

ANAEROBIC TREATMENT OF AUTOLYZED EXCESS YEAST

AN ALTERNATIVE ROUTE FOR YEAST DISPOSAL



WATERLEAU

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Excess yeast from the brewery industry is a valuable energy source when submitted to anaerobic treatment. However, due to its characteristics, the total excess yeast flow cannot be mixed with brewery wastewater for anaerobic treatment in the same reactor. With more than 100 references in the brewery industry alone, Waterleau designs the appropriate solution for optimizing wastewater and excess yeast treatment.

YEAST AS A BY-PRODUCT IN THE BREWERY PROCESS

The production of beer generates important amounts of wastewater containing organic compounds, to be treated before discharge into the environment. Nowadays, almost every large brewery has a wastewater treatment plant, i.e. anaerobic pre-treatment and aerobic post-treatment. Apart from the wastewater, the brewery industry also generates different by-products such as spent grains, kieselguhr and excess yeast from the fermentation process. In many cases, the discharge of the excess yeast requires special attention.

The yeast produced during the fermentation process is only partially re-used for the pitching of subsequent brews. The excess yeast production can be estimated at $\pm 0,56$ kg dm/hl beer produced. This excess yeast has a rather high nutrition value after autolysis and is generally used for animal feed. Its disposal however, often presents a considerable problem. Indeed, direct discharge often causes logistic issues and pre-dewatering is rather expensive and only possible on the non-autolysed yeast.

TURNING YEAST INTO BIOGAS

Waterleau has developed a cost-effective treatment process for brewery excess yeast. Taking into account sustainability and cost-effectiveness, anaerobic treatment offers the best alternative: the energy conservation aspect is indeed the main driver in choosing for anaerobic treatment as this solution avoids energy loss during drying and/or dewatering of the yeast while biogas is produced during its anaerobic treatment process. The anaerobic digestion of the excess yeast helps reducing the energy footprint of the brewery.

A SEPARATE CSTR REACTOR FOR EXCESS YEAST TREATMENT

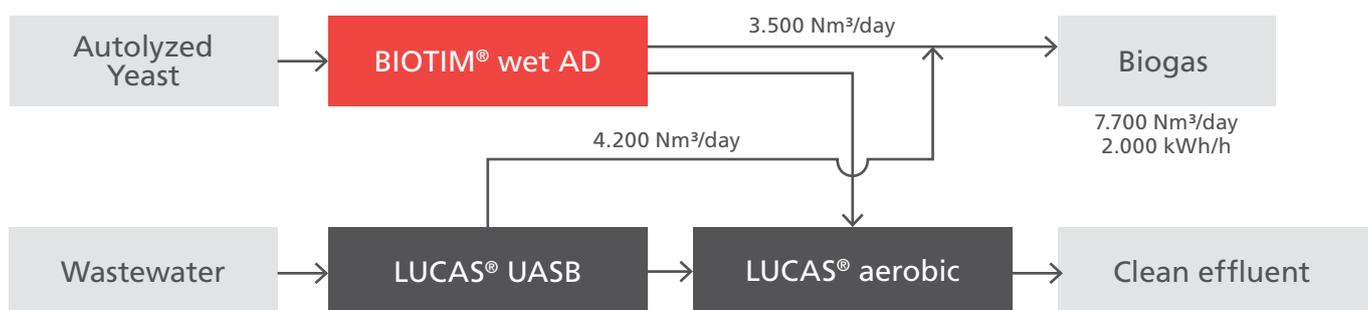
For anaerobic treatment, the high suspended solids (SS) and nitrogen (N) concentration in the yeast are to be taken into account. The characteristics of the brewery excess yeast are shown in the table below.

PARAMETER	UNIT	RANGE
Dry matter	%	15 – 17,5
COD	mg/l	350,000 – 450,000
Suspended solids	mg/l	125,000 – 175,000
Nitrogen (N)	mg/l	7,500 – 9,500
Total (P)	mg/l	3,500 – 4,500
pH	-	4.0 – 6.0
Temperature	°C	30 – 40



Due to the high amount of suspended solids, the total yeast flow cannot be mixed with the brewery wastewater flow as brewery wastewater is generally pre-treated in a LUCAS® UASB (Upflow Anaerobic Sludge Blanket) reactor. This type of anaerobic reactor is dependent on the growth of well-settling granular sludge. However, too important suspended solids concentrations and too low COD/SS ratios are known to interfere with the granulation of anaerobic sludge. Consequently, a separate and other type of reactor is to be provided for the anaerobic treatment of yeast. Because of the very high COD concentration of the yeast flow and the corresponding hydraulic retention time, a CSTR (Continuous Stirred-Tank Reactor) type of reactor is to be used.

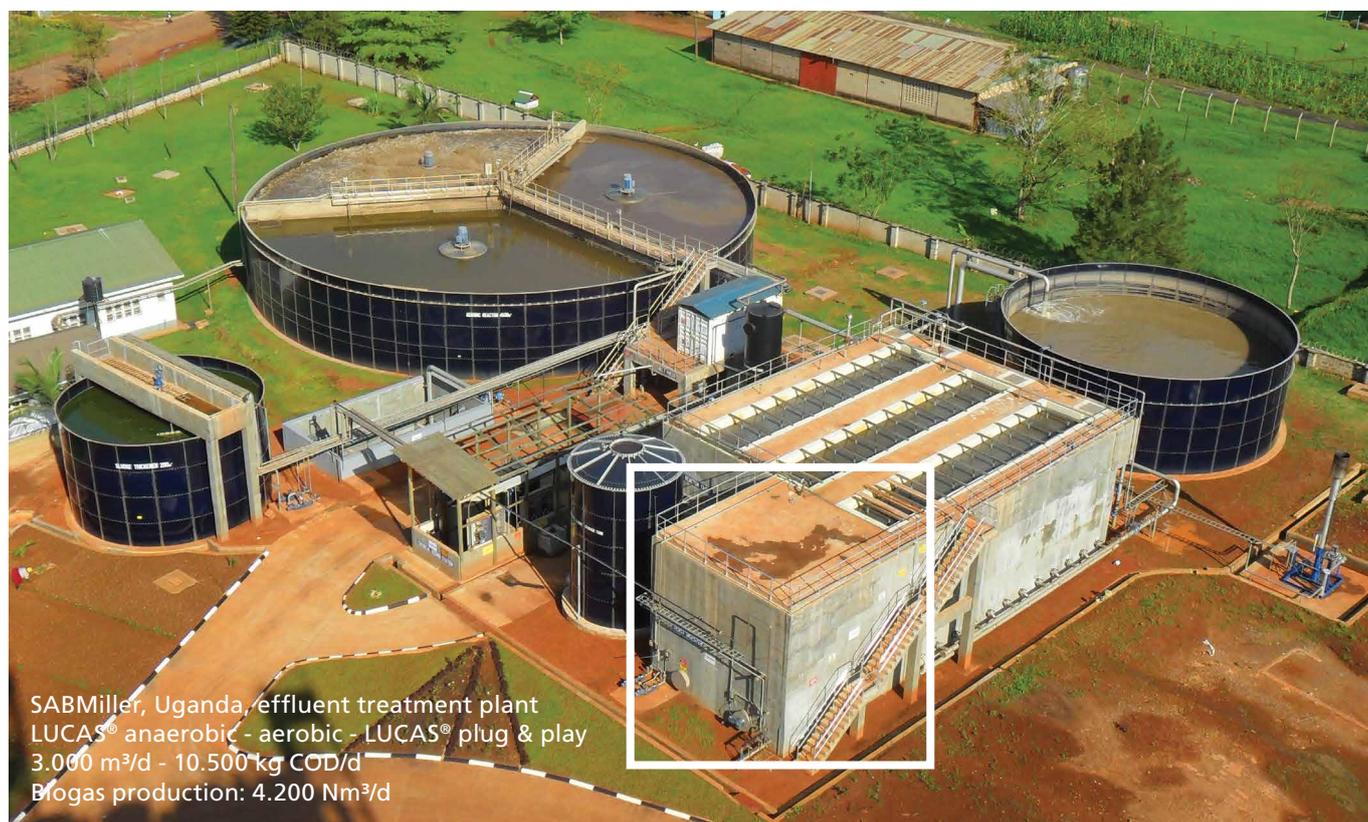
An example: 1,5 mio hl brewery



NILE BREWERIES UGANDA

In the Nile Breweries site in Jinja, Uganda, a SABMiller brewery, Waterleau has successfully designed and built such an adapted CSTR yeast digester and is involved in its daily follow-up.

The yeast digester is part of a complete anaerobic/aerobic wastewater treatment plant. The effluent of the yeast digester is sent towards the aerobic post-treatment. The biogas produced is mixed with the biogas from the UASB reactor and is being reused in a dual fuel boiler after desulfurization.



AUTOLYZED EXCESS YEAST, AN OPPORTUNITY TO CONTROL YOUR ENERGY FOOTPRINT

DESIGN
ENGINEERING
CONSTRUCTION
OPERATION
MAINTENANCE

PROTECTING THE 4 ELEMENTS



We all have the responsibility to handle our natural resources in a careful and sustainable way. Waterleau develops environmental technologies and offers sustainable solutions for water, air and waste treatment, as well as for energy recovery. As an EPC contractor and operator, Waterleau counts more than 1000 references for municipal and industrial clients around the world.



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