

'Is cleaning cooling machines important? The simple answer is YES'

Spain
Food industry

Cleaning of condenser and evaporator for maintenance

Industrial process chilling systems come with four main components: evaporator, throttle valve/ expansion valve, compressor and condenser.

After an energy auditory in a Spanish food industry, they realized that chillers are the single most energy consumers, so a comprehensive maintenance program is necessary.

In fact, dirty condenser and evaporative coils have a negative impact on energy efficient system operation, because at this industry the compressor had to work longer and, therefore, the system was using more power because the coefficient of performance/energy efficiency ratio (COP/EER) was severely affected.

For this reason, preventive maintenance is still the best way to ensure sustenance of chiller efficiency for getting economic and consumption savings.

Maintenance extra cost
15,000 €

Savings
11,560 €/year
85,000 kWh/year

Main NEBs (other benefits)
Increased life span
Best ROI

Description

This Spanish food industry uses finned coils in a number of different applications to transfer heat either into or out air streams.

Over time the surfaces of these coils had become dirty as the air moving over the coils contain dust, dirt, pollen, moisture and other contaminants. A build-up of

contaminants decreased the available surface area for heat transfer, reducing the efficiency of the heat transfer process, leading to excessive energy consumption and poor system performance.

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This report claims that systems whose heat transfer surfaces have not been cleaned in the last three years an immediate energy saving of at least 10% is expected to be achieved following cleaning

For this reason, it is important that air conditioning coils are regularly inspected and maintained to ensure they operate at optimum efficiency.

What is the improvement focus?

After the cleaning of finned coils there was a decrease in the condensation temperature from 35 to 40°C, increasing the cooling capacity

by 10%, then 10% of savings are reached by this improvement.

This means that the nominal cooling capacity of the 2 coils increase from 630 kW per unit to 700 kW as previously operated, thus the electric power from goes down to 315 kW instead of 350 kW to keep the same cooling power.

Benefits

With this maintenance you get energy consumption savings and economic savings.

Furthermore, regular maintenance and cleaning allows greater durability of life span of the systems

Postponing maintenance and cleaning can have a detrimental impact on process equipment and heating and cooling systems. When dirt and grime coat a chiller's or air-conditioner's coils, it can drastically increase the costs of running that system.

Cleaning the surfaces of the condensers and evaporators showed an average reduction of 10%, thus the food industry reduced its energy consumption from 850,080 kWh to 765,072 kWh, getting a Return on Investment in one year.

Calculations

The calculations show a quick idea of the costs and returns of this practice, as well as the economic impact after the implementation of the new equipment. In order to be clear, the initial situation is directly compared with the final situation and a table of differences is shown broken down into the different key points of savings, using an average price of electricity and emissions taking into account their expected evolution.

	Data
Productive capacity [t/year]	900
Annual energy consumption currently [kWh/year]	850,080
Annual improvement energy consumption [kWh/year]	765,072
Annual energy savings [€/year]	85,008
Annual economic savings [€/year]	11,051

Total investment (€)	15,000
Energy savings [kWh/year]	85,008
Average electricity price [€/kWh]	0.13
Average emission price [€/tCO ₂]	20
Emission reduction [tCO ₂ /year]	25.50
Energy economic saving (€)	11,051
Emission economic saving (€)	510
Total economic savings (€)	11,561
Return period (years)	1.30

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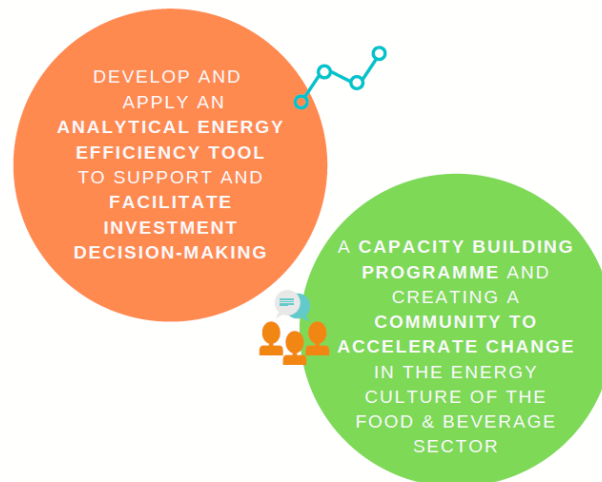


About ICCEE

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:



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