

WATER MANAGEMENT

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New challenge for brewery

Water recycling is not common practice in breweries yet the South African Breweries Project Eden is expected to set a new benchmark.

BUSINESS SOLUTION

Many industries typically do not employ water recycling. However, with careful consideration and proper implementation, even food-and-beverage factories can benefit from these systems.

Although still very much in the research stages, Project Eden at the South African Breweries (SAB) iBhayi Brewery in Port Elizabeth could, ultimately, be part of a water-recycling process within the brewery. The project entails a biological wastewater-treatment system and the final product is being tested for reuse in irrigation and secondary water uses. The treated effluent is, however, not being used at the iBhayi Brewery in its production process despite recommendations to SAB on several occasions by Martin Davies, senior aquaculture and fisheries scientist at the Department of Ichthyology & Fisheries, Rhodes University.

Water reuse in the production process is still considered taboo in the beverage industry except for the first wash of returnable bottles.

While only 0,15% of the facility's annual water use went through Project Eden in its trial process, SAB states that plans are under way to upscale the Project Eden plant to treat 30% of iBhayi Brewery's effluent. Ultimately, 100% of the water will be treated depending on the success of the project, according to SAB.

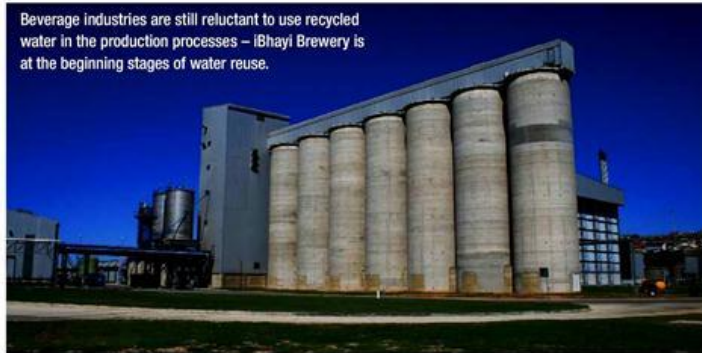
"The process is unlike many conventional treatment methods where effluent is transported by pipe or sewers to a central point so it is not available for reuse by the initial user," says Dr Cliff Jones, aquaculture specialist at the Department of Ichthyology & Fisheries, Rhodes University. "Our method can be carried out on site where the effluent was created. This creates the opportunity for water reuse by the industry that created the effluent."

SAB says that, as the initiative is in its pilot phase, the company would like to upscale and evaluate the process at iBhayi Brewery before assessing whether or not it would be viable at other breweries. The brewery is treating the majority of its water – 99,85% of its annual water use of 6,8-million hℓ – through anaerobic digestion before it is sent to the Swartkops municipal wastewater-treatment works.

BETTER THAN ACTIVATED SLUDGE?

In its initial test for reuse of water, the brewery effluent from the post-anaerobic digester was treated using a reverse-osmosis (RO) system. However, this failed hopelessly as the particle load in the effluent was still too high for RO treatment. As a result, a treatment process had to be considered to reduce the load before it could be used in the RO process. The RO system is, therefore, intended as a final polish but not as a main workhorse in the brewery, comments Davies.

Beverage industries are still reluctant to use recycled water in the production processes – iBhayi Brewery is at the beginning stages of water reuse.



If chloride levels can be lowered, the high-rate algal ponding system could be part of a water-recycling process for breweries and thus substantially decrease the water-efficiency ratio of beer to water.

Photographs courtesy of South African Breweries

Project Eden was developed to potentially fill that gap as part of SAB's investigations into water reuse. SAB moved to trial effluent treatment using high-rate algal ponding (HRAP) and constructed wetlands (CW) technology.

According to Davies, the HRAP/CW technology has several benefits over traditional effluent-treatment technologies such as activated sludge (AS). He states that four key benefits of the system include a reduction in energy consumption, higher tolerance of fluctuations in effluent quality, reduced operational and capital costs, and the production of high-value by-products which could either be sold on or incorporated into sustainability programmes by SAB.

CHLORIDE CONUNDRUM

An issue which raised concern among the project team was the level of chloride in the final treated effluent.

Initial testing showed that the system was ineffective at removing chloride from the effluent which persisted at levels of between 200 mg/ℓ and 500 mg/ℓ. However, Davies says that, as the system has matured, these levels have dropped significantly and he does not view the chloride level, or salinity, as major cause for

concern. "Our latest results show that we are bordering on compliance with Department of Water & Environmental Affairs limits of 120 mg/ℓ and averaging between 125 mg/ℓ and 130 mg/ℓ of chloride.

CONSTRAINED EFFLUENT REUSE

However, Jones and Davies concur that the high chloride levels may pose a problem for certain forms of water reuse and the gradual accumulation of chloride limits complete water recycling. They suggest that the problem could be addressed by reducing the use of chloride products in the brewing and cleaning process.

SUSTAINABILITY

"We are using a more ecologically centred approach to treating the brewery's effluent as opposed to a more equipment-heavy technological approach," says Davies.

Jones says: "We have also taken algae grown in the effluent and used it successfully as a dietary ingredient in formulated fish feeds. We thus ensure that the process used to clean the effluent is economically self-sustaining." According to SAB, Project Eden is one of the progressive initiatives the company has implemented to recycle water. ■