

The hidden potential in dairies

Dairies use water for many different stages in the production process. There are often potential savings to be made here in terms of resources and energy. To achieve this, however, an integral view is required, since the cycles used in dairies, which have often grown over the years, are highly complex.



Image: An accurate analysis of the entire production process makes it easier to discover hidden potential optimisations for raw materials and energy.

Water is ubiquitous within the milk industry. Whether a dairy is processing fresh milk, making cheese, or producing dry powder, it relies on fresh water (for cleaning), boiler feed water, and cooling water. Even the wastewater that is produced has to be cleaned. “There are often many different water flows and cycles,” explains Eva John, project engineer at Envirochemie. “If you consider these collectively and as a whole, there are various potential savings to be made in most cases.” That said, many milk companies tend to focus on selective aspects of water, with wastewater being a particular favourite.

And then, of course, there is a whole host of other different aspects to consider. One of the major growth markets within the sector – the production of milk powder that is primarily exported to Asia or Africa – provides a prime example. The water is evaporated from the milk, whereby around 880 millilitres of water – the vapour condensate – is removed from a single litre of raw milk. This water

is suitable for drinking, despite containing milk-based residues. As long as it is prepared appropriately, it can certainly still be used. Once treated, the vapour condensate can then be used as cleaning water so the dairy does not have to waste fresh water.



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Diverse recycling and energy-saving options

“The trick here is finding out where we can use which type of water during the process,” explains Klaus Dickhoff, Head of Process Water at Envirochemie. Ultimately, processing a litre of milk uses the same amount of water – around one to two litres of fresh water are required for processes such as cooling or cleaning. Dairies, however, are required to comply with stringent legal requirements with regard to hygiene: when cleaning their evaporators or butter machines, they have to ensure the water they use is of drinking water quality and – in the most complex scenarios – that it has been prepared accordingly in advance. The ultimate objective is to minimise the consumption of fresh water – for example, by using treated vapour condensate, which is just water that accrues anyway as part of the production process.



Image: Model of a vapour condensate treatment plant that can be used to replace valuable fresh water.

Adopting a holistic approach also means considering the bigger picture. Recycling vapour condensate, for example, allows even more changes to be made. As vapour condensate is removed from the cycle, the wastewater becomes even more contaminated as a result and an appropriate strategy is required to deal with this. “It is essential to consider the entire chain as a whole,” observes Dickhoff. “We are not simply turning a single screw, we are also keeping an eye on all of the resulting repercussions.” This approach makes it possible to convert waste into a valuable resource or even an energy provider. With the appropriate systems, they

– for example – can be converted into biogas, which in turn can be used to power other parts of the production process or the company as a whole. “It goes without saying that water and energy can both be saved, but this is also particularly appealing to many companies from a CSR perspective, or even for an energy audit,” notes Dickhoff.

Dairies need customised solutions

Particularly within the dairy industry, the plants around today are rarely developed from scratch; they are more likely to have grown old facilities that have been continually expanded and modified over time. Then, of course, there is the trend towards manufacturing processes becoming more diverse: in the past, dairies would typically handle various products in a single hall, whereas butter, fresh milk and cheese are now increasingly being produced at different facilities. “Anyone who wants to get involved here has to focus on bespoke solutions every step of the way,” explains John. The various Envirochemie experts visit the plants together on a regular basis, with each one specialising in a different field, such as process water preparation, wastewater treatment or plant operation.

In one case, a dairy was able to save around a third of its energy consumption – specifically that used for wastewater cleaning. This was achieved by taking measures such as replacing the old, energy-guzzling ventilation systems used for aerobic wastewater cleaning processes. In another case, the Envirochemie experts were able to cut down on the use of fresh water by recycling vapour condensate appropriately. “Even the sludge that builds up in



Image: Envirochemie experts reveal the results of the process analysis to customers and explain potential measures that can be taken to save energy and resources.

together with wastewater sludge to create biogas,” explains John.

Continuous improvement process

A further core aspect of the milk industry is the cooling water, as – ultimately – the cooling tower is a major water consumer in virtually all dairies. This is why here, too, the question of how water could be recycled and saved is a pressing matter. Vapour condensate is a possible alternative once again, although it requires the water management to be appropriately conceived. Furthermore, contamination is prevented through regular checks and the use of the correct raw materials and chemicals.

Even when all of these individual aspects have been improved, it is inevitable that production and processes will change over time and continue to develop. “We are always on hand to support operations by repeatedly checking processes and making adjustments as we go,” reports Böhm. In the space of just a few years, the volume and composition of dairy wastewater could have changed significantly yet again. “We don’t

simply allow the situation to perpetuate and then make suggestions at the end,” asserts Böhm. “The best solution is a continuous improvement process like the one we offer through our operation management concepts. This is where our specialists take the reins at customers’ water treatment plants to implement process optimisations.”

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dairy wastewater is a recurring theme,” notes Ulrich Böhm, Operation Management Project Manager at Envirochemie. The use of anaerobic wastewater technology allows biogas with a significantly higher recovery to be created here, when other organic residues and wastewater components are decomposed in special anaerobic reactors. This not only reduces disposal costs but also generates biogas that can be used in other areas of production – for example, to generate steam. In an ideal scenario, this would simultaneously resolve the problem surrounding product returns that many dairies face. “These returns can ideally be used



Image: Using tailor-made operating materials, water treatment plants can be adjusted perfectly to achieve the required water quality.