> Constructed Wetlands
	<input type="checkbox"/> Chemicals and Waste		
		<input type="checkbox"/> Mercury	
		<input type="checkbox"/> Artisanal and Scale Gold Mining	
		<input type="checkbox"/> Coal Fired Power Plants	
		<input type="checkbox"/> Coal Fired Industrial Boilers	
		<input type="checkbox"/> Cement	
		<input type="checkbox"/> Non-Ferrous Metals Production	
		<input type="checkbox"/> Ozone	
		<input type="checkbox"/> Persistent Organic Pollutants	
		<input type="checkbox"/> Unintentional Persistent Organic Pollutants	
		<input type="checkbox"/> Sound Management of chemicals and <u>Waste</u>	
		<input type="checkbox"/> Waste Management	
			<input type="checkbox"/> Hazardous Waste Management
			<input type="checkbox"/> Industrial Waste
			<input type="checkbox"/> e-Waste
		<input type="checkbox"/> Emissions	
		<input type="checkbox"/> Disposal	
		<input type="checkbox"/> New Persistent Organic Pollutants	
		<input type="checkbox"/> Polychlorinated Biphenyls	
		<input type="checkbox"/> Plastics	

		<input type="checkbox"/> Eco-Efficiency	
		<input type="checkbox"/> Pesticides	
		<input type="checkbox"/> DDT - Vector Management	
		<input type="checkbox"/> DDT - Other	
		<input type="checkbox"/> Industrial Emissions	
		<input type="checkbox"/> Open Burning	
		<input type="checkbox"/> Best Available Technology / Best Environmental Practices	
		<input type="checkbox"/> Green Chemistry	
	<input checked="" type="checkbox"/> Climate Change		
		<input type="checkbox"/> Climate Change Adaptation	
			<input type="checkbox"/> Climate Finance
			<input type="checkbox"/> Least Developed Countries
			<input type="checkbox"/> Small Island Developing States
			<input type="checkbox"/> Disaster Risk Management
			<input type="checkbox"/> Sea-level rise
			<input type="checkbox"/> Climate Resilience
			<input type="checkbox"/> Climate information
			<input type="checkbox"/> Ecosystem-based Adaptation
			<input type="checkbox"/> Adaptation Tech Transfer
			<input type="checkbox"/> National Adaptation Programme of Action
			<input type="checkbox"/> National Adaptation Plan
			<input type="checkbox"/> Mainstreaming Adaptation
			<input type="checkbox"/> Private Sector
			<input type="checkbox"/> Innovation
			<input type="checkbox"/> Complementarity
			<input type="checkbox"/> Community-based Adaptation
			<input type="checkbox"/> livelihoods
		<input checked="" type="checkbox"/> Climate Change Mitigation	
			<input type="checkbox"/> Agriculture, Forestry, and other Land Use
			<input checked="" type="checkbox"/> Energy Efficiency
			<input checked="" type="checkbox"/> Sustainable Urban Systems and Transport
			<input checked="" type="checkbox"/> Technology Transfer
			<input checked="" type="checkbox"/> Renewable Energy
			<input checked="" type="checkbox"/> Financing
			<input type="checkbox"/> Enabling Activities

		<input type="checkbox"/> Technology Transfer	
			<input type="checkbox"/> Poznan Strategic Programme on Technology Transfer
			<input type="checkbox"/> Climate Technology Centre & Network (CTCN)
			<input type="checkbox"/> Endogenous technology
			<input type="checkbox"/> Technology Needs Assessment
			<input type="checkbox"/> Adaptation Tech Transfer
		<input type="checkbox"/> United Nations Framework on Climate Change	
			<input type="checkbox"/> Nationally Determined Contribution
			<input type="checkbox"/> Sustainable Development Goals
		<input type="checkbox"/> Climate Finance (Rio Markers)	
			<input type="checkbox"/> Climate Change Mitigation 1
			<input checked="" type="checkbox"/> Climate Change Mitigation 2
			<input type="checkbox"/> Climate Change Adaptation 1
			<input type="checkbox"/> Climate Change Adaptation 2
			<input type="checkbox"/> Biodiversity 2
			<input type="checkbox"/> Desertification 2