

The local to global cold-chain summit

University of Birmingham,
29th September 2022



Research needs and collaboration opportunities
to operationalise sustainable and resilient cold-chains in a warming world

“The cold-chain is the invisible backbone of our food system, a perpetual mechanical winter that we have built for our food to live in. Artificial refrigeration was introduced in the United States in the second half of the nineteenth century, but the term “cold chain” gained currency only in the late nineteen-forties, when European bureaucrats rebuilding a continent shattered by war studied and copied American methods”. Nicola Twilley, New Yorker, 22nd August.

Approximately 60% of food should be refrigerated at some point in the food supply chain – a number which will only increase as we look to meet the Sustainable Development Goals, feed a fast-growing population and adapt to a warming world and fast degrading environment. Lack of effective refrigeration results in the loss of 526 million tons of food produced (12% of the global total) with developing countries refrigerating less than 20% of their production. These food losses result in *an estimated 1 gigaton of CO₂-eq emissions each year globally, in addition to wasting agricultural inputs such as land, fertilizers, water and energy.* Equally, 25% of vaccines reach their destination with degraded efficacy mainly due to failures within the cold-chains; 20% of temperature-sensitive pharmaceutical products are damaged due to broken cold-chains.

At the same time, 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, and these 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 imperative we face is how to provide the globally connected cold-chains for a well-functioning society in an efficient, affordable, equitable and sustainable manner that builds resilience and delivers against the Sustainable Development Goals (SDGs) and the commitments under Paris Agreement and Kigali Amendment to the Montreal Protocol simultaneously. The challenge is that temperature-controlled supply chains networks are complex, requiring coordination across multiple stakeholders, both across countries and between continents.

At the same time we need to understand the interplay with renewable energy, climate friendly refrigerants as well as the impact and opportunities of radical new innovations - refrigeration cycles, Drones, Blockchain, Internet-of-Things (IoT) as well as the food innovations such as alternative proteins, vertical farming which will dramatically change how we produce, distribute and consume food.

The Centre for Sustainable Cooling is a lead co-investigator on a series of multi-national and multi-partner cold-chain research programmes across UK, EU and internationally to (i) explore system approaches on how to use (and mitigate the need for), make, store, move, manage, finance and regulate “cold” to meet cold-chain needs; (ii) facilitate uptake of innovative systemic solutions at scale and (iii) increase awareness among policy makers about the importance of a sustainable, equitable and resilient cold-chain system globally and how to operationalise. Programmes include the Africa Centre of Excellence for Sustainable Cooling and Cold-chain; the Horizon 2022 ENOUGH programme which brings together 30 partners from 12 European countries and the UK’s four year Zero-Emissions Cold-chain study - a combined programme value in excess of £25M, excluding infrastructure and industrial contributions in kind. *See overleaf for more details.*

On 29TH September more than 50 research, industry and government partners from these programmes from UK, EU and Africa are coming together to share their knowledge and discuss research and innovation needs and collaboration opportunities to operationalise sustainable, equitable and resilient cold-chains for food and health globally. While we are keeping the conference to a limited number of attendees to ensure engaged discussions, we are keen to make it an open-house event to bring in a wider cohort of experts, industry and academic partners keen to engage.

ZERO-EMISSION COLD-CHAIN (ZECC)

Bringing together academics and industry across the UK, the aim of this four-year project is to deliver an industry-led pathway to achieve the UK's net zero 2050 target whilst maintaining food security and affordability for UK consumers and economic opportunity for the UK food industry. It will also highlight opportunities and approaches that will enable the UK food industry to remain and become more competitive and provide potential new business opportunities to new actors in the food cold chain. The project starts by evaluating future cold-chain and cooling energy consumption demands (from both a technical and non-technical perspective) and the impact on UK energy consumption and peak electricity demand before going on to determine areas of intervention considering available energy and thermal resources, emission targets and other commitments as well as costs

ENOUGH

The main scope of the ENOUGH programme is to support the EU farm to fork sustainable strategy by providing technical, financial, and political tools and solutions to reduce GHG emissions (by 2030) and achieve carbon neutrality (by 2050) in the food industry. The project will provide tools and methods to contribute to the EU Farm to Fork strategy to achieve climate neutral food businesses. It will identify how to achieve climate neutrality for food businesses; improve integrated sustainability and meet societal goals. The project will also aim to demonstrate promising technological solutions applied within the main sectors of the food chain from harvest to consumption (processing, transport, retail and domestic) for different products categories including meat, fish fruit/vegetables and dairy.

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

ACES is a first-of-its-kind Centre dedicated to sustainable cooling, cold-chain and post-harvest management. It is hosted by the University of Rwanda in Kigali; 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 UK universities and industry partners. The work 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.

draft Agenda

A workshop report on the outcomes will be published

Should you wish to participate, please email Sehar Amer (s.amer@bham.ac.uk); places are limited. *We also have four short intervention slots during the day to showcase technologies and solutions. Please contact us if you would like to be considered for a slot*

08:15 – 08:40

Registration and coffee

08:40 – 09:00

Welcome and objectives for the day

Enough and ZECC

9.00 – 10.30
Projects

ACES, to include Community Cooling Hubs and insights from Kenya

What have we learned about vaccine cold-chains?

Open floor – other projects, thoughts, questions

10:30 – 10:50

Coffee break

10:50 – 1200

Plenary Discussion supported by short interventions

The Big Issues

If the goal is sustainable resilient cold-chain aligned to future needs, what are the big issues e.g.

Changing demands

Global pressures

Transition to renewable

Climate change

Financing cooling

Skills

12.00 – 12.30

Policy challenges and needs

Plenary Discussion

Interconnectivity of stakeholders (govs, industry, financiers, others)

12:30 – 12:50

Solution showcase - 2 presentations

12:50 – 13:50

Lunch

13.50 – 14.50

“Cold-chain 2050” – how radical innovations might change the cold-chain from new refrigeration technologies to drones to IoT or alternative proteins

14.50 – 15.50

Break-out groups

Further deep-dive discussions around issues and opportunities

15.50 – 16:10

Tea

16:10 – 16:30

Solution showcase - 2 presentations

16:30 – 17:20

Plenary discussion

Key areas for research and advancement

Opportunities for collaboration and policy implications

17:20 – 17:30

Next steps and close

Reception