

Africa Centre of Excellence for Sustainable Cooling and Cold-chain (ACES)

ACES is a first-of-kind Centre dedicated to sustainable cooling, cold-chain and post-harvest management. It is hosted by the University of Rwanda in Kigali in collaboration with Rwanda Polytechnic (IPRC). SPOKES are being rolled out throughout Africa to deploy ACES solutions in real-world settings; the first of these is in Kenya. The permanent Centre is developed by the Governments of Rwanda and the United Kingdom (UK), the United Nations Environment Programme and the UK's Centre for Sustainable Cooling leading a consortium of leading UK universities, with more than \$20M of seed investment committed by the UK and Rwanda Governments and industry, alongside the campus and physical infrastructure.

The mission of ACES is to accelerate the uptake of sustainable cooling and cold-chain solutions in the agriculture and health sectors in Africa, improving livelihoods, health, food and nutritional security, bringing integrated environmental, social and economic development. Globally, 536 million tonnes (12% of total food production) are lost due to lack of cold-chain, enough to feed ~1 billion people. In Rwanda, as an example, food loss equates to 21% of its total land use, 16% of GHG emissions, and 12% loss to its annual Gross Domestic Product. In short – food saved is as important as food produced. Similarly, 25% of vaccines are wasted globally due to failures within cold-chains; more than 1.5 million people globally die from vaccine-preventable diseases each year.

At the same time, 4% of global GHG emissions are caused by cold chains and lost food. Conventional cooling technologies are highly polluting due to the climate impact of refrigerants (HFCs) and the indirect emissions from energy use. They account for 7% of all global greenhouse gas (GHG) emissions, warming the planet and contributing to their own demand. Global cooling emissions could double by 2030, and triple by 2100. Existing cold-chain technologies represent 1/3 of HFC emissions and, given projected growth in demand, will increase proportionately by 2050 without action. The challenge we face is *how to provide access to cold-chains in an efficient, affordable, equitable and sustainable manner that builds resilience and achieves the Sustainable Development Goals (SDGs)*.

To date, where donors do engage, they often continue to pour money and effort into the same flawed solutions - more production without addressing loss to market; cold storage buildings that are relatively worthless without the other cold chain links and post-harvest management (pre-cooling, transportation, environmental controls, packaging) and technical training, and installing obsolete technology. Unsustainable solutions that are not market-oriented and depend on grant funding to continue. 96% of farmers living in the vicinity of donor-funded cold rooms in Rwanda do not use them.

Despite the strategic role it plays in delivering key development and climate targets, cold-chains are mainly owned and governed by the private sector that often prioritize only financial returns; not the impact that could be achieved on the economy, environment, and society as a whole. The broad range of societal benefits from access to sustainable and resilient cold-chains are typically treated as a “soft win”, rather than the core driver for provision, and as a result suffers from lack of investment and a piecemeal approach.

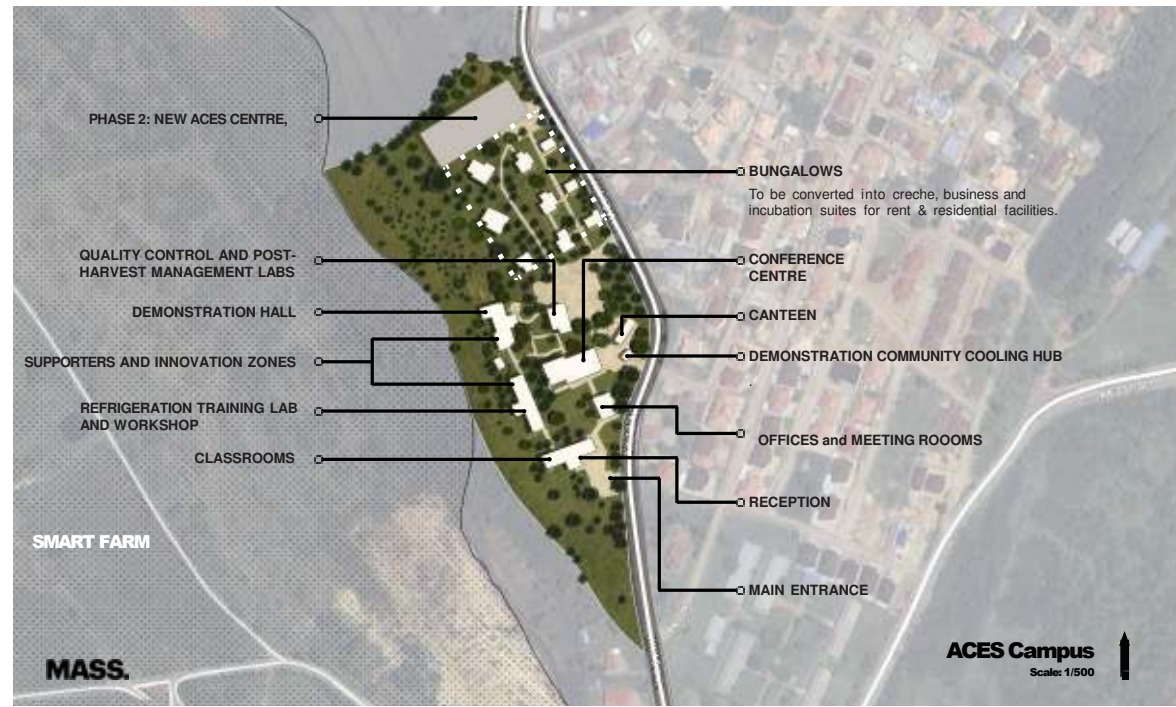
Making cold-chain part of the critical infrastructure is key to breaking millions of rural and urban poor out of poverty and hunger; accelerating economic recovery from the COVID-19 pandemic, and improving ability of food and health care systems to absorb, recover from, and adapt to (i.e., build resilience) economic, environmental, and social disturbances such as pandemics, Russia's invasion of Ukraine and other external shocks by improving the spare food, vaccine and medicine deployment capacity available.

Working with governments, industry, academia, communities and wider stakeholders, ACES will be a first-of-a-kind, comprehensive, one-stop hub for state-of-the-art technical assistance and knowledge transfer along the ‘fork-to-farm-to-fork’ continuum. It will foster international collaborations to advance innovations, create new business and identify, coordinate and secure funding opportunities. We will demonstrate technologies and solutions, and (provide the skills, capacity building and business models to accelerate the deployment of fit-for-market solutions to meet the needs of underserved communities. SPOKES across the continent will showcase how solutions can be deployed in practical applications and act as outreach learning, training and knowledge transfer and technical assistance centres to support local community uptake.

In short, ACES will be at the forefront of the development of pan-Africa food loss solutions – simultaneously provide resilient nutrition to all, whilst economically empowering marginal and small-holder farmers, and achieve these sustainably. To find out more and how to engage, please contact Maiada Hegazy m.hegazy@bham.ac.uk. Or in-country Issa Nkurunziza issa.nkurunziza@un.org.

The core structure of ACES is one Centre of Excellence (the Rubirizi campus) where we undertake collaborative research, test new equipment, develop knowledge, deliver learning and train the trainer programmes as well as raise awareness. SPOKES, will demonstrate solutions and cascade knowledge to local markets in order to accelerate deployment of solutions.

- Develop, test, demonstrate and deploy fit-for-market pathways to net zero smart cold-chain and cooling at scale in Africa.
- Improve knowledge on post-harvest behaviour of food to optimise systems and maintain nutritional and physiological quality.
- Provide technical and business assistance and training to small-holder farmers and rural communities.
- Integration of renewable energy, e-logistics and other advanced solutions.
- Design and implement sustainable and equitable business models.
- Foster linkages between entrepreneurs, investors, agri-businesses.
- Encourage use of standards, certifications and enabling policies.
- Skills development and innovation support for students and start-ups.
- Build the skilled engineering workforce for installation and maintenance.
- Conduct research on future-proof, localised solutions for food loss reduction.
- Build public awareness on the benefits of using sustainable cooling.



Key Research and Training areas within ACES

Post-harvest Handling, Storage, Quality, Process and Packing Zone

Off-grid mobile pre-cooling, controlled atmosphere systems, refrigerated storage, precision cooling, sustainable packaging

Distribution, Cold-Chain and Logistics Zone

Ice-production, zero-emission transport refrigeration, PCMs and small-scale rechargeable cooling boxes, and zero-emission refrigerated transport

Energy and Energy Storage Centre

Integrated thermal systems, waste heat to cold and thermal storage (PCMs).

Other areas

Vaccine and health, retail, and domestic

Data and Digital Transformation

Needs assessment tools, data capture and use monitoring, virtual models, electronic trading and fulfilment platforms.

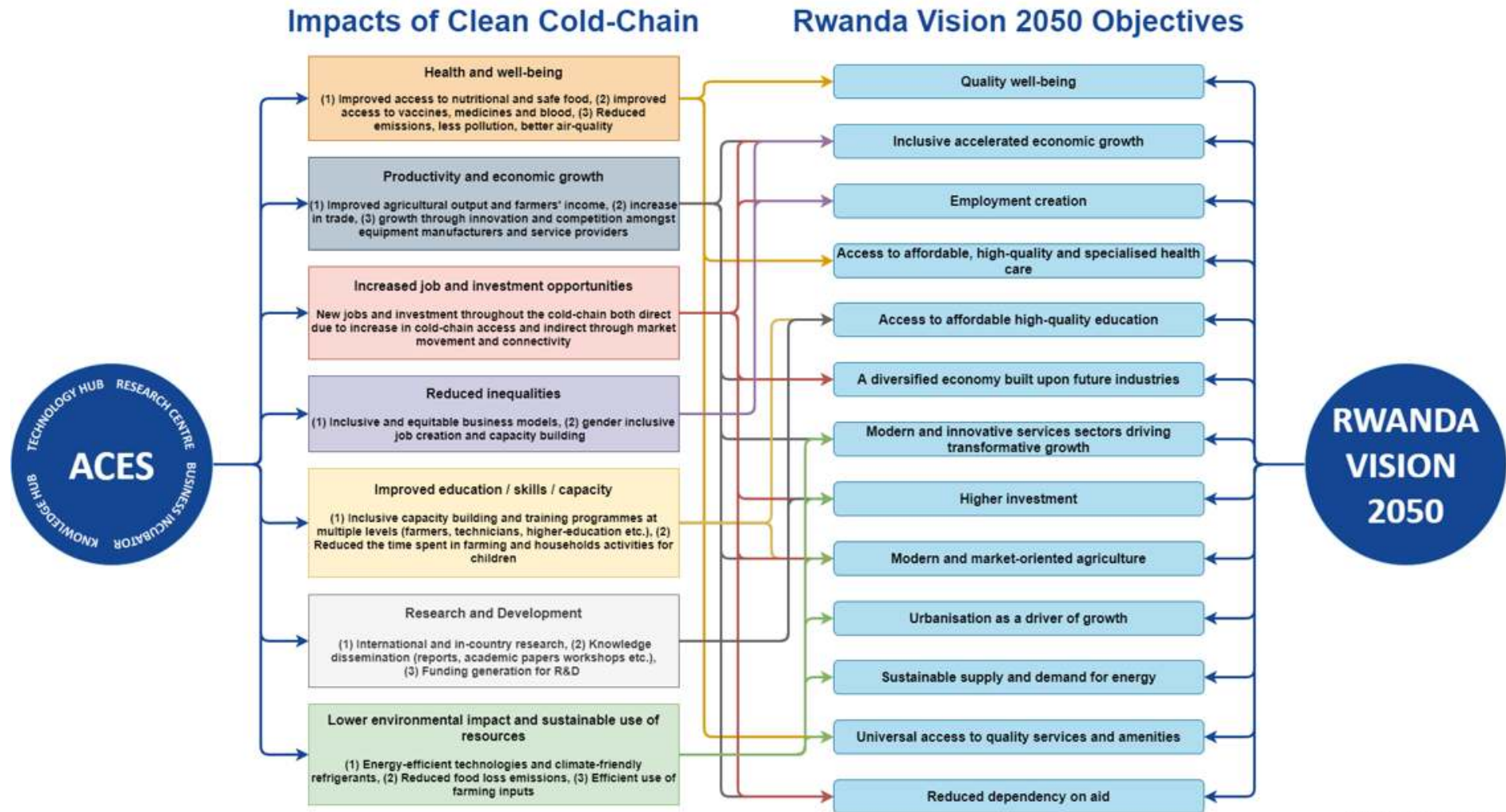
Business Start-Ups and Incubation Suite

Design service, business models market engagement and finance, export distribution network, meeting and conference facilities, and co-location space for business and industry partners.

Quality control and Certifications Lab

Codes and standards, farm-to-fork QA, setting quality thresholds for retail sector and export markets, and food safety.

ACES will deliver against key global goals including UN SDGs, Paris Climate Agreement and Kigali Amendment to the Montreal Protocol and country’s own policy objectives such as Rwanda’s Vision 2050 or Africa’s Agenda 2063. In his opening speech at the Sustainable Energy for All Forum, Rwandan President Kagame emphasised the need for a just and equitable energy transition. He called for African-led solutions and set out the role Rwanda – as one of the most ambitious green partners on the continent – could play. He highlighted Rwanda’s partnership with the UK on the Africa Centre of Excellence for Sustainable Cooling and Cold Chain (ACES) as a concrete example.



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