



INSTITUT INTERNATIONAL DU FROID
INTERNATIONAL INSTITUTE OF REFRIGERATION

ENVIRONMENTAL CHALLENGES OF THE REFRIGERATION SECTOR COP 27

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SHARM AL SHEIKH (EGYPT)

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Director General

What is the IIR?



1st IIR International Congress of Refrigeration – 1908, Paris Sorbonne (France)

Founded in 1908

The IIR is an independent intergovernmental science and technology-based organisation

Objective: Worldwide dissemination of knowledge on all refrigeration technologies and uses

“Refrigeration for Sustainable Development”

Key domains include...

- Food quality and safety from farm to consumer
- Comfort in homes and commercial buildings
- Healthcare products and services
- Low temperature and liquefied gas technologies
- Energy efficiency
- Safe use of non-ozone depleting and low global warming refrigerants



International network

59

Member Countries

+950

Corporate and Private Members

+300

Experts



Food and Agriculture
Organization of the
United Nations



OzonAction



OECD

BETTER POLICIES FOR BETTER LIVES



CIHEAM



World Health
Organization

What do we do?

A refrigeration information network adapted to your needs

- Fridoc database: 110,000 references
- International Journal of Refrigeration: the best peer-reviewed scientific journal in the field
- Guides, courses: online/on site
- Informatory Notes: for decision-makers
- Professional directories: Expertise Directory, Laboratories, International Dictionary of Refrigeration
- Newsletter: distributed monthly
- Conferences: 5 IIR conferences, 8 IIR co-sponsored conferences per year
- Working groups
- Research and development projects with United Nations, countries and European Union funds, with the IIR member network, in Europe, Asia, Africa.....

Visit the IIR website: www.iifiir.org

Main challenges

1) Refrigeration use will continue to dramatically increase:

- growing population in underequipped developing countries
- air conditioning in warm countries which are underequipped compared to USA....and because of adaptation to global warming everywhere: It is a vital issue in many countries and during heatwaves elsewhere, even if natural solutions shall be developed. According to the IEA, energy needs for space cooling (already more than 8% of global electricity consumption), could triple by 2050

Main challenges

- cold chains in developing countries because of food losses (and their impact on environment), food security and health issues (safe food, vaccines and other health products): developing countries can have a refrigeration capacity (concerning refrigerated storage, refrigerated vehicles, domestic refrigerators....) ten times lower than in some developed countries
- energy needs: heat pumps, LNG, hydrogen....
- information technologies, biotechnologies, nanotechnologies, space technologies....
- many other uses including vital uses (hospitals...), environmental uses (carbon capture and storage, species preservation....)

Main challenges

2) Refrigeration technologies and their carbon footprint

Two main issues, except material factories:

- whatever the technology, need of energy, thus energy efficiency and use of renewable energies issues
- most technologies are based on vapour compression systems, with the use of fluids, generally high global warming potentially fluids if there are leakages (operation, maintenance, end of life)
- chlorinated fluids (CFCs and HCFCs) which destroy the stratospheric ozone layer; the Montreal Protocol organizes the phase-out of these fluids

Main challenges

- fluorinated fluids (HFCs), with no effect on the ozone layer but still often are potent greenhouse gases: the Kigali amendment of the Montreal Protocol organizes their phase-down
- low GWP refrigerants exist, but with potential other environmental drawbacks (TFAs with HFOs) or security problems (natural refrigerants: ammonia, CO₂, hydrocarbons)

According to IIR estimations (2017), the refrigeration sector represents 7,8% of total greenhouse gases emissions including 4,9% due to energy consumption and 2,7 % due to fluids

Main challenges

3) Consequences

- apart of environmental issues, we have an health issue (safe food, vaccines, health products, air conditioning) and a food security issue: food losses could feed almost 1 billion people
- refrigeration can be a solution for global warming: a cold chain similar in capacity in developing countries than in developed countries could halve the carbon footprint of the current food chain of products which should be refrigerated
- heat pumps are also an environmental solution for heating needs
- however, in any case, we need to limit the refrigeration capacity needs thanks to insulation, passive cooling technologies....

Main challenges

- the issue of chlorinated and fluorinated refrigerants is progressively solved thanks to the Montreal Protocol and the Kigali amendment, but the energy issue is still in front of us. Thinking general systems (buildings, districts.....), not only refrigeration systems alone, will be necessary

Application today in two main sectors: food and health products cold chains; heat pumps

Research and development projects



A consortium partner in international research and development projects since 2011 with:

- Countries funds (Norway...)
- The European Commission
- The World Bank
- UN Environment Programme, UNIDO....

**Contact us for support
on your next project!**



Technical assistance to the World Bank projects on clean cooling for food supply chain in low income economies



In **Bangladesh** Technical Assistance on Clean and Energy Efficient cooling solutions for Livestock Value Chains in Bangladesh (World Bank-funded project)

- Market assessment of cold chain infrastructure in livestock value chain
- Business models, investment plans, training, and communication
- Preparation of Policy note and practical guidance note.

In **India**, Implementation of an Inland Water Transport, Logistics and Spatial Development infrastructure to facilitate the movement of both passengers and freight across the Hooghly River, and improve the accessibility of the Kolkata Metropolitan Area

- Baseline and gaps assessment for potential integration of IWT.
- Market forecasting
- Technology recommendation and challenges
- Design and develop a pilot model for IWT integration of agricultural and fisheries cold chain

Bibliography

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Contact Details

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IIF IIR, RD&T, BRAC UNIVERSITY, Bangladesh University of Engineering and Technology, UNIVERSITY OF BIRMINGHAM, HERIOT WATT UNIVERSITY

For more information please see: Development Projects - Livestock and Dairy Development Project - P161246 (worldbank.org)

ENVIRONMENTALLY SUSTAINABLE COLD CHAINS FOR THE LIVESTOCK SECTOR IN BANGLADESH

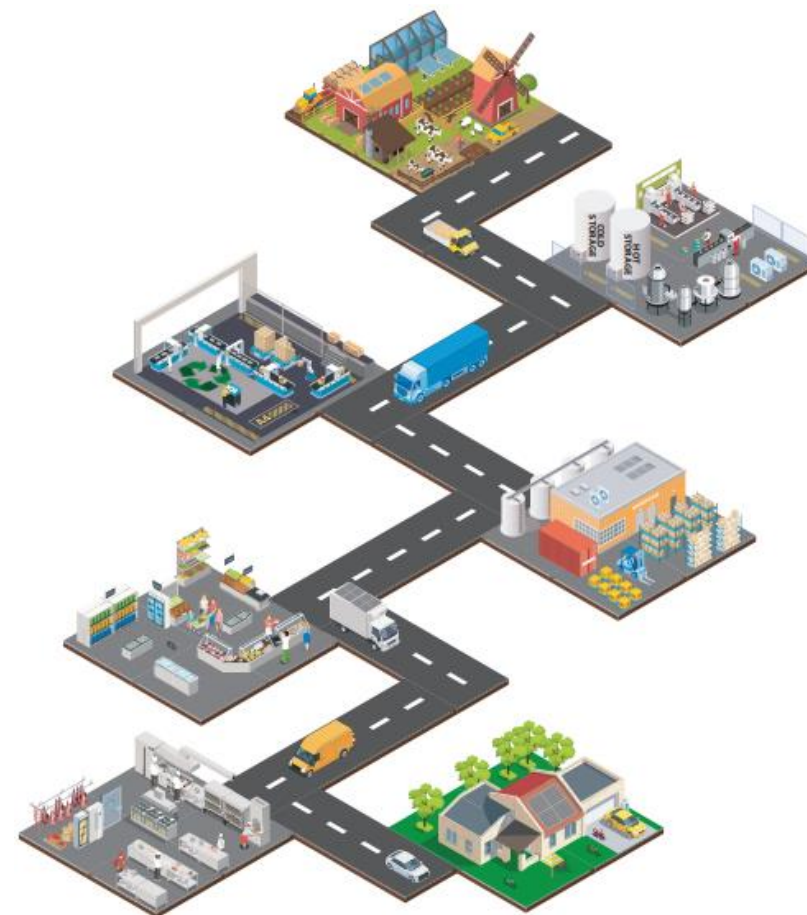
ENOUGH: the EU project to reduce GHG from the food sector by 2050



- EU funded project coordinated by SINTEF Ocean.
- 28 partners from 12 European countries with expertise across the whole food chain –
- 2021 – 2025
- The project will provide technologies, tools and methods to contribute to the EU Farm to Fork strategy to achieve climate neutral food businesses.

Objectives

- Identify strategies to achieve climate neutrality for food businesses.
- Integrate and manage the food chain of the future.
- Demonstrate new technologies to help decarbonisation of the food chain.
- Develop innovative food chain systemic approaches and solutions.



SOPHIA: Sustainable off-grid solutions for pharmacies and hospitals in Africa



- EU funded project coordinated by Hochschule Karlsruhe (HKA)
- 13 partners including five African countries
- 2021 - 2025
- SophiA will enable African populations in a sustainable way to access to a better health through
 - Clean drinking water
 - Clean cooling for medicines storage (5°C) blood plasma (-30°C) and sensitive medication (-70°C)
 - Emergency clean electricity supply
- SophiA - Systems will be built, tested and demonstrated at four remote hospitals located throughout the African continent covering different geographic and climate regions.



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Thank you