



ENVIRONMENTAL SOLUTIONS FOR THE FOOD AND BEVERAGE INDUSTRY



WATERLEAU

protecting the 4 elements

DAIRY INDUSTRY

Waterleau Group is a key-player in providing solutions for the dairy industry, counting more than 100 references in the treatment of process wastewater, high-strength whey, yogurt slop... from milk processing, yoghurt and cheese production. From the rental of liquid-solid separation KROFTA® DAF reactors to the Design and Build services of complete LUCAS® & BIOTIM® anaerobic-aerobic effluent treatment facilities Waterleau, provides integrated solutions for the local dairy farm and cheese producer as for the world's global food processors.

INTEGRATED SOLUTIONS FOR THE DAIRY INDUSTRY

- Complete anaerobic/aerobic treatment systems
- Pre-treatment
 - Equalization
 - Oil & Fat removal through KROFTA® Dissolved Air Floatation (DAF)
- Anaerobic treatment
 - Thermophilic fat digestion in BIOTIM® reactor
 - Methane production from effluent in LUCAS® & BIOTIM® reactor
- Aerobic treatment
 - Nitrification/denitrification to remove nitrogen
 - Biological and physicochemical phosphate removal
 - Sand filtration
- Sludge separation, thickening and recycling
- Biogas treatment using BELGAS® desulphurization
- Odour treatment using BELAIR® bio filters



Lactalis Retiers, France - BIOTIM® UASB
Capacity: 22,200 lbs COD/d - biogas: 105,050 ft³/d



Danone, Belgium - BIOTIM® UASB
Capacity: 15,070 lbs COD/d - biogas: 71.960 ft³/d

LESS COSTS, MORE SUSTAINABLE

- Clean water discharge
- Biogas valorization
- Energy saving (power and heat)
- Sludge turned into valuable fertilizer or biofuel
- Reduced cost of transport
- Remedied odor concerns
- Reduced air emissions
- Compliance with regulations



TURTLE LAKE WI, USA

- Total load COD: 152,930 lbs/d
- Biogas produced: 720,000 ft³/d methane
- Total energy value: 8,430 kW



COVINGTON TN, USA

- Total load COD: 13,000 lbs/d
- Biogas produced: 62,000 ft³/d methane
- Total energy value: 727 kW



CAMPBELL NY, USA

- Total load COD 71,300 lbs/d (32,400 kg/d)
- Biogas produced: 340,000 ft³/d (9,650 Nm³/d) methane
- Total energy value: 4,000 kW



FREDONIA PA, USA

- Whey UF permeate 20,700 gpd
- Process wastewater 27,500 gpd
- Total energy value: 19,000 lbs/d



NORTH LAWRENCE NY, USA

- Total load COD: 20,000 lbs/d
- Biogas produced: 95,500 ft³/d methane
- Total energy value: 1,120 kW



BATAVIA NY, USA

- 552,500 gpd
- Total load COD: 19,900 lbs/d

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 WASTEWATER TREATMENT

The LUCAS® aerobic and the LUCAS® anaerobic-aerobic wastewater treatment technologies are Waterleau's flag-ship solutions for the treatment of beverage wastewater. 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 brewery, the Netherlands
LUCAS® anaerobic - 30,000 lbs COD/d - biogas: 142,860 ft³/d



SABMiller brewery, Uganda
LUCAS® plug & play - 23,1000 lbs COD/day - methane: 110,300 ft³/d



AmBev brewery, Brasil
BIOTIM® UASB - 50,000 lbs COD/d - methane: 237,400 ft³/d

MORE THAN 100
REFERENCES FOR THE
TOP-5 BREWERIES IN
THE WORLD



SOFT DRINK SYROP MANUFACTURING - APOPKA, FL, USA

- BIOTIM® UASB
- Total load COD: 12,000 lbs/d
- Biogas produced: 56,287 ft³/d
- Total energy value: 659 kW



FRUIT PROCESSING - DALLAS, OR, USA

- BIOTIM® UAC & KROFTA® DAF
- Total load COD: 30,100 lbs/d
- Biogas produced: 143,246 ft³/d methane
- Total energy value: 1,678 kW



HEINEKEN BREWERY - SEVILLA, SPAIN

- LUCAS® anaerobic
- Total load COD 61,600 lbs/d
- Biogas produced: 294,132 ft³/d methane
- Total energy value: 1,000 kW



READY-TO-DRINK BEVERAGES - PRYOR, OK, USA

- BIOTIM® UASB
- Total load COD: 23,100 lbs/d
- Biogas produced: 110,300 ft³/d methane
- Total energy value: 1,292 kW



WINERY - ACAMPO, CA, USA

- Waterleau Anaerobic Reactor & KROFTA® DAF
- Total load COD: 44,000 lbs/d
- Biogas produced: 210,000 ft³/d methane
- Total energy value: 2,461 kW



BREWERY AB INBEV - LEUVEN, BELGIUM

- LUCAS® anaerobic
- Total load COD 66,000 lbs/d (30,000 kg/d)
- Biogas produced: 315,140 ft³/d methane
- Total energy value: 1,480 kW

POTATO INDUSTRY

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 WASTEWATER 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.



Lorenz Snack World, Germany
BIOTIM® UASB - 9,900 lbs COD/d - methane: 47,271 ft³/d

A MODERN POTATO
PROCESSING FACTORY
CAN PRODUCE UP TO
60% OF ITS ELECTRICAL
AND THERMAL ENERGY
REQUIREMENTS



Agristo, The Netherlands
BIOTIM® UASB - 64,000 lbs COD/d - methane: 305,600 ft³/d



Claerebout, Belgium
BIOTIM® UASB - 74,000 lbs COD/d - biogas: 353,300 ft³/d

YEAST AND BAKERY INDUSTRY

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
BIOTIM® UAC - Capacity: 74,250 lbs COD/day - biogas: 354,534 ft³/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

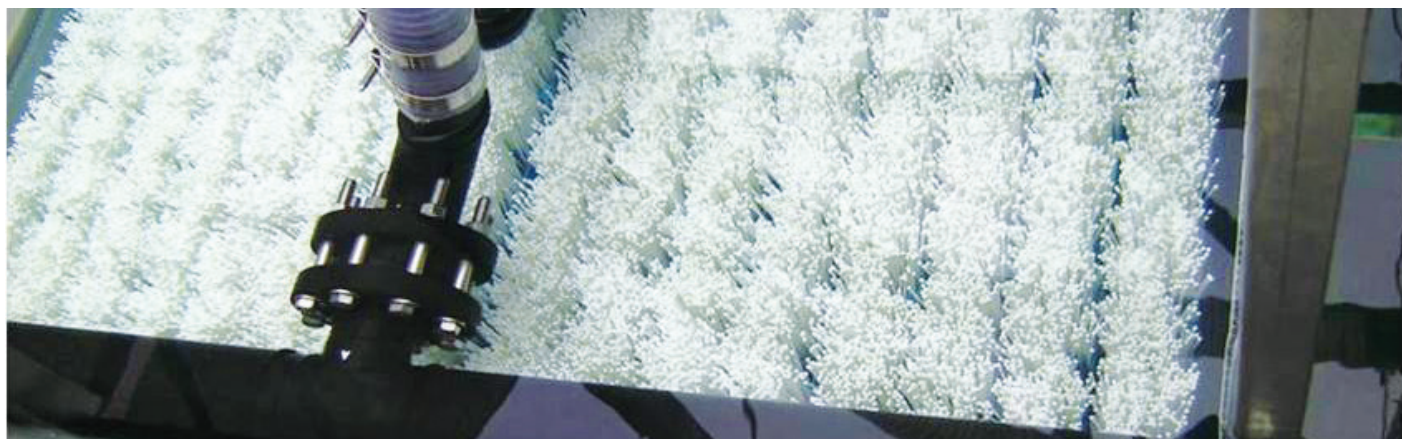
Another Waterleau solution is used to treat extraction gases from the refining process at the same plant. A 4-stage BELGAS® scrubber with a capacity of 200 m³/h removes 3.5 kg S/h from the exhaust gases. Satisfied with the results, the same client ordered a second BELGAS® scrubber for another plant.

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
ATLANTIS® submerged MBR - 4,400 lbs COD/d



Membrane bio reactor

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.



Tereos, France
BIOTIM® UAC - 88,000 lbs COD/d - methane: 420,18900 ft³/d



Saint Louis Sucre, France
BIOTIM® UASB - 28,600 lbs COD/d - methane: 136,561 ft³/d

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



Biowanze, Belgium
BIOTIM® UASB - 33,000 lbs COD/d - methane: 157,571 ft³/d

BOOMERANG® WATER REUSE

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 wastewater 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

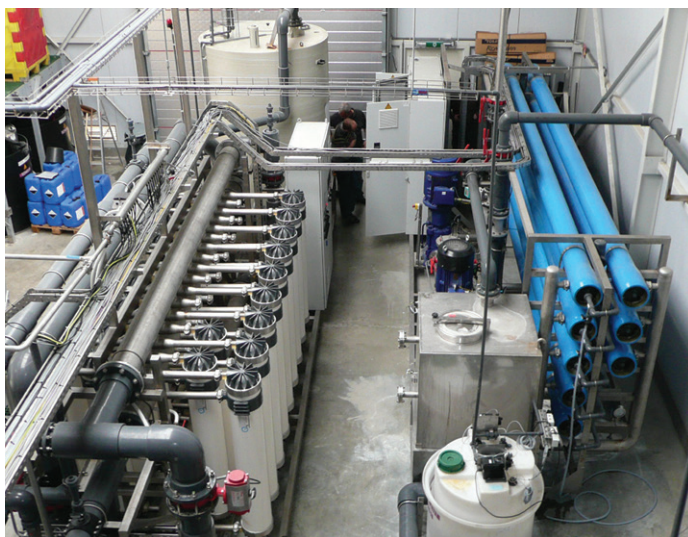
Biological effluent does not require any treatment before feeding the BOOMERANG® installation, Waterleau's proprietary water reuse technology which consists of an AQUALITY® ultrafiltration (UF) step followed by an EXSEL® reverse osmosis (RO) step. This double barrier membrane concept allows a substantial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



Farm Frites, Belgium, water reuse
AQUALITY® ultrafiltration - EXSEL® reverse osmosis
Water reuse: 317,000 ft³/d



Heineken, Laos, water reuse
AQUALITY® ultrafiltration - EXSEL® reverse osmosis
Water reuse: 317,000 ft³/d

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.



Cargill, Belgium, sulphur removal from extraction gas
4 -stage BELGAS® scrubber
Flue gas flow: 7,000 ft³/h



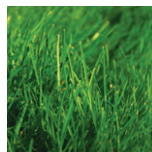
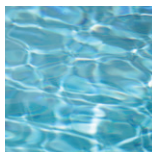
Tereos, France, dedusting + SO₂ and VOC treatment
Wet dedusting and scrubber chimney
Flue gas flow: 15,000.000 ft³/h

STATE-OF-THE-ART TECHNOLOGIES
FOR THE REDUCTION OF THE WATER,
ENERGY AND CARBON FOOTPRINT

+4,000 REFERENCES IN THE
FOOD & BEVERAGE INDUSTRY

DESIGN
ENGINEERING
CONSTRUCTION
OPERATION
MAINTENANCE
RENTAL

PROTECTING THE 4 ELEMENTS



Waterleau Inc. is part of the Waterleau Group, a global leader in environmental technologies. Waterleau 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 5,000 references for municipal and industrial clients around the world.



WATERLEAU

protecting the 4 elements

Waterleau Inc. - 50 Square Drive, Suite 200, Victor, NY 14564
t. +1 (585) 421-3500 – f. +1 (585) 421-3535
info@waterleau.com - www.waterleau.com