Towards high system efficiency and more sustainable dairy operations

Intelligent solutions for optimising utility processes in a dairy

GRUNDFOS

Possibility in every drop

Introduction

This whitepaper discusses approaches for meeting the many challenges in water and energy in dairies by implementing intelligent water solutions and pumping systems. In this way, savings and optimal operation can be achieved for water supply and distribution, temperature control, cleaning and water treatment and chemical disinfection.

An optimised pump system for water cycles helps achieve more sustainable dairy production. A greater focus on water use and reuse combined with more efficient energy consumption enables dairies to set and achieve science-based targets[1] for reducing carbon emissions, contributing to their sustainability agenda.

[1] Find out more at https://sciencebasedtargets.org

Contents

1. Trends and challenges facing dairy

Dairy industry maintenance, operation and sustainability managers work with their teams on the factory floor and at the corporate level to confront a competitive market under extreme price pressure. Therefore, cost avoidance, process optimisation, sustainability and compliance are areas prioritised for investment.

The dairy industry faces many challenges and is under transformation. We see this in the focus on sustainable and efficient operations for supplying water, when and where it is needed in dairy production processes.

To meet challenges, Dairies are setting ambitious targets and moving towards more sustainable production, for example by saving water and energy, reducing production costs, optimising process efficiency and increasing quality standards.

Challenges facing dairy

- Maintaining sustainable production and viable value chain
- Competitive markets and price pressure
- Complexity of wastewater, for example high organic content, and high and low flows
- Regulatory demands, surcharges for wastewater treatment, and limited municipal wastewater capacity
- Food safety and transparency
- Growing demand driven by a growing population, higher income levels, and rising health consciousness
- Reducing and meeting carbon reduction targets as part of a sustainability agenda, supporting the UN Sustainable Development Goals

Setting targets for reducing carbon emissions

One of the tools used to address high water and energy consumption in critical processes is to set carbon emissions reduction targets in line with the science-based targets initiative (SBTi), an organisation that drives ambitious climate action in the private sector. Science-based targets are becoming more critical in business as a way of measuring emissions within the framework of Scope 1, 2 and 3[1].

Areas where dairies typically set sustainability targets:

Short-term targets, for example:

- Renewable energy sources for production facilities
- Transport running fossil-free
- Optimisation of existing pumping solutions

Long-term targets:

- Carbon net zero by 2050

BUSINESS AMBITION FOR 1.5°C

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

On average, production of 1 kg of dairy product requires 2 to 4 liters of water[2] , and for milk production, dairies work from a benchmark of 1.3 liters of water per kilo milk[3]. This number is steadily decreasing[4] , as dairies improve water management. In addition, a significant amount of water is used for cooling, heating, steam and cleaning processes. Pump systems may account for up to 40% of dairy factory energy usage[5].

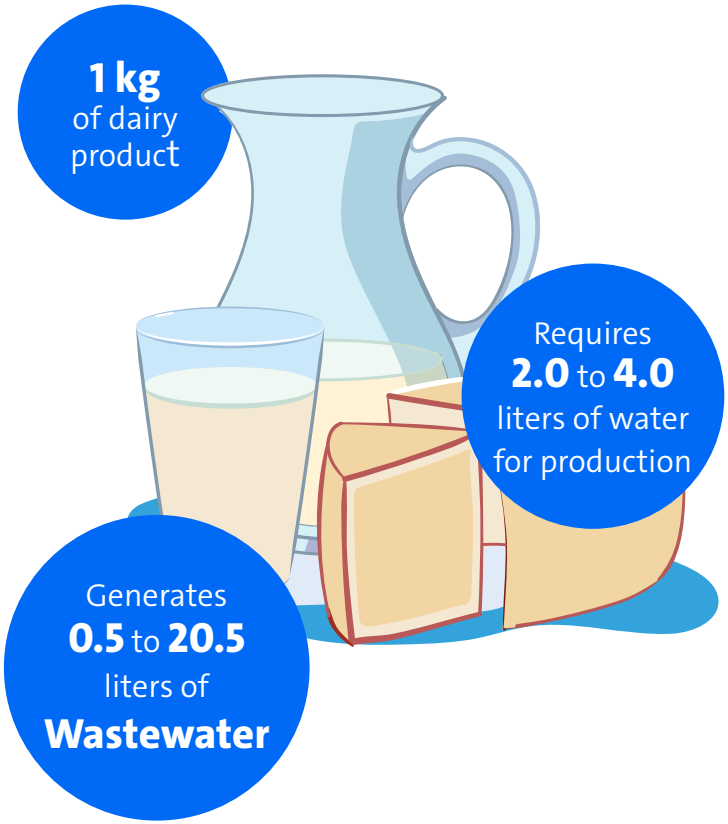
Increasingly, dairies are focusing on the recovery of condensate from evaporation of dairy products, or 'cow water', as way of reusing water with a rapid return on investment[6].

Arla Foods has 2030 targets of lowering carbon emissions in operations by 63% at 60 dairies worldwide.

[1] Find out more at **https://sciencebasedtargets.org**
[2] Source: **https://www.veoliawatertechnologies.com/en/newsroom/latest-news/not-just-milk-and-water**
[3] Source: **https://blog.drinktec.com/dairies-and-liquid-food/water-management-in-dairies/**
[4] Source: **https://eda.euromilk.org/fileadmin/user_upload/Public_Documents/EDA_Position_papers_-_Fact_Sheets/Sustainability/2018_03_19__EDA_factsheet_The_importance_of_water_in_Dairy_FINAL.pdf**
[5] Source: **https://www.pumps.org/resources/energy-efficiency/**
[6] Source: **https://www.veoliawatertechnologies.com/en/newsroom/latest-news/not-just-milk-and-water**

Broadly categorised, the main water usage areas in dairy processing – and which provide the quickest returns on improved water management from water reuse – are:

- Process water – more than 50% used for cleaning-in-place (CIP), for example
- Cooling water – about 16% used to remove heat during the production process
- Boiler feed water – used for steam production
- Other water – used for activities such as crate washing, and so on[7]



The amount of water consumed and wastewater generated for producing 1 kilo of dairy product, approximate figures

[7] Source: **https://www.infinitewater.com/articles/recyling-water-in-the-dairy-industry**

Utilising water and energy saving technologies

The question is how we together with dairies can utilise water saving technologies to protect resources and use energy more efficiently and economically. Until now, developments in the pump industry have emphasised technical product and process innovations. Now the focus has turned to innovations that allow pump users to take advantage of modern pump system features and functions to optimise their business processes. Operations managers must consider the overarching theme of growing environmental awareness.

From discussions Grundfos has had with dairy industry executives, the consensus is that the most significant gains in efficiency will only be achieved with a systems-based approach that addresses the entire system – pumps, drives, piping, fittings, and measurement and control equipment. While sensors record target and actual values, algorithms in software analyse the requirements and send corresponding signals to the control systems like speed adjustment via frequency converter or water distribution via valves.

In summary, these discussions revealed the following important trends:

Overall equipment effectiveness (OEE):
This is becoming one of the most important performance indicators for a dairy's operational stability, output and quality.

Reduced water consumption:
Reusing process water or reducing heating and cooling demand and thus enabling changes in the size of boilers and pumps is a high priority.

More efficient and intelligent pump systems:
Dairy size is increasing, and powerful pumps that can cope with varying flow and pressure demands are essential for dairy utility processes.

Energy saving and recovery:
Condensate recovery is a good source of heat energy and another top priority.

Use fewer chemicals:
Reusing cleaning agents (alkalis or acids) in cleaning processes is another key consideration for dairy operations.

Improved membrane separation processes:
Water saving technologies for improved water reuse in milk processing.

The way forward

The dairy industry is undergoing rapid change, faced with the need to reduce high water and energy consumption and to set and achieve ambitious sustainability targets. At the same time, dairies must adhere to stricter government regulations and rising standards for wastewater release and find solutions to limited municipal water capacity. Wastewater from dairies can be complex to deal with, but also has the potential to be reused. And across the board, the industry transformation offers opportunities for growth in water treatment and reuse.

Innovative, proven solutions for liquid pumping, chemical feed, and measurement and control for utility dairy processes are available and use proven technologies. With these, dairies can transform production and meet the challenges ahead.

2. Water and wastewater in dairies

Dairies benefit from investments to optimise pump systems in all water and wastewater applications. Reduced water consumption, higher energy efficiency, lower carbon emissions, increased process water reuse, more efficient process design and minimised water loss are all realistic outcomes of investing in an intelligent and integrated pump system approach.

Wastewater treatment in an installation for producing process water for reuse

Water supply and transfer

Dairies need a considerable amount of water, either from wells or municipal utilities. An additional challenge is that dairy process water consumption usually fluctuates significantly, with typically short but sharp peaks in demand. This calls for the use of either large pressure tanks or variable-speed booster systems.

Adding a variable frequency drive for speed control of the pump increases energy efficiency substantially, by on average 37% compared with a standard pump[8]. The ability to adjust the speed to the level required by the process lowers costs considerably and can significantly reduce water consumption in some applications, for example by not over-pressurising the system, as happens with fixed-speed pumps.
The improved energy efficiency helps dairies approach and potentially achieve their goal of zero impact in terms of energy use and water consumption. Furthermore, digitalisation can also have a significant impact on the dairy industry with quality and efficiency based on stable process control, factory uptime and flexibility.

Dairies are trending towards a pronounced market consolidation, which is reducing the number and increasing the size of dairies. This changes the requirements for the pumps installed, with the need for increasingly powerful pumps – and therefore greater opportunities to optimise and make savings.

Hydro MPC-E pressure booster sets with Grundfos CR pumps are designed to maintain constant delivery flow or pressure at maximum energy efficiency.

Grundfos case:

Helping a dairy increase their water supply for protein production

This was the case for a western European dairy, who wanted to increase its production capacity for proteins. The new production facility would include utilities for reverse osmosis and hot water. To remove any doubts about the reliability and efficiency of the pumps, Grundfos was called on to discuss the engineering of pump solutions for four different applications in their utilities.

Solution:

Grundfos collaborated closely with with consultants and project engineers from the dairy. The result was a customised design for the Hydro MPC and CRN vertical multistage pumps in high-grade stainless steel. The MPC is a multi-pump controller for booster systems that can be controlled remotely.

Grundfos iSOLUTIONS ensured intelligent system optimisation. Grundfos took care of commissioning and start-up.

Outcome:

- Customised pump design in stainless steel grade 316 with remote control
- Increased reliability with reduced total costs

[8] See Grundfos Product Center pump sizing page: **https://product-selection.grundfos.com/size-page?**

Grundfos case

Complete turnkey water treatment solution for Ukrainian dairy

The BIAGR dairy in Ukraine decided that a complete reconstruction and implementation of new dairy technology was necessary to support the market introduction of new dairy products. This included the water supply system, where reliability, energy efficiency and sustainability were decisive factors.

Solution:

Eurowater, a Grundfos company, supplied a complete turnkey water treatment solution. Grundfos products included CUE speed-controlled SP groundwater pumps to get the raw water to treatment, SMART Digital dosing pumps for antiscalant pre-treatment in the RO system, and powerful Grundfos CRNE vertical multistage pumps to distribute the treated water to every point of consumption with the appropriate flow and pressure.

Outcome:

- Much lower OPEX and higher efficiency of the technological processes than the old system
- The highest dairy product quality possible!

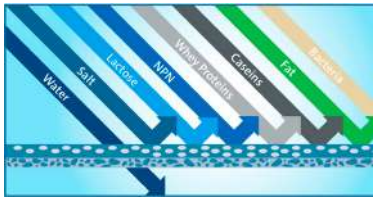
Read the Eurowater Grundfos case

Process water treatment – reliability in every step of the process

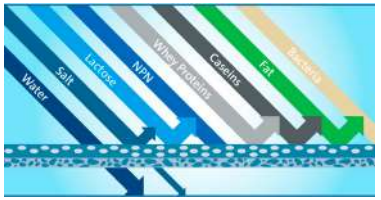
The intake water quality varies greatly from dairy to dairy, depending on the water source, and the cost of water treatment depends on the water quality requirements for the different applications.

The first step in water treatment is filtration. Filtration technologies are an essential part of treating process water and water for reuse. In the various forms of membrane separation, including ultrafiltration, nanofiltration and reverse osmosis, pumps and pump systems are typically used to compensate for the resulting pressure loss, for example with prefabricated booster systems or multiple series-connected high-pressure pumps. Membrane separation can also incorporate activated charcoal filters and ion exchangers.

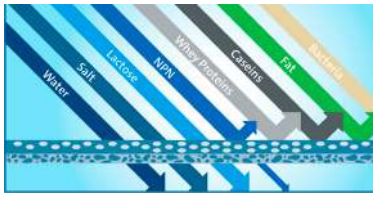
The use of special additives is often needed during water treatment, requiring chemical feed pumps and dosing skids. Chemicals are added to the water for purposes such as pH control. The methods for injecting substances into the water flow, and mixing them as rapidly as possible, can have a decisive influence on the treatment result.



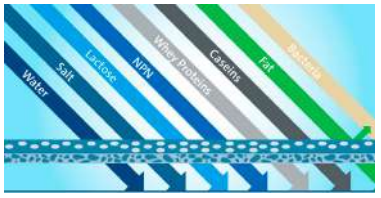
Reverse Osmosis



Nanofiltration



Ultrafiltration



Microfiltration (membrane 1.4µm)

Safe and effective bacteria inactivation

Disinfection is one of the most important processes in water treatment. This step eliminates microorganisms in process water to ensure safe water use according to relevant regulations and directives. Depending on the source, disinfected water can potentially be used as an ingredient, condensate water, CIP water, ice water used as cooling medium, cooling tower water and packaging cleaning water. Peracetic acid (PAA) is used widely as a disinfection agent in dairies; however, it is extremely corrosive, and there are health and safety issues if inhaled.

Chlorine dioxide (ClO2) use is on the rise because it is more efficient, selective and, if applied correctly, completely safe for the process.. Sodium hypochlorite generated onsite (electro chlorination) is used for bacteria inactivation in condensate water.

How stepper motors ensure greater dosing precision

Diaphragm-driven chemical feed pumps that incorporate a stepper motor are a way of ensuring greater precision in chemical dosing. By using a stepper motor, digital dosing pumps can achieve a turn-down ratio of 3000:1. This is around 30 times more than conventional diaphragm driven chemical feed pumps.

The impact of an increased turn-down ratio means that even a small digital dosing pump can cover an enormous range without compromising accuracy throughout the range. This means the dairy operations team can significantly reduce the number of pump models and associated spare parts needed to support a broad range of operating conditions.

Grundfos case

Solving issues with bacteria contamination in a cooling circuit

A multinational dairy company had for years experienced a lack of good disinfection capacity in the cooling circuit of one of its factories in Europe and the risk existed for cross-contamination problems.

Solution:

Grundfos supplied a complete turnkey disinfection project, including an Oxiperm Pro onsite chlorine dioxide generation system, a two-point dosing system in the cooling circuit using high-precision DDA smart digital dosing pumps in pre-mounted Dosing stations, and DID measuring and control system to monitor the water quality parameters.

Outcome:

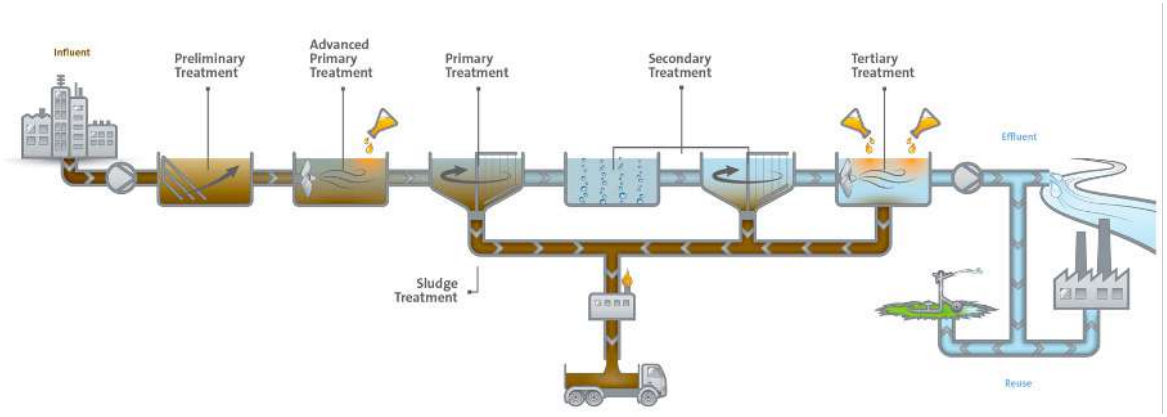
- Effective disinfection of the cooling circuit, destroying biofilm
- Measurement and control ensures that the disinfectant values are correct

Wastewater treatment and water reuse – inefficient systems are wasteful

Dairies are among the most polluting industries as they produce large volume of wastewater that may adversely affect the environment if discharged untreated. Dairies produce up to 14 liters of wastewater per kilo of product. This quantity fluctuates, depending on the finished product[9] . The great fluctuations in dairy wastewater composition, quality and quantity are problematic.

Dairy wastewater is characterised by large variations in pH, chemical oxygen demand (COD), biochemical oxygen demand (BOD), total suspended solids (TSS), nitrogen, phosphorus and temperature. Wastewater from dairies also contains dissolved sugars, proteins, fats and possibly also additive residues. As a result, dairy wastewater output streams usually require some level of pre-treatment before being discharged into municipal wastewater treatment and disposal systems in order to comply with municipal regulations.

Wastewater treatment consists of three stages.
Primary treatment involves a range of mechanical and chemical approaches such as filtration bar racks and screens, separators for oil, fats and light hydrocarbons, pH neutralisation, coagulation/flocculation, floatation, sedimentation and centrifuges.
Secondary treatment involves activated sludge (SBR/MBR/CAS), sedimentation (secondary clarifier) and nitrogen and phosphorous removal.
Tertiary treatment is where ammonia stripping, filtration for effluent polishing, membrane filtration and disinfection happens.



The wastewater treatment process, starting with the wastewater intake (influent) and then following through the treatment phases physical/mechanical, biological and chemical to either water reuse or discharge as effluent.

Filter away unnecessary costs

Although dairy wastewater is complex to deal with, it also has the potential to be reused; and an increase in reuse reduces demand for new water also reducing costs. Furthermore, water reuse reduces the water footprint of heating and cooling applications, which in turn lowers the required boiler and pump capacities.

When water is reused, the amount of wastewater decreases and the disposal costs fall accordingly. An example of an integrated, sustainable water reuse solution is an intelligent reverse osmosis filtration solution, which is a highly flexible system that adapts to the operating conditions, while protecting the membranes and guaranteeing a high yield. This has proven to be a cost-effective method for treating and repurposing dairy wastewater.

Reusing wastewater is the new norm

As more manufacturers become aware of wastewater's potential, governments are tightening regulations around its treatment and reuse in order to support sustainable initiatives while combatting water scarcity. But navigating the rules can be difficult. Zero Liquid Discharge (ZLD) systems are already mandatory across some industries in India and China[10] , and with the US and EU weighing up similar directives, this is having a ripple effect across the world, and clear and simple guidance on treating and reusing wastewater are increasingly the norm.

[9] Source: **https://www.veoliawatertechnologies.com/en/newsroom/latest-news/not-just-milk-and-water**
[10] Source: **Mendi, g. (2019, March 5). India & china are more than zld. https://www.wwdmag.com/zero-liquid-discharge/india-china-are-more-zld**

Grundfos case

Reusing RO water from treated whey filtration

Arla Foods' Rødkærsbro dairy in Denmark needed to manage the wastewater produced in dairy production within a short period of time, specifically the cow water produced from whey filtration.

Solution:

Grundfos solutions are applied in the reactor, filtration and general dosing process of the dairy's water reuse plant, including NBE end-suction single-stage and CM end-suction multistage pumps for transfer, SMG mixers and bottom diffusers in the reactor system, and DDA SMART Digital dosing pumps support the membrane filtration system. Sensors and controllers are also installed across the system.

Outcome:

- Treat 164,250 m3 RO water yearly, where 20-30 % is reused as technical water
- Successfully manage the wastewater without compromising dairy production

The Arla Foods Rødkærsbro dairy in Denmark

3. Dairy utility processes and temperature control

All dairies require a large amount of water for the processing of their products, and a significant portion of plant water consumption is for the cooling, heating, cleaning and steam generation throughout the factory.

Ensuring the right process temperature is essential to production efficiency, reliability and the quality of the end products. But too often, systems are unnecessarily complex and operate at full speed no matter the load. However, integrating intelligent solutions can provide full control of temperatures with fewer components and a complete overview of the system's performance.

A typical utility installation in a food & beverage plant

Cooling water systems – regulate speed and stabilise costs

Dairies require constant cooling energy for both production and the storage of the final product. Thus at least some parts of the cooling systems remain in operation 24 thours a day, seven days a week, even when the dairy pauses or slows production. Therefore, maximising the energy efficiency of the cooling systems and to be able to flexibly adapt to production output is very important. Cold water, ice water, brine solution or an alcohol solution, such as glycol are used as cooling mediums.

Critical cooling processes require that the temperature does not deviate, resulting in inefficient cooling down. Cooling water treatment and temperature issues could result in increased operational and energy costs, perhaps fines from the regulatory authority or, in the worst case, production shutdown for the dairy owners. These issues can be resolved through enhanced water treatment using precision digital dosing, components that improve the cooling process, such as sensors, and speed-controlled pumps with a temperature control algorithm.

Inefficiency in boiler systems can often be traced back to the level control system in the boiler feed. Conventional boiler feed systems have a control valve and a bypass loop arrangement in combination with oversized pumps. By controlling pump speed, in an integrated, intelligent solution, you can reduce pressure loss across feeding valves and control the level directly, making valves redundant.

Grundfos TPE pumps installed for the ice water system at the Arla Foods Westbury dairy

Grundfos case

Optimising cooling water systems using speed-controlled multistage pumps

Arla Foods has set ambitious efficiency targets of lowering carbon emissions by 63% at 60 dairies worldwide by 2030. The initial focus was on the cooling water systems at the Arla Westbury dairy in the United Kingdom.

Solution:

Grundfos Energy Audit optimisation services found the actual energy consumption by placing sensors in the system. Based on proven and validated energy measurements, Grundfos supplied and installed new intelligent CRE vertical multistage and NBE end-suction single-stage pumps.

Outcome:

- With the new pumps, the dairy achieved savings per year of 481,800 kWh energy and 194 tons CO2 for their ice and chilled water systems
- The return on investment (ROI) is less than two years
- Arla achieved cost, sustainability and engineering benefits for operations and production
- A follow-up project updating the boiler feed pumps resulted in annual savings of 4096 kilowatt hours per year and 33.81 tons of CO2 equivalent.

Read the **Arla Westbury Grundfos case**

Boiler process systems – make valves redundant

Feed water from boiler process systems is among the most demanding tasks for pumps, due to the high pressure and temperature requirements. The source of this feed water is usually steam boilers, also to heat water as heating medium in heat exchangers.

Heat recovery is important, because in many cases, a product must first be heated for a certain treatment and then cooled. This saves heating and refrigeration energy. The process takes place in a heat exchanger and is also called regenerative heat exchange. Up to 95% of the heat content of pasteurised milk for example can be recycled[11].

Reused water from various processes, once treated in reverse osmosis systems for example can be a good source of boiler feed water. Pre-treatment steps such as water softening may be eliminated by the usage of reused water.

The challenges facing boiler feed pumps in dairies, such as numerous on/off switching cycles that can stress the pump motors, are often met using special designs with low suction pressure requirements that perform reliably and cavitation-free at unfavourable inlet heights or low pre-pressure.

A boiler feed installation using Grundfos CRE pumps for optimal steam production

[11] Source: **www.dairyprocessinghandbook.tetrapak.com/public/chapter/heat-exchangers**

Wash & Clean – get the required pressure when needed

Cleaning processes account for a major part of the process water used in dairy (see the list of main usage areas in section 1)[12] . This places substantial and varying demands on pumps, depending where in the dairy the specific cleaning process takes place:

- Open Plant Cleaning (OPC) of equipment, floors, and other plant installations requires pre-rinsing, scrubbing, lathering, disinfecting and flushing
- Clean-in-Place (CIP) of the internal surfaces of process equipment and piping without disassembly, require that the internal pump surfaces meet health and safety requirements
- Cleaning packaging for aseptic packaging of treated milk requires pumping with sterilising agents such as hydrogen peroxide or peracetic acid followed by rinsing with sterile water

The main challenge when designing a Wash & Clean system is fitting a powerful pump into a small space while still delivering the pressure needed to handle sudden variations in flow. Vertical multistage centrifugal pumps are well suited for these purposes.

Chemically resistant booster pumps are used in process steps that employ certain cleaning agents and typically operate at pressures between 290 to 580 psi and as high as 1160 psi (typically 20 to 40 bar, up to 50 or 80 bar).

Grundfos case

Dosing skid stations help to optimise CIP processes

A dairy in eastern Europe needed to resolve issues with their dosing systems for CIP cleaning process. Chemical cost was high as was dosing system downtime, because warnings and faults were not notified properly. As well, they wanted to improve safety to reduce incidents.

Solution:

Grundfos designed and installed complete Dosing skid stations for the chemicals, proper Chemical storage tanks and a local control system connected to the dairy's SCADA through a ProfiNET connection.

Outcome:

- Achieved a 30% cost reduction on chemicals due to high precision dosing systems
- Improved safety, avoiding new accidents from chemical leakages

4. Why you need a trusted partner to meet water and energy challenges

This whitepaper has discussed approaches for meeting the many water and energy challenges in dairies, particularly related to the savings that can be achieved by implementing intelligent water solutions and optimised pumping systems.

Grundfos is already working with dairies to create robust, efficient and reliable pump asset-based systems, addressing the three most common customer pain points:
Process optimisation: How to configure manufacturing and utility systems in the most efficient and effective way?
Energy Efficiency: How to manage the ongoing costs of production and utility services with ever-increasing energy rates and ageing equipment?
Asset Reliability: How to optimise system uptime in a critical production environment?

Considering the complexity and scale of modern dairies, partnership is essential for achieving high system efficiency and lower carbon emissions, and meeting strict regulatory requirements for water, energy and wastewater. With a trusted supplier, you can be sure that the products are appropriate for the required applications, that they are installed and commissioned correctly, and then serviced and maintained throughout the life of the product.

In this way, you get optimised pump systems to help achieve a more sustainable dairy production with lower carbon emissions in support of a sustainability agenda.

Ambitious net zero science-based targets

Grundfos is the first water solutions company to receive full validation of its 2050 net-zero target of a minimum of 90% emission reduction in operations and across the value chain by 2050 from the Science Based Targets initiative (SBTi). SBTi also validated our near-term 2030 emission reduction targets. By accelerating our own transformation to a net-zero future we are also helping our partners save energy.

This continues our sustainability journey, and we are set to accelerate our energy efficient water and digital solutions. We recognise and continually contribute to the UN's Sustainable Development Goals (SDGs). Specifically, SDG #6 and SDG #13 are where Grundfos can contribute the most by protecting the world's water, alleviating climate challenges, protecting precious resources, and improving people's quality of life.

Find out more: **Sustainability ambitions**

[12] Source: **https://www.infinitewater.com/articles/recyling-water-in-the-dairy-industry**

Intelligent and integrated systems approach

A pump doesn't exist in isolation. It's always part of a larger system, working together with a whole range of other components. That's why we think beyond the pump and take the entire system into account when developing new solutions.

Grundfos E-solutions – integrated intelligence

A Grundfos E-solution features the pump, motor and frequency drive all in one product. As the frequency drive constantly adapts pump speed according to demand, it's possible to achieve significant pump energy savings.

Grundfos iSOLUTIONS – optimising your pump system

Grundfos iSOLUTIONS takes intelligence to a whole new level. Where an E-solution primarily focuses on the product level, Grundfos iSOLUTIONS will extend savings to the entire system, optimising the way pumps, drives, controls, protection, measurement and communication units work together.

Why focus on system intelligence?

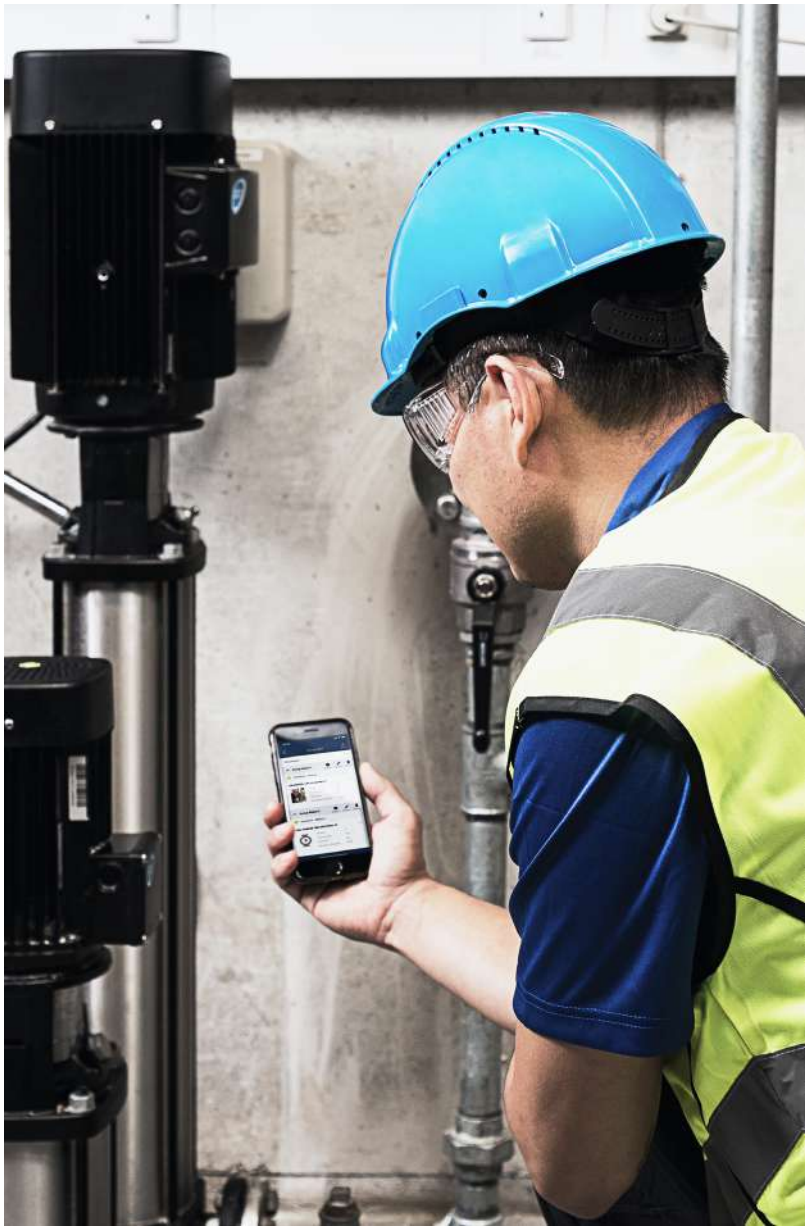
Autonomously optimise system performance:
Reacts to system performance data, adjusting to demands

Complete system overview and control:
Integrated user interface for the pumps and components, remote control from your device

Improved reliability:
Reduced downtime and maintenance costs

High energy efficiency:
Exceeding current standards and regulatory requirements

Grundfos iSOLUTIONS optimises the way pumps, drives, controls, protection, measurement and communication units work together



Keeping production uptime optimal across the entire dairy plant

Optimisation and digital services that address operational, efficiency and maintenance issues are extremely important for keeping dairy operations running.

Optimisation services

Inefficient pumps can waste substantial amounts of energy. When you consider that 85% of the total life-cycle cost of a pump is spent on energy consumption – and this figure rises to 95% when service and maintenance are factored in – ensuring pump efficiency makes good sense. Grundfos can help you reduce energy consumption, improve pump efficiency and find the hidden savings in your pumps.

Energy Check: Recommendations and analysis based on available pump data

Energy Audit: A comprehensive analysis and report with data from actual measurement of the pump system

Grundfos can inspect, review and monitor the current pump asset systems in real time, take the data and enter these into a specifically designed algorithmic tool that identifies the potential pump asset energy savings. This enables us to generate a recommendation on how to upgrade and optimise the existing system to new and more modern technology and application design. Another positive here is the energy monitoring tools used are non-invasive and can be connected without interrupting the system operation.

AI-driven machine learning for condition monitoring

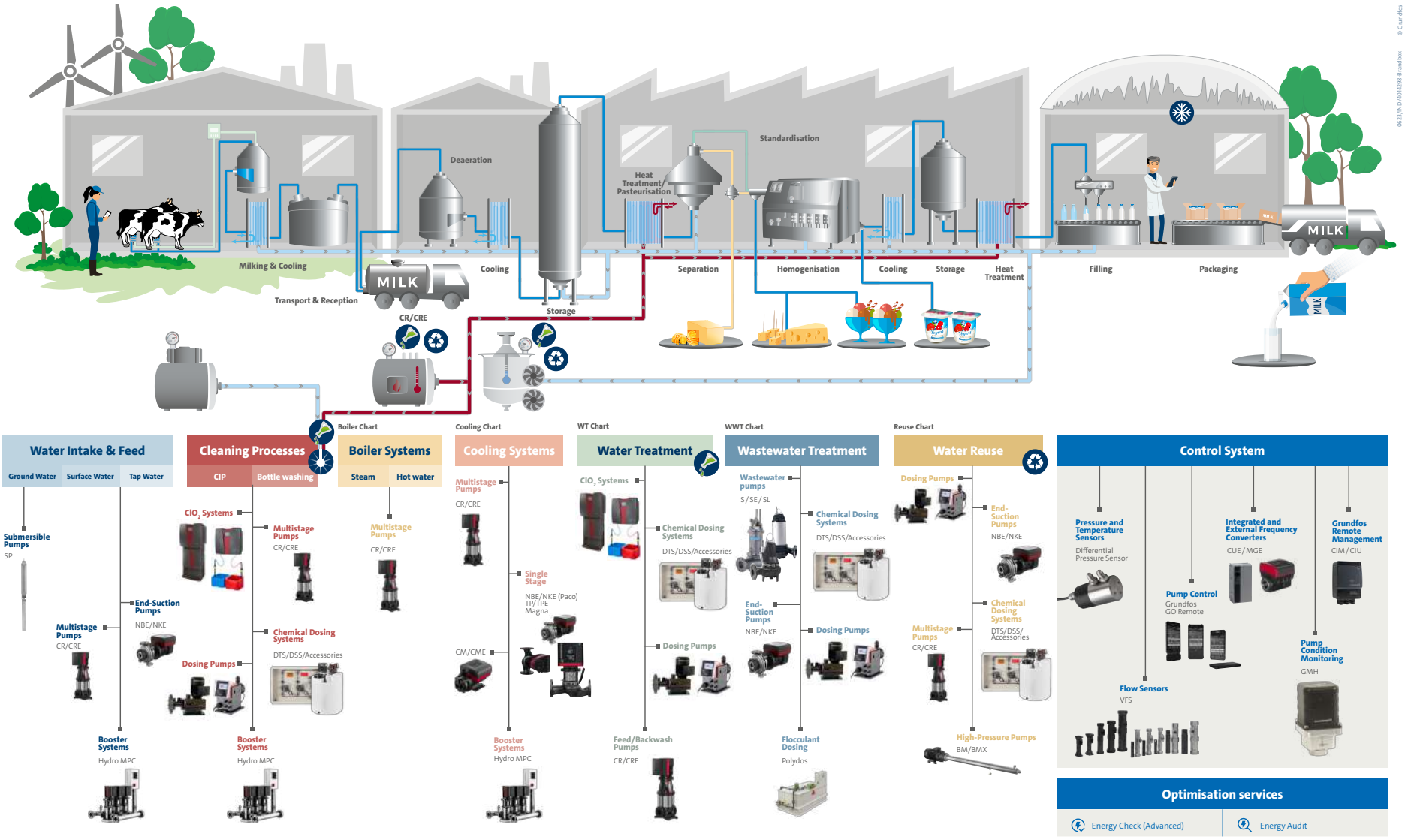
Grundfos Machine Health (GMH) is cloud-based AI-driven machine learning for predictive maintenance for all rotating equipment, not just pumps. The GMH suite can assist your dairy production output, stability and reduce waste of valuable resources and product, across operations. When detecting early faults and anomalies, asset lifetime is extended, efficiency and longevity of rotating assets improved, and maintenance practices optimised to shift from time-based maintenance to predictive maintenance. Customers using GMH are achieving a significant reduction in unforeseen downtime, optimising their maintenance practices and tasks, as well as saving significant production losses.

A non-invasive GMH unit monitoring unit placed on a pump motor

Full system and solution offerings

Grundfos is a full systems and services provider and is therefore in a strong position to help transform the dairy industry. The chart below shows how Grundfos utility pumps and control systems fit with dairy processes.

Download the Grundfos Dairy process chart



Disclaimer: We do not supply pumps with hygienic design!

Examples of Grundfos products in dairies

The products presented in this whitepaper are generally available as a standard pump or as an E-pump enabling reductions in energy consumption, carbon emissions and life cycle costs.. Highlighted products quoted in the case examples include:

CRE vertical multistage pumps

CME end-suction multistage pumps

DSS dosing skid systems

NBE/NBGE end-suction single-stage pumpss

Chemical storage and dosing tanks

Hydro MPC booster systems

CUE external frequency converters

SMART Digital dosing pumps

Polydos chemical preparation systems

Grundfos iSOLUTIONS

CIM/CIU communication interfaces

Chlorine disinfection systems

Would you like to hear more?

We are your partner for improving sustainability, energy efficiency and optimisation. Let's transform your dairy factory together and find ways to address the challenges and reach ambitious goals.

Contact your Grundfos food & beverage expert:

grundfos.com/food-beverage/contact

To learn more go to:

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