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Case Study

Ice Water Pre-cooling Unit in a Dairy

Main activities	Dairy specialising in cheese production
Region	EU
Energy Consumption	The total annual energy costs before investment were €44,050 (subsequently reduced to €32,200 per year)

Project goals

Ice bank cooling is now state of the art technology for reducing electricity costs in the food industry. The dairy needs ice-water at 0° C. This was produced by submerging evaporator coils in a water filled tank. These coils were currently cooled to between minus 10 to minus 15° C, a significant overcooling and waste of energy.
The investment aimed to reduce energy requirements by installing an ice-water pre-cooling plant. Cooling water is pre-cooled to 1-2° C before entering the ice-water tank. The pre-cooling process uses the return ice-water.
At the same time the cooling capacity was increased from 150 kJ/sec to 550 kJ/sec.

Main investments

The investment comprised:
- A pre-cooler unit.
- A new screw compressor with a Coefficient Of Performance of 4.5 at -2° C evaporation temperature.

The compressor peak load demand is now 45 KW lower than a traditional solution and has expanded the cooling capacity from 150 kJ/s to 550 kJ/s.

Benefits

The specific electricity consumption for the ice-water system was reduced from 0.333 kWh to 0.243 kWh per kWh of heat removed. The compressor peak load demand is 45 kW, lower than a traditional solution.

Applications

Food processing and other industries where low temperature cooling is an important part of the production process.

Investment type	Cost (€)	Energy saved (KWh/year)	Saving achieved (€/year)	Payback period from energy saving
Pre-cooling unit (not including cost of compressor)	41,300	215,000	11,400	3.6 years