

would anaerobic digestion add value to your business?

This paper will help you understand what anaerobic digestion is and how it can benefit a brewery or distillery when integrated within an effluent treatment system.

anaerobic digestion for wastewater treatment

Over the last five years the brewing and distilling sector has seen a surge in implementation of technologies such as anaerobic digestion for recovery of energy from co-products driven not only by the need to enhance efficiency but also to improve environmental performance.

For example, the Scotch whisky distilling sector has set a strategic target that by 2020 it will ensure that 20% of the industry's primary energy requirements will be derived from non-fossil fuel sources, with a target of 80% by 2050, thereby reducing greenhouse gas emissions from fossil fuel sources to a minimal level.

To meet such targets there is a need to achieve process optimisation, enhancing efficiencies and deriving more value from existing assets, and anaerobic digestion can be a powerful tool in achieving this.

What Anaerobic Digestion can do for you

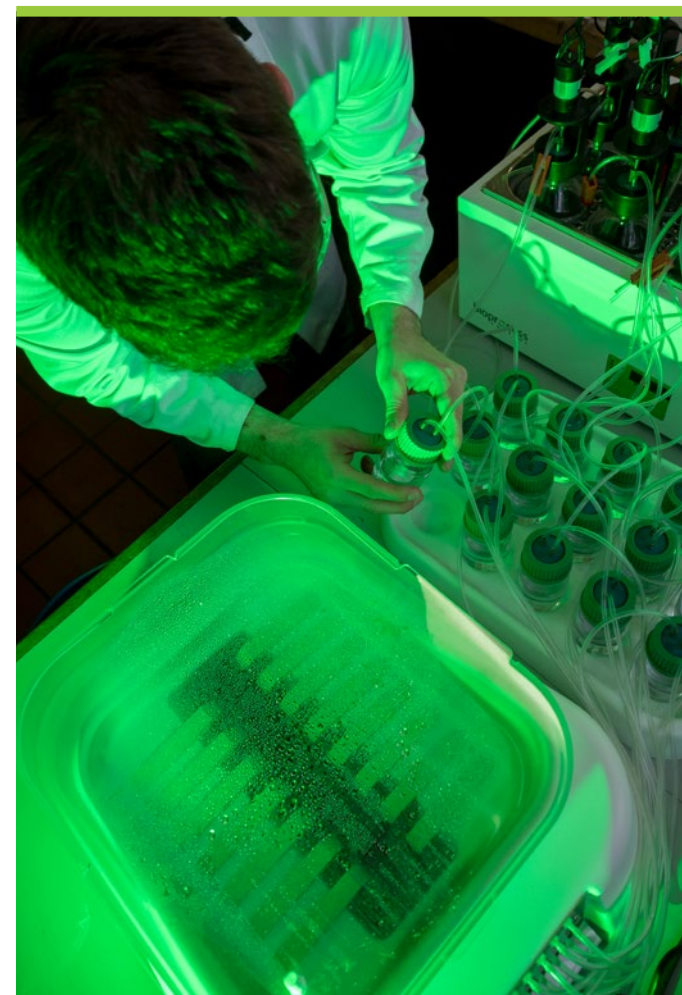
Integrating an Anaerobic Digestion system as a part of your co-products management will enable you to recover biogas that can be used to drive an engine, turbine or boiler to produce steam, energy or electricity, which, in turn, can be redirected back into your system. The excess electricity can be sold back to the national grid, enabling

you to cut energy bills and generate an income, while reducing your environmental footprint. Generating your own energy also de-risks your business. It allows you to become more robust during periods of global instability that affect energy supply pricing.

Anaerobic treatment plants are becoming more common in breweries, with larger breweries using the methane gas for boilers or electricity generation in CHP (combined heat and power installations). About 65% of biogas produced by anaerobic reactors is methane, with CO₂ being the next highest proportion. Anaerobic plants can handle more concentrated COD effluents than aerobic plants – up to 10,000 mg/l or higher, with a typical reduction rate of up to 90%.

How the process works

The capacity of water to consume oxygen during the decomposition of organic matter and the oxidation of inorganic chemicals is tested and defined as Chemical Oxygen Demand; the higher the result, the more oxygen required. The impact of an effluent or waste water discharge on the receiving water is predicted by its oxygen demand. This is because the removal of oxygen from the natural water reduces its ability to sustain aquatic life.



anaerobic digestion for wastewater treatment



Anaerobic Digestion is a process by which micro-organisms break down biodegradable material in the absence of oxygen. An anaerobic biological treatment process breaks down organic carbon, generating methane that can be recovered to produce energy and discharging water with a significantly lower COD. Typically, removing 1 ton of COD (Chemical Oxygen Demand) has the potential to produce around 3,500 KWh. There are a range of anaerobic biological digesters to choose from, each producing recoverable by-products with a small footprint.

Exploring the potential of Anaerobic Digestion

A water and wastewater solutions provider will evaluate factors such as potential gas yield, microbiology and inhibition, cost of design / build and financial returns to establish the correct specification for you. This will allow your business to make an educated strategic decision. This can be achieved by using automated biomethane potential test systems to replicate the operation of full-sized anaerobic plants. These 'AD simulators' can replicate your industrial processes and accurately estimate the financial benefit you will achieve from employing the technology at full scale. When considering the application of Anaerobic Digestion it is also important to be aware that there are options available even when

specifying Anaerobic Digestion for plant situated in highly populated areas; for example, Anaerobic Digestion systems can be bespoke designed to blend in with the built environment, with the off gas treated to a high specification to reduce the effect of any odour before being sent to boilers to produce steam.

How does Anaerobic Digestion work?

A typical ETP passes effluent via a DAF (Dissolved Air Flotation) unit to anaerobic (and aerobic) stages, with sludge removed to a belt press. The effluent then passes to sand filters before being safely discharged.

Within this typical configuration there are a range of anaerobic biological digesters for brewers and distillers to choose from. For example, in a Granular Sludge UASB (Upflow Anaerobic Sludge Blanket) digester a blanket of granular sludge is formed in the reactor, which suspends in the tank. Effluent flows upwards through the blanket and is processed (degraded) by the anaerobic micro-organisms. This process has been highly efficient in treating effluent from wine producers and breweries; an Upflow Anaerobic Sludge Blanket followed by flash aeration have reduced COD by over 95% in a UK brewery. Indeed, each anaerobic system has proved to be particularly effective in at least one specific brewing

anaerobic digestion for wastewater treatment

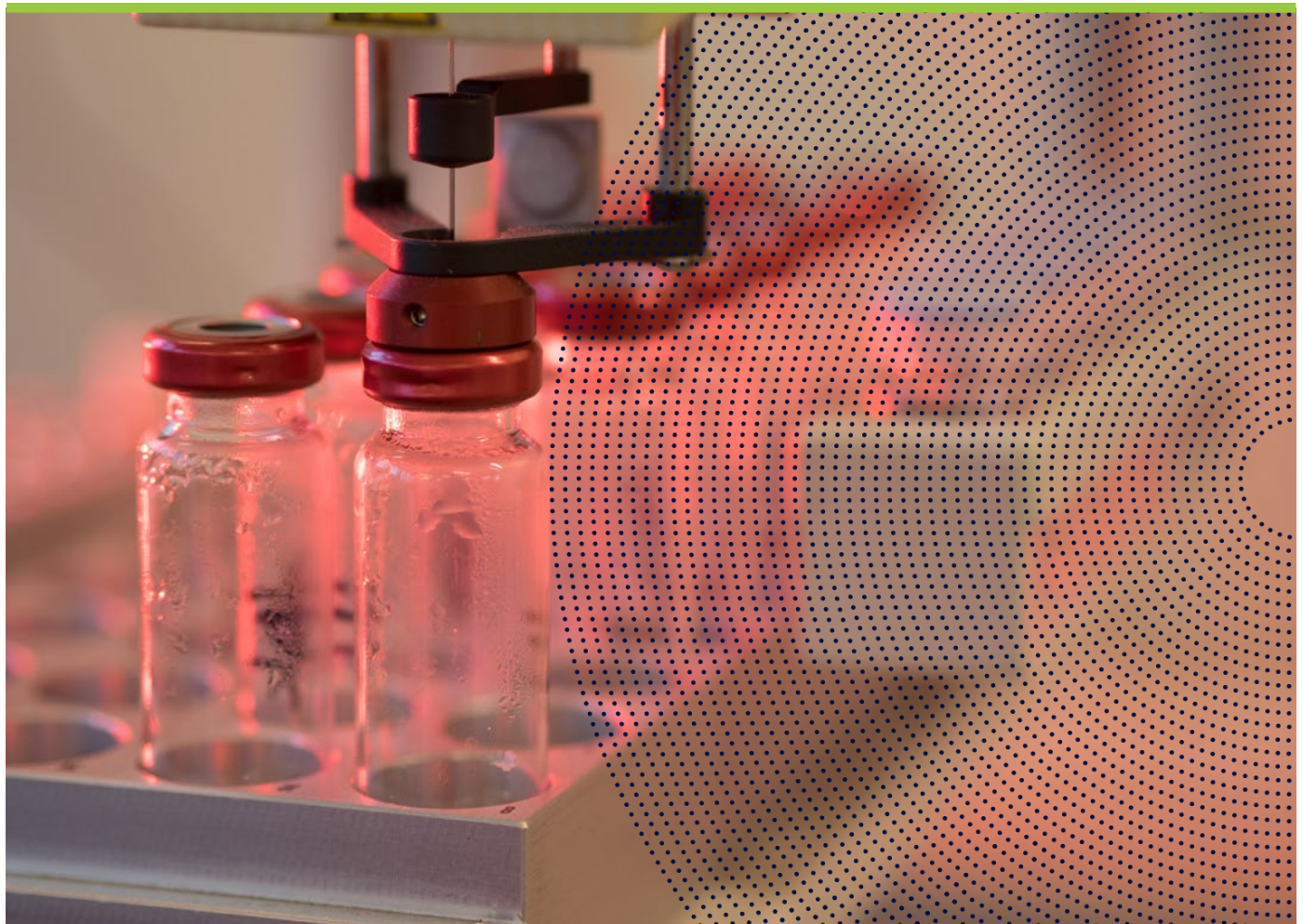
and distilling application. A Contact Reactor, for instance, is suited to the treatment of complex juices, while a Fluidised Bed is frequently specified to treat evaporation condensate and alcohols.

An Expanded Granular Sludge Bed (EGSB) is more often used in breweries due to its smaller size and footprint. An advantage over aerobic systems is that biomass production is significantly less with very little removed from site, in fact biomass is often in demand with sludge being removed from active plants to feed new installations. Larger plants are sometimes fitted with small aerobic reactors to polish effluent coming from anaerobic plant to achieve compliance for discharge to river. Polishing aerobic plants are much smaller because the effluent loading from the anaerobic reactor is much lower.

Evaluating the pros and cons of Anaerobic Digestion

Advantages

Wastewater disposal costs are becoming so expensive that some businesses cannot sustain them. A powerful way of reducing those costs is to use Anaerobic Digestion to produce methane that can be recovered and used as fuel while reducing COD levels by around 90%. The process can treat effluent with strength as high as



anaerobic digestion for wastewater treatment



50,000mg/l, producing a smaller amount of sludge and a lower, more compact biomass growth than aerobic processes. Another common challenge that can be addressed by Anaerobic Digestion is expansion; when there is an opportunity or a need for the business to expand production from an ageing plant the most cost-effective way of adapting is often to introduce Anaerobic Digestion.

Disadvantages

Anaerobic Digestion systems are susceptible to toxic and shock loadings, and, since they contain microorganisms, feedwater may need to be treated with nutrients to provide the right level of nitrogen and phosphates. Anaerobic Digestion systems also need to be operated at closely monitored temperatures as they produce methane, which is an explosive gas that needs to be handled in the appropriate manner. In addition, the true costs of installing and running AD may be high compared to the payback.

Summary

Anaerobic Digestion integrated within a brewing and distilling ETP can bring significant cost-savings but only if specified correctly for your application.

Over the last five years the brewing and distilling sector has seen a surge in implementation of technologies such as anaerobic digestion for recovery of energy from co-products.

To discover what an Anaerobic Digestion system for your plant will look like, how to buy one, who to talk to, and what you will need to do to build and operate one, consult a specialist water and wastewater solutions provider.

Your specialist partner will guide you through all the necessary stages as the project progresses, helping you to avoid many of the pitfalls that exist, and enabling you to make the right strategic choice for your business.

Contact

SUEZ Industrial Water UK
Ondeo Industrial Solutions, 530-534 Durham Road,
Low Fell, Gateshead NE9 6HU

Tel: +44 (0)191 491 4274 | Fax: +44 (0)191 491 4277
Web: www.degremont-industry.com

