

Annual Review

Title: Sustainable Cooling and Cold Chain Solutions		
Programme Value £ (full life): £21 million		Review date: July 2023
Programme Code:	Start date: August 2019	End date: July 2025

Summary of Programme Performance

Year	2023	2024	2025
Overall Output Score	A		
Risk Rating	Medium		

DevTracker Link to Business Case:	Business Case Annexes to Business Case
DevTracker Link to results framework:	LogFrame

A. SUMMARY AND OVERVIEW

A1. Description of programme

Sustainable cooling and cold chains are everything that keeps things cold in our warming world, this is mostly refrigeration but also includes air conditioners. Cooling is becoming an increasing issue globally; as temperatures rise, so does demand for cooling that is both energy efficient and uses climate friendly refrigerant gases.

Cold chains are vital to help the food system deliver food that is affordable, nutritious and safe, while also providing optimal returns to farmers and others in the value chain. Similar systems are also essential for vaccine supply chains, and both need to be delivered in a way that minimises environmental and climate impacts. Currently they are looked at in a disaggregated way rather than as a whole system keeping products cool from production, through transport, to end user. Therefore, the Sustainable Cooling and Cold Chain Solutions (SCCCS) programme works through four different workstreams to target solutions from a whole systems perspective with expert input at all stages from academics, industry and governments:

- Workstream One: Africa Centre of Excellence for Sustainable Cooling and Cold Chain (ACES)
- Workstream Two: Model Regulation Guidelines
- Workstream Three: Technical Assistance for Regional and National Implementation
- Workstream Four: HFC Outlook Model

ACES, which makes up 80% of the funding, looks specifically at reducing food and vaccine loss while mitigating the potential environmental impact of the cold chain through capacity building and training of engineers, farmers and health care workers. Through this we aim to increase the adoption and uptake of resilient, efficient and climate friendly cooling solutions. The programme is Pan-Africa with a Centre in Rwanda as the 'hub', then development of SPOKES (Specialised Outreach and Knowledge Establishments) that will share research, innovation and knowledge through a 'hub and spoke' model. Complementing ACES, the other three workstreams support the development of modelling, policies and tools that implement global best practice and provide technical assistance for policy makers.

UNEP is the lead delivery partner receiving Defra funding directly, working in partnership with University of Birmingham through the Centre for Sustainable Cooling as the lead academic partner and University of Rwanda as the lead in-country partner. While Defra is pleased with the progress made, there have been challenges across the workstreams as we are implementing a first-of-its-kind intervention. This has resulted in delays and slower than expected progress in the context of the ACES workstream; some areas which were due to be audited this year have not been. Through this process we have also had to consider the process through which we change behaviour through the Programme, and this will be updated in the LogFrame.

A2. Summary supporting narrative for the overall score in this review

This review has been undertaken by Defra with information provided by Delivery Partners UNEP and University of Birmingham as the lead academic institution. Data was collected throughout the year and through working with those in country to provide up to date information, as well as both Defra and delivery partners undertaking multiple site visits this year to confirm progress.

The programme has scored an A overall. With the first year of increased funding to the programme, it is unsurprising that there have been some delays, especially to ACES which is now transitioning rapidly to operations through training, equipment procurement and demonstration. However, there has been significant progress and when reassessing the outputs/outcomes it is clear that ACES is delivering well. Other workstreams remain on track and we are already seeing progress in the outcomes of the programme. Breakdown of outputs below:

Output	Score
1: Enhanced capacities to implement policies, programmes, and investment plans.	A+
	Impact weighting: 30%
2: Improved skills and technical capacity within country to implement sustainable cooling and cold chain solutions through capacity building.	B
	Impact weighting: 30%
3: Increased access to, energy efficient and climate friendly cooling and cold chain solutions for food and vaccines.	A/B
	Impact weighting: 20%
4: Improved farmer knowledge and skill on best-practices through capacity building.	B
	Impact weighting: 20%

We acknowledge there have been delays due to contracting and funding flow as the Programme aims to deliver large scale changes to processes which takes time. The complexities of ordering equipment which is not currently available in Africa, and which requires training of procurement officers and in-country technical advisors, as well as extended tendering processes with contractors have both led to delays in workstream one. For the other workstreams, we've seen positive progress and they have not been impacted in the same way; they are smaller in scale and continue to advance and promote policy change across countries as expected. For example, the outputs of workstream four are currently being used in the context of both the Kigali Amendment to the Montreal Protocol and the Paris Climate Agreement and provide a detailed picture of the energy and climate savings on offer to both countries and consumers according to different ambition scenarios, helping to inform policy choices globally.

The programme started shortly before COVID in 2019 which resulted in the first field visit as part of ACES being delayed until May 2022. More recently, climate disasters such as flooding and mudslides have been necessary priorities for the Rwandan government programme leaders who work on ACES, taking them away from the day-to-day leadership of the project. Despite these challenges to delivery, the programme has been able to make significant progress across the different workstreams.

Highlights and key areas of progress from the 2022/23 year include:

- The programme has received critical buy-in from supporting countries and partners through co-funding eg, Rwandan government providing funding for both the Campus site and a demonstration hall.
- Rwandan Cabinet has requested that ACES becomes an independent Institute (international NGO). This is in process for submission for review and approval.
- 'Train the trainer' programme has been developed and trainers have had world-leading training. Training has been extended to farmers in Rwanda and further new courses are being launched in Kenya in August.
- Industry partners, including Carrier, Danfoss, Surechill, PLUSS Technologies and Ecozen, have committed equipment and wider support to the programme, including Danfoss opening their first regional office in Africa at the ACES campus in Rwanda.
- Three students have completed an extensive traineeship program that lasted more than 6 months, with one now employed by Danfoss (leading industry).
- Smart Farm finances and land (200 hectares) adjacent to the campus has been approved.
- Statement of Cooperation was signed between International Finance Corporation (IFC) and Defra at COP27 with the IFC Tech Emerge Programme due to support 8 -10 start-up companies on the campus once open.
- The first SPOKE is at an advanced stage in Kenya with a site selected, a needs assessment undertaken and procurement underway with a view to opening in Autumn this year.
- Further SPOKES are in early-stage development in Senegal (in partnership with the Government of Canada) and Lesotho (in partnership with the Millennium Challenge Cooperation).

- Activities are also underway in India to replicate the ACES model with two centres being established in Telangana and Haryana (sites are located and due to begin building this year)
- Model Regulation Guidelines and Policy Harmonisation work has been sighted at the Montreal Protocol as examples of best practice and put to use by a variety of countries.
- HFC Outlook Model has been used by a wide variety of actors and is being used to support decisions in the Montreal Protocol with the advancement of the Global Outlook Model having the capacity to support policy making for governments across the world.

A3. Major lessons and recommendations for the year ahead

Major lessons can be learnt regarding the time it takes to procure technical equipment and implement a training programme in a country which has not been through these processes before. The programme stalled because of process-based delays and identifying and mitigating these will be important going forward. This has in part been addressed through moving to form an autonomous institute which can make decisions quickly and implement its own procurement procedures.

Recommendations:

Delivery partners to clearly highlight risks associated with the programme to Defra through a process that aligns with Defra's updated risk auditing in order to streamline the risk reporting. This should be done immediately.

Delivery partners to continue to expand on GESI (Gender Equity and Social Inclusion) with new staff in place to complete a needs assessment specifically linked to the experience of women in cold chain to identify any barriers that need to be addressed. This should be done in the next 3 months.

Delivery partners to update GESI policies in the ACES workstream in order to further ensure that women are brought into the programme and able to access the benefits. This should be done in the next 6 months.

Defra to include Safeguarding as an agenda item in quarterly reporting exercises to ensure that if any concerns arise, there is space for them to be quickly addressed. This should be done in the next quarterly report in Q3 2023.

Defra to establish monthly calls with UNEP Chief Finance Officer (CFO) to navigate the contracting and procurement channels and plan to ensure timely processing. This should be done in the next month.

Defra to establish consistent Government to Government calls between Defra and Government of Rwanda seniors, to enable workplans to be monitored and avoid further in-country delays. This should be done in the next month.

Defra to realign the outcomes and outputs as detailed below to better reflect the theory of change that training is first required to see any changes in knowledge. This should be agreed in the next 5 months.

Defra to begin to scope out where further funding would allow scale up into different markets and countries that would result in greater benefits for the programme. This should begin immediately and continue over the next 8 months.

B: THEORY OF CHANGE AND PROGRESS TOWARDS OUTCOMES

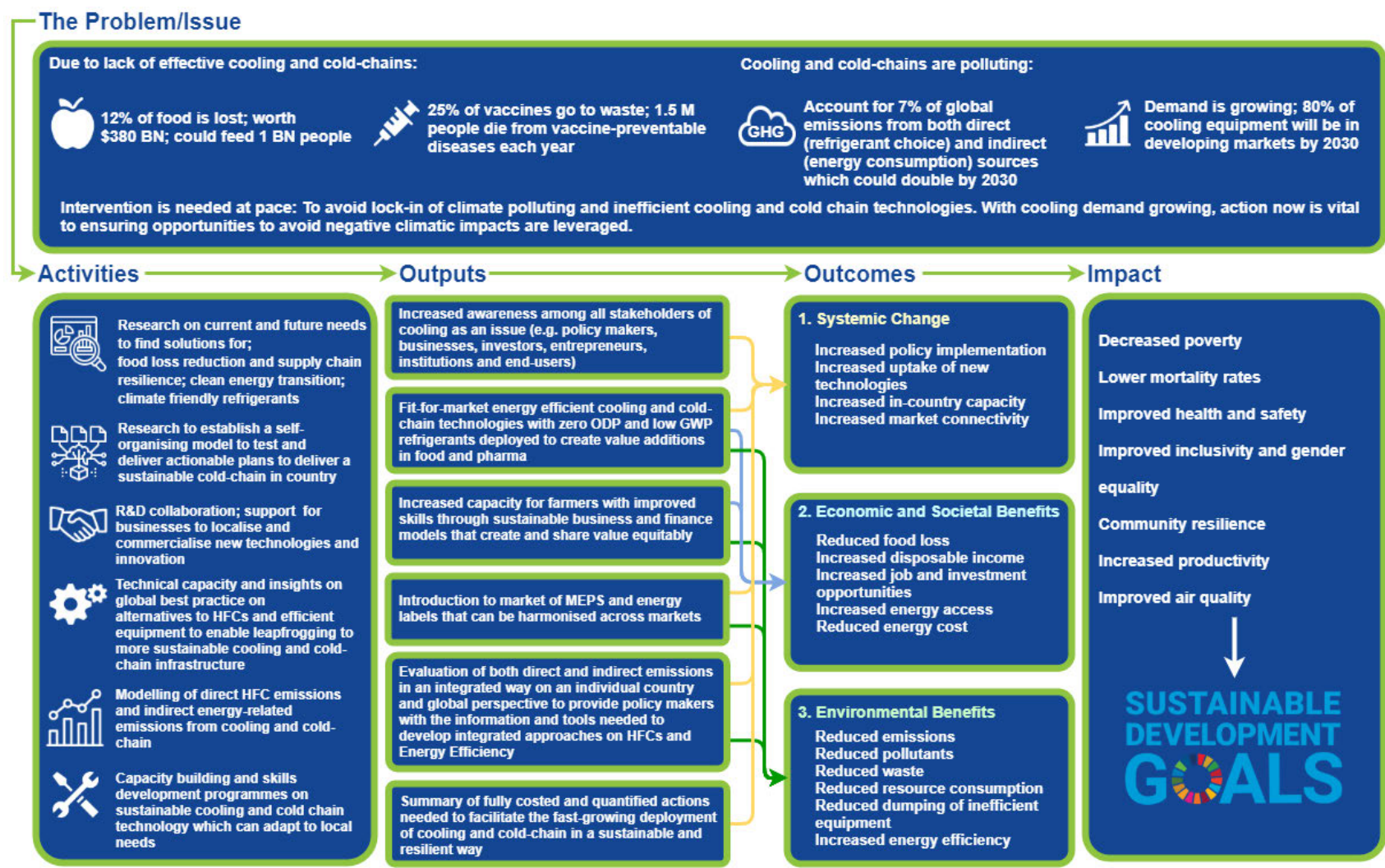


Figure 1: Theory of Change

B1. Summarise the programme's [theory of change](#), including any changes to outcome and impact indicators from the original business case.

The final LogFrame was developed after the original business case was signed off, but the impact indicators have consistently remained the same with a focus on how activities can have systematic change to how cold chains are developed and used. The activities undertaken as part of the programme are based on extensive research on the needs of each country and each specific cold chain, and interventions for each workstream are focused on supporting behavioural change, both by those in the field and in governments. Needs assessments have shown that this is what is required to tackle the issue of a lack of connectivity in the cold chain that can result in food and vaccine loss.

Since the business case was finalised, cooling demand has continued to increase at pace, with unexpectedly high temperatures across the world creating a larger interest in cooling, especially among governments that was not expected and now cooling has a prominent place in discussions such as COP28. Further, a stronger focus has been placed on learning through training, following field research that highlighted this as what will have the largest impact in changing behaviours. Feedback from the ongoing ACES training is that the training is unique and different to what participants have been offered before, due to it being targeted to specific circumstances within country and focusing on how different aspects on the cold chain are connected to ensure benefits are realised throughout the whole system. Therefore, this training has been found to be effective to date, but more work will continue into next year to audit whether the learnings have translated into greater knowledge for farmers, technicians and health workers.

During the last year there has been a GESI audit of the programme which has highlighted the need for us to better engage with our delivery partners and relevant stakeholders, to ensure that the programme has an optimised impact for women and other marginalised groups. Disaggregated data has been collected where possible and safeguarding policies are in place.

Through early work on this we have identified that gender-disaggregated information on cooling is limited globally. ACES focuses on supporting small-holder, subsistence and at risk and vulnerable farmers and fishers; data from 2019 shows that women represent on average 36.7% of all agricultural workers globally, and up to 50% in many countries in Africa^[1], and are often traditionally responsible for post-harvest activities^[2]. We are therefore commencing a new programme to address this knowledge gap to better understand the relationship between cold chain and GESI goals and help us design a clear series of needs and targets for the role of cold chain in addressing unequal power relations and other inequalities.

The current outcomes of the programme are progressing well, for example we've had a much higher than predicted number of training programmes taking place and there have been considerable partnerships made with international academics that demonstrates progress. However, through carrying out this review we know now that the outputs and outcomes have been mis-assigned. Training itself should be the first step through the output and the increased knowledge following training should follow as an outcome. We will be updating the LogFrame to reflect this and further information on this is included in section C.

B2. Describe where the programme is on/off track to contribute to the expected outcomes and impact. What action is planned in the year ahead?

As training has only just started to be implemented it is hard to know if the interventions are leading to increased knowledge and behaviour change; however, early anecdotal feedback from training suggests the training is having a positive impact and from further needs assessments we know that a lack of knowledge remains a barrier. Especially within governments, the past year has seen an increased awareness on the issue of cold chain and cooling from which the need for intervention to develop scalable solutions has been recognised. This programme has contributed to this awareness, but also offers solutions to support interventions from governments.

We should continue to monitor if it is possible to achieve full system change in the current duration of the programme – due to end in 2025. As a lot of these outputs and outcomes take a long time to emerge, there is a strong argument that funding of this programme should continue to maximise and expand upon the progress made to date and ensure the intended outcomes and impacts are reached.

^[1] <https://www.fao.org/3/cb4477en/cb4477en.pdf>

^[2] <https://www.seforall.org/chilling-prospects-special-gender/factors>

A full evaluation of the programme is expected to take place in 2025. It is likely that this will involve a field visit to assess the change in cold chain understanding and access since the programme began in order to confirm that the increased capacity through training has been able to reduce food and vaccine losses. There will also be an assessment of how much importance governments place on issues of cooling to understand if systemic change has effectively taken place.

B3. Justify whether the programme should continue, based on its own merits and in the context of the wider portfolio

Implementing systemic change in a novel way, such as the whole systems approach that this programme is using, is undoubtedly going to take time and this first review makes it clear that outputs on improving knowledge and understanding are difficult to measure at this early stage in the programme.

This programme tackles some of the key Defra ODA priorities and KPIs including Net Zero and supports one of the four Defra priorities going into COP28 through targeted action on Sustainable Cooling and F-gases. The programme is also contributing to multiple ICF indicators as detailed in the Log Frame.

On assessment of the outcomes and outputs, as well as acknowledging that through the theory of change there is a strong need to upskill and ensure that relevant research has taken place, there is a robust case that this programme is targeting exactly what is needed by looking at a whole systems approach. Therefore, there is a strong case for keeping the programme running as there is good value for money in relation to high-cost leverage and expertise from delivery partners being some of the main reasons why we've been able to attract investment.

This initial year has set up the key mechanisms for action. Existing funding will allow for some benefits predicted to be realised in the timeframe, however, we acknowledge that some outcomes will only be realised after current funding ends. Further funding would allow scale up into different markets and countries and produce greater benefits.

C. DETAILED OUTPUT SCORING

Output Title	Enhanced capacities to implement policies, programmes, and investment plans.		
Output number:	1	Output Score:	A+
Impact weighting (%):	30	Weighting revised since last AR?	N/A

Indicator(s)	Milestone	Progress
1.1 Number of macro level tools developed and applied for gaps and needs analyses and impact assessment (disaggregated by countries)	2	4 – Kenya, Rwanda, India
1.2 Number of SPOKEs / outreach programmes established (disaggregated by countries)	1	3 – Kenya, India
1.3 Number of organisations and countries using the HFC Outlook Model	10	16
1.4 Number of regional harmonisation activities for cooling products (disaggregated by market and country)	1	2 - Southern Africa Development Community (16 countries); and East African Community (6 countries) on Room ACs and Residential Refrigerators
1.5 Number of governments receiving targeted support for implementation of MEPS or Energy Efficiency voluntary programmes for cooling products (disaggregated by market/product)	2	3 – Malaysia (room ACs), South Africa (S&L programme), Gambia (ACs and Refrigerators)

C1. Briefly describe the output’s activities and provide supporting narrative for the score.

This output is focused on ensuring that countries can make decisions on policies that will have the greatest impact toward systemic change. There has been significant progress here due to higher than expected levels of engagement and participation of countries, as such it has scored it an A+.

Countries and markets are beginning to recognise that cooling is an issue they should be looking at with the warming temperatures as interest increasingly grows in the work outputs 1.1-1.5 are delivering. This demonstrates that these tools are needed and from this we can turn interest into action.

The use of tools for countries to understand policy impacts are being used in Kenya and Rwanda as well as the development of an outreach centre (SPOKE) in Kenya and two centres replicating ACES in India (Telangana and Haryana). These tools have been both developed and applied and the centres also increase capacity to target what the country needs through being able to offer tailored solutions. There have been a lot of foundational activities (hiring of personnel, writing of training programmes, development of business models) that provide the groundwork and structures needed to progress into next year where we hope to continue progress on the number of outreach centres and we remain on track with building further capacity through discussions already taking place with other countries.

A key focus is on the development of a cold chain virtual modelling tool and roadmap to be launched for COP28 as part of indicator 1.1. This model will ensure that this work is tailored to specific country needs and ensures that there is a fully costed, whole systems approach to looking at cooling.

There has been a larger than expected interest in the Defra-supported workstream four. This modelling tool is increasingly recognised as the most powerful modelling platform available to assess global and regional pathways to reduce greenhouse gas emissions from cooling equipment. The outputs of the model are currently being used in the context of both the Kigali Amendment to the Montreal Protocol and the Paris Climate Agreement and provide a detailed picture of the energy and climate savings on offer to both countries and consumers according to different ambition scenarios, thereby helping to inform policy choices.

We are pleased with the progress of the regional activities which have been immensely useful. These take a lot of time to coordinate and require agreement between multiple countries to advance. The Southern African region voted positively in June and are undergoing final administrative procedures to align regional policies for room air conditioners and residential refrigerators, and in the East African region, agreement has been achieved with the EACREEE (East African Centre of Excellence for Renewable Energy and Efficiency) to support the same process. Specific countries have also been able to have tailored support with international experts in order to ensure policies are implemented effectively.

C2. Describe any changes to this output during the past year, and any planned changes as a result of this review.

No changes required for this output going into next year as we are pleased with progress.

C3. Progress on recommendations from the previous AR (if completed), lessons learned this year and recommendations for the year ahead

No recommendations.

Output Title	Improved skills and technical capacity within country to implement sustainable cooling and cold chain solutions through capacity building.		
Output number:	2	Output Score:	B
Impact weighting (%):	30	Weighting revised since last AR?	N/A

Indicator(s)	Milestone	Progress
2.1 Number of farmer cooperatives trained in cold chain through ACES and SPOKEs reporting improved knowledge in new equipment and processes (disaggregated by countries and gender)	38	<p>Cannot yet be collected (expected 2024)</p> <p>Over 120 farmers trained to date (Rwanda and Kenya)</p>
2.2 Number of students trained through ACES and SPOKEs reporting improved knowledge in analytical skills and models of vaccine systems (disaggregated by countries and gender)	15	<p>Cannot yet be collected (expected 2024)</p> <p>Over 20 healthcare workers trained to date</p>
2.3 Number of governments/organisations that have participated in training (webinar or in-person) on the Model Regulation Guidelines (disaggregated by market/product, gender and country)	30	<p>68</p> <p>14- Residential and commercial refrigeration and air conditioners, 5 women, 14 countries, including Argentina, Lebanon, Turkey, Egypt, Mexico, India, Sri-Lanka, Pakistan, Gambia, China + 4 unknown.</p> <p>54- Commercial Refrigeration Equipment, 17 female and 12 chose "other" or no answer, Albania/Tirana, Austria, Brazil, Canada, Cape Verde, Chile, Côte d'Ivoire, Croatia, France, Germany, Iran, Kenya, Lao People's Democratic Republic, Mali, MAROC, México, Niger, Nigeria, Panama, Portugal, Thailand,</p>

		Turkiye, Uganda, United States, Vietnam + 7 unknown
2.4 Number of procurement experts trained on the SPP toolkit (disaggregated by country and gender)	30	25- Ghana – 22 (2 female) Morocco – 3 (1 female)

C1. Briefly describe the output’s activities and provide supporting narrative for the score.

Training and capacity building is a key pillar of this programme - we are confident that it is what is needed to deliver systemic change and to improve best practices. Some parts of this output require an audit of improved knowledge, which we only expect to be able to report against next year. Therefore, although training itself has been delivered this year, the output has scored a B.

Comprehensive training programmes and modules have been developed through the early stages of the ACES programme, including input from the four UK universities around refrigeration engineer training and post-harvest management. New academic partners have been brought on-board from Wageningen University in the Netherlands and experts at the University of Rwanda. Alongside this, further programmes have been developed in conjunction with founding industry partners who will be supplying technologies.

Following these initial setup activities, training has been able to begin (including through world-leading train-the-trainer courses in workstream one) in order to build capacity among policy makers from emerging economies, equipping them with greater knowledge and skills to develop and implement effective energy efficiency initiatives in their respective countries through Sustainable Public Procurement (SPP) in workstream three. For workstream two, a key focus has been on explaining the contents of the model regulation guidelines, and offering practical examples of contents applied in a real-world setting, while for farmers and healthcare workers there has been upskilling on vital skills that will ensure food and vaccines aren't lost or spoiled.

Training has been rolled out this year, with more healthcare students being trained than expected (20 compared to 15). In addition, a lot of work has been undertaken to design a master's programme, and ready four PhD places on vaccines, both of which will be rolled out in the next reporting year where we expect to see good results. Discussions also remain ongoing between the University of Rwanda and the four UK universities involved in the programme to formalise working relationships and put in place opportunities for student exchange schemes and a two-way flow of information exchange. However, the timing of the training taking place toward the end of the reporting year, means that we are unable to report against indicators 2.1 and 2.2 despite high number of farmers and healthcare workers already trained. This is because we've not had time to survey to see if there has been improved knowledge that has transferred into better practices.

C2. Describe any changes to this output during the past year, and any planned changes as a result of this review.

Following a review of where activities will create outputs and outcomes it is suggested that at an output level it would be helpful to know on a yearly basis how many are being trained. This should then be compared at an outcome level to see how many from these trainings are reporting improved knowledge. This will help to ensure that the training is being effective and help attribute the activities of this programme to changes on the ground. Therefore for 2.1 and 2.2. these outputs will change to:

- 2.1 Number of representatives from a farmer cooperative attending training to address sustainable cooling and cold chain development and access (disaggregated by countries) (Adapted from the current outcome indicator 1.5)
- 2.2 Number of students and health professionals trained to support development of a sustainable cooling and cold chain system for health (disaggregated by countries and gender) (Currently outcome indicator 1.4)

It is also suggested that an extra output on technicians and engineers should be added as below:

- Number of technicians/engineers attending training to support development of a sustainable cooling and cold chain system for food and/or health (disaggregated by countries and gender)

Going forwards, output 2 will focus on number of individuals trained and the outcomes associated will be adapted to begin reporting from year 2 in order to capture the extent to improved knowledge from training undertaken in year 1. These will all be updated in the 'change frame' tab on the LogFrame in the next 5 months.

C3. Progress on recommendations from the previous AR (if completed), lessons learned this year and recommendations for the year ahead.

Currently the gender balance could be improved, or it needs to be clear that those receiving the training are improving female access to these solutions. We recommend conducting GESI analysis to assess the practical and strategic needs and interests of different groups of women and men engaged in the project and clarify how these have been integrated into the project design. This might include ensuring there are no barriers to women attending the training or that any benefits from the training are clearly translated to women and girls.

Output Title	Increased access to, energy efficient and climate friendly cooling and cold chain solutions for food and vaccines.		
Output number:	3	Output Score:	A/B
Impact weighting (%):	20	Weighting revised since last AR?	N/A

Indicator(s)	Milestone	Progress
3.1 Number of Community Needs Assessments conducted to support equipment deployment (disaggregated by countries)	2	4 (Kenya, India)
3.2 Number of demonstration activities completed with support from ACES (disaggregated by countries)	2	2 (Rwanda)
3.3 Number of public health interventions contributing towards sustainable delivery of vaccines for future needs, and vaccine/cold chain demand mitigation (disaggregated by countries)	5	1 (Rwanda)

C1. Briefly describe the output’s activities and provide supporting narrative for the score.

This output is focused on identifying barriers to access of sustainable cooling and cold chain solutions and there has been a range of progress within this output which means its scored a A/B.

Despite delays, progress has been made on this output through first analysing what the needs and barriers are to access through three assessments taking place in Kenya and three further currently taking place in Rwanda and India. This is the first step and as such it is vital to make sure that actions are targeted and country specific. Delivery partners have been pragmatic and demonstration activities have been progressed through the development of a 'Try Before You Buy' scheme which will be implemented initially through the first SPOKE in Kenya and built out from there, enabling good reach to rural communities and farmer co-operatives. In addition, progress has continued to ensure that the right solutions are being put in place, for example, Rwanda has already started to test technologies on the ground from SureChill and Ox Drive. These UK businesses have begun to demonstrate their technologies and farmers are able to access these and start to use them. Progress was also made at a high level with International Finance Climate (IFC) signing a Letter of Intent with the Government of Rwanda and UK at COP27 in order to facilitate demonstrations of their Cooling TechEmerge programme winners on the ACES campus.

Less progress has been met on the healthcare side, due to the clinical due diligence and extensive training required around healthcare taking longer to develop which was optimistically considered when setting these targets. The extensive groundwork this year means that we now have a complete picture of the healthcare system within Rwanda, from which we can start to make an impact in medical interventions into next year with some clear activities planned early in the next audit year. We have been pleased with the progress to date though, especially with potential threats of Ebola in neighbouring countries, limiting our capacity at times to implement. Additionally, having SureChill vaccine fridges now on campus will support the demonstration of a health cold chain. There will be a strong focus on healthcare into the next year with a symposium on vaccine cold chain taking place in October, from which we will continue the roll out of further public health interventions.

C2. Describe any changes to this output during the past year, and any planned changes as a result of this review.

Overall, this output targets the first stages of ensuring access, through evaluating what barriers are in place and ensuring the availability of equipment in country through demonstration activities. Despite not meeting the targets on the healthcare side, there are activities planned for early next audit year that mean we do not expect to need to adjust targets for indicator 3.3, now the initial lag has been resolved. No planned changes.

C3. Progress on recommendations from the previous AR (if completed), lessons learned this year and recommendations for the year ahead.

The next stage is making sure actions are supporting farmers and healthcare workers to effectively source the right equipment and understand the business models. This comes through business plans which require training in how to develop the right business solutions to achieve long-term improvement, which will be a key focus as we move towards implementation and action in the coming years.

Output Title	Improved farmer knowledge and skill on best-practices through capacity building.		
Output number:	4	Output Score:	B
Impact weighting (%):	20	Weighting revised since last AR?	N/A

Indicator(s)	Milestone	Progress
4.1 Number of farmer cooperatives trained in post-harvest management reporting improved knowledge (disaggregated by gender and country)	38	Cannot yet be collected (expected 2024) Over 120 farmers trained to date (Rwanda and Kenya)
4.2 Number of farmer cooperatives received basic refrigeration training reporting improved knowledge (disaggregated by gender and country)	38	Cannot yet be collected (expected 2024) Over 120 farmers trained to date (Rwanda and Kenya)
4.3 Number of farmer cooperatives trained in market chain analysis, business planning and market linkage etc. reporting improved knowledge (disaggregated by gender and country)	38	Cannot yet be collected (expected 2024) Over 120 farmers trained to date (Rwanda and Kenya)

C1. Briefly describe the output's activities and provide supporting narrative for the score.

Similarly, to output 2, this output focuses on training and capacity building to deliver systemic change and to improve best practices. This output focuses on progress to deliver this training and although we have seen lots of training take place this year, due to the indicators requiring an audit of improved knowledge, this output has scored a B.

The training of farmers has begun, but it started later than expected due to delays outlined below on procurement, disbursement of funds and getting staff in place in line with the due diligence and best practices we wish to promote within the programme. As a result, there has not been sufficient time to audit whether farmer cooperatives have improved knowledge. Progress has been extensive in training the farmers and over 100 farmers across Kenya and Rwanda already being trained following successful 'train the trainer' campaigns which mean that knowledge can be effectively transferred. Further to this, with the demonstration hall on the ACES campus now in progress there will be further opportunity to train individuals on this new equipment, as well as the Smart Farm to be included as part of the campus where there is the opportunity to consider best agricultural and post-harvest management practices.

Despite to not being able to audit improved knowledge, there is a clear point at which this will be audited next year, and significant progress has been made in training farmers in both Rwanda and Kenya. It was an oversight when agreeing on targets that we wouldn't be able to measure these outputs, as there would be an inevitable lag if training did not take place immediately after funding was released, and it sits better as an outcome than an output. Additionally, time was needed to develop the training modules which are new and unique by focusing on the needs of those receiving the training.

C2. Describe any changes to this output during the past year, and any planned changes as a result of this review.

Following a review of where activities will create outputs and outcomes it is suggested that this output would be better placed at an outcome level to see how many from these training courses are reporting improved knowledge. Therefore, going forwards these will be reported in the LogFrame through Outcomes below and will not be assessed through Output 4. We will also adjust the milestones to consider the lag time in order to reflect that we can't report on improved knowledge in the first year and need at least a year to be able to undertake the necessary surveys and knowledge assessment. The outputs associated with training will be included in Output 2 as discussed above and the aspect on improved knowledge will be incorporated instead into Outcome 1:

- Number of representatives from a farmer cooperative attending training courses to address sustainable cooling and cold chain development and access reporting improved knowledge (disaggregated by countries and gender) (Outcome 1.2)
- Number of technicians/engineers trained to support development of a sustainable cooling and cold chain system for food and health reporting improved knowledge (disaggregated by countries and gender) (Outcome 1.3)
- Number of students and health professionals trained to support development of a sustainable cooling and cold chain system for health reporting improved knowledge (disaggregated by countries and gender) (Outcome 1.4)

A field visit took place this year to establish whether education and language barriers would impede the effectiveness of using surveys to collect this data for the Outcome level, but it was deemed that this would still be able to take place. Therefore, it is recommended that the outcomes associated with improved knowledge should all shift by a year in order to account for the delay between training and reporting improved knowledge.

These will all be updated in the 'change frame' tab on the LogFrame in the next 5 months.

C3. Progress on recommendations from the previous AR (if completed), lessons learned this year and recommendations for the year ahead.

This year the programme has experienced delays around the ACES and the construction and completion of the headquarters (Hub) at the Rubirizi Campus in Kigali, which includes construction of the demonstration hall on the campus. This is one of the main ways in which energy efficient and climate friendly cooling and cold chain solutions for food and vaccines can be showcased and tested through ACES, and thus adopted by farmers and health workers following training and ongoing support through business plans and mentoring.

Delays have been in part due to Rwandan Ministry of Finance being unable to release the \$1 million for the build on the demonstration hall. Funds have now been released and a detailed workplan has been agreed with the contractors to complete construction by the end of November 2023. Ongoing wider refurbishment of the campus, including the classrooms and conference centre are expected to be completed by the end of August to enable equipment to be installed where appropriate.

Procurement hurdles and lack of information were also some main blockers in this output. To overcome these procurement challenges in Rwanda, new measures are being put in place this year to register ACES as its own Institute (an International NGO born in Rwanda but pan-African in scope) which will make using the different processes easier and will allow access to wider sources of potential funding. The Rwandan Cabinet agreed to the establishment of the Institute in February and steps are now well underway to register ACES as an Institute and to develop the related Board and organisational structures and governance arrangements. Complex processes to avoid corruption through UNEP and Rwanda-meeting the UNEP and Rwanda standards to stop corruption and full transparency have been central to the delays faced to date.

Focus into next year should be effective and regular audits and check-ins to ensure that the training is having the desired impact through farmers, healthcare workers and engineers all taking up the best practices which will be reflected in the outcomes. This can be done by taking on advice from early training sessions and implementing them as soon as feedback begins to be received in order to capitalise on lessons learnt. Looking forward, ensuring that any lag in changes to behaviour are incorporated into the evaluation would be helpful.

D: RISK

Overview of risk management

The risk level of our programme is medium. Risks continue to be managed on a daily basis as well as through the formal weekly check-ins and quarterly reporting, with a separate Steering Committee managing risks for the largest workstream ACES, due to it having more complex governance and financial impact. Risk appetite remains the same. Expenditure is regularly monitored through quarterly updates and detailed reports provided by UNEP.

Delivery risk remains at medium (same as in the original business case), but there is an increased risk on the operational side due to delays in procurement that have stalled progress in a range of areas for ACES and are now in the process of being resolved. Financially there have been some delays in the procurement, including purchasing of equipment and hiring of personnel. This is due to the extensive due diligence required by UNEP processes and the checks are particularly long when working with new partners in Rwanda and Kenya who are having to use new processes and put in place measures that meet UNEP requirements. These have been the greatest area of risk and have led to the postponement of the formal launch of the ACES campus twice, because of delays in building aspects of the campus and the ability to start delivering training. Alternatives have been pursued as a result with initial training now taking place in local farming communities and through a train-the-trainer programme delivered in the UK to 8 trainers who will then be able to deliver training to refrigeration engineers in-country. Ability to continue to progress has been down to delivery partners finding innovative solutions and they kept us updated regularly with these decisions and progress through the formal weekly check-ins and daily calls when needed.

Furthermore, recent climate disasters such as the flooding and mudslides have been a necessary priority for the Rwanda senior government programme leaders, taking them away from the day-to-day leadership of the project and requiring re-direction of their own funding, previously intended for ACES to support the clean-up and rescue operations. Therefore, weekly government to government engagement has begun to bridge these gaps in communication and reiterate the importance of having them on board. A detailed workplan for the delivery of the necessary steps is closely monitored by the two sides together and are being discussed at the weekly calls. A Government-to-Government MOU is also being developed and the governance structure linked to the establishment of the Institute will further strengthen engagement and working relationships and provide the ability to mitigate delays and reduce risks through agile decision-making. These new mitigating steps will be assessed at the next Steering Committee to ensure that these updated practices between countries are having an impact

and engagement is increasing on both sides. We've already seen some progress with these new measures for example the flagship Demonstration Hall that is being funded by Rwandan government has started to be built and there has been cabinet-level approval for the 200 hectares of land that will be the ACES model smart farm.

This year our safeguarding practices have been further tightened with the appointment of a GESI lead in Rwanda and a GESI lead in the UK as part of the Centre of Sustainable Cooling (CSC) to ensure that gender is mainstreamed into all decision making and governance. We will continue to ensure that there are no unintended consequences with this work and maintain that safeguarding is a high priority for both our delivery partners and those benefitting from our programme. The Defra team has received training and an external audit led us to integrating new lessons learnt as captured elsewhere in the document. New posts are now being integrated into the programme in order to mitigate any safeguarding risks. We are actively strengthening conversations around safeguarding through maintaining regular discussions on risks including safeguarding are an agenda point with partners during quarterly reporting that will begin at the Q3 report. The upcoming GESI analysis that is taking place will also help inform the programme of any risks and areas for action that are needed.

Internally there remain risks over team capacity and ability to maintain oversight of the growing programme with a small team. These are being managed through prioritisation and recruitment. When back to full capacity, a focus should be made on logging and tracking risks in a more streamlined way.

E: PROGRAMME MANAGEMENT: DELIVERY, COMMERCIAL & FINANCIAL PERFORMANCE

Summarise the performance of partners and Defra, notably on commercial and financial issues, and including consideration of VfM measures of economy and efficiency.

Spend to date:

Workstream		19/20	20/21	21/22	22/23
Workstream One	Africa		£207,703.88	£2,500,000.00	£4,336,666.67
			£2,467,336.70		
	India			£500,000.00	£333,333.33
	Roadmap			£496,856.92	£1,182,701.46
Workstream Two		£244,416.33	£194,044.44	£500,000.00	£150,000.00
			£142,754.15		
Workstream Three	Regional				£156,000.00
	National				£424,000.00
Workstream Four		£243,596.03	£116,077.87		£100,000.00
		£284,973.66			
Total for budgetary period		£772,986.02	£3,127,917.04	£3,996,856.92	£6,682,701.46

Approved money yet to be spent: £6,500,000.

Defra have been impressed and pleased with the performance of the partners and the significant progress that has been made, despite various delays because of procurement processes and inconsistent country engagement in workstream one. The other workstreams are also advancing as hoped and future work looks positive. There has been regular, clear and transparent communication and the quarterly reports have continued to be of an excellent standard, with a level of detail that means management of the programme has been able to be both collaborative and timely.

Further, in the last year there have been two field visits to Rwanda, where delivery partners have been able to demonstrate they have close engagement with partners in country and are able to effectively manage complex relationships with the stakeholders. Additionally, through two strategic visits in the UK, we have been able to cement these strong working relationships that allow risks to be flagged early and managed proportionately.

A particular strength of the partners has been effective promotion of the programme with externals and there is strong credibility associated with the team as known leading experts in the field which, in turn, has positioned the UK as global leaders in cold chain and cooling. As a result, the programme has regularly been used by organisations as an example of best practice. For example, the programme has been showcased at a range of events including the UN Montreal Protocol and received senior support from the Secretary of State at a No.10 Reception.

Delivery partners have actively worked to improve practices and have worked with the UK and Rwandan governments to unlock these challenges through developing ACES to soon become its own Institute to support this. In future, clearly highlighting risks through a process that aligns with Defra’s updated risk auditing would streamline this work further and ensure that both delivery partners and Defra are aware of and working to mitigate the same risks.

Defra could further support delivery by explicitly highlighting where key milestones and internal targets need to be met, so that delivery partners can plan accordingly and reduce the backlog of work for them. For example, Defra can pre-agree when deadlines for reporting targets and milestones will be, as they should remain as a yearly audit with pre-planned times. In addition, Defra can support in unblocking any delays by maintaining strong bilateral relationships with delivery partner colleagues that are intrinsic to delivery, such as the Chief Finance Officers, senior Rwandan Government colleagues and Communication teams as necessary.

E2. Assess the VfM of this output compared to the proposition in the Business Case, based on performance over the past year.

Economy

Procurement and finances are effectively managed by our experienced delivery partner UNEP, who ensure that all contractors in country undergo the necessary checks to ensure that the money being used has the best value for money. This has in part slowed down procurement to ensure that this is done correctly, and in turn created some delays, but it means that we are confident that the money is being used to good effect with limited risk of fraud.

Efficiency

By focusing our training efforts on lead farmer cooperatives and other key members of the medical and healthcare professions, we can maximise the level of learning that can then be disseminated out to communities. This is done through a ‘train the trainer’ programme where one person passes knowledge learnt onto many others through cooperatives. This is an efficient way of funding just a few individuals in a community to be trained in order to have maximum impact.

As a result, the programme continues to scale up technology and market connectivity to make sure that through a whole systems approach we are able to simultaneously build adaptive capacity and resilience. The economic and social benefits in addition to the environmental benefits of reducing food and vaccine losses through sustainable cooling are huge and this programme can effectively deliver results in all areas through the same activities.

Positive advocacy of the programme through impressive delivery partner engagement has meant that significant funding has been cost leveraged through other key players in the field such as the Clean Cooling Collaborative. Over \$1.5 million has already been cost leveraged from public sources and there has been extensive in-kind support through private companies including a cold store from Danfoss and refrigerated vehicles from Carrier, two of the largest multinational cold chain industry players. This work has increased substantially the value for money of the programme and suggests that the intention to keep this as a focus of the programme in order to sustain work after Defra intervention is valid and remains on track to be delivered.

Effectiveness

Lack of knowledge, training and business models were sighted as one of the main constraints to cold chain development when starting this programme, alongside evidence of failed previous interventions from funders who did not understand needs or locate interventions where it was strategically sensible. Through an initial focus on the needs of communities, this programme has been able to target funding in these areas to aim for maximum impact and best value for money. This is demonstrated through

output 3.2 which is tailored specifically to the needs of countries through SPOKES and other outreach centers.

A lot of the outcomes are not expected to be seen until future years due to systemic and novel approaches being used, but progress is going well so far. Despite some delays in reporting outputs, this has not delayed the progress that has been made in outcomes through impressive cost leverage, reports being published, and commitments being formed with partners. This suggests we are having the desired effect and activities are having real impact. Further, seven knowledge bases have been created that can be used as tools within country to strengthen capacity.

Equity

Work is beginning to conduct GESI analysis to assess the practical and strategic needs and interests of different groups of women and men engaged in the project and clarify how these have been integrated into project design. Currently the gender balance could be improved, and it needs to be clear that those receiving the training are improving female access to these solutions. Where possible, delivery partners should continue to track who is benefitting from the programme in order to understand how equitable it is. This can include recording age, disability etc for those receiving training.

Date of last narrative financial report	29/04/23	Date of last audited annual statement	29/04/23
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