Support to the Sustainable Cooling and Cold-chain Solutions Programme in Kenya, 2025-2028

Key results:
The Community Cooling business model is validated, and scaled in Kenya, with the community outreach model strengthening farmer cooperatives and enterprises delivering reliable and sustainable cold chain services and training to reduce food loss, increase market access, and improve livelihoods through job creation among youth and women with 4 outputs; 1) 150 communities with enhanced capacity to manage cold-chain ecosystems, 2) 150 business models developed and validated and financial institutions engaged, 3) enhanced training, and 4) accelerated access to sustainable cold-chain infrastructure through Community Cooling Hub models being rolled-out to a wider portfolio of communities.

Justification for support:
Kenya's smallholder farmers have loss of 30-40% of their produce due to lack of access to an adequate cold chain infrastructure. Kenya's National Cooling Action Plan from 2022 underlines the relevance of a coherent cooling approach and includes Action 3.5 "Promotion of access to innovative business models and designing finance models" and Action 3.6 "Designing finance models targeted at small-holder farmers".
Danish co-financing is coherent with the Danish intentions as described in "A Changing World - Partnerships in Development" and can be viewed as an operationalisation in the field of ambition of the United Nations Environment Programme "Cool Coalition" supported by Denmark. The Danish cooling industry has an interest in the growing refrigeration market in Kenya that lacks sustainable models for large scale financing for smallholder farmers to take off.

Major risks and challenges:
Major programmatic risk for the project is associated with the operationalisation of the business model that will secure cooperatives and smallholder farmers access to invest in cold chain infrastructure. The size and complexity of investing in cold chain infrastructure requires that smallholder farmers have the resources to actively engage and invest in a cooperative/community approach.

File No.	25/46069				
Country	Kenya				
Responsible	Green Diplomacy and Climate				
Sector	Agriculture Sustainability				
Partner	UNEP-U4E				
DKK million	**2025**	**2026**	**2027**	**2828**	**total**
Commitment	40	0	0		40
Project disburs.	5,8	14,2	10	10	40
Duration	2025(Q4) - 2028(Q4)				
Previous grants	None				
Finance Act	FL-06.32.01.32				
Head of unit	Anne Haugaard Jensen				
Desk officer	Dorrit Skaarup Jensen				
Reviewed by	Jacob Strange-Thomsen				

Relevant SDGs

Danish support to the SCCCS programme is	No Hunger	Good Health,	Quality Education	Gender Equality	Clean Water,
Affordable Clean Energy	Decent Jobs, Econ. Growth	Industry, Innovation, Infrastructur	Reduced Inequalities	Sustainable Cities, Communities	Responsible Consumption &
Climate Action	Life below Water	Life on Land	Peace & Justice, strong Inst.	Partnerships for Goals	

Objective:

The Sustainable Cooling and Cold Chain Solutions Programme aim to establish integrated, inclusive, sustainable, and future-proofed cooling and cold-chain infrastructure at scale. The objective for the Danish earmarking to the Programme in Kenya is to accelerate access to resilient, inclusive and self-sustaining community-based cold chain ecosystems that enhance rural livelihoods, including through job creation (food processing, refrigeration engineers etc), food and nutrition security, and equitable value distribution through food system integration.

Environment and climate tagging - Principal objective (100%); Significant objective (50%)

	Climate adaptation	Climate mitigation	Biodiversity	Other green/environment
Indicate 0.50% or 100%	50%	50%	0	0
Total green budget (DKK)	20M	20M	0	0

Justification for choice of partner:

The partners behind the Sustainable Cooling and Cold-chain Solutions Programme have shown important results as to setting-up a programme since 2020 with a holistic approach that creates the local and global "field to market" connectivity to nutritiously feed 10 billion people in 2050, whilst economically empowering hundreds of millions of small-scale farmers whose livelihoods and well-being are often dependent on only 1-2 hectares of land, as well as ensure they are climate-change resilient. The programme has launched operational field activities in Kenya with national support from the African Centre for Technology Studies. The project in Kenya will secure delivery and impact through replication and scaling up outreach to smallholder farmers.

Summary:

The Danish support to the Sustainable Cooling and Cold-chain Solutions Programme will be an earmarked support to activities planned for replicability and scaling up in Kenya. The ambition is to secure availability of resources and willingness of up to 150 smallholder farmers cooperatives or communities for a cold chain investment having completed financeable business models and financial tools. These 150 cooperatives or communities will have a cascading effect for 300 extra communities.

Budget:

Overall Budget	Inception phase DKK	Q3.26-Q4.28 DKK	% Op. Costs
ACTS incl., SPOKE, Equip, travel, support from CSC	3.259.310	16.454.274	63,0
ACES incl. travel	952.313	6.397.090	23,5
Communication & Events	128.200	881.375	3,2
U4E Project Management incl. travel	522.710	2.676.175	10,3
Total Operational Costs	**4.862.533**	**26.408.914**	**100**
UNEP PSC 13%	632.152	3.433.136	
UNEP Levy 1%	54.947	298.420	
Total Disbursement to UNEP	5.549.632	30.140.470	
Reviews and monitoring	250.000	750.000	
Unallocated	0	3.309.898	
Grand total	**5.799.632**	**34.200.368**	**40.000.000**

Allocation Q3.2026 – Q4.2028 subject to approval by inception review

Ministry of Foreign Affairs of Denmark

Support to the Sustainable Cooling and Cold-chain Solutions Programme in Kenya

2025 – 2028

Project Document

4 December 2025

Ref: 25/46069

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LIST OF ACRONYMS

ACES	African Centre of Excellence for Sustainable Cooling and Cold Chain
ACTES	African Centre for Technology Studies
AfCFTA	African Continental Free Trade in Africa
BM	Business Model
CCH	Community Cooling Hub
CCN	Clean Cooling Network
CSC	Centre for Sustainable Cooling
Defra	Department for Environment, Food and Rural Affairs
DGBP	Danida Green Business Partnership
DKK	Danish Kroner
DMDP	Danish Market Development Programme
EHS	Environment, Health and Safety
FAO	Food and Agriculture Organisation
GEF	Global Environmental Fund
GESI	Gender Equality and Social Inclusion
GHG	Green House Gas
HFC	Hydro Fluor Carbon
ICA	International Copper Association
KLIMA	Green Diplomacy and Climate Department
L2V	Loss to Value
MESPT	Micro Enterprise Support Programme Trust
MFA	Ministry of Foreign Affairs
M&E	Monitoring and Evaluation
MP	Montreal Protocol
NGO	Non-Governmental Organisation
NRDC	Natural Resources Defence Council
ODA	Overseas Development Aid
OECD	Organisation for Economic Co-Operation
RTC	Refrigeration Training Centre
PSC	Project Support Cost
SCCCS	Sustainable Cooling and Cold Chain Solutions
SDG	Sustainable Development Goal
SEAH	Sexual Exploitation, Abuse, Harassment
SITA	Sustainable Inclusive Trade in Africa
SME	Small and Medium Enterprises
SPOKE	Specialised Outreach and Knowledge Establishment
SOP	Standard Operating Procedure
TBYB	Try Before You Buy
TMA	TradeMark Africa
TOC	Theory of Change
U4E	United for Efficiency
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USD	United States Dollars

Budget exchange rates

100 DKK = 15.6 USD

1 INTRODUCTION

This project document outlines the background, rationale and justification, objectives and management arrangements for development cooperation concerning Danish support to UN Environment Programme - United for Efficiency (UNEP - U4E) "The Sustainable Cooling and Cold-Chain Solutions Programme in Kenya" as agreed between the parties: UNEP – U4E and the Green Diplomacy and Climate Department (KLIMA) of the Ministry of Foreign Affairs (MFA) of Denmark. The project document is an annex to the legal bilateral agreement with the implementing partner and constitutes an integral part hereof together with the documentation specified below. This project document concerns a commitment on the part of the Ministry of Foreign Affairs, Denmark to contribute 39 million DKK to U4E in support of certain activities and deliveries of "The Sustainable Cooling and Cold-Chain Solutions Programme in Kenya".

The Sustainable Cooling and Cold-Chain Solutions Programme (SCCCS) was conceived in 2019 by the Centre for Sustainable Cooling (CSC) at University of Birmingham (UoB), Department for Environment, Food and Rural Affairs (Defra[1]) and UN Environment Programme (UNEP) United for Efficiency (U4E) with UKs Defra funding ($35M to date) with additional matched support from government, grants, and cold chain industry to increase the adoption and uptake of resilient, efficient, inclusive and climate friendly cooling and cold-chain with the triple objective of reducing food and vaccine loss, economically empowering subsistence and smallholder farmers and their communities whilst mitigating the potential environmental impact of cold-chain. Activities address the system challenge and create the comprehensive suite of services - delivered though specialised Centres of Excellence for Sustainable Cooling and Cold-Chains (Rwanda, Africa and Haryana, India) and regional Specialised Outreach and Knowledge Establishments (SPOKEs) (Kenya launched and Sénégal in scoping stage) - to accelerate the uptake of sustainable cooling and cold-chain in the Global South.

SCCCS's Vision Statement is to sustainably create and develop the cold-chain infrastructure for the agrifood and pharma vaccine value chains in emerging markets. The ambition of SCCCS programme is to create a self-financing organisation (symbiotic online platform and physical facilities) and growth business model that can deliver long-term and sustained impact, along with the immediate wins.

The present Project Document will be revised during an Inception Phase of 6 months in Q1 and Q2 2026.

2 CONTEXT, STRATEGIC CONSIDERATIONS, RATIONALE, AND JUSTIFICATION

2.1 Development problem addressed

Cold chains are critical infrastructure that are vital for a well-functioning society and economy. They are dimensional, complex, multi temperature-controlled supply chains that maintain perishable produce and/or temperature-sensitive products at their optimum temperature and environment from source to destination, preventing qualitative and quantitative product losses and ensuring their safety. They underpin our access to safe and nutritious food and health, as well as our ability to eradicate rural poverty, bring economic growth, and deliver socio-economic development. The absence of robust cold chains exacerbates multiple global challenges. The lack of robust cold chains directly results in the loss of 526 million tons of food production annually (or 12% of global production), which could feed an estimated 1 billion people in a world where 811 million people are hungry, and 3 billion cannot afford a healthy diet. Furthermore, the growth of global cold-chain infrastructure for food remains uneven. While developed countries refrigerate approximately 60% of perishable food, developing countries refrigerate only 20%. In sub-Saharan Africa, smallholder farmers, who produce 80% of continent's food often lack access to robust cold-chains, experience crop losses as high as 50%. Meanwhile, conventional cooling technologies (refrigeration, air conditioning, and fans) already account for more than 7% of global GHG emissions, with hydrofluorocarbons (HFCs) being the fastest-growing source of emissions due to increasing global cooling

[1] UK government department responsible for policies and programs related to environmental protection, food production and standards, farming, fisheries, and rural communities.

demand. We are therefore faced with a cooling paradox: the rapid growth in cooling and cold-chain needs is being met largely through inefficient and climate-polluting equipment, contributing further to global warming. This rapid increase in cooling and cold-chain needs will also strain electricity grids in many countries, presenting a major hurdle to the ongoing transition from fossil fuels to renewable energy sources. The challenge we face is how to deliver cooling to everyone who needs it equitably, rather than just to those who are advantaged and can afford it, while minimising environmental impacts and costs, and simultaneously building resilience. Achieving this requires a fundamental rethinking our approach to innovation and re-evaluating how we deliver cooling and cold-chain solutions. Latest studies confirm that Sub-Saharan Africa has tremendous opportunities for both food loss (47%) and emissions reductions (66%) under optimised refrigeration conditions.

The wicked problem to solve

Over the years, a private sector-led cold-chain business model, especially in low-income countries, resulted in cold-chains suffering from sub-optimal investments and a piecemeal approach, perpetuating issues around equitable access. This approach fails to deliver against society's most acute cold chain needs mainly because the areas that are most in need, such as small-scale and marginalized farmers, producers, and their communities, often do not present a compelling business case for the private sector. For example, because of private-sector-dominated development, around 72% of Rwanda's cold storage capacity is used for flowers, while only 1% is used for fruits and vegetables. A pivotal research question which underpins the Sustainable Cooling and Cold-chain Solution Programme is: "How do you create the local and global "field to fork" connectivity to nutritiously feed 10 billion people in 2050, whilst economically empowering hundreds of millions of small-scale farmers whose livelihoods and well-being are often dependent on only 1-2 hectares of land, as well as ensure they are climate-change resilient …. and achieve this without using diesel?".

2.2 Past results and lessons learnt

Challenges of the cold chain industry

Interventions within cold chains in Sub-Sahara typically focus solely on cold storage, disregarding or underestimating the actual cold-chain, local skills and technical training needs and appropriate business models. As a result, most interventions fail to achieve or sustain the desired impact, leading to inefficient allocation of resources and potentially higher financial and environmental costs in the long run. The World Bank, for example, has funded ten cold-storage rooms in Rwanda in the past few years, but estimated that at least 96% of the target farmer communities do not use them.

Furthermore, both in the global South and North, there is limited understanding regarding what an economically, environmentally, and socially sustainable and resilient cold chain should look like in 10-20 years. Current models are often backwards looking, based on historical equipment trends, failing to make changes to the system and future risks into account, and focus on short-term performance over long-term potentials. Given the equipment and infrastructure being deployed during the rest of the decade will likely still be in operation in 20-25 years for commercial use, this is problematic not only in terms of optimising investments and managing risks, including the impact on energy consumption from source to destination, transition to renewables, and GHG emissions, but also in terms of effectively addressing cold-chain needs over the long term and reaping opportunities.

While the horticulture farms and the floriculture industry in Kenya follow best practices for the export market, the horticulture farms that produce vegetables and fruits for domestic consumption do not meet these standards. There are several practices that should take place during production or pre harvest. Smallholder farmers producing for the domestic market have no formal training in best practices, and they generally lack access to this kind of training. Buyers in the supply chain have in certain situations tried to create a business by sourcing from local farmers in both flowers and horticulture products to sell in the export market, but they cannot find farmers who have the capacity to adopt practices that would meet international standards and produce a product for a profitable return.

The Sustainable Cooling and Cold-Chain Solutions Programme (SCCCS)

Clean Cooling is defined by Centre for Sustainable Cooling as a holistic approach that simultaneously delivers societal needs while protecting the environment:

"Clean cooling provides resilient cooling for all who need it without environmental damage and climate impact. It incorporates smart thinking to mitigate demand or active cooling where possible, is minimised, and optimal use of natural resources, and a circular economy design that includes repurposing of waste heat and cold thermal symbiosis throughout the lifespan of the cooling system".

"Clean cooling meets cooling needs while contributing towards achieving society's greenhouse gas (GHG) emissions reduction, climate change mitigation, natural resource conservation and air quality improvement. It necessarily must be accessible, affordable, financially sustainable, scalable, safe, and reliable to help deliver societal, economic and health goals as defined by the united nation's Sustainable Development Goals (SDGs)."

Detailing the ambition of the programme mentioned in chapter 1, the programme aims to deliver:

• Resilient food supply chains - addresses critical food loss challenges, enhancing food security and reducing associated economic and environmental impacts.

• Resilient and fast response vaccine and health supply chains, meeting both current demands but also building frontline defence against future pandemics and health crisis.

• Reduced energy and climate impacts from cooling, refrigeration and food loss can help the Global South transition efficiently to low-Global Warming Potential cooling options.

• Sustainable development, gender equality, and social inclusivity in the Global South, aligning with broader Oversea Develop Aid (ODA) objectives including Gender Equality and Social Inclusion.

• New market opportunity for the refrigeration and cooling sector, creating access to fast growing markets for companies in refrigeration and clean cooling technologies and services.

• Opportunities for food retailers, processors and logistic operators to engage with and build their supply chains from farm to fork.

African Centre of Excellence for Sustainable Cooling and Cold Chain (ACES)

Since the start of the SCCCS in 2020 (ACES registered as independent international NGO in Rwanda in September 2023), the Centre for Sustainable Cooling led by Birmingham University has been actively disseminated and integrated into the Programme and has been instrumental in establishing the African Centre of Excellence for Sustainable Cooling and Cold Chain (ACES) in Kigali, Rwanda. The centre was officially opened in March 2024 on a 4-hectare campus with an adjacent 200 hectare "Research Park". It includes classrooms, a Refrigeration Training Centre (RTC) and Solar Lab and Training Centre and a 200-person conference centre. Alongside a range of demonstration and testing equipment (including a state-of-the-art environmental test chamber) will open late 2025 and early 2026. ACES is presently operational with four centres of knowledge/development:

- A Research Centre on comprehensive food and vaccine cold chain design,
- A Technology Hub to demonstrate best available technologies,
- A Business Incubator to increase market connectivity and investment,
- A Knowledge Hub to enhance capacity and raise awareness of rural communities,
- An Innovation Accelerator as well as a Manufacturing and Assembly Hub are planned to be developed in 2026.

ACES delivers on the ground support to test and showcase solutions in practical, real-world applications and provide the on-site and outreach learning, training and knowledge transfer and technical assistance

centres to support local community uptake not only in Rwanda but also as a resource centre for Clean Cooling Network (CCN) and SPOKEs (see below) recognising its status as "Born in Rwanda, Pan-African in scope".

Clean Cooling Network (CCN)

To facilitate engagement with the programme and to provide further opportunities for training and knowledge exchange, a digital knowledge platform, CCN has been developed by ACES as a one-stop access to resources, expert forums, and e-learning materials. The CCN serves as a comprehensive, single-access resource, offering guidance for designing future Centres and Specialised Outreach and Knowledge Establishment (SPOKE), training courses, educational materials, practical tools, data repositories, research papers, technical resources, cold chain industry innovations, and expert presentations. Additionally, the CCN aggregates, convenes, and maintains an inclusive and dynamic global multi-stakeholder community. These have focused on a range of topics linked to cold-chains, modelling, financing mechanisms and other related challenges.

Specialised Outreach and Knowledge Establishment (SPOKE)

The establishment of SPOKE's is an integrated part of meeting the ambition of the programme as SPOKE's will be the extended vehicle of ACES and CNN in securing dissemination of knowledge and tools developed at ACES both across Africa but also globally through a franchise (reference and replicate) approach. To extend its impact ACES was designed with a "hub and SPOKE" model with SPOKEs in strategic locations across the continent to flow the knowledge and training and support out to other markets. Specifically, these SPOKEs are designed to put into practice and demonstrate real world solutions using model communities which can become the training and demonstration centres, cascading the knowledge further in their regions. The first SPOKE is in Kenya with implementation led by the African Centre for Technology Studies (ACTS) and they are working with a new Farmer Co-operative (Lari Horticulture Co-operative Ltd.) as the pilot community.

Community Cooling Hubs (CCHs)

With the ambition to present an integrated system approach to meet the diverse cooling, cold-chain, and wider energy demands of rural communities in a sustainable way - economically, environmentally, and socially through innovative "shared value" business models, CSC conceived the Community Cooling Hubs (CCHs) in 2014 and has developed it within the programme. By sharing infrastructure, CCHs make it possible for communities to access cooling and other energy services without each needing costly individual equipment. The CCH enables economies of scale and high utilisation, bringing technology to underserved rural areas in an affordable way thus enabling smallholder farmers not just to produce raw goods, but to share in the processing, marketing, and revenue of what they produce.

In many aspects the establishment/development of CCHs can be said to be at the cross road of the three outcomes of the programme (see ToC) for the communities targeted by the programme with the CCH becoming both a rural food factory and a business incubator enabling communities to "move up the value chain", shifting from exporting raw commodities and importing finished goods to producing, finishing, and packaging food products right where they are grown.

Holistic and system-level strategy

The Programme's strategy is based on a holistic and systems-level approach. Instead of focusing on siloed interventions, it deploys a coordinated suite of solutions - fit-for-purpose and market technologies, infrastructure, financing mechanisms, policies, and human capacity - to build robust, end-to-end cold chain systems that are sustainable, inclusive, and resilient. This comprehensive approach is organised around nine pillars of action: 1. Training and capacity building 2. Finance and business models 3. Market needs, value addition and consumer behaviour 4. System design and modelling 5. Energy transition 6. Technology research, testing, demonstration, and innovation 7. Manufacturing and assembly 8. One Health, including food and nutrition security, seed systems, agricultural and farming resilience, health system resilience and diagnostics, vaccine cold-chains 9. Enabling policies and thought leadership.

These nine pillars are complemented by a cross-cutting pillar on Gender Equality and Social Inclusion (GESI) ensuring that the programme identifies and addresses unequal power dynamics and disparities experienced by individuals due to their social identities, including gender, location, (dis)ability, wealth, education, age, caste or ethnicity, race, and sexuality. Key elements to date have included: GESI training courses (farmers, communities, policymakers), GESI Scoping report, GESI Framework for evidence gathering and project design, ACES Sexual exploitation, abuse, harassment (SEAH) and safeguarding Policy, ACES internal GESI monitoring and evaluation (M&E) framework.

2.3 Main partners, actors and stakeholders

Project management

UNEP, through the United for Efficiency Team (U4E), is the overall programme manager receiving as of today all Defra funding directly and managing allocation to the many stakeholders supporting of the programme through detailed Project Cooperation Agreements (PCAs) with three main partners, ACES, UoB and ACTS. Funding drawdowns from UNEP by the project partners for the agreed programmes are dependent on reporting and all partners are formally audited on completion with 15% of funding under the PCAs reserved until the final report is submitted and approved.

U4E is a global effort supporting developing countries and emerging economies to move their markets to energy-efficient appliances and equipment.

- Under the leadership of the United Nations Environment Programme (UNEP), U4E brings together all key stakeholders active in product efficiency;
- Informs policymakers of the potential environmental, financial and economic savings of a transition to high efficiency products;
- Identifies and promotes global best practices in transforming markets;
- Offers tailored assistance to governments to develop and implement national and regional strategies and projects to achieve a fast and sustainable market transformation.

U4E focuses primarily on developing countries and emerging economies, where electricity demand is set to more than double by 2030. U4E is a public-private partnership led by UNEP, the Global Environment Facility (GEF), the United Nations Development Programme (UNDP), the International Copper Association (ICA), and the Natural Resources Defence Council (NRDC) with financiers being Global Environmental Fund, Green Climate Fund, Clea Cooling Collaborative, Defra, Fond Francais pour l'Environnement Mondial.

U4E has responsibility for the programme management and roll-out of the physical facilities (centres and SPOKEs) through in-country delivery partners or teams and approving spending plans, procurement, etc. The Centres (ACES and similar in India) and SPOKEs are designed by the academic partners working with in-country partners. Multiple further meetings take place continuously across the teams and all parties have their own internal financial management, procurement and recruitment processes. UNEP also provides additional support and sign-off where required to local partners, e.g. for larger equipment procurement processes, thereby ensuring they meet appropriate rules and protocols.

UNEP through U4E and supporting partners provides very hands-on support to the local partners, including for equipment specification and procurement and the UNEP regularly visit Rwanda and Kenya to support in-country teams and sign-off on major decisions on the ground where necessary.

Beneficiaries

Beneficiaries of SCCCS reach a broad spectrum of beneficiaries, spanning communities, national agencies, and international stakeholders. Key beneficiary groups and their specific benefits include:

Smallholder Farmers and Rural Communities: Smallholder farmers in developing markets significantly benefit from access to robust cold chains, reducing post-harvest losses, enabling value addition, and

enhancing market access. In Rwanda and Kenya, ACES and its SPOKEs actively engage with communities to empower farmers (including women and youth) by offering targeted training on post-harvest management, cold-chain fundamentals, effective management practices, and business model development. Additionally, they facilitate access to innovative technologies through "try before-you-buy" schemes, supporting the development of farming cooperatives, enabling communities to test equipment, build market connections, and establish financeable business models (see description of experience in Kenya, Lari in chapter 2.3). This structured approach ultimately assists farmer cooperatives in securing financing to purchase their own equipment, fostering sustainable agricultural growth.

Food Industry: The Programme's interventions extend significant benefits beyond individual farmers, positively impacting the broader food and agriculture sector. Cold-chain development creates a multiplier effect throughout the value chain, enhancing outcomes from farm to fork. Equitable access to robust cold chains ensures that produce reaches markets in optimal condition, delivering direct benefits to traders, food processors, retailers, and ultimately consumers. Additionally, strengthened cold-chains and improved post-harvest management empower agribusinesses in developing markets to consistently meet the stringent quality standards of high-value markets, thereby unlocking new opportunities and expanding their presence in competitive global supply chains.

Renewable Energy Sector: The entire Programme has been structured around the principles of the "Cold Economy," adopting a needs-driven, systems-level perspective to meeting both current and evolving future cooling demands with minimal climate and environmental impacts at the lowest possible cost. In practical terms, most energy services required by modern societies are thermal. However, substantial amounts of readily available cold and heat are currently wasted. Although energy-efficient cooling technologies and grid decarbonisation can achieve significant mitigation, their potential alone is limited. Instead, thermal needs can be more effectively supported through thermal-to-thermal solutions rather than relying solely on electricity and chemical batteries. Central to the Cold Economy is the principle of storing and transporting energy in its thermal form directly to where it is needed, avoiding unnecessary conversions between thermal energy and electricity. This strategy aids broader energy system decarbonisation by reducing the requirement for expanding power grids and generation capacity, liberating limited renewable energy resources for other applications, lowering peak energy demands, and maximising the utilisation of intermittent renewable and waste thermal energy through thermal energy storage systems.

Government and Policymakers: National and local governments are primary beneficiaries of the Programme's initiatives, particularly through strategic policy engagement and advisory support. CCN advocates for the recognition of cooling and cold-chain as critical national infrastructure. It equips governments and policymakers with evidence-based tools designed to help plan and implement food and health cold-chains that align with national developmental and climate objectives. Additionally, CCN offers customised training sessions targeted at policymakers and financial institutions to increase understanding of cold-chain requirements, economic viability, climate impacts, and the social returns associated with cold-chain investments, ultimately driving more sustainable and effective policy outcomes.

Researchers and Academic Institutions in Africa: The Programme has a strong capacity-building effect for researchers, especially in partner countries in Africa. Over 65 researchers and experts from various countries (more than half based in Africa and India) are engaged through the Programme. These include faculty and students from University of Rwanda, Rwanda Polytechnic, the African Centre for Technology Studies (Kenya), as well as EU universities and UK.

Technology companies: ACES is dedicated to accelerating sustainable innovations to market and supports technology companies at every stage from early startups to mature enterprises, including both local businesses and international entrants (Danfoss has sponsored a cold room in Kigali and holds offline and webinar training modules on refrigeration). The extensive infrastructure in Kigali is complemented by tailored programs: early-stage companies gain hands-on incubation and acceleration support from mentorship on design and business models, while more mature companies leverage ACES as a platform to pilot and demonstrate their innovations at scale in the African market. Furthermore, SPOKEs bring solutions into local communities for on-ground demonstration and knowledge transfer, enabling technology

companies gain exposure to real customers and receive market intelligence and cold chain industry insights to inform their scaling strategies.

Project developers

At the core of the development of SCCCS, is the Centre for Sustainable Cooling (CSC), a consortium of 4 UK Universities led by University of Birmingham (UoB), a hub for academics, technical experts, policy makers, NGOs, local communities and cold chain industry experts to come together to resolve heat related challenges with sustainable cooling and cold chain solutions. CSC is established to take an holistic systems approach to delivering sustainable and resilient cooling and cold chain for all. Although CSC has a strong technological and energy underpinning, to bridge the gap between technological breakthroughs and practical implementation, CSC place equal focus on the essential non-technological aspects - finance, business models, policy and behavioural challenges. CSC has been instrumental in developing the concepts behind ACES, SPOKE and CCHs and turning these into operational organisations, including through core support to UNEP in fund raising from Defra in UK.

2.4 Strategic framework – Alignment and Synergies

The SCCCS initiative is strongly in line with the recently released Danish Strategy for Development Cooperation "A Changing World - Partnerships in Development". Two prioritised focus areas are remarkably aligned with the initiative: "A just, sustainable, and green transition" that specifically underlines the need for reduction of food waste and loss through improved cold chain systems under the guiding principle that climate adaptation efforts are guided by local needs. Secondly, "Job creation, economic growth, trade, and investment" where the strengthening of sustainable value chains, including through direct advisory services and capacity building for companies in African countries is underlined. The initiative is furthermore aligned with the Danish Strategy "Africa's century Strategy for strengthened Danish engagement with African countries" with climate adaptation and green growth ambitions within the areas of climate-adapted agriculture and food production supplemented by efforts within clean energy for cooking and cooling.

The initiative is aligned to MFAs "How to note" on Green transformation of agri-food systems – agri-food production, business and food security namely within Objective 4 "Create hope and prospects for the future through green and socially just economic recovery and poverty-oriented development" with commitment to action being to "Support the business community's involvement in the work on achieving the UN Sustainable Development Goals within areas such as energy, water, environment, food and health. Ensuring decent jobs and livelihoods in developing countries are at the heart of this work."

The SCCCS initiative is managed by UNEP as is the Cool Coalition that is supported by Denmark. It is a vital global multi-stakeholder network that connects 160 partners from governments, cities, international organizations, businesses, finance, academia, and civil society groups to facilitate knowledge exchange, advocacy and joint action towards a rapid global transition to efficient and climate-friendly cooling. The Cool Coalition and SCCCS work closely on advocacy when relevant.

A potential support to SPOKE in Kenya (namely financing the scaling up of planned activities) will complement many activities and projects supported by Denmark in Kenya and the East Africa Region:

- The Danish support to the project "Transforming Livelihoods through Climate Resilient, Low Carbon, Sustainable Agricultural Value Chains in the Lake Region Economic Bloc, Kenya", co-implemented by FAO and Agriterra with 2 key results being; 1) six climate-resilient, low carbon value chains are sustained financially and upscaled by the adoption of new business models and practices among farmers and value chain actors and 2) 130 cooperatives and 14 counties in the

Lake Region Economic Bloc will be strengthened in supporting the upscaling of the six climate-resilient, low carbon, sustainable value chains.

- The Strategic Sector Cooperation within Food and Agriculture that is in its third phase and end in August 2026. Cold Chain focus has been on legal requirements within milk, meat and fish as well as export requirements and compliance with Codex Alimentarius. The strategic sector cooperation has a strong bridge to the interest of Danish industry as the market in Kenya.
- Danish Market Development Programme (DMDP), where Denmark is supporting e.g. Solar for Cooling: Energy and refrigeration solutions for small-scale fishing in Kenya (DKK 5 million).
- The DanChurchAid "Loss to Value L2V" project (total budget 15 million DKK) funded by Danida Green Business Partnerships (DGBP) with Danfoss as a strategic partner. The project's core objective is to reduce food loss and waste by implementing scalable cold storage solutions accessible to horticulture smallholder farmers. By offering flexible and sustainable financing and payment/loan options, the project aims to make cold storage accessible to farmers, cooperatives, and traders, benefiting 2,000 farmers, 4 trader associations, and 10 commodity aggregators in Nakuru and Nyandarua in Kenya.
- Denmark has granted DKK 100 mil. to the World Bank's Food Systems Fund and the MFA collaborate with the UN, EU, global climate funds and through government-to-government cooperation to boost agri-food systems that increase productivity through climate-smart approaches.
- The project "Green employment in agriculture programme" implemented by Micro Enterprise Support Programme Trust (MESPT) 2021-2025 supported with 70 million DKK by the Royal Danish Embassy and have recently been extended. The Strategic Plan 2021-25 from MESP defined 4 strategic objectives; 1) facilitate the establishment and growth of 100 sustainable agri enterprises and integrate at least 75,000 smallholder farmers in targeted Value Chains in Kenya, 2) grow MESPT niche in financial access and inclusion in Kenya, 3) increase agricultural productivity and food safety for 75,000 smallholder farmers, and 4) increase awareness and adoption of green technologies in targeted value chains.
- The recently approved "Sustainable Inclusive Trade in Africa (SITA) 2025 – 2030" supported with 200 million DKK by the Danida, implemented by TradeMark Africa (TMA) and monitored by the Royal Danish Embassy in Nairobi. The project will support the ongoing efforts to implement the African Continental Free Trade Area (AfCFTA), which presents a key opportunity to boost intra-African trade and increase exports with a development objective "to improve livelihoods and economic opportunities through more inclusive free trade in Africa" with output 3 "Increased volumes of sea freight for containerised horticulture exports" and output 4 "Increased market access for women and youth in trade" being most relevant for SCCCS.
- Denmark support the regional innovation centre in Nairobi, which will open in 2026, that supports the government's overall desire for a stronger strategic presence and equal partnerships with countries in Africa. It will create joint opportunities between Danish and African actors within innovation, entrepreneurship, as well as academic knowledge sharing and cooperation to support mutual economic and research-based development. The intention is to support emerging initiatives and start-ups in commercially relevant markets in Africa; Kenya, South Africa, Ghana and Nigeria. In collaboration with Danish start-ups, knowledge institutions and investors, the development of innovative solutions using new technologies is supported in response to local and global challenges.

SCCCP and all cold-chain solutions projects are dependent on the existence of a private sector that is involved with supply of equipment, analysis, training, transport and sales of products and as such an element in the chain. Danish industry is present in Kenya and already involved in the horticulture export and has

shown interest in various aspects of cold chain, namely Danfoss (involved in ACES in Kigali), CT Technology, Vestfrost, and Mærsk. During October, the Embassy of Denmark in Nairobi hosted a roundtable on Financing for Agri-Food Cold Chains in Kenya, co-chaired by Danfoss and the Ministry of Foreign Affairs of Denmark. The dialogue brought together experts and private-sector partners to explore innovative finance and business models that can reduce food loss, empower smallholder farmers, and advance Kenya's National Cooling Action Plan. Field trips to the respective cold-chain community projects of L2V and SPOKE/Lari were also arranged.

2.5 Justification

Criterion	Justification
Relevance	SCCCS has presented an ambitious holistic approach with many stakeholders in securing a sustainable resilient equitable cold chain with focus on from farm to fork and is continuously developing/testing approaches suited for the African continent. Kenya's smallholder farmers have loss of 30-40% of their produce due to lack of access to an adequate cold chain infrastructure. Kenya's National Cooling Action Plan from 2022 underlines the relevance of a coherent cooling approach and includes Action 3.5 "Promotion of access to innovative business models and designing finance models" and Action 3.6 "Designing finance models targeted at small-holder farmers". As presented in annex 1, the figure linking Sustainable Resilient Equitable Cold Chain to social, economic and environmental benefits have a positive impact (to a larger or lesser degree) on all 17 SDG's.
Effectiveness	The SCCCS team has shown important results in only 5 years in terms of setting-up ACES (and another Centre in India), having defined training courses, developed CCN as the virtual platform and launched a SPOKE platform in Kenya with all basic Standard Operation Procedures in place. SCCCS have had a very effective communication that have increased the number of stakeholders including the cold chain industry. SCCCS is presently shifting towards practical implementation and measurable impact, aiming for accelerated scale-up. Central to this transition is ensuring equitable access for all stakeholders, especially poor, disadvantaged, and marginalised farmers, communities, women, and youth having the ACES campus in Rwanda as a central hub for research, policy advocacy, training, and technology demonstration in clean cooling and sustainable cold chains.
Efficiency	The core group behind SCCCS have been capable of pooling a variety of different stakeholders (Universities, Government, Cold chain industry) with an openness, perseverance and risk willingness to build the programme. The UoB have been instrumental (also before 2020) in communicating internationally about cooling, cold-chain paradox and seeing cooling as a critical infrastructure. The CCN set-up is operational and a strong tool/platform for knowledge sharing. The team behind SCCCS have been excellent in taking up the new ways of making distant work operational during the Covid-19 pandemic.
Impact	SCCCS have set-up an operational centre, ACES in Kigali where cooling technology start-ups have demonstrated their solutions and ACES is hosting a test centre. Being

	a try research, testing, demonstration, innovation, and training hub "Born in Rwanda but pan-African in vision". 150 training modules have been developed, with training of 400 individuals (39% women) that includes farmers, community leaders, health professionals and trainers. The ambition is to reach 5000 students over the next 2 years. SPOKE in Kenya is operational and has launched its first pilot cooling and cold chain cooperative in March 2025.
Sustainability	As described under relevance, the programme will have impact on a high number of the SDG's but specifically SDG 2 (Zero Hunger), 5 (Gender equality), 8 (decent Work), 13 (Climate Action), 15 (Life on Land) and positively support the ambition of the Kigali Amendment to the Montreal Protocol. In Kenya, the SPOKE approach will strengthen the further development of the cooperative culture that have been supported by Danish development aid for decades by focusing cooperatives on cold chain with many of them resulting in Community Cooling Hubs strengthening the bargaining power of smallholder farmers. Reduce GHG emissions having a programme that is entirely structured around the principles of Cold Economy (move away from conventional refrigeration, reduce food waste, decentralised mainly PV technologies, storing and transporting energy in its thermal form, reuse of waste heat).
Coherence	Danish support to the SCCCS programme is coherent with the Danish intentions as described in A Changing World Partnerships in Development the World and can be viewed as an operationalisation in the field of ambition of the UNEP Cool Coalition supported by Denmark. The Danish cooling industry has an interest in the growing refrigeration market in Kenya that lacks sustainable models for large scale financing from smallholder farmers to take off. In Kenya, the SPOKE approach is in full coherence with the National Action Plan on Cooling.

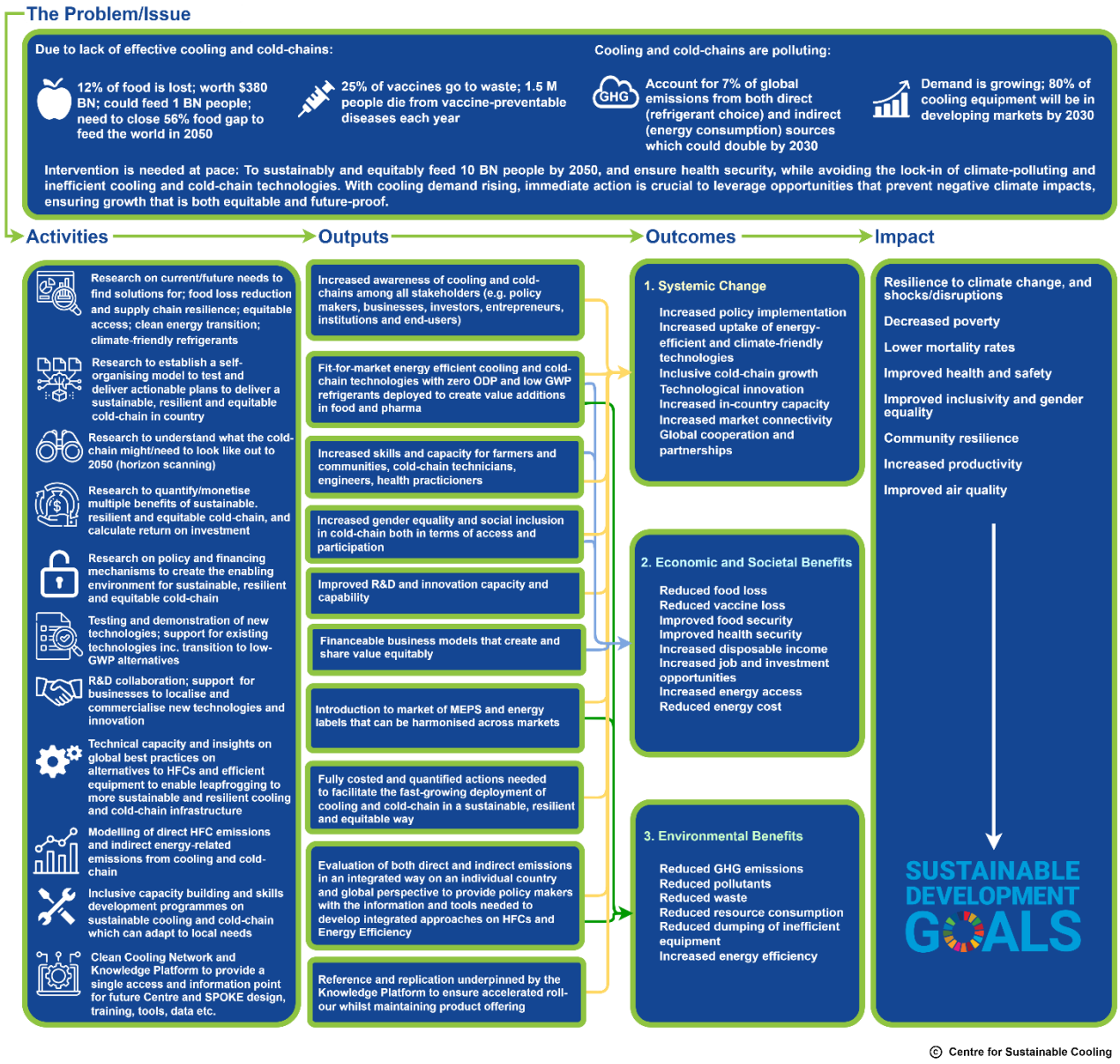
3 PROGRAMME (SCCCS) OBJECTIVE, THEORY OF CHANGE AND PROJECT DESCRIPTION

3.1 Programme (SCCCS) objective

The programme objective is "The Sustainable Cooling and Cold-chain Programme aim to establish integrated, inclusive, sustainable, and future-proofed cooling and cold-chain infrastructure at scale".

3.2 Theory of Change

The SCCCS present the following Theory of Change (ToC) established having activities, outputs and outcomes as a response to two main issues on cooling and cold chains. Outcomes and Impacts are described at a very generic level and are not suitable for inclusion in a results framework.



Problem/Issue

To meet Agri-economic, nutrition and health goals, the urgent challenge for emerging economies is scaling 'Farm Gate to Market' and 'Manufacturer to Arm' cold chain capacity and infrastructure and ensuring its seamless operation from source to destination. Cold chains are vital to help the food system deliver food that is affordable, nutritious and safe, whilst providing optimal returns to farmers and others in the value chain and minimising environmental and climate impacts.

A cold chain is however not a cold store. It is a complex system that requires accountability from multiple levels through the chain, varying by country and depending on local economic, environmental, social, cultural and political circumstances. For food, they typically involve primary processing (such as sorting and grading), precooling, cold storage, refrigerated transport as well as domestic storage to maintain the safety, quality and quantity of food produce. However, these processes are energy-intensive, often relying on diesel and fossil fuel-based power generation, whether on- or off-grid, and use refrigerants with a high climate impact. As the uptake in demand for cold chain technologies increases in developing countries, the dumping of inefficient technologies exists (new or second hand), locking countries into costly, high-carbon, energy-inefficient cooling pathways.

From a whole system perspective, it is also important to integrate elements of the wider food system, such as on-farm/close to farm food processing, which can unlock many value addition opportunities. Food processing can take many forms, including freezing, curing, drying, pasteurizing, fermenting, canning,

aseptic packaging, etc. and can provide significant economic benefits by extending the usable life of food products or reducing need for cooling. Such an integrated system is also needed for the healthcare sector, to allow for the proper storage and deployment of vaccines.

The challenge of designing sustainable supply chains has been tackled to date in a disintegrated way, looking at energy and food separately. This programme of activities approaches this global issue from a synergistic perspective, having the nexus between food and energy at the core of its activities.

Activities

The funding provides continued support for activities aimed at optimised implementation of the Kigali Amendment and the development of sustainable cooling and cold chain solutions, for faster action on HFCs under the Montreal Protocol (MP) and parallel improvements to the energy efficiency of cooling equipment making a strong contribution to climate change objectives.

The programme is unique in that all the activities target the whole cold chain which has never been done before, with expert input at all stages from academics, industry and governments. The findings from the surveys in the early needs assessment underscore the lack of comprehensive cold-chain. The common barriers are identified in finance, technical, social, policy and management areas. Furthermore, the assessment shows that training and capacity building on the benefits of cold chain is what is currently needed to enable uptake in cold chain technologies and is the gap this programme can support.

In developing countries where populations depend heavily on agriculture for their livelihood's rural women and youth under age 18 are the most vulnerable groups in the context of this programme. There are inequalities regarding the distribution of this support which is an ongoing challenge. Women lack access to agricultural land and finances, and relevant skills to successfully develop agri-businesses. Women also earn less than men and are more frequently engaged in unpaid and informal agricultural work. The programme will tackle this through providing both groups with the education and training to equip them to pursue higher value-added economic opportunities beyond the traditional subsistence farming pathway. Further, women are disproportionately affected by energy access, the programme looks at how energy efficient cooling technologies can improve the lives of women and other underserved populations living in remote areas through saving both time and money. Access for these marginalised groups will run through all activities through ensuring female participation in training.

Outputs

Activities will accelerate and grow a network of resilient and climate friendly solutions across cold chain and refrigeration (food and vaccines) networks. This will lead to a range of outputs addressing all aspects of the cold chain.

• Improved understanding of the cold chain for key stakeholders including farmers and medical staff, as well as governments. Currently this is lacking and leading to present interventions from other donors to fail. The assessment of needs showed a social lack of awareness, especially in rural communities. Fresh products are preferred to refrigerated products, which discourages investment into cooling equipment.

• Developed policy for governments through guidance and advise to policy makers on how to effectively implement climate friendly, energy efficient solutions across the cold chain, in line with government aims and visions to ensure uptake.

• Sustained engagement through exchange of lessons learnt through a hub and spoke model and instilling change within government processes to maintain progress.

• Climate benefits from improved energy efficiency and use of climate friendly equipment from the capacity building and training for refrigeration engineers and the improved guidance to governments. Training in maintenance and securing buy-in from stakeholders before undertaking the capacity building will ensure behaviour change is realised.

• Research outputs through on the information being collected and the use of models to fully understand the problems of the cold chain and take action from these outputs.

Outcomes

a) Transformational Systems Change: Through an increase in policy and technical capacity within country on sustainable cooling and cold chain solutions to deliver a transformational systems change.

b) Economic and Societal Benefits: Through an increase in skills and jobs for refrigeration engineers and technical capacity for farmers on sustainable cooling and cold chain solutions to deliver economic and societal benefits.

c) Environment and Climate Benefits: Through reduced food loss due to improved availability of sustainable, climate friendly cooling and cold chain solutions to deliver environmental and climate benefits avoiding locking into obsolete, polluting technologies, because food saved is as important as food produced.

These outcomes are all focused on key stakeholders (farmers and businesses) and creating systemic change within countries (policy level). Ensuring engagement and uptake of practices are addressed at every stage of the cold chain.

Assumptions

The SCCCS programme has not presented any assumptions linked to the presented TOC but given the very overall and holistic nature of the TOC, with effect on all SDG's. The TOC is more of an orientation guide for the programme and as such, and not readily an operational tool for programme implementation. Viewed as an orientation guide, the number of assumptions would be very long and not operational either.

3.3 The Danish supported project

The Danish contribution is not suggested to be a general funding support to SCCCS, but an earmarked funding to the SPOKE activities (briefly presented in chapter 2.2 and annex 7 for more details) in Kenya where the funding will be supporting delivery and impact through validation, replication and scaling up.

As opposed to the SCCCS that has been titled as a Programme, the Danish contribution will be termed Project in the following.

To date, Defra have funded the initial development of the SPOKE programme through the activities in Kenya. This has involved several related areas including the purchase of 2 sets of "Try Before You Buy" (TBYB) cold storage units including vehicles as well as supporting staff costs in country. Defra has also funded the development of the SPOKE concept with related supporting tools (playbooks, manuals, SOPs, EHS etc) as well as the design and development of all the training content that is being delivered in country. To date, this has supported the delivery of the first community/cooperative to receive a TBYB unit since March 2025 and a second community/cooperative is being launched in Q4 2025 with a second TBYB unit.

The Danish contribution will impact the ambition level that is presently possible with the Defra funding. It is planned that a revised ToC will be developed during the Inception Phase as the present ToC is evaluated to be too generic. The revised ToC should finetune on the resilience building focus of farmers and community level implementation. The new ToC "SPOKE Kenya" should still relate to the overall ToC formulated for SCCCP by integrating the Activity "Inclusive capacity building and skills development programmes on sustainable cooling and cold chain which can adapt to local needs" with;

- Output 1 "Increased awareness of cooling and cold chain among all stakeholders (policy makers, businesses, investors, entrepreneurs, institutions and end-users",
- Output 3 "Increased skills and capacity for farmers and communities, cold chain technicians, engineers, health practitioners",
- Output 4 "Increased gender equality and social inclusion in cold chain both in terms of access and participation" and,

- Output 6 "Financeable business models that create and share value equitably",

Contributing to outcome 2 (Economic and Societal Benefits) and 3 (Environmental Benefits).

The Danish funding will be supporting the replication activities not included in the Defra funding, i.e. Defra has funded the tools, design and approach for reference and replicate (the franchise model) but not it's deployment. Defra will continue to fund the ongoing core design and tools (training evolution, enhanced TBYB design and testing, CCH design and testing, SPOKE playbook etc). SPOKE development in Kenya is thus highly dependent on all tools/procedures/standards/equipment testing developed and supported by ACES in Kigali for a Pan-African roll-out.

Denmark funds are focussed on:

- Purchase of 3 extra units of TBYB cold storage including some processing equipment supporting long term CCH ambitions,
- Replication through up to 150 farming communities/cooperatives over the years 2026-2028 with deep dive training and Business Management support including ACTS and SPOKE management team support,
- Contribution to leadership and expertise support from academia's,
- Financing SPOKE Kenya strategic management team,
- Contribution to marketing/comms support.

Justification for the Rio Marker scoring of the project is given in annex 6.

3.4 Project implementation

SPOKE programme

The core SPOKE programme works in two phases - Phase 1 – Building the community ecosystem for resilient cold-chain and Phase 2 – Try Before You Buy. Complementing these, another key overarching pillar in the wider programme is training future trainers who can then go out and work either developing the model in their own communities or create a career supporting other communities. The programme also runs a variety of underpinning foundation, policymaker and wider training programmes (in-person and online) including technical training for refrigeration engineers, as well as GESI training.

Phase 1 – Building the community ecosystem for resilient cold-chain

The SPOKE management team provide the essential enabling mechanisms, tools, technology, and targeted training necessary to support community leaders and the wider community establish grassroots, community cold-chain ecosystem. The goal is to build the capacity within the community – and the underpinning business model - to position itself as a key pillar in the food system and become a self-sustaining, resilient and adaptive engine of sustainable growth - boosting rural incomes, building resilience, and creating inclusive job opportunities, including for youth and women.

Key elements

- Training – from postharvest management and market connectivity to value addition, inclusive Business Model (BM) development and the day-to-day operational processes and health & safety.

- Value Addition – not simply reducing food loss and market connectivity but better understanding the full resource, need and cold-chain value and opportunities for localised and micro-enterprise

value addition activities built on access to cooling, including, for example, food processing, waste to energy and ancillary services.

- Technology Enablement - Alongside physical hardware, digital platforms and data analytics are critical tools for market connectivity and tracking and tracing to make ecosystems scalable and responsive, empowering micro-enterprises and decentralising decision-making to drive innovation.

Phase 2 – Try Before You Buy

Once the foundational ecosystem, community engagement and business model are in place, Phase 2 introduces the "Try Before You Buy" (TBYB) programme to jump-start cold-chain adoption by removing upfront risk for the community. In a TBYB, a package of basic cold-chain equipment (which could include, for example, pre-cooling, cold storage, processing equipment, temperature-controlled vehicle) is loaned to the community at no cost for a trial period. The equipment is temporarily installed and used by a farmer cooperative/community for a set time (e.g., one harvest season), during which the community can test out their business model in real conditions - and with ongoing support and mentoring during this period. The primary objectives of the TBYB approach include:

- Farmer communities and households gain first-hand experience of the tangible benefits of cold-chain and value-added activities.
- With continued mentoring and support during this period, communities can develop, test, evaluate and refine their business models and operational details, including logistics for aggregating produce, fee structures for cold-chain services and bundling of other income streams, and market connectivity strategies.
- By demonstrating proof-of-concept and practical viability, TBYB builds confidence among investors and financial institutions to provide financing, as well as among farmers and cooperatives to invest in their own fit-for-purpose cold-chain infrastructure.

Ultimately, TBYB bridges the gap between initial interest and long-term adoption by providing communities with concrete evidence of feasibility and economic viability. During the trial phase, ongoing support and training are provided, assisting communities in troubleshooting operational issues, reinforcing best practices, and gathering critical performance data. This sustained guidance better ensures that communities are well-prepared and confident in their ability to secure finance and independently manage and sustain cold-chain operations beyond the pilot period.

Experience from first SPOKE in Kenya at Lari community

The field-level application of the model is still relatively new; first pilot community in Lari being deployed in March 2025 and a second presently being started up. Preliminary findings are over all promising: Up to November 2025, 200 smallholders have reportedly registered to join the cooperative and more are joining as they see tangible benefit in aggregating their produce through the cold-chain and collectively marketing their quality produce to higher-end markets. On average farmers are able to get a price premium of 50% for their produce due to the project (See annex 11). The community is now seeking finance to implement their business plan and purchase their own cold-chain equipment.

Inception Phase

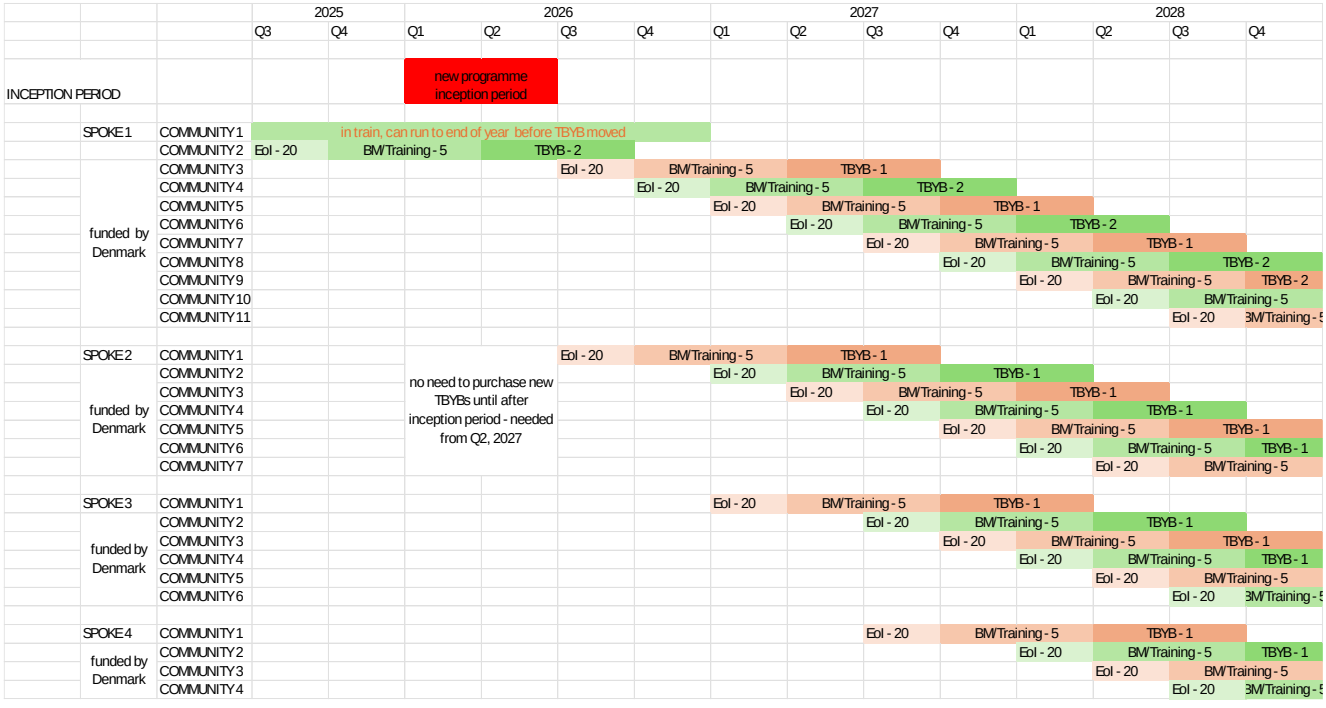
Given status in the detailed planning of SPOKE in Kenya with incorporation of lessons learnt from implementation of TBYB with first communities in Kenya (Lari), including refinement of business plans as

well as the need for ACTS to have sufficient time to organise the institutional set-up for scaling up (including internally at ACTS), an Inception Phase of 6 months starting January will be included.

The Inception Phase will deliver an updated project document to be reviewed by MFA/KLIMA to be attached the Agreement between UNEP and MFA as a post-inception amendment. The activities of the Inception Phase are described in chapter 3.5. The Inception Phase will end with a review by KLIMA of the Inception Phase including a value for money review of the CSC &Academics and ACES's contribution (during inception and forward) to the project.

The Gannt chart below, shows the initial plans for the Danish contribution. It is expected to raise number of communities to be targeted from the 61 financed by Defra with 150 more because of Danish funding. That might be revised because of the Inception Phase, but the dynamics of moving the TBYB forward "through" communities will be maintained.

Each community receiving a TBYB unit have been selected through the following process: An EoI is launched amongst 20 communities in a selected county and for a specific value chain and amongst those, 5 are selected for receiving the training for Phase 1 as described above and only 1 end in having the possibility of borrowing a TBYB unit. As can be seen from the Gant chart below, it is furthermore expected that half are of the communities in SPOKE 2, 3 and 4 will, after Business Model development and training have a financeable BM ready for investment (thus not requesting a TBYB unit). Another option might be that the TBYB period can be shortened from the six months indicated in the chart to 3-4 months allowing for a faster rotation of the TBYB units and this is expected as the project matures.



3.5 Summary of the Results Framework

The following (pre-inception) results framework will be adjusted/revised during the Inception Phase taking into account a SPOKE Kenya ToC has been developed including impact and output indicators. The final results framework will be used for results-based management, learning, and reporting. Progress will be measured using the agreed framework and the table below sets out the overall project objective, the activities to support this and then four outputs.

The approach and numbers below assume three new TBYB packages are purchased using Danish funding to support activities and these will complement the two existing TBYB packages already purchased and in country through Defra funds.

Project		Support to the Sustainable Cooling and Cold-chain Programme, Kenya focus, 2025-2028	
Project Objective		To scale the SPOKE model to accelerate access to resilient, inclusive and self-sustaining community-based cold-chain ecosystems that enhance rural livelihoods, including through job creation (food processing, refrigeration engineers etc), food and nutrition security, and equitable value distribution through food system integration across Kenya	
Impact indicator		TBD	
Baseline	Year	2026	0
Target	Year	2028	TBD
Outcome 1		The Community Cooling business model is validated, and scaled across Kenya, with the community outreach model strengthening farmer cooperatives and enterprises delivering reliable cold chain services and training to reduce food loss, increase market access, and improve livelihoods through job creation including in youth and women	
Outcome indicator		Cooperatives/communities in targeted Counties have designed, specified and costed their own Community Cooling Hub	
Baseline	Year	2026	1 cooperative onboarded end 2025
Target	Year	2028	150 down-selected communities with completed financeable business models and financial tools
Outcome indicator		5 key financial institutions engaged, with Business Models tools and template peer reviewed and accepted	
Baseline	Year	2026	0
Target	Year	2028	5
Outcome indicator		"Seeing is Believing" - communities visit and learn from TBYB cooperatives /communities	
Baseline	Year	2026	0
Target	Year	2028	300 (based on 10 community visits to each of the TBYB cooperatives/communities)
Output 1.1		Enhanced community capacity to manage cold-chain ecosystems	
Output indicator		1. Number of trained community leaders and members 2. Number of communities with investment-ready business plans to invest in CCH 3. Number of communities engaging with TBYBs or CCHs to learn about investing in cold chain	

		4. Access to trained personnel to support activities	
Baseline	Year	2026	1. 0 2. 0 3. 0 4. 0
Target	Year	2028	1. TBD 2. TBD 3. TBD 4. TBD
Output 1.2		Business model development and validation including financial community engaged	
Output indicator		1. Number of new SPOKEs established providing outreach training 2. Number of community farmers identified and engaged 3. Number of communities with validated business models 4. Number of financial institutions engaged and actively ready to support communities	
Baseline	Year	2026	1. 0 2. 0 3. 0 4. 0
Target	Year	2028	1. TBD 2. TBD 3. TBD 4. TBD
Output 1.3		Enhanced training	
Output indicator		1. Number of new community-based trainings developed 2. Number of new wider training portfolios developed and implemented 3. Number of Kenyans registered on the CCN online training platform and trainings completed	
Baseline	Year	2026	1. 0 2. 0 3. 0
Target	Year	2028	1. TBD 2. TBD 3. TBD

Output 1.4		Accelerated access to cold-chain infrastructure and integrated value addition through of "off the shelf" CCH models to roll-out to other communities and engage a wider portfolio community through site visits to the model communities and general engagement	
Outcome indicator		1. Number of communities securing funder engagement 2. Number of value-added activities initiated 3. Percentage reduction in postharvest losses 4. Increase in farmer produce sold and new enabled markets 5. Strengthened operational systems	
Baseline	Year	2026	1. 0 2. 0 3. 0 4. 0 5. 0
Target	Year	2028	1. TBD 2. TBD 3. TBD 4. TBD 5. TBD

Inception Phase activities

During the Inception Phase a sounding board structure will be established to monitor and guide the partners. The sounding board will meet at launching, midterm and end of the Inception Phase. UNEP-U4E will be responsible for calling in and preparing the meetings. The sounding board will include representatives from Defra and MFA. Meeting should also present development on the more detailed Monitoring Evaluation and Learning system being prepared by Defra and UNEP.

KENYA ROLL-OUT - INCEPTION PERIOD January - June 2026							
Task	**PARTNER**	**January**	**February**	**March**	**April**	**May**	**June**
CONTRACTING with Dilivery Partners	ALL						
MARKET RESEARCH AND NEEDS ASSESSMENT	ACTS						
Data collection frameworks Define - key Kenya regions to support, - baseline against which to measure impact - market development opportunities, etc.							
KENYA FOOD CORRIDOR RESEARCH AND ENGAGEMENT							
Value chain analysis for dominant crops	ACTS						
Build-up potential off-takers and routes to market / financial models							
Validate business model(s)							
Kenya Food System Design and RoI model	HWU						
(using data from Market Research and Needs Assessment)							
Based on updated research							
SPECIFICATIONS FOR COMMUNITY COOLING HUB	LSBU						
RfQ for TBYB equipment	LSBU						
THEORY OF CHANGE - Gantt chart and targets	ACES/ACTS						
Detailed programme plan and gantt chart							
MEL FRAMEWORK	ACES						
COST VERIFICATION AND BENCHMARKING	ALL						
GOVERNANCE AND REPORTING STRUCTURES (incl. multi donors)	ACES						
MAP OUT RECRUITMENT NEEDS & TORS	ACTS						
COLLATE ALL MATERIALS AND TOOLS	ACTS						
ENGAGE AND DEVELOP 2nd SPOKE TEAM	ACES						
MAP OUT SPOKES 3 AND 4 AND COMMENCE ENGAGAEMENT	ACES						
Initial STAKEHOLDER ENGAGEMENT							
Government, industry, and other potential donors, etc	ACTS/UoB						
Financiers for CCH	ACTS/UoB						
Community engagement	ACES						
ANNOUNCE AND LAUNCH PROGRAMME and	ACTS/UoB						
CREATE COMMUNICATIONS PLAN and template tools	ACTS/UoB						

Activities during implementation

Without being exhaustive the activities below will be part of the work programme to support the output deliveries:

- Co-design, test, and validate community-based cold chain business models with GESI integration
- Create the necessary workforce to deliver predictive health management, environmental health safety, and inclusive business training via CCN portfolio
- Engage the finance community and develop the tools to enable financial support to communities
- Facilitate Try Before You Buy (TBYB) trials with mentoring and performance tracking to scale proof of concept in cold chain integrated farmer-focused enterprises
- Deploy digital platforms for traceability and market connectivity

- Support Small and Medium Entreprises (SME) enterprise development around cold-chain access
- Design and test scaling approach for accelerated Community Cooling Hub (CCH) deployment

In parallel to the Danish funding, several Innovation and Testing activities will be performed in Kenya; testing of new technologies/equipment, evaluation and improvement of training modules, and reduction of system failures, all under Defra funding.

The on-the-ground SPOKE activities in Kenya will on a continuous basis benefit and interact with ACES in Kigali that will continue to be a research and demonstration hub. This will include:

- Design, through validated models, the integrated food corridors, nodes and modal systems that can link Africa's production zones to major national, regional and markets.
- Help harmonize standards and unlock regional value chains.
- Build and test novel business and financing models.
- Develop and test value addition, technology adoption and climate-smart practices.
- Develop the training programmes (including Technical and Vocational Education and Training) and tools for all key stakeholders (farmers, engineers to policymakers).
- Place youth at the centre of this transformation.
- Support business incubation and help catalyse investment in Agri-tech start-ups.
- Strengthen partnerships – public and private, domestic and international – to invest in climate-resilient agriculture, storage, cold chains and other logistics systems.

Assumptions

The SPOKE project in Kenya is based on a few critical assumptions;

- The success of the project is highly dependent on the assumption that it is possible to develop a financeable business model at cooperative/community level that allows them to invest in cold chain infrastructure.
- Having a financeable business model in place at cooperative/community level, the implementation of it requires that financial institutions have the trust in the model and can limit their risks.
- The individual smallholder farmers have the necessary resources, capabilities and culture to engage in cooperative/community approach with sufficient appetite and trust to take the risk of the investment.

4 INPUTS/BUDGET

The Danish contribution of this three-year project amounts to a total of 39.000.000 DKK.

The Danish contribution is supporting the project in Kenya with parttime cost of manhours of the many stakeholders engaged in the programme. The four Outputs as per the result framework are the result of efforts/contribution of many entities of the programme and a distribution of budgets per outputs has not been possible to establish.

The Danish support can only be spent on activities eligible as Official Development Assistance as defined by the Organisation for Economic Co-Operation (OECD) Development Assistance Committee (DAC). Beyond the limits defined in the Financial Management Guideline (10 pct.), funds cannot be transferred between the budget lines without prior approval from MFA. Expenditures beyond the total grant cannot be reimbursed to UNEP – U4E.

UNEP charge a Project Support Cost (PSC) of 13 pct. plus the 1 pct. UN Levy. The level of 13 pct. is in accordance with the decisions and directives of UNEP's Governing Council and covers the PSC of UNEP administering the contribution. The 1 pct. UN Levy is pursuant to UN General Assembly Resolution 72/279 of 31 May 2018 and is to help fund the UN Resident Coordinator System. This is the same Project Support Costs and Levy as per the Government of Denmark's previous contribution to the Cool Coalition.

Budget allocation for the period Q3.2026 to Q4.2028 will depend on the Inception Review carried out by KLIMA. The review will evaluate progress including assess the value for money of CSC & Academics contribution as well as ACES's contribution to the project during the Inception Phase and the beyond implementation.

Summary budget in DKK

Overall Budget	Inception Phase DKK	Q3.26-Q4.28 DKK
ACTS		
Staff + Alpha SPOKE	548.055	5.646.337
SPOKE 2	147.255	1.517.095
SPOKE 3 and 4		2.294.233
Equipment	1.903.770	4.974.254
Travel ACTS	19.230	419.855
Support from CSC & Academics	641.000	1.602.500
ACES incl travel	952.313	6.397.090
Communication & Events	128.200	881.375
U4E Project Management incl travel	522.710	2.676.175
Total operational costs	4.862.533	26.408.914
UNEP PSC13 %	632.152	3.433.136
UNEP Levy 1%	54.947	298.420
Total disbursement to UNEP	5.549.632	30.140.470
Reviews and monitoring	250.000	750.000
Unallocated	0	3.309.898
Grand total	**5.799.632**	**34.200.368**

5 INSTITUTIONAL AND MANAGEMENT ARRANGEMENTS

UNEP's United for Efficiency (U4E) team is the overall programme administrator, overseeing all funding, reporting and delivery both from its internal expert team and external delivery partners. U4E has a diverse array of market transformation projects spanning the globe since its founding in 2019.

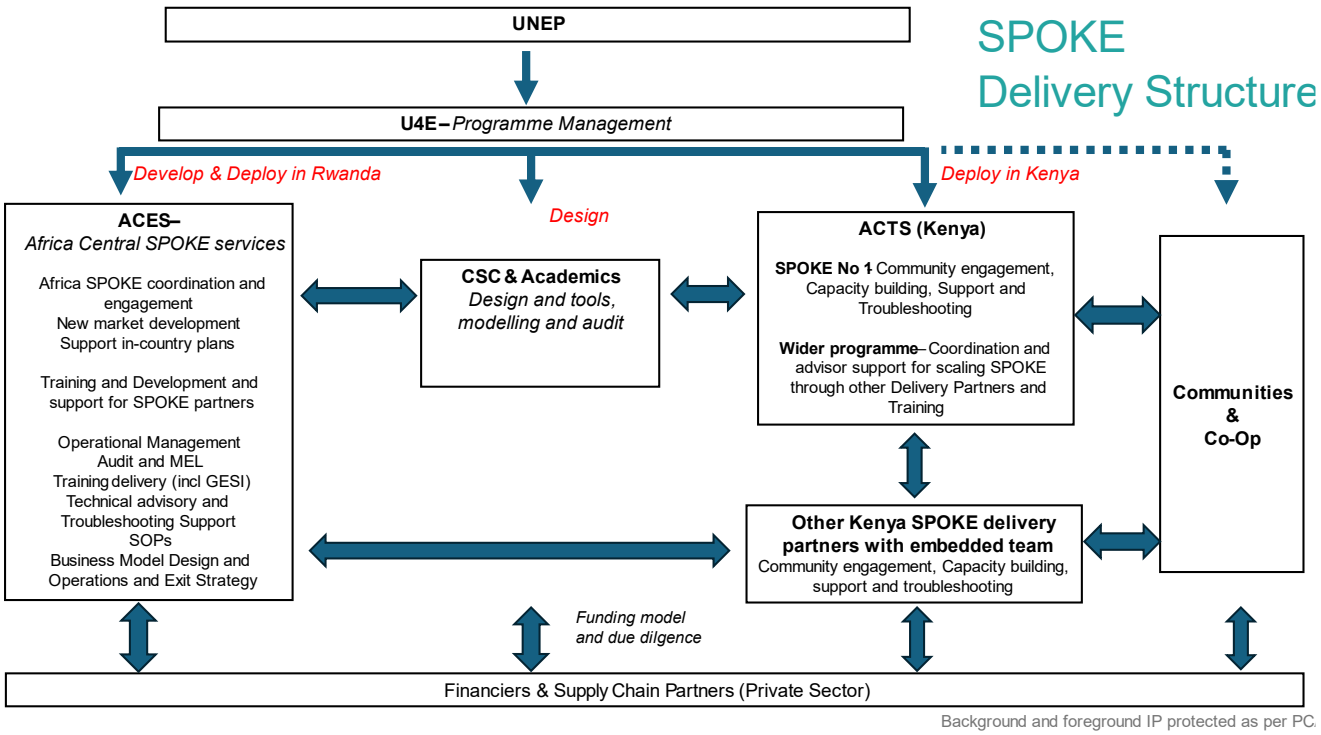
U4E's lead is a senior Programme Manager. In UNEP more broadly, Climate Change Division CFO provides fiduciary oversight independent of the U4E team, procurement oversight is provided by a Procurement Officer, and a diverse array of administrative staff provide further support on all contracts and reporting to ensure compliance with the UNEP Project Management Manual, UNEP Evaluation Manual, UN Procurement Manual, and other pertinent protocols. programme.

The main delivery partners for SPOKE implementation in Kenya is the Africa Centre for Technology Studies (ACTS). ACTS is a non-profit, non-partisan, intergovernmental think tank, founded in 1988, whose mandate is to strengthen the capacity of African countries and institutions to harness science, technology, and innovation (STI) for sustainable development. ACTS's headquarter is located in Kenya. ACTS employs 70 staff and consultants who implement more than 40 projects in more than 25 countries with 100+ partners.

ACTS is structured around five programmes. The programme on "Agriculture, Food & Nutrition Security", promotes science, technology and innovation-driven solutions for strengthening food and nutrition security, inclusive livelihoods, and resilient agri-food systems in Africa. The Programme contributes to SDG goals on food security, trade, and sustainable agri-food transformation, and have the following focus areas; i) resilient smallholder-focused agri-food transformation, ii) digital-led agri-food transitions, leveraging regional trade for inclusive agri-food systems, iii) sustainable commercialization of agri-food systems and iv) gender-transformative agri-food systems.

The ACTS project "Circular Bioeconomy for the Kenya Dairy Sector" has students attached which are supported by Danish Fellowship Centre. The workshop on "Dairy Industry Sustainability through Adding Value to Processing Side streams" engaged Roskilde University Centre, DTU and Arla.

The scaling-up of the SPOKE programme in Kenya will be the responsibility of ACTS who will coordinate, manage, train and support the 1 to 2 extra delivery partners having the local presence and knowledge when the SPOKE project extends beyond Kiambu county. The plan for upscaling of ACTS implementation capacity will be included in the Inception Phase.



The SCCCS programme has recently set up a Steering Committee with Defra that meets quarterly. As incoming donor, MFA will participate in the quarterly Steering Committee meetings. The development of SPOKE in Kenya will be a permanent item on the agenda.

Specialised expertise outside of U4E is secured through Project Cooperation Agreements and Small

Scaling Funding Agreements (USD $200,000 and below) with organisations that must go through a due diligence process and validation by a partnerships committee. An important advisor across the programme is the University of Birmingham-led Centre for Sustainable Cooling, with a consortium of additional universities engaged due to their specialised areas of expertise. For ACES implementation in Rwanda, the main delivery partner is the ACES Institute. These contracts are reviewed and approved by senior management, based on standard UNEP legal requirements, and entail regular progress and financial reporting to U4E which is further checked by UNEP Admin, and subject to audit. All staff members are competitively selected and undergo evaluations on every contract to ensure compliance with ToRs.

The programme conducts a semi-annual check-in discussion with a PowerPoint presentation covering key areas addressed in the annual report. Risks are captured in annual reporting and semi-annual check-in calls. Within the programme delivery team (ACES, ACTS, SCS & Academics), there are regular working group meetings and daily interactions through calls and email, as well as site-visits for in-person assessments and deliberations as needed. Risk monitoring is ongoing by the project team, with standard operating procedures established and in force to escalate any matters which are not readily resolved at the most immediate level and timeframe. Risk reporting to the donor is proactively conveyed via email to the donor should an incident arise, that could cause significant impact to the programme, and a meeting is undertaken should the situation warrant.

6 FINANCIAL MANAGEMENT, PLANNING AND REPORTING

Funding contributions are made through an official donor agreement signed by UNEP senior management and the donor entity (See annex 9), with clear delineation of the purpose of the funds, duration and associated requirements. UNEP's Paris office has a Financial Management Officer who leads the administration and financial management of the project, has financial control on expenditures and ensures financial reporting. With respect to financial management, the donor agreement between UNEP and MFA, includes the following critical sections which are summarized here and further elaborated in the donor agreement:

• The contributions shall be made and transferred in Danish Kroner (DKK).

• The value of the payment, if made in a currency other than United States dollars, shall be determined by applying the United Nations operational rate of exchange in effect on the date of payment. UNEP shall acknowledge in writing receipt of contributions in Danish Kroner as well as the equivalent amount in US dollars at the rate of exchange applicable on the date of receipt of the contribution.

• UNEP shall receive and administer the payment in accordance with the regulations, rules and directives of UNEP.

• For agreements more than one year, (a) every year the status of progress, including the substantive and financial reports, for the duration of the Agreement will be provided (b) Within six months after the date of completion or termination of the Agreement, a final report summarizing activities and impact of activities as well as financial data. More frequent reporting can be agreed with the donor.

• The contribution shall be subject exclusively to the internal and external auditing procedures provided for in the financial regulations and rules. Should an Audit Report of the Board of Auditors of UNEP contain observations relevant to the contributions, such information shall be made available to the Donor.

UNEP requires funding in advance as it cannot work in arrears, so staff contracts, PCAs and SSFAs have funds obligated (committed) prior to issuance to ensure ability to pay. Payments are disbursed at a

monthly basis for staff (assuming ToR requirements are properly fulfilled each month), and at major milestones for PCAs and SSFAs appropriate for each contract though typically several times per year, contingent upon satisfactory progress and reporting. Contracts may be amended or cut short when needed if delivery is insufficient or due to extenuating circumstances (i.e. if a natural weather disaster or conflict arose which precludes reasonable ability to continue with planned activities).

7 MONITORING, EVALUATION, ACCOUNTABILITY AND LEARNING

The SCCCS programme submit a detailed annual written progress report and financial report to the MFA per their template and schedule (such as to align with fiscal year or on the anniversary of funds disbursement)..

Defra (as funder) undertake an annual independent review of the programme. To support these reviews, information and analysis is collected throughout the year, collated and provided by UNEP and UoB, drawing on the progress made across delivery partners. Two reports have been undertaken to date, one for 2023 and one for 2024. Both reports scored an A overall.

At the end of the Inception Phase, KLIMA will lead a review that will evaluate the Inception Phase including the inception report as well as a value for money of the participation of SCS & Academics as well as ACES during Inception Phase and planned inputs during full scale implementation.

The annual project report providing status as defined in the result framework shall be submitted including financial reporting to MFA no later than 31 March each year during implementation. The first submission will be 31 March 2027.

A project completion report providing status on the progression of expected outcomes, outputs and activities and defined in the result framework shall be submitted with the final financial reporting to MFA no later than 31 March 2029.

The MFA shall have the right to carry out any technical or financial supervision mission that is considered necessary to monitor the implementation of the project. After the termination of the project support, the MFA reserves the right to carry out evaluations in accordance with this article.

8 RISK MANAGEMENT

A detailed risk management matrix is included in Annex 4. The main risks identified by SCCCS during the project formulation are:

Contextual risks:

- Decreasing national budgets for extension services
- Changes in financial policy hinder financial institutions' ability to lend to cooperatives/communities
- Limited collaboration between Government stakeholders
- Fluctuations in demand; quantities/products/prices

Programmatic risks:

- Realism of developing a financeable business model at cooperative/community level that allows them to invest in cold chain

- Willingness of the financial institutions to invest in cold chain infrastructure for smallholder farmers
- Resistance on women's participation and empowerment
- Availability of resources, capabilities and culture to engage in the cooperative/community approach

Institutional risk:

- The partner set-up biased towards research might have challenges in responding to the realities of smallholder farmers
- Corruption and/or mismanagement of project funds

These have all been addressed by mitigating actions lowering the risks. All risks will be evaluated as part of yearly and half yearly reporting securing mitigating actions can be taken.

The project represents a considerable scale-up of SPOKE (Defra financed) activities in Kenya and the plan to on-board 150 cooperatives /communities over the three year is ambitious, even with the effort in staff increase. There might be a risk of delays in this on-boarding, which should be monitored by the SCCCS HQ team.

9 CLOSURE

No actual plans for closure have been presented by the Stakeholders of SCCCS but a Mid Term Review is planned for 2027 that will give indication of closure or reorientation of the programme. The ambition of SCCCS is presently to identify financing for extending the SPOKE to more countries in Africa (Sénégal being prepared but also Zambia)

10 ANNEXES