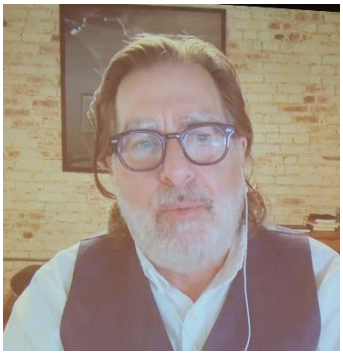
INTERNATIONAL DAIRY magazine

Water in the Food Industry

1st IFC Water Congress in Herning, Denmark

About 80 participants from a number of countries were present at the IFC Water Congress that was held on 6 and 7 October 2021 in Herning, Denmark. The event informed about the state of the art in water saving, water management and water stewardship with a special focus on dairy and food. IDM took part in this very interestng and well organised congress.



William Sarni, Founder and CEO of Denver-based Water Foundry, proposed that companies should make their water management/water stewardship into a business model for growth and added value moving it all beyond footprint focus. The climate change puts food security at risk, he said, and simply paying more for water will not work. Sarni presented a large number of startups and established firms that can help food manufacturers in defining their water strategy. First help may very well be given by WWF and other NGOs that have built solid knowledge in water issues.

FrieslandCampina's perspective

Gerrit Westhoff, Business Group Technology Director, FrieslandCampina, presented the water perspective of an international dairy co-op. In average, FrieslandCampina needs 4.81 m^3 of water to manufacture one metric ton of product. Westhoff confirmed that saving water is an important subject but given the cheap price of well water in many places, priorities sometimes change. FrieslandCampina has chosen to optimise processes, especially CIP, and to build best practice solutions that are shared company-wide. An international paper on water re-use is in preparation so that the about 70 plants operating in 38 countries may benefit from well-proven concepts in the group. Besides re-use of water from bioreactors, FrieslandCampina also opts for smart CIP processes and caustic recovery. Overall target is to reduce water consumption by 2% every year and in the end get to a fully circular water use.

„Technical water"

Thomas Lauritsen (photo), Senior Project Manager, and Anders Harpøth, Project Manager Arla Foods Ingredients, explainded a brand new project at Danmark Protein (DP, part of AFI) in Videbæk, Denmark. So far, the plant has been re-using 58% of its total water intake. Together with technology and engineering suppliers, DP has built a plant that can turn up to 500 m^3 from a daily total of 900 m^3 of clean water into what they call technical water. The 900 m^3 flow from the waste water treatment plant used to be discharged into a nearby river. Now it is subjected to a cascade of membrane filtration followed by UV disinfection (and the addition of growth inhibitors) making the water suitable for cooling purposes. The new technical water plant is highly automated and will to reduce well water consumption by 13%. At a later stage the new plant's capacity will be expanded so that DP may come to a 85% re-use of water.

Making technical water in practise

Niels Osterland, Managing Director, MMS Nordic, explained technological features of the DP project. It is important to notice, he said, that it is not about re-used water entering the production environment. The technical water never gets in contact with the product. And it is brought exactly to a quality that is required for a well defined process. The DP plant designed by MMS Nordic has a low energy consumption, for instance CIP is made at room temperature. The plant produces also its own water for membrane flushing and UF backwash. Nils Osterland will publish an article in IDM that describes the processes in more detail soon.

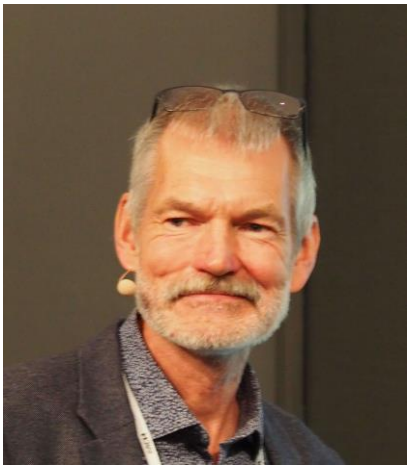
Nestlé's regional approach

Nestlé has joined the Alliance for Water Stewardship and aims at having all factories worldwide certified according to the standards of this group by 2025. Some 35% of the Nestlé plants are located in water stress areas, Carlo C. Galli, Technical Director Water Resources, Nestlé, told the audience. Financial resources are allocated to those plants where it matters to invest in water saving, he added, while the group also looks on to the communities where the plants are located. Nestlé knows about the psychological barriers of customers when it comes to re-use of water. Although, depending on the area, technical water in plants has sometimes a higher quality than fresh water, the group does not allow recycled water to contact products.

Water re-use increases the carbon footprint

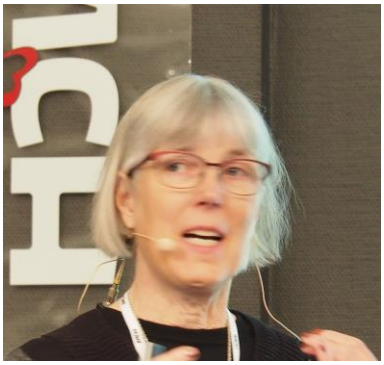
According to Veolia, a specialist in water recycling, only 3% of fresh water is consumed by the food industry worldwide. The biggest gains therefore can be made when water saving efforts are targeting the supply chain. Recycled water can be used for cooling or CIP means but never in a product said Kris Lambert, Managing Director, Veolia Water Technologies, Belgium. Veolia does not recommend to install a second loop for recycled water in food plants as this is expensive and prone to error by operators. When water is recycled, processors should know that one m^3 of re-used water adds 0.402 kg of CO_2 emissions to the footprint of a factory. The cost of 1,000 liters of technical water range about 50 Euro cents. This cost tend, however, to decrease as membrane lifetime increases and membranes have become cheaper anyway, Lambert said. Given the cost explosion of caustic, there is a new trend in food plants to recover chemicals. Here, the ROI is often less than a year. Overall, the trend towards plastic recycling makes water re-use sometimes secondary as budgets are re-allocated in companies.

Making water fit for purpose



Prof. Hans-Jørgen Albrechtsen, Technical University of Denmark, asked why drinking water should be a standard for food manufacturers. The quality of fresh water differs greatly worldwide so that processors better should look at a water quality that makes it fit for purpose. Fresh water, he added, is very often treated to make it suitable for industrial use anyway. Processors need to ask which quality their water has and which quality parameters are important for their processes. Then there are questions about how to produce, maintain and monitor the desired water quality and where the non-technical obstacles are (i.e. re-used water and food contact?). Albrechtsen pointed out to bacterial growth in recycled water that limits the storage time.

The authorities‘ view



Christina Reenberg Skov, Msc in Agriculture, Danish Veterinary and Food Administration, explained how an authority looks at rechnical water. Food makers, she said, are free to use any water provided they can convince authorities that it poses no hazard for food. Industrial water, she said, does not need drinking water quality. Milk water for instance is not covered by any regulation and may be used for a number of purposes if the food factory has a HACCP approach. Reenberg Skov pointed out to an industry guideline on re-used water that is currently in preparation in the Danish dairy industry.

Safety first

Prof. Lisbeth Truelstrup, Technical University of Denmark, explained the risk assessment of the use of treated process water for cleaning purposes in the food industry. She pointed to the risks associated with the use of process water after advanced treatment. In any case it must be made sure when using technical water that no carry-over to food can happen. Truelstrup‘s statement looking at recycling of CIP water was that given a cascade membrane filtration incl. UV irradiation and several loops of the water through the system, it can be ruled out that the composition of the final food will altered.

Other than dairy

Anders Kokholm, Group Production Director, Carlsberg & Søren Nøhr Bak, Expertise Director Water in Food & Beverage, NIRAS, explained the concept that allows the Carlsberg brewery to save a great amount of water. Karen Sørensen, Project Manager, Danish Technological Institute, told the audience how water can be saved in the emat industry.

Finally, Leif Brandt Iversen, Lyras, explained a new concept of milk „pasteurisation“ using UV light. The process can save up to 60% water compared to conventional pasteurisation in heat exchangers.