News

Green Energy From Wastewater Opens Up New Horizons

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The meat processing industry is entering uncharted waters as governments worldwide introduce carbon pricing regimes and expand community awareness about which industries are posing environmental challenges in terms of air and water purity.

Meat processing – including cattle, sheep, pig and poultry plants - will attract increasing attention as we move further into the current decade, both in terms of its energy use to produce steam and hot water, for example, and for the quality of its wastewater and its emissions to air.

The industry faces particular challenges – and opportunities – because of the nature of its process wastewater, which typically has a high content of organic material and consequently a high biochemical oxygen demand (BOD) and chemical oxygen demand (COD) due to the presence of blood, tallow, and mucosa.

Meat industry wastewater may also have a high content of nitrogen (from blood) and phosphorus, in addition to pathogenic and non-pathogenic viruses and bacteria, and parasite eggs (not to mention disinfectants and detergents may enter the wastewater stream during facility-cleaning activities, including acid, alkaline, liquid paraffin and neutral compounds).

This is a fairly potent brew to deal with – and the downside for the industry is that, because historically it has not had to respond to environmental scrutiny on today's scale, it has not had to consciously encourage development of the technologies required.

The upside for the industry is that such technologies do exist; that highly effective anaerobic green energy and waste water treatment processes have been proven in other food and beverage industries; and they can be readily adapted to meat processing in the environmentally aware 21st Century.

What is required for this to happen, more than anything else, Is not a technology revolution, but a mindset evolution away from old technology that has passed its use-by date, (such as extensive, polluting and smelly lagoons) and outdated attitudes that treat waste water as a cost or even place in which to hide process problems, rather than a resource for recycling and generation of green energy.

The issues facing the meat industry

Water Use

Elevated consumption of high-quality water, which is an important element of food safety, is often characteristic of the meat processing industry. Water is used for watering and washing livestock, cleaning vehicles, dehairing and rind treatment of pigs, rinsing carcasses and byproducts, and cleaning and disinfecting equipment and process areas.

Emissions to Air

Odor may often be a significant form of air pollution in meat processing. Major process odor sources include singeing, scalding, lairage, wastewater treatment and rendering.

But frequently the greatest community liability – and the greatest environmental danger – is smelly emissions of gases (primarily methane) from the large lagoons characteristic of the industry

Energy Consumption

Meat processing facilities are major users of use energy to heat water and produce steam for process applications and for cleaning purposes, as well as for operation of miscellaneous electrical equipment, refrigeration, and air compressors. Traditionally the industry has been a heavy user of fossil fuels, primarily oil, the price of which has fluctuated from under $15 a barrel 20 years ago to peaks of $90 to over $100 now, making fossil fuels such as bunker oil vastly more expensive.

The opportunity these present

In fact the problems of waste water, emissions and energy consumption also present an opportunity to use the huge but often hidden potential of wastewater as a source of renewable energy. This has been clearly demonstrated by partners Global Water Engineering, a world leader in clean water and green energy solutions, and CST Wastewater Solutions, a leading wastewater solution group which also employs GWE technology on major projects. GWE has built successfully more than 250 plants producing biogas as part of the industrial effluent clean-up system, of which more than 75 were supplied with subsequent biogas utilization systems for clients worldwide.

Many of the latest installations use advanced technologies – including anaerobic pre-treatment of water and aerobic polishing – to enhance water discharge purities while converting waste to methane to be burned to power boiler and hot water systems, for example, or to power generators and permanently replace fossil fuels. On average the removal efficiency of GWE's anaerobic wastewater treatment installations is as high as 90-95%, easily bringing the organic load down to regulatory discharge standards for most types of wastewater.
The concept of using wastewater to create green energy is much more widely applicable than is

often realized. Any factory with a biological waste stream or wastewater with high COD (Chemical Oxygen Demand) can easily use this model to generate energy.

Applicable industries include primary processing industries such as the meat and dairy industries, for which GWE technologies such as its Flotamet system (pictured) combined with its proprietary Dissolved Biogas Flotator (DBF) technologies (above) are specifically designed to take the high levels of fats and oils prevalent in effluents.

So far, many primary industries have mainly focussed on treating their effluent to meet local discharge standards. By doing so, wastewater treatment installations have only generated additional costs and have never been seen as revenue generators.
Instead of looking at efficiency, and getting the inputs and outputs optimized, the meat and other industries have traditionally employed big lagoons requiring huge amounts of energy to aerate. However, applying anaerobic wastewater treatment sheds a whole different light on the cost structure of wastewater treatment infrastructure. It can now actually become a substantial additional source of income for many processing plants.

Power from effluent
Closed anaerobic reactors generate large quantities of methane (CH_4) from the organic materials in the wastewater that can diminish or even completely replace the use of fossil fuels in the production process.
To bring some perspective to the value, one ton of COD (chemical oxygen demand) digested anaerobically can result in 350Nm3 of methane, equivalent to 0.15MW of power.
For specific industry applications with high organic loads, enough biogas can be generated to fully cover a production plant's energy needs and still have a biogas surplus to feed it into power generators and sell electricity to the national grid, often generating carbon credits, where these apply, as well as profit.

For a greener footprint
But it doesn't end there. The GWE closed anaerobic process systems prevent large quantities of CH_4 being emitted into the atmosphere. With CH_4 being 21 times more harmful than CO_2, GWE's anaerobic wastewater solutions can also qualify for Emission Reduction Certificates for projects in countries listed under the United Nations Kyoto Clean Development Mechanism (CDM) and Joint Implementation (JI) programs.
Besides the economical advantage of efficient anaerobic wastewater treatment, there is clearly also the environmental advantage, significantly reducing factories' carbon footprint.
Not only by supplying renewable energy and thus reducing or even eliminating the use of fossil fuels, but also by replacing more traditional, CH_4-polluting, open lagoons and by replacing power consuming and sludge producing traditional aerobic WWTPs.

SOURCE: CST Wastewater Solutions