BEST PRACTICES – AUXILIARY TECHNOLOGY
FACTSHEET

ICCEE
Improving Cold Chain Energy Efficiency in food and beverage sector

'Compressor replacement'

Latvia
Freezing industry

TRL 9

Investment (real or estimated)
250 000 €

Savings
35 000 €/year
362 MWh/year

Main NEBs (other benefits)
Increased lifespan
Improved control
Lower water consumption
Improved safety
Reduced greenhouse gas emissions

Consumption and emissions savings

Company "Teikas Saldētava" offers storage facilities. freezer warehouse and office spaces. Mainly working with frozen meat and fish suppliers. as well other kind of suppliers mainly in food and retail sectors. Company considers energy costs and efficient use of resources as an important objective.

The biggest energy efficiency measure implemented was the instalment of new compressors that are virtually capable of covering a larger portion of the cold load.

The switching of compressors resulted in a significant reduction in electricity consumption and CO_2 savings. It also it improved working conditions and safety due to ammonia leakage detection system that was improved when old compressor system was changed.

Description

The freezer rooms have an average temperature of up to -18°C while the premises in the basement with a total area of 1175 m^2 provide a temperature interval from 0 to 5°C. Shock freezing is available upon request with a temperature regime of -30°C. Freezer space is arranged across five floors and covers a total area of around 5 665 m^2. Generation of cold energy for refrigeration is carried out using ammonium as a cooling agent during the compression cycle.

For many years, condensation of ammonia in the compressors was carried out using water spraying and recirculation basins.

The new compressors were installed together with the dry cooling/condensation tower. The new system provides possibility to switch between the two condensation options, however due to high water consumption company is planning to

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use only dry cooling/condensation tower.

What is the improvement focus?

The amount of electricity consumed in the company depends heavily on outdoor air temperature. In particular, the largest electricity consumer in the company is refrigeration equipment, for which the amount of energy consumed depends on the amount of cooling energy needed.

Benefits

The compressor change saves 362 MWh of electricity per year, representing 30.7% of the total electricity consumption of the company. It also improves working conditions and safety due to ammonia leakage detection system that was improved when old compressor system was changed.

Other important benefits are the increased lifespan lower maintenance costs of the new equipment and improved control system.

Opportunities and barriers to implementation

Opportunities	*Barriers*
Increased lifespan of equipment	Lack of human resources (development, implantation and general project management)
Improved control	Lack of affordable financing
Lower water consumption	Lack of skills and knowledge of installers
Improved safety	
Reducing greenhouse gas	

Calculations

Annual reduction in electricity consumption achieved by switching compressors was calculated. The electricity savings were determined at the regulatory outdoor air temperatures specified in the Latvian construction standard in Riga. On average. electricity consumption in the company is seen to have decreased by 30 MWh per month. Depending on outdoor air temperature. it accounts for 25% to 43% of the total company's electricity consumption. A higher percentage of electricity savings are seen in the coldest winter months. which is due to the use of a “dry” cooling tower for new compressors. As the amount of data available is relatively small. the estimated electricity savings may change over time.

Month	Outdoor air temperature	Electricity consumption of the company. MWh		Savings	
		With old compressors	With new compressors	MWh	%
January	-4.7	69.8	40.3	29.5	42.3%
February	-4.3	70.9	41.3	29.6	41.7%
March	-0.6	80.6	50.8	29.8	36.9%
April	5.1	95.6	65.5	30.1	31.5%
May	11.4	112.1	81.6	30.5	27.2%
June	15.4	122.6	91.9	30.7	25.1%
July	16.9	126.6	95.7	30.8	24.4%
August	16.2	124.7	94.0	30.8	24.7%
September	11.9	113.4	82.9	30.5	26.9%
October	7.2	101.1	70.8	30.3	29.9%
November	2.1	87.7	57.8	29.9	34.1%
December	-2.3	76.1	46.5	29.7	39.0%
Total	6.2	1181.3	819.1	362.3	30.7%

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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 considering their expected evolution.

	Initial situation	Final situation
Productive capacity [t/year]	n/a	n/a
Annual energy consumption [kWh/year]	1 934 300	1 572 000
Annual energy cooling consumption [kWh/year]	981.600	608.592
Annual economic energy expenditure [€/year]	184.285	135.265

Total investment (€)	250.000
Energy savings [kWh/year]	362 000
Average electricity price[€/kWh]	0.097
Average emission price [€/tCO_2]	25
Emission reduction [tCO_2/year]	39.458
Energy economic saving (€)	35 143
Emission economic saving (€)	986.45
Total economic savings (€)	36 129.55
Return period (years)	7

References

[1] Company internal energy audit acording to Latvian Regulation No. 487 Regarding Energy Audit of Enterprises

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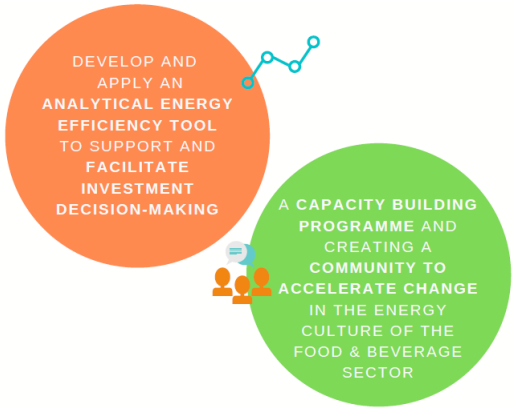
About ICCEE

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
- to 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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