ICCEE
Improving Cold Chain Energy Efficiency in food and beverage sector

‘For each one what it needs’

France
Food retailer

TRL 9

Implementability: 99%

Separated compartments warehouse

Looking for energy efficiency potentials in a warehouse of a food retailer, a separation of the warehouse is made among other things. Goods that need to be cooled to the same temperature are stored together in one compartment. In this way, a significant amount of energy can be saved, as it is no longer necessary to cool all goods to that temperature of those goods that need to be the coolest.
Another effect of subdividing the food warehouse is to reduce the heat input by convection through open doors. In contrast to a large area, only a smaller area can cool down due to the subdivision.
An HVAC expert (Heating, Ventilation and Air Conditioning) was invited to plan this measure. When implementing this, the separation of the compartments was optimized so that fewer cooled compartments are located on the outside wall of the warehouse and colder goods are located as far as possible on the inside, so that there is as little temperature difference as possible on all walls.

Main NEBs (other benefits)
Saving costs
Green image

Description

For the subdivision, it was first analysed which goods are to be stored and which temperatures are required for this in each case.
Based on Table 1, food groups can be derived which can be stored together in one temperature section. The table is based on sources of the German Federal Institute for Consumer Health Protection and Veterinary Medicine [1].

In order to minimise heat transfer to the refrigerated areas, frozen areas are planned so that they border on as few external walls as possible. In this way, and by ensuring that the doors of the freezer areas do not lead directly to the outside, but to other cooling areas with a slightly higher temperature, the refrigeration capacity is not completely lost, but finds further use in the less cooled areas.

In addition, the office areas must be included in the planning. This area is planned in such a way that it does not border on areas with frozen food, so that an area in a corner of the warehouse, i.e. with two external walls, appears to be suitable.

Table 1: Maximum storage temperatures T for different food products in °C, based on [1]

T [°C]	Food products
- 18	Frozen foods (except ice cream)
- 12	Frozen meat, frozen egg products
2	Fresh fish and fish products
4	Fresh poultry meat, Hares, game and domestic rabbits, minced meat (products), feathered game, egg products
7	Fresh meat (except poultry), game (except hare, and rabbits and feathered game), feathered game (pheasant, partridge, quail) even if they are farmed, gourmet salads, raw food (e.g. fresh mayonnaise)
8	Preferential milk, chicken eggs
10	Butter, cream cheese, dairy products, pasteurized milk, soft and semi-hard cheeses, Live bivalve snails

What is the improvement focus?

The key to this measure is mainly to reduce the unwanted heat input to the cooled areas, thus reducing the cooling load and power consumption. This mostly impacts the electricity consumption

Benefits

In addition to the main benefit of the electricity saved by the measure, there are also the other advantages of energy saving. For example, the reduction of electricity savings contributes to the reduction of the negative environmental impact of electricity generation. In addition, there is an equivalent cost saving for the food trade.

Opportunities and barriers to implementation

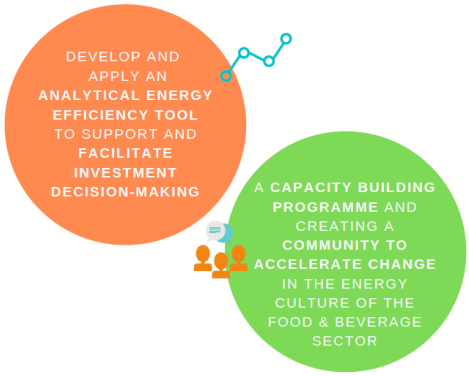
Opportunities	*Barriers*
Lower power consumption and related cost	Know-how required
Greatest potential for new construction	Staff for planning required
Improved food quality	Limited Implementability for existing warehouses
Negligible maintenance	Additional cost for glide racks
Green image	

References

[1] BGVV (Bundesinstituts für gesundheitlichen Verbraucherschutz und Veterinärmedizin, German Federal Institute for Consumer Health Protection and Veterinary Medicine). Accessed 24 March 2020

About ICCEE

The project ICCEE, www.iccee.eu, funded by the EU programme Horizon 2020, aims at improving energy efficiency in the cold chain of the food & beverage sector and making it easier for the sector to undertake energy efficiency measures across the entire supply chain and accelerate the implementation of energy audit results.
ICCEE follows a holistic approach that moves from a single company perspective to the assessment of the entire cold supply chain. Existing financing schemes for SMEs will be assessed: the optimal ones will support the implementation of energy efficiency measures. ICCEE objectives build on 2 pillars:



The ICCEE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 847040.