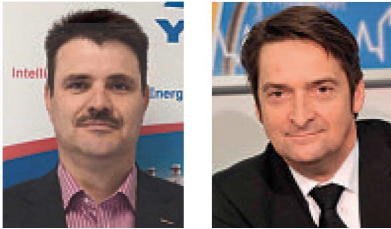


Co-generation

Improvement of energy efficiency



Authors: Olaf Besser, CEO, Silvio Müller, Financial Manager, YADOS GmbH, Hoyerswerda

Axel Munsch, Manager and Partner, EcoEnergyTherm, Hanover

Rising energy costs and growing public awareness of the climate and the environment are key factors of business success in the dairy industry. Energy- and cost-efficient production processes are turning into critical success factors (CSF). Innovative high-technology systems based on combined cooling, heat and power (CCHP) offer major opportunities for saving. YADOS, a manufacturer of CCHP units based in Hoyerswerda, and EcoEnergyTherm GmbH, a Hanover-based company specialising in planning and engineering design, provide practice-focused information on how to realise energy-efficient systems.

The dairy industry needs not only electricity and heat, but also continuous cooling for refrigeration, air-conditioning and process cooling. Given this, energy costs represent a major share of the total costs of production. In view of climate change and increasing automation, the amount of energy required for cooling is expected to rise in the future. Given this, sustainable, energy- and cost-efficient process solutions are becoming increasingly attractive to companies in the dairy industry.

Tri-generation, i.e. combined cooling, heat and power (CCHP) units, offer a sustainable and reliable alternative to the compression chillers frequently used for cooling. Energy conversion systems enable dairy companies to produce their electricity locally on site. The heat produced during power generation can be used for efficient cooling and other processes. In a best-case scenario, dairy companies can reduce their demand in primary energy needed to produce their electricity, heat and cooling to such an extent that they need no additional electricity for their compression chillers even in times of peak load.

Cost for the generation of heat, electricity and cooling reduced by up to 30 %

As automation and the capacity of production equipment increases continuously and heat recovery processes are steadily improved, the demand for thermal energy in the milk and dairy industry is falling while demand for electricity is rising, an effect observed across all high-energy industries. By using modern CCHP units such as those made by YADOS, companies can unlock far-reaching opportunities for improving energy efficiency in production.

CCHP units make parallel use of heat and electricity, thus offering highly efficient utilisation of the energy contents of fuels such as natural gas or biogas. Modern co-generation units are able to cover major parts of the electricity demands of a dairy company.

The recoverable waste heat that can be used in low-temperature processes (low-temperature heat, temperature < 95 °C) is a positive side-effect. With the help of innovative heat-exchanger concepts and a system of heat exchangers, the waste heat of a co-generation unit can be used as needed in an absorption chilling unit to produce cooling, in product pre-heating processes and clean-in-place (CIP) units or to heat the building.

Heat turned into cold

In the dairy and milk-processing industry, cooling is an imperative but high-cost process. Generally, the cooling required for ice water, cooling brine, chilling of stored products and air-conditioning is produced by compression chillers.



Depending on their energy efficiency profile, high-energy industries such as the dairy industry may unlock significant opportunities for energy saving with the help of CCHP units. Photo: EcoEnergyTherm

The use of absorption chillers is more environmentally friendly and saves costs. Absorption chillers convert the waste heat produced by the CHP unit into process cooling. They are particularly suitable for covering the high demand for base-load cooling in dairy and milk-processing companies.

Absorption chillers use the waste heat produced by the CHP unit to convert it into process cooling. Each kilowatt hour of cooling produced by an absorption chiller saves electricity normally consumed by the compression chillers, and thus doubles potential savings. The absorption cooling produced in this manner is distributed via the existing brine cooling system and thus as needed in the actual cooling process. A highly efficient combined cooling, heat and power process can cover the entire demand in base load cooling.

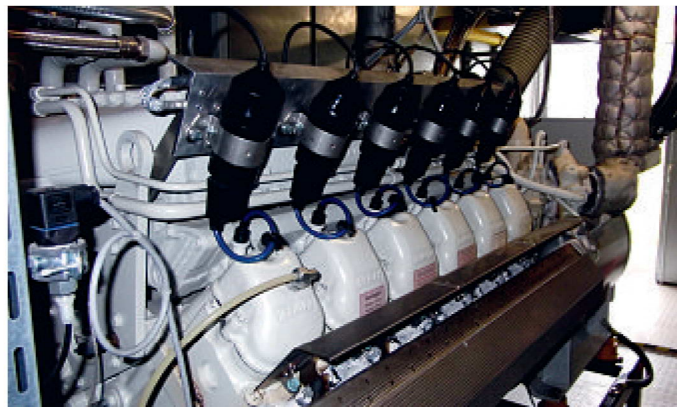
Financial support of sorption cooling with optimum system design

Energy consumption and energy costs in milk processing vary from company to company. On average, energy costs in an industrial-scale dairy company amount to roughly five to eight per cent of the gross value added. The actual energy demand is influenced by the company's size and product portfolio and its market orientation, i.e. whether the company produces its products for industry or consumers.

In view of the above, CCHP units should always be tailored to the needs and the energy profile of the individual company in question. A company-specific analysis supplies basic information on actual energy consumption and heating base load. This information is then used to plan and design the unit. The objective should always be a design that optimises utilisation of electricity and heat because heat that cannot be distributed, e.g. in summer, results in significant energy losses and the fuel is no longer used efficiently.

For optimum efficiency and maximum savings, a realistic and robust design of the unit is imperative. Economic and future-focused solutions call for a high level of expertise. For maximum efficiency, plants must combine highly innovative technological systems such as those built by YADOS "expert manufacturer of energy units" with the solid experience in design, implementation and operation offered by EcoEnergyTherm GmbH. The planning process that benefits customers includes the necessary applications for financial support, which can cover up to 25% of the costs of the energy unit.

The CCHP units are available in prefabricated or modular design depending on the customer's needs. Modular systems offer



Look inside the CHP container module made by YADOS: the photo shows the left V12 engine row with exhaust gas system and turbocharger. Photo: EcoEnergyTherm

faster realisation, and thus additional cost savings. These units also can be flexibly expanded and moved to other locations. Given this, these units do not generally need official building permits unless required for other reasons. Modular unit orders are handled under a general contractor agreement and the units are handed over to the customer as turnkey systems.

Reliable energy supply at low costs

In the milk-processing industry, low energy costs are considered a key success factor. CCHP units ensure maximum energy efficiency and offer opportunities for significant cost savings. The German government supports the modernisation of existing and the building of new CCHP units by offering financial assistance under the Combined Heat and Power Generation Act (KWKG). Provided the applicant meets the applicable technical and legal requirements, the funds are granted by the German Office of Economics and Export Control (BAFA). Beyond that, realisation of a CCHP unit may provide cuts in energy taxes which are tied to an increase in energy efficiency under the revised Energy and Electricity Tax Act.

In the milk and dairy industry these financial benefits are critical factors for ensuring sustainability, as they enable competitive and cost-efficient production in a highly volatile market and ensure the use of alternative energy production systems that contribute to a responsible and sustainable protection of resources.

Safe heat transfer fluid Kilfrost

Kilfrost will be unveiling an innovative new product set "to revolutionize" the use of heat transfer fluids within the food and beverage industry at BrauBeviale.

Kilfrost ALV solves the issue that many in the food and drink industry face; having to compromise between heat transfer fluid efficiency and toxicity for their heating and cooling processing equipment. The technical performance of ALV is comparable to (toxic) monoethylene glycol and a safety profile like mono propylene glycol, Kilfrost claim. kilfrost.com