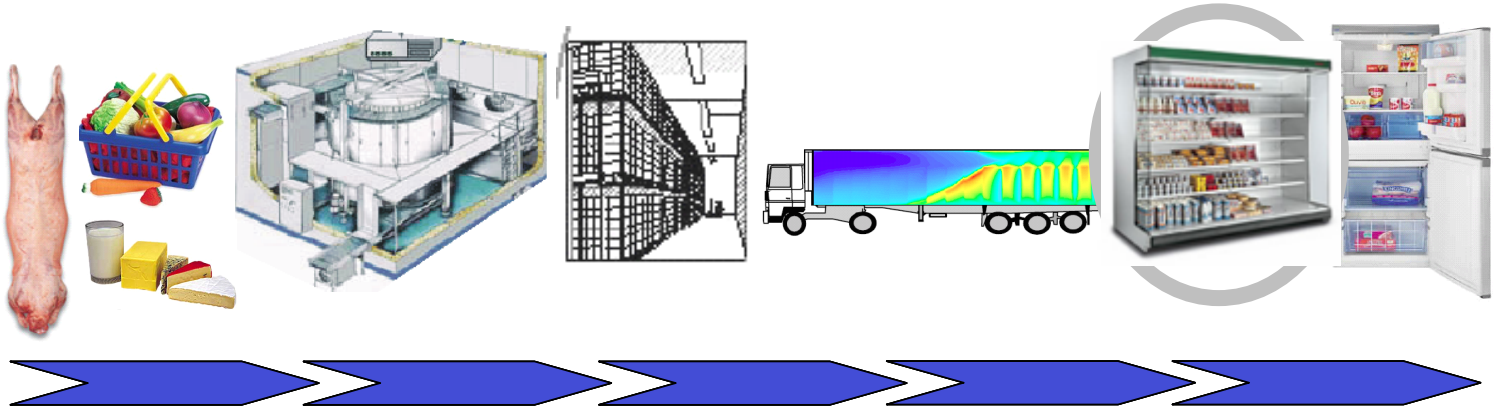
Fostering the Development of Technologies and Practices to Reduce the Energy Inputs into the Refrigeration of Food

Climate change

- UK government aims to achieve a 60% reduction in carbon use by 2050
- Food industry accounts for at least 12% of UK energy use*
- Energy efficiency per unit produced in the UK food industry improved by only 4% between 1990 and 2000*
- Needs to be greater if UK is to succeed in reducing carbon emissions by 60% by 2050

*DTI figures

Aim



Identify and stimulate development and application of energy efficient refrigeration technologies and business practices for use throughout the food chain whilst not compromising food safety and quality

Background

- Sponsored by defra
- Coordinated by FRPERC (University of Bristol now Grimsby Institute)
- Partners:
  - Brunel University
  - LSBU (London South Bank University)
  - Sunderland University
- Project started 1st June 2006

Work

1. Mapping of energy use
2. Identifying available technologies
3. Feasibility studies on promising current technologies

1. Mapping of energy use

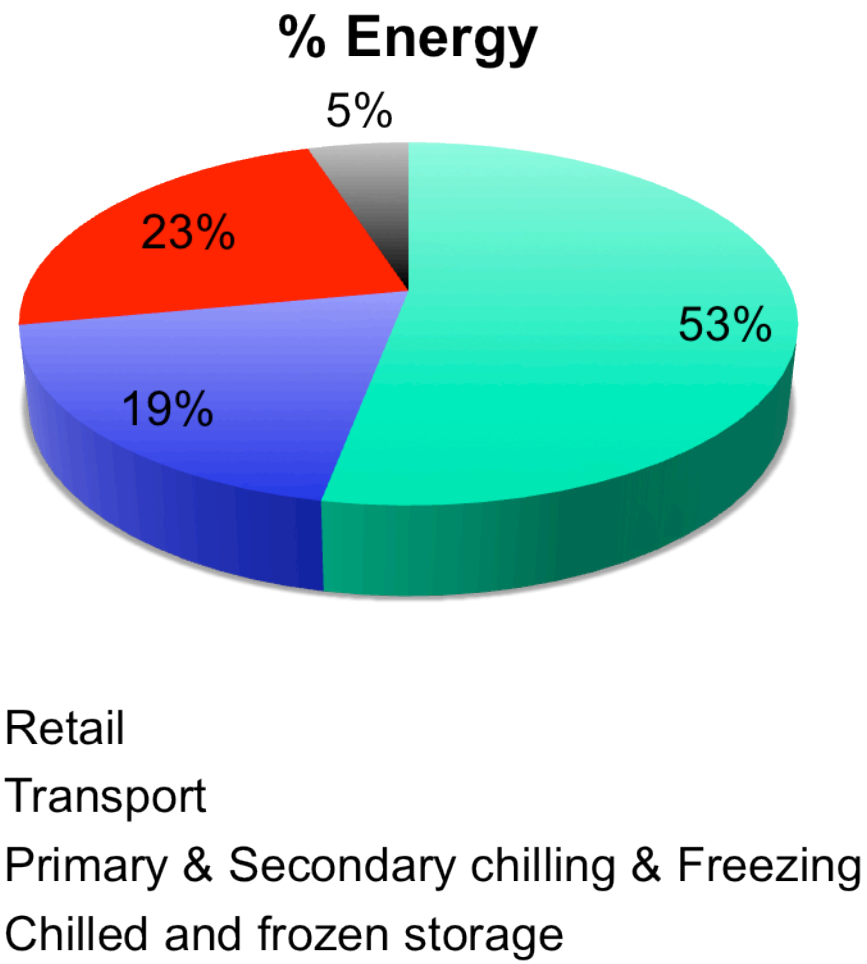
Objective

Identify and rank 10 ‘operations’ (process/food combinations) in order of the potential to reduce energy usage in food refrigeration by the use of improved technology and enhanced business practice.

Mapping

- Aim to quantify where energy is used in cold chain
- At start not well documented and conflicting sources
- Initial indication that ~50% used in retail
- Lack of data on catering use and often not considered

Mapping – Initial estimate



Target - Energy efficiency matrix

	Chilling	Freezing	Storage	Retail	Catering
Energy used					
Throughput					
Energy change					
Efficiency					
Saving potential					

Problem

- Little measured data on energy consumed in a food refrigeration process.
- Common sources for much ‘quoted’ data and source usually an ‘educated’ estimate.
- In the few cases where data had been measured there was no data on food i.e. throughput and temperatures.

2. Available technologies

- Identify and rank current technologies, systems or business practice options with most potential to save energy from 1.
- Disseminate energy saving potential of technologies
- Investigate application of current technologies by identifying barriers to their uptake

Alternative and Emerging Refrigeration Technologies

- Magnetic
- Thermoacoustic
- Thermoelectric
- Stirling cycle
- Air cycle
- Tri-generation
- Sorption technologies (absorption and adsorption)
- CO_2 refrigeration systems

3. Feasibility studies

- Demonstrate feasibility of current unexploited technologies
- Identify gaps where further research needed
- Generate industry led research projects

Partners

- FRPERC –project management, mapping, feasibility, available technologies in primary chilling/freezing, mathematical modelling
- Brunel –available technologies in storage, transport, retail
- LSBU –modelling of cold chain, best practice
- Sunderland –assessment of business practices upon equipment requirements and performance

Collaborating organisations

- Campden BRI
- Dairy UK
- Food & Drink Federation (FDF)
- Chilled Food Association (CFA)
- Meat and Livestock Commission (MLC)
- Federation of Environmental Trade Associations (FETA)
- Cold Storage & Distribution Federation (CSDF)
- Catering Equipment Suppliers Association (CESA)
- Food Processing Faraday Partnership (FPFP)
- Institute of Refrigeration (IOR)
- + Companies

Steering group and stakeholders group to help guide project

Outputs

- Used by policy makers to identify opportunities and barriers to energy reduction in refrigeration of foods
- Assist in development of future public funded innovation programmes
- Platform for exploitation through further research, development and demonstration of new technologies and systems that have been identified in the project

Further Information

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