Globally connected sustainable, resilient & equitable cold-chains

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• Less than half of the food that requires refrigeration is refrigerated.



- •12% of the total food produced is lost due to lack of cold-chain; enough to feed 1 billion people
- 25% of vaccines wasted; 1.5 million people/year lose their lives due to vaccine-preventable diseases.

The need for cold-chain



- Cold-chain technologies + food loss = 4% of total GHG emissions
- Cooling technologies: 7% of GHG emissions; could rise 90% above 2017 levels by 2050



The need for cold-chain



KIGALI AMENDMENT

Globally connected, sustainable, resilient & equitable cold-chain

SUSTAINABLE DEVELOPMENT GOALS

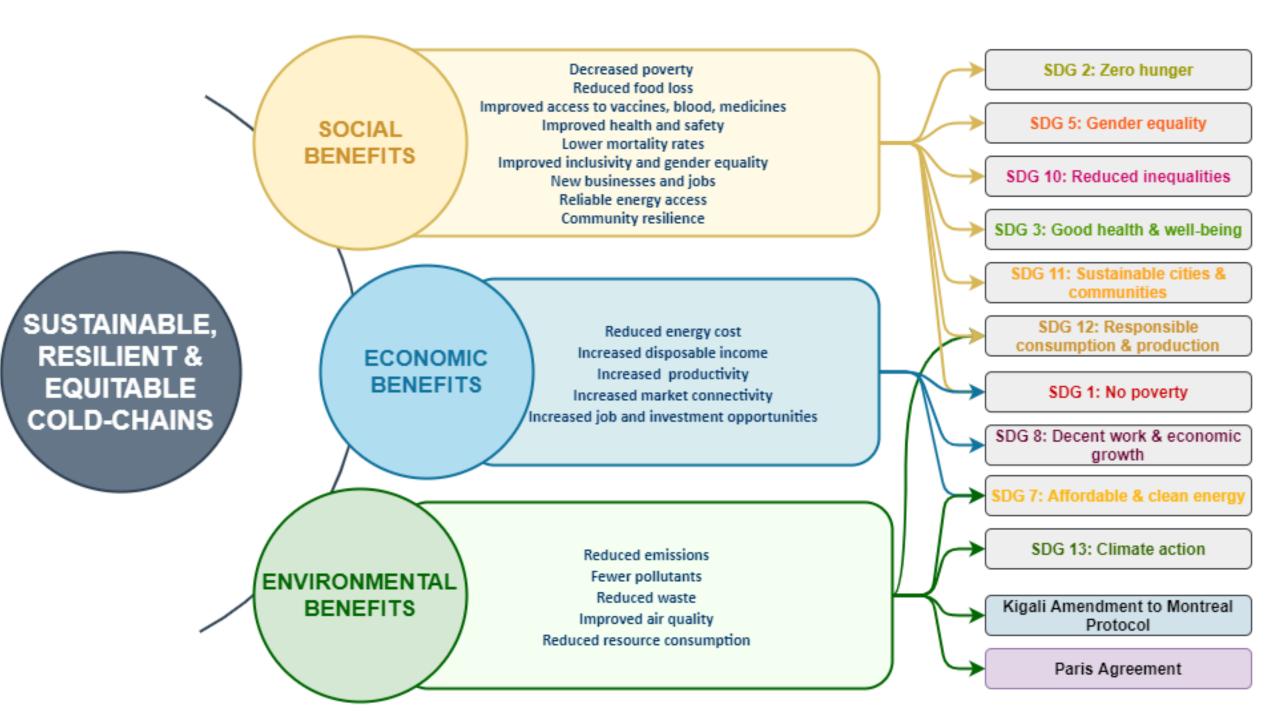
PARIS AGREEMENT → Key for achieving SDGs and <u>a</u> <u>well-functioning global society</u>
→ Can contribute three internationally agreed goals simultaneously

The challenge



In low-income countries, cold-chains are mainly owned and governed

- by the private sector:
 - \rightarrow Fails to deliver against society's
 - most acute cold-
 - chain needs
 - \rightarrow Societal benefits are treated as "soft win"



Flaw in the business model

C Toby Peters / Leyla Sayin



Inefficient allocation of resources & suboptimal investments:

- MORE PRODUCTION without addressing PHL
- MORE COLD STORAGE buildings without other functioning elements & connectivity
- MORE DONOR-DRIVEN PROJECTS that are not marketoriented and depend on grant funding to continue
- **<u>OLD TECHNOLOGY</u>** that is not climate friendly and expensive



Cold-chain is a critical infrastructure

PUBLIC

Co-investor, facilitator and regulator, ensuring inclusive, equitable and optimal cold-chain development in line with its societal targets

Public-Private-Community Partnership

PRIVATE

Co-investor and co-provider, providing access to private capital, bringing knowledge, skills, innovative technologies, operational and managerial efficiencies

COMMUNITY

End-users, co-investor and coprovider, ensuring service usage, complementing input resources but also providing social capital for inclusive and equitable needsbased development

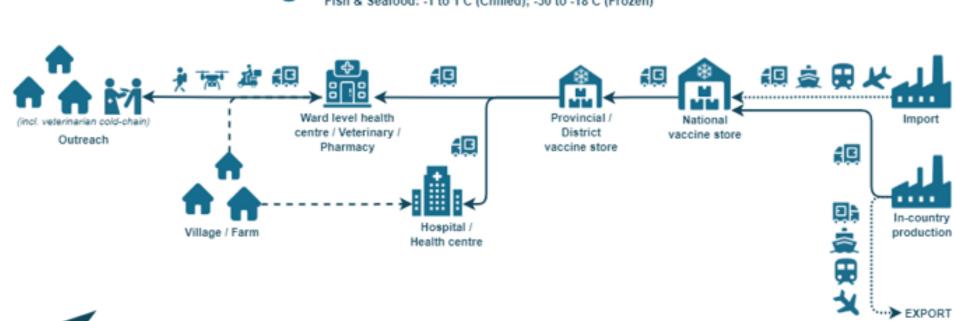


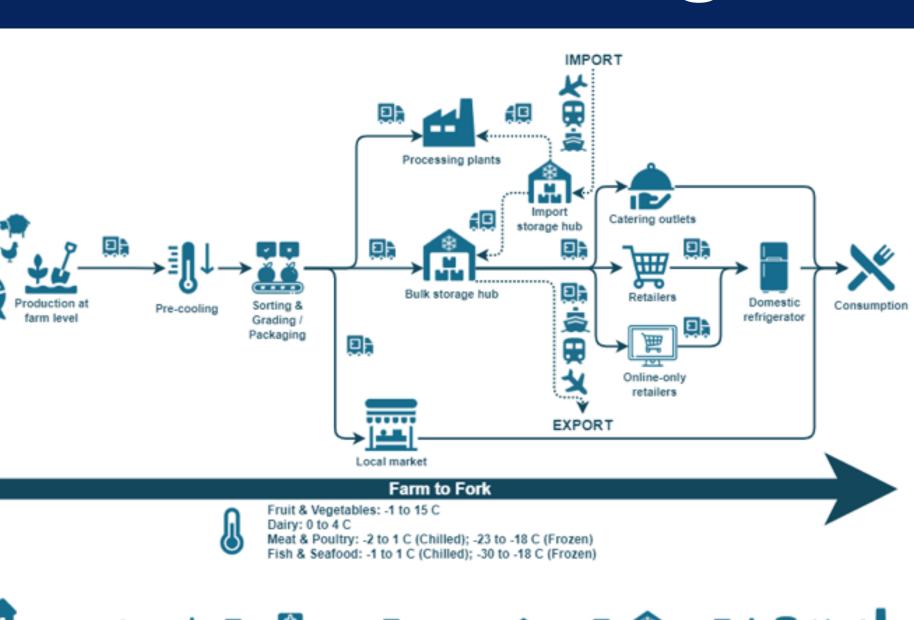
Disconnect between low-income and high-income countries:

- Cold-chain development & connectivity
- Policy and regulations
- Prevent beggar-thy-neighbour strategies

→ Need for collaboration between low-income and highincome countries









Cold-chains are global

Manufacturer to Arm

Traditional vaccines: 2 to 8 C mRNA vaccines: Frozen / Ultra-Low Temperature (ULT)



Centre for Sustainable Cooling

Multi-partner cold-chain research programmes across the UK, EU and internationally to design and deliver a globally connected sustainable, equitable and resilient cold-chain system:

Africa Centre of Excellence for Sustainable

Cooling and Cold-chain

- Horizon 2022 ENOUGH
- ZECC
- TICR

Value > £30M, excluding infrastructure and industrial contributions in kind





First-of-kind centre dedicated to sustainable cooling and cold-chain:

- → Accelerated uptake of sustainable, equitable cooling and cold-chain solutions in the agriculture and health sectors in Africa
- \rightarrow Technical and business assistance
- \rightarrow Training and knowledge transfer
- \rightarrow International collaborations





"ACES is a demonstration of how we can work together, to help tackle rising emissions and keep alive the goal of limiting average global temperature rises." COP26 President, the Rt. Hon. Alok Sharma MP







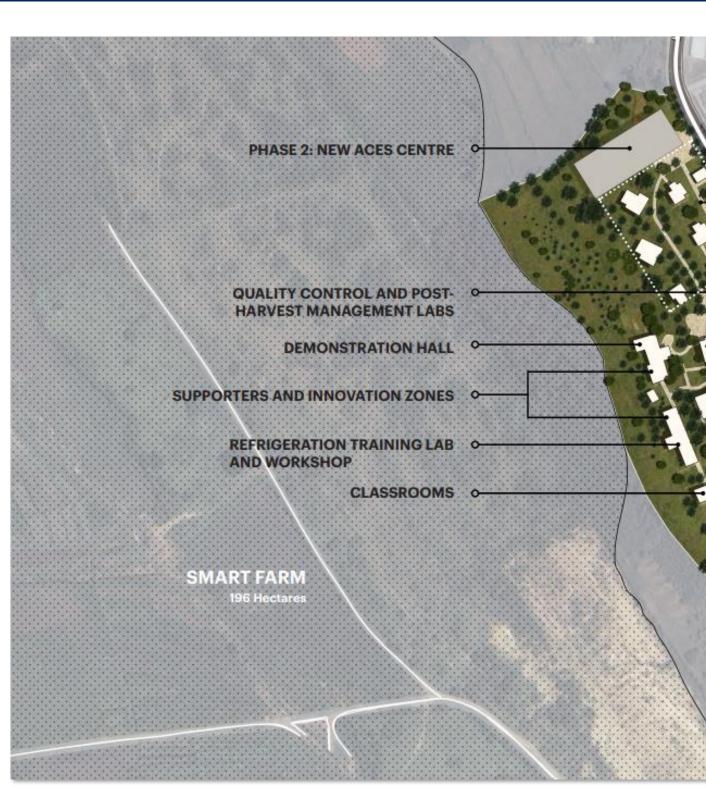
ACES "Hub & SPOKE" Approach

- ✓ SPOKEs deployed in strategic locations as real-world applications of ACES' solutions
- ✓ Specializing in particular needs and opportunities for local markets
- ✓ Provide technical assistance, demonstrations and knowledge transfer
- ✓ 1st SPOKE in Kenya
- ✓ Two CoEs in India in development (Hyderabad & Haryana)





- \checkmark > \$25M of seed investment committed by the UK and Rwanda Governments and industry
- \checkmark + the campus and physical infrastructure
- \checkmark + smart farm



Complete logistics chains for soil to fridge

ACES

6 KM to Kigali International Airport

BUNGALOWS To be converted into creche, business' and incubation suites for rent & residential facilities.

CONFERENCE CENTR

O CANTEEN

DEMONSTRATION COMMUNITY COOLING HUB

OFFICES AND MEETING ROOMS

RECEPTION

MAIN ENTRANCE

ACES Campus Scale: 1/500



Support for businesses to accelerate market at scale:



Test and demonstrate solutions



Market intelligence and knowledge





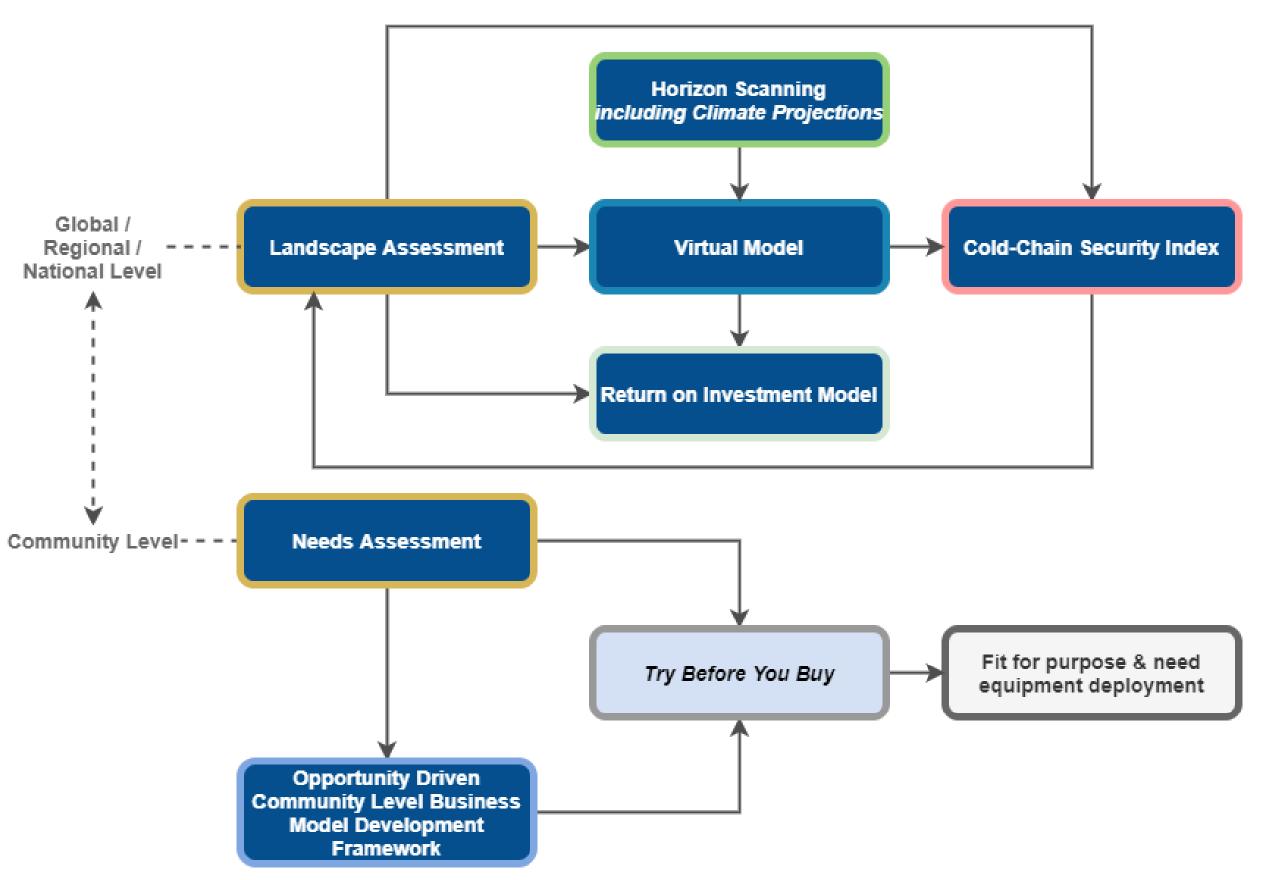
Incubation space





Tools, models, assessment methodologies:

- ✓ Understanding current and future cold-chain needs
- Virtual models to develop optimal solutions & stress testing
- Real value & return on investment







Global food and health security depend on achieving a **globally** connected sustainable, resilient & equitable cold-chain

- 84% of fruits & 47% of vegetables are imported in the UK; Rwanda will • double exports by 2025
- Need to close 56% food gap by 2050
- With 60% of the world's uncultivated arable land laying in Africa, the continent will play a key role in feeding the surging global population.

Global cooperation is needed to achieve win-win outcomes

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