

Industrial water management

Water and wastewater management in the soft drink industry

A recently completed Water Research Commission (WRC) project investigated water and wastewater management in the South African soft drink industry.

Background

The aim of this WRC project, undertaken by the Pollution Research Group at the University of KwaZulu-Natal, was to conduct a survey of the South African soft drink industry in order to obtain an overview of operations, specific water use, specific effluent volume and the extent to which best practice is being implemented.

This survey follows a similar survey undertaken in 1987 and funded by the WRC. Since this time, the industry has undergone a number of significant changes, such as new legislation, new markets, social attitudes and change in ownership as well as the use of updated technology, the manufacture of new products and the variety of packaging materials available.

In addition, there is growing awareness of the need to optimise water and energy use, and reduce the production of waste.

State of the soft drink industry

The global consumption of soft drinks has increased from 1 171 million MI in 2011 to 1 974 million MI in 2014. Compared to the compilation of the market in 1987, today's soft drink industry includes a variety of 'new' products such as bottled water, energy and sports drinks, although carbonated drinks still remain the main revenue for soft drink manufacturers.

The soft drink industry in South Africa produces in the region of 3 700 MI per year (2012 figures). This is more than double the volume recorded in 1987. The majority of this production is non-cola carbonates

(42%), followed by cola carbonates (33%) and 100% fruit juice (9%).

Definition of soft drinks

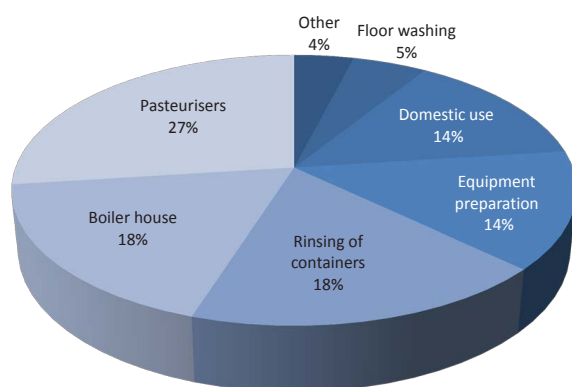


Soft drinks can be described as sweetened, water-based beverages (usually balanced with the addition of an acid), which can be carbonated, flavoured or coloured, and which often contain an amount of fruit juice, fruit pulp or other natural ingredients. They come in two forms, namely ready-to-drink and concentrated (i.e. made-to-dilute) forms. Bottled water is also included in this definition and can be still, carbonated, plain or flavoured.

Where is water used in the soft drink industry?

Water is used in various quantities in the following soft drink manufacturing processes:

- Storage of concentrate/raw product
- Water treatment
- Sugar dissolving
- Blending
- Carbonation/pasteurisation
- Filling and packaging
- Bottle forming
- Bottle washing/rinsing
- Cleaning-in-place



Caption: Main water use in the soft drink industry.

The production processes followed by a soft drink company depends on the product being manufactured and the type of packaging to be used.

How much water does the South African soft drink industry use?

The study calculated the specific water intake (SWI) of participating companies. The SWI refers to the litres of water used per litre of production.

The average SWI was calculated as 1.6 ℓ for carbonated soft drinks. This is far lower than the target of 2.3 ℓ set out in the 1987 survey. The average water use was calculated at 170 000 kl/year while the average production was calculated at 120 000 kl/year.

Only one bottled water company responded to the survey with an average water use of between 1.2 ℓ and 1.5 ℓ.

Where information was supplied, those companies undertaking bottle and crate washing were highlighted as these operations may result in a higher water consumption.

The SWI for fruit drink manufacturers ranges from a 1 ℓ to a high of 4.5 ℓ per litre of production. Fruit companies that process fruit on-site (rather than manufacture from concentrate) have a higher water consumption.

Comparison between the 1987 and 2014 results showed that on average, the water used by the soft drink sector has increased approximately two-fold, however, there is a much larger range in water consumption than previously reported.

On the other hand, production volumes have increased four-fold, even though the number of soft drink companies in South Africa has reduced overall.

It therefore appears that, while the soft drink sector is consuming more water, this water is being used more efficiently than in the past. With regards to best practice, a comparison of SWI to benchmark figures shows that the South African companies are operating at a lower SWI. This indicates that the majority of companies are aware of the need to optimise water use.

The increase in efficiency in the use of water is attributed to the following:

- Installation of sub-metering
- Leak prevention programmes
- Optimisation of clean-in-place
- Recovery and reuse of filter water from water treatment
- Optimising water use on the conveyors
- Investigating the use of rainwater harvesting

In addition, the move away from returnable bottles to plastic bottles also impact on water use, as it reduces the need for bottle washing.

With regards to effluent, the soft drink sector discharges, on average, 120 000 kl/year of effluent. The reported COD range is higher in the 2014 survey. This is most likely as a result of the lower SWI which can result in a more concentrated pollution load.

Good management practices

It is clear from the study that the implementation of best practices and the awareness of good water and wastewater management practices is not equal throughout the soft drink sector and further work is required to raise awareness

and assist companies in identifying opportunities for reduction.

The study ends with a section on good management practices which can assist companies to save even more water. These include aspects such as maintenance, training and awareness.

For example, a maintenance programme that gives priority to the repair of water leaks is key to an effective water management programme. In many cases leaks either go unnoticed or are ignored as they have not been quantified. Further, it is important to make staff aware of the cost of water, not only in terms of monetary value, but also the environmental value due to the limited water resources in the country.

Washing of equipment and factory floors is important in the soft drink industry, but some options can be implemented to save water in this area. These include the use of flow restrictors on hoses to ensure an optimum spray flow, the installation of automatic shut off triggers on hoses to prevent them being left running, making use of high pressure systems where possible to limit the volume of water used, and to make use of dry cleaning methods and squeegees before using a hose.

Further reading:

To order the report, NATSURV 3: Water and wastewater management in the soft drink industry (Edition 2)

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