ENVIRONMENTAL SOLUTIONS FOR THE FOOD AND BEVERAGE INDUSTRY
BEVERAGE INDUSTRY

AQUALITY® AND EXSEL® PROCESS WATER PRODUCTION

Waterleau’s AQUALITY® and EXSEL® technologies are micro and ultrafiltration systems for treating raw water and producing high quality water, free of suspended solids, colloidal material and bacteria. Highly appreciated in the food and beverages industry, this proprietary membrane technology is used to guarantee a continuous flow of process water.

LUCAS®: BIOLOGICAL WASTE WATER TREATMENT

The LUCAS® aerobic and the LUCAS® anaerobic-aerobic wastewater treatment technologies are Waterleau’s flag-ship solutions for the treatment of beverage waste water. The compact LUCAS® aerobic treatment system is a hybrid system combining the advantages of SBR and conventional wastewater treatment designs. The LUCAS® anaerobic technology is an UASB-based anaerobic reactor that fits perfectly in the aerobic reactor design. The LUCAS® technology provides excellent water quality for more than 80 breweries throughout the world.

LUCAS® PLUG & PLAY: THE PRE-ASSEMBLED AND FAST ERECTION WWTP

Based on the success of the LUCAS® technology, Waterleau has developed a fast mounting LUCAS® plug & play concept. It is a modular and pre-assembled plant with glass coated steel reactors and a pre-mounted COBRA® container module containing all control systems, technical and laboratory equipment. Many breweries have implemented the LUCAS® plug & play concept, reducing civil costs, limiting on-site electrical installation and speeding up erection time.

Heineken, the Netherlands, effluent treatment
LUCAS® anaerobic
Capacity: 4.000 m³/d - 13.600 kg COD/d - biogas: 3.905 Nm³/d

SABMiller, Uganda, effluent treatment
LUCAS® anaerobic - aerobic - LUCAS® plug & play
Capacity: 3.000 m³/d - 10.500 kg COD/day - biogas: 4.200 Nm³/d

AB InBev, Belgium, effluent treatment
LUCAS® anaerobic - aerobic
Capacity: 30.000 kg COD/d - biogas: 9.600 Nm³/d

AB InBev, Russia, effluent treatment
LUCAS® anaerobic - aerobic
Capacity: 30.600 kg COD/d - biogas: 8.400 Nm³/d
MORE THAN 100 REFERENCES FOR THE TOP-5 BREWERIES IN THE WORLD

Heineken, Spain, effluent treatment
LUCAS® anaerobic
Capacity: 8.000 m³/day - 28.000 kg COD/day - 1 MWe

Diageo, Kenya, effluent treatment
LUCAS® anaerobic
Capacity: 7.215 m³/d - 32.280 kg COD/d - biogas: 10.080 Nm³/d

Diageo Kumasi, Ghana, effluent treatment
LUCAS® anaerobic + conventional aerobic
Capacity: 10.000 kg COD/d - biogas: 3.200 Nm³/d

Zambian breweries, effluent treatment
LUCAS® aerobic - plug & play
Capacity: 1.333 m³/d - 3.330 kg COD/d
BREWERY OF THE FUTURE

Waterleau takes the lead in developing sustainable solutions for the beverages industry. Its brewery of the future concept integrates water management, air and waste treatment and new energy production from wastewater and spent grains, leading the beverage industry into a green future.

Heineken, Nigeria, effluent treatment
LUCAS® anaerobic-aerobic
Capacity: 4.800 m³/d - 12.000 kg COD/d - biogas: 4.800 Nm³/d

Heineken, South-Africa, effluent treatment
LUCAS® anaerobic-aerobic
Capacity: 9.000 kg COD/d - biogas: 2.520 Nm³/d

AmBev, Brasil, effluent treatment
BIOTIM® UASB
Capacity: 22.600 kg COD/d - biogas: 7.231 Nm³/d

Heineken Craiova, Romania, effluent treatment
LUCAS® anaerobic
Capacity: 8.000 kg COD/d - biogas: 4.800 Nm³/d
POTATO POWER

When a major potato processing plant nearly doubled its production capacity to 32 tons of finished products per hour, the existing wastewater treatment capacity became insufficient. Waterleau designed a complete new wastewater treatment plant with a capacity of 100 m³/hour and 40 tons COD/day. The new treatment plant was operational in just 6 months.

LUCAS® BIOLOGICAL WASTE WATER TREATMENT

Our typical treatment process for the potato industry is as follows: after sieving, the wastewater is temporarily stored in a buffer tank in order to avoid fluctuations in flow and organic load. A SEPAFLOC® lamella settler then separates the starch from the wastewater. The starch is dewatered in a decanter centrifuge afterwards and the wastewater is pumped into a LUCAS® UASB reactor.

PRODUCTION OF BIOGAS

After pretreatment and conditioning, up to 90% of the organic load is digested and transformed into granular sludge and biogas containing a methane concentration of 70%. A crossflow three-stage separator at the top of the reactor separates sludge, cleaned effluent and the biogas. The 6 000 m³ of biogas produced each day can provide 42 MWh/day for the production of 2 tons of steam/hour @ 6 bar. Up to 25% of the plant’s total energy needs are produced on-site, replacing natural gas from an external energy supplier.
VALORIZATION OF VINASSES
Vinasses, originating from molasses based yeast production and alcohol fermentation processes, contain high levels of BOC, COD & TSS. In the past, these vinasses were often used for agricultural purposes after concentration by evaporation. Today, the valorization of this organic matter and the green energy recovery has become a profitable option. However, converting organic matter into bio-energy requires special attention due to the high concentrations of potassium, sulphates, nitrogen and/or bivalent ions present in the vinasses.

BIOTIM® ANAEROBIC TREATMENT WITH AEROBIC POST TREATMENT
Waterleau has built an anaerobic treatment plant for one of the largest producers and distributors of yeast and bakery ingredients in the world. The new BIOTIM® UAC reactor is an Upflow Anaerobic Contact reactor, followed by an external sludge separation system (SEPAFLOC®) with biomass recirculation. This solution combines the main advantages of CSTR and UASB technology and excludes their potential drawbacks. Other advantages are the small footprint (up to 70% less space) and the lower anaerobic effluent TSS values, facilitating the aerobic post-treatment.

Mauri Hull, United Kingdom, effluent treatment
BIOTIM® UAC
Capacity: 33.750 COD/day - biogas: 14.344 Nm³/day
AGRO INDUSTRY

ATLANTIS® MEMBRANE BIO REACTOR:
CAPACITY DOUBLING WITHIN EXISTING INFRASTRUCTURE

In 2008, the rape seed and soya crushing and extraction facility of an oil processing plant in Belgium was expanded with a biodiesel production unit and refinery. As a result, the capacity of the existing wastewater treatment plant became insufficient to treat the full effluent flow. Waterleau revamped the existing aerobic treatment and transformed it into a state of the art plugflow bioreactor by implementing a submerged ATLANTIS® MBR (Membrane Bio-Reactor) in a new extraction compartment. Only small modifications to the existing civil structures were necessary to increase volumetric capacity up to a total flow of 30 m³/h corresponding to an organic load of 2 ton COD/day.

DESULPHURIZATION OF EXHAUST AND BIOGAS

Another Waterleau solution is used to treat extraction gases from the refining process at the same plant. A 4-stage BELGAS® scrubber with a capacity of 200 m³/h removes 3.5 kg S/h from the exhaust gases. Satisfied with the results, the same client ordered a second BELGAS® scrubber for another plant.

The BELGAS® scrubber is also used to remove H₂S from the biogas produced in anaerobic digestion processes: from 1.000-10.000 ppm H₂S at the inlet of the scrubber to less than 200 ppm H₂S at the outlet.

MEMBRANE SEPERATION ALLOWS OPERATING THE BIOREACTOR AT MUCH HIGHER SLUDGE CONCENTRATIONS

Cargill, Belgium, effluent treatment
ATLANTIS® submerged MBR
Capacity: 2.000 kg COD/d
DAIRY INDUSTRY

In 2002, one of France’s largest dairy factories producing milk, milk powder, butter and cheese invested in a new Effluent Treatment Plant (ETP).

PROPRIETARY WATERLEAU TECHNOLOGY

In order to achieve parameters well below European standards, COD and BOD levels, fats, suspended solids, nitrogen and phosphorus levels had to be reduced considerably. The treatment process makes use of Waterleau proprietary technologies.

BIOGAS PRODUCED IN TWO REACTORS

The fats recovered from the flotation process are digested in a thermophylic reactor and produce biogas which is mixed with the biogas from the UASB reactor treating the effluent after flotation. Biogas is used as energy source in a boiler to produce hot water heating the UASB influent.

CLOSING THE LOOP

The plant is equipped with two centrifuge dewatering systems: one for the dewatering of the biological sludge (aerobic) allowing the thickened sludge to be used as a soil conditioner. The second dewatering system is used to treat the sludge enriched with iron phosphates obtained from physicochemical phosphate removal, allowing the sludge to be sold as a fertilizer: all endproducts of the effluent treatment process are given added value:

biogas, soil conditioner, fertilizer and of course clean water. Waterleau has built anaerobic and/or aerobic treatment plants for many dairy plants in the UK, Germany, Belgium, Portugal and Colombia.

INTEGRATED SOLUTIONS FOR THE DAIRY INDUSTRY

- Fat removal through flotation
- Methanisation in UASB anaerobic reactor
- Nitrification/denitrification to remove nitrogen
- Biological and physicochemical phosphate removal
- Sand filtration
- Sludge treatment
- Odor treatments using BELAIR® bio filters
SUGAR INDUSTRY

FLEXIBLE SOLUTIONS FOR A SEASONAL INDUSTRY

Waterleau’s anaerobic technology is perfectly adapted to the seasonal sugar industry. The UASB reactor can be cooled down when supply is short, without causing a loss of microbiological activity in the anaerobic sludge. The UASB design is perfectly suited for the increasing COD load during the sugar processing season, caused by the augmented soluble pollution from the beet loop in the factory. This temporary load surplus does not result in increasing operational costs, whereas in conventional aerobic treatment systems such costs are proportional to incoming waste load.

NUTRIENT REMOVAL AND AEROBIC POST TREATMENT

In the sugar industry, the major source of nitrogen comes from the condensate stream. This condensate is processed in an aerobic post treatment together with the effluent of the UASB. A bypass over the UASB allows an increase of the COD/N ratio improving nitrogen removal in the aerobic treatment. Off-season, the aerobic treatment is shut down by gradually removing the activated sludge. Vice versa, at the start of the season, sludge is taken from another plant to restart the aerobic treatment. The combination of both UASB and aerobic treatment with nitrogen removal produces a final effluent stream which complies with all requisites for discharge to surface water. Another advantage of the anaerobic treatment is the production of biogas which can be valorized for steam production.

Most of sugar processing factories also produce secondary products like alcohol or bio-ethanol. Waterleau has designed many plants for the treatment of the by-products from fermentation and distillation of cane and sugar beet molasses. Waterleau’s UAC technology has been designed to treat concentrated wastewater using a SEPAFLOC® lamella settler for the separation and the recirculation of the anaerobic sludge.

THE ANAEROBIC TREATMENT PRODUCES BIOGAS, USED AS A VALUABLE ENERGY SOURCE

Tereos, France, effluent treatment
BIOTIM® UAC
Capacity: 40.000 kg COD/d - biogas: 21.250 Nm³/d

Saint Louis Sucre, France, effluent treatment
BIOTIM® UASB
Capacity: 13.000 kg COD/d

Biowanze, Belgium, effluent treatment
BIOTIM® UASB
Capacity: 15.000 kg COD/d - biogas: 6.400 Nm³/d
FROM BIO-EFFLUENT TO POTABLE WATER

Within its strategy for a more rational use of natural resources, a global leader specialized in deep frozen potato specialties decided to reuse the biologically treated effluent. Before applying the water reuse scheme, our customer was relying on groundwater and drinking water supplies for its production process. These water resources are coming under pressure due to increasing costs of drinking water and of waste water discharge. Furthermore, obtaining groundwater permits is becoming more and more difficult since requirements for the sustainable use of groundwater has led to strict regulations. Recent improvements in membrane technologies have caused a substantial improvement in the economics of ultra or nano filtration and water reuse has become a strategic option to cut water footprint and water supply costs for industries.

ULTRA FILTRATION AND REVERSE OSMOSIS OF EFFLUENT

Biological effluent does not require any treatment before feeding the BOOMERANG® installation, Waterleau’s proprietary water reuse technology which consists of an AQUALITY® ultrafiltration (UF) step followed by an EXSEL® reverse osmosis (RO) step. This double barrier membrane concept allows a substantial impact on waste water discharge and drinking or groundwater intake.

DENITRIFICATION OF RO-CONCENTRATE

If the Reverse Osmosis-concentrate does not comply with the discharge regulations and cannot be discharged, a possible but costly solution is to send the concentrate to an evaporator. A more economical alternative is to treat only part of the treated wastewater and mix the RO concentrate with the remaining fraction of the treated wastewater. In this specific project however, the blended mixture still exceeds the nitrate concentration norms. To control this parameter, the RO-concentrate is recycled to the biological treatment (denitrification tank).

A SOLUTION GUARANTEED BY THE REGIONAL WATER AGENCY

In this particular project, the BOOMERANG® UF unit in our customer’s plant is operated by the Regional Flemish Water Agency (VMW). The water agency not only controls the water quality produced in situ, it also takes care of its distribution into the plant’s water network.
AIR TREATMENT

Waterleau offers a wide range of solutions for air and gas treatment problems. Air and gas can be polluted by various substances and choosing the appropriate technology is project specific. Well known air pollutants are volatile organic compounds (VOC’s) and odors. Off gases and flue gases on the other hand are often polluted by particulates, aerosols, acid gases and various other noxious chemical substances that need to be removed before discharge in the atmosphere.

**Main pollution control systems:**
- Chemical pollutants abatement
- Industrial dust removal using wet process
- Flue gas treatment
- VOC treatment & odor control
- BELGAS® Biogas treatment
- WATMONIA® scrubber

**BELGAS® BIOGAS TREATMENT**
Biogas often contains H₂S which needs to be removed prior to incineration because of corrosive characteristics and due to emission norms. Aerobic activated sludge is used as washing medium in a counter flow type scrubber.

**VOC & ODOR CONTROL USING BELAIR® BIOFILTER AND BIOWAVE® BIOSCRUBBER**
Contaminated gases are passed through organic material providing a source of nutrients for the micro-organisms and supporting the water phase in which these micro-organisms are immobilized.

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Cargill, Belgium, sulphur removal from extraction gas
4-stage BELGAS® scrubber
Flue gas flow: 200 Nm³/h

Tereos, France, dedusting + SO₂ and VOC treatment
Wet dedusting and scrubber chimney
Flue gas flow: 425,000 Nm³/h
STATE-OF-THE-ART TECHNOLOGIES FOR THE REDUCTION OF THE WATER, ENERGY AND CARBON FOOTPRINT

+400 REFERENCES IN THE FOOD & BEVERAGE INDUSTRY

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.