

the hidden costs of water usage in food & beverage



the hidden costs of water usage for food & beverage

The Institution of Mechanical Engineers recently published a report stating that as much as 50% of all food produced in the world ends up as waste every year.

The publication entitled 'Global food: waste not, want not' also aimed to highlight the wastage of energy, land and water involved in production. According to the report, approximately 3.8tn cubic metres of water is used by humans annually with 70% being consumed by the global agriculture sector.

With such volumes of water involved in production, and the cost of raw water and waste water disposal on the rise, effective water reuse offers an opportunity for the food and beverage manufacturer to ensure reliable and cost-effective water management.

Direct and indirect water reuse

There are two ways to re-use water in manufacturing. The first, direct water reuse, feeds water back into the production process, but using such a supply in direct contact with product has been referred to as 'taboo' in the food and beverage industry.

However, the second, Indirect Water Re-use, can provide

a cost-effective supply for cleaning floors, machine washdown, boiler feed or similar duties. The question is how to ensure this is not only beneficial to the environment but also the bottom line?

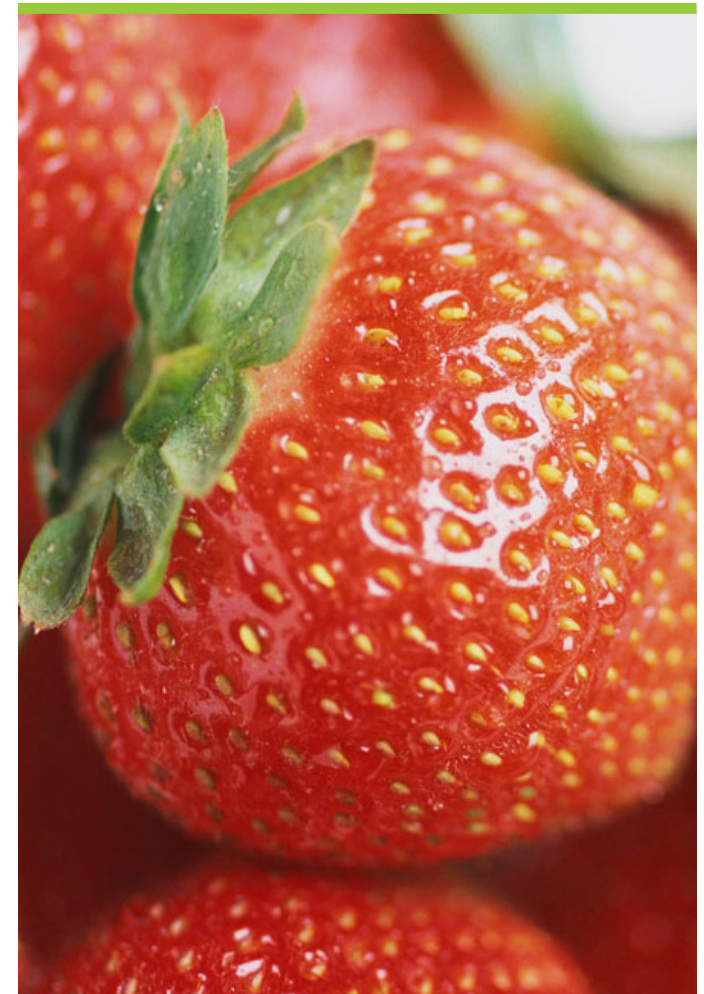
In a sense, water is an easy target: a large volume of water comes into the factory and, after being used in the process, it all ends up going down the drain. Naturally, in the current climate, the user asks, 'Can't we reuse this water?' The answer is, 'Yes, you can - but will it demand hidden costs?'

The true cost of water

The truth is that the cost of water as a raw material is not high. You can put together a scheme to recover process water but in terms of capital costs this could be quite expensive, and the payback may be several years.

For example, the additional area required to house the re-use water system may not be available. So, from a green point of view a scheme to recover process water is a positive step but from a commercial one it may not.

To avoid the hidden costs of water usage, you need to look beyond the cost of the water itself and evaluate the processes used to treat it.



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Hidden costs

The first area to consider is heat, where the added cost of fuel – gas, oil, etc. – to heat water and raise steam far outweighs that of the water itself. Making the fuel more efficient is where real savings can be made, because fuel costs have risen steeply and it is likely that they will continue to rise. If boilers can be run more efficiently without scaling, more energy will be converted from heat to steam and thus fuel costs will be reduced. Likewise, in a cooling system, keeping clean the surfaces offers a further opportunity, as this will provide better heat transfer and, again, greater energy efficiency.

The cost of water reuse can also be hidden when it comes to storage, as tanked water carries the risk of Legionella. Managing this can require further process and management, which demands investment. Increasingly stringent legislation such as the current Health and Safety Commission's Approved Code of Practice (ACoP) L8, means that hygiene - and, ultimately, safety - is enhanced but specification becomes ever more challenging. ACoP L8 provides guidelines for Legionella control, illustrating that businesses using tanked water require process knowledge on the subject, an effective water treatment product installed to curb the growth of

the bacteria, and the capacity to maintain proper water treatment installations that comply with the code.

Ultimately, labour is one of the major hidden costs of water usage. If it is necessary to keep de-scaling and maintaining and repairing boilers that have become inefficient or damaged by the quality of the water they are processing, then the business is wasting money.

This cost is exacerbated by the fact that repair is likely to be scheduled out of hours. Most boilers are running almost 24/7 and so the only time to perform maintenance work is likely to be at night, and out of hours labour is far more costly than that which is carried out during normal working hours.

Traditionally, softeners have been used to improve the quality of water supplied to boilers but although they take the hardness out, softeners leave in the same volume of minerals. For some boilers this is not a problem but for high pressure boilers the minerals remaining in the water can become too concentrated, creating a highly mineralised water in the boiler that could lead to problems with precipitation of low solubility salts or "foaming", which could significantly reduce the efficiency of the boiler or in the worst case lead to mechanical failure.



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To reduce the potential of over concentration boilers are “blown-down” periodically, i.e. water drained off and replenished with fresh water, essentially this means putting hot water – which has required expensive energy to heat – down the drain, and also means heating up more cold water to replace it, representing two more hidden costs.

If you can increase the number of cycles in the boiler before this ‘blow down’ process is required, you can save energy, and this can be achieved by putting in water that is low in minerals using reverse osmosis.

A solution

Reverse osmosis feeds water under pressure into a module containing one or more semi-permeable membranes. This process removes up to 98% of inorganic ions, plus virtually all colloids, micro-organisms, endotoxins and macromolecules.

The effectiveness of these membranes helps reduce further the hidden costs associated with water reuse. For example, most engineers know that when evaluating a system for energy efficiency, pumps are typically energy-hungry components that demand far more of

their lifetime cost in the form of energy consumption than anything else, so minimising pump speeds is always a great benefit to efficiency. Feed pressure can be significantly reduced by up to 50% using the latest reverse osmosis membrane elements, with lower fouling potential and less pressure drop, while flow rates have increased several fold. Further gains can be made if pumps are linked to variable speed drives, which enable the speed of each unit to be matched exactly to the output demands of the water treatment system.

To ensure the most cost-effective results – and to avoid the hidden costs of water reuse - it is vital to establish a relationship with an expert supplier that is consistently active and focussed on the specification, design and manufacture of water purification technology. For over 40 years, SUEZ has been at the forefront of water purification technology, providing equipment, systems and long term support to our customers in markets ranging from food and drinks to laboratory and research, healthcare, electronics, manufacturing, chemical production and beyond.

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