



BREWERY OF THE FUTURE

SOLUTIONS FOR A CO₂ AND ENERGY
NEUTRAL BREWERY

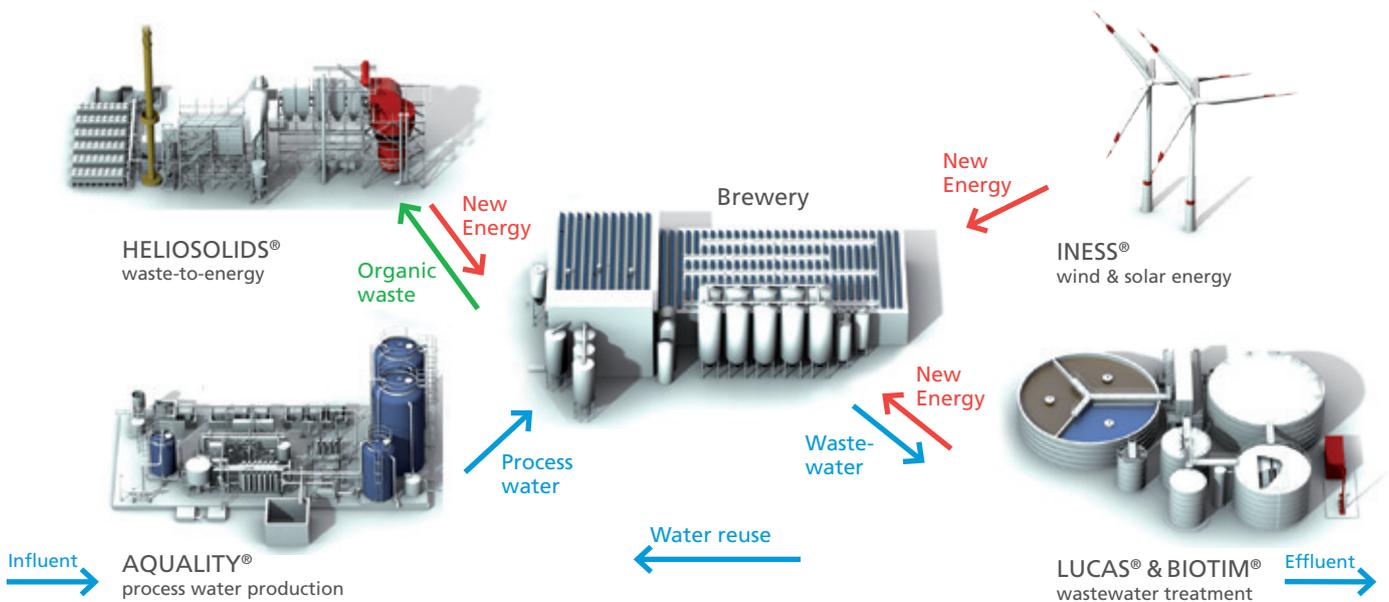


WATERLEAU

protecting the 4 elements

SOLUTIONS FOR A CO₂ AND ENERGY NEUTRAL BREWERY

Energy efficiency, CO₂ reduction, water recovery, green brewery, ... Sustainable development has always been key in the beverage industry. By combining its technologies for water, wastewater and waste treatment with its technologies in Green Energy (wind and solar energy), Waterleau provides integrated solutions in order to face the actual challenges in relation with energy, water and wastewater.



WATER - WASTEWATER - WATER RECOVERY

All major beverage groups are committed to cut on water consumption. Market leaders have put forward targets of 3.5 hl water consumption per hl beer brewed by 2020. In order to achieve these challenging targets, optimizations will be searched within the brewery process first. By doing so, water consumptions will drop to 4-4.5 hl/hl.

Waterleau's BOOMERANG® water technology can help brewers to close the gap and achieve the 3.5 hl/hl target. The BOOMERANG® water technology upgrades the biologically treated effluent (after full anaerobic and aerobic treatment) to drinking water quality by means of membrane technology. By doing so, up to 75% of the biological effluent can be recovered, leading to an impressive 50% reduction in the overall water intake.

Theoretically, water consumption could be reduced further down to 2 hl/hl. However, the lacking of a well performing anaerobic-aerobic treatment plant in combination with discharge limits for effluent or disposal of the concentrate flow, make the 2 hl target difficult to achieve. Discharge limits indicated as a concentration seem indeed to be the limiting factor today. It makes more sense for the brewing industry to apply for values based on daily loads rather than concentrations.

ENERGY

A global awareness for sustainable development is making businesses to reduce fossil fuel CO₂ emissions and comply with international agreements and treaties. In the brewing industry, energy is used for heating and power throughout the brewing and packaging process. Two types of energy are required in every brewery: thermal energy and electricity.

Together, thermal energy and electricity make up for +/- 43 kWh per Hectoliter beer produced. Electricity accounts for 8 kWh/hl or 20% of total energy requirements, and thermal power accounts for 35 kWh/HL or 80% of total energy requirement.

Electrical power is either taken from the grid or produced on site by generators, turbines or CHP-units. In emerging markets these generators are still fed from time to time with, highly polluting, heavy fuel.

ELECTRIC POWER FROM SOLAR AND WIND ENERGY

However, electricity produced from fossil fuels can be replaced for a full 100% by green energy produced from Waterleau's INESS® technology which combines both wind and solar power. Up to 1.25 kWh/hl or 15% of total electrical requirements can be obtained from solar panels on roofs of packaging halls and office buildings. Adding wind turbines provides an even more substantial amount of green energy.

Calculations indicate that wind turbines can provide 35 to 70% of the electrical requirements, depending upon the location of the brewery, which of course, must allow implementing wind mills and must also be located in a wind rich area. Both solar and wind energy require adapted local conditions and a feasibility should be done on a case by case base. In many countries governments support both solar and wind energy and provide subsidies for the investment, or CDM's for CO₂ reduction or even green energy certificates for every MWh of green energy produced.

ENERGY FROM ANAEROBIC WATER TREATMENT

The electrical power can also be provided by energy produced in a CHP-unit (Cogeneration Heat & Power) fed with biogas produced in a LUCAS® anaerobic treatment plant. By doing so, up to 1 kWh/hl can be produced, leading to a replacement of 15% of the overall electricity requirement. The heat produced in the CHP unit can be used either for pre-heating the wastewater, for the heating of buildings or for preheating the process water in the production area. By doing so, almost 100% of the energy potential of biogas is recovered! Waterleau's feasibility studies show a ROI of 3-5 years for the such a CHP.

THERMAL ENERGY FROM BIOGAS

Also thermal energy, in breweries accounting for 80% of the total energy requirement, can be replaced by several green energy technologies.

Steam can be provided by using biogas (if not used to produce electricity). Up to 4 kWh/hl can be produced from biogas, which equals over 10% of the total thermal heat requirement. In order to be able to use the biogas in the boiler unit, it needs to be pre-conditioned (desulphurization, compressing, dewatering, storage). The boilers might require some modifications for the biogas usage, which can be done either at the burner or upstream by mixing biogas with natural gas.

ENERGY FROM SPENT GRAINS

By using Waterleau's HELIOSOLIDS® fluidized bed incineration plant, energy can be produced from the organic waste available within the brewery. Spent grains can be used for the production of steam but an organic co-source is required in order to make this technology feasible. However, due to the significant investment, ROI is interesting for large plants with brewery capacities starting from 3 Mio hl and more and depends upon the local conditions for disposal of the spent grains.



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

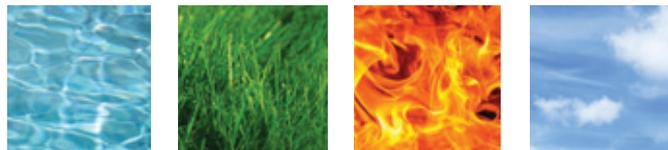


Heineken, South-Africa, effluent treatment
LUCAS® anaerobic-aerobic
Capacity: 9.000 kg COD/d - biogas: 2.520 Nm³/d

HELPING BREWERIES KEEPING THE LEAD IN SUSTAINABLE DEVELOPMENT

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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