Technology for Water
ENVIROCHEMIE

Energy from Wastewater

Use of biological wastewater treatment to generate energy, preserve resources and lower operating costs

The challenge in terms of sustainability:
Reducing energy consumption and optimising operating costs is an important aspect for many companies. Under certain conditions these goals can be combined in an intelligent wastewater treatment plan. By recovering energy, recycling water and minimising disposal costs, operating costs can be lowered and CO2 emissions reduced.

EnviroChemie GmbH in Rossdorf identified this trend some time ago, and has been developing process technology and designs since the nineteen nineties to combine industry wastewater treatment with the other aspects mentioned above.

Initial situation:
The Swedish dairy company Norrmejerier, based in Umeå, had to handle large quantities of whey which are a by-product of their production, on a daily basis. Around 90% of the milk used in cheese production ends up as the high-energy by-product whey. The high costs of disposing of whey have been reduced by marketing a whey-based drink and by selling it as a feedstuff for livestock. But the volumes created are so huge that the marketing approach on its own has not been enough.

The solution - sustainable technology:
Since 2006 an economically and environmentally successful anaerobic wastewater treatment and energy recovery approach has been in operation there. This has also allowed disposal costs to be lowered.

The EnviroChemie engineers developed a sustainable wastewater technology process for the customer. After separating the valuable proteins from the whey, the remaining organic load in the whey and the whey permeate are processed anaerobically, together with other production wastewaters, to produce energy rich biogas. In this holistic energy approach, a part of the heat energy stored in the wastewater is recovered using heat exchangers and heat pumps.

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The anaerobic wastewater treatment at Norrmejerier dairy in Umeå is carried out using the EnviroChemie Biomar AWR process. Each day, up to 250 m³ of whey or whey permeate is created at the dairy, which is then transferred to the wastewater treatment system. The daily COD levels are up to 20 t COD/day.

Biogas generation takes place in two biogas reactors with a total volume of 5,000 m³. The wastewater, which is now fat-free and hydrolysed in a mixing and equalisation basin is passed to the biogas reactors. Using a contact sludge process at a temperature of approx. 35 °C, the anaerobic breakdown and biogas production take place. After separating off the biomass, some of the heat energy is recovered from the cleaned wastewater, which is now at a temperature of about 35 °C, using heat exchangers and heat pumps, before the wastewater is released into the sewerage system at a temperature of around 13 °C. The energy recovered by means of the heat exchangers and heat pumps is used to heat the wastewater flowing into the bio-reactor up to 35 °C. Each day up to 10,000 m³ of biogas is now produced with a methane content of 65 to 70%. The energy from the biogas which is produced is then used to generate steam.

in 2012 a modification was made to the capacity of the wastewater treatment plant. In addition, the plant was extended to include a cleaning phase, which removes about 90% of the phosphates from the wastewater.

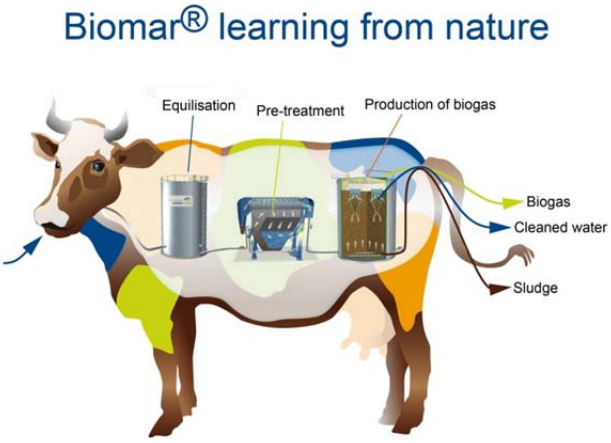
Sustainable advantages:
This project has been both an economic and an ecological success for the large-scale dairy company. The intelligent process technology combination of biological wastewater treatment, biogas/energy recovery and whey disposal creates a clear economic benefit for the dairy company, as well as significantly improved energy efficiency. The processes described above convert wastewater and waste products into substances from which biogas can be created, which is then used to generate steam.

In 2009 more than 2,000,000 m³ of biogas was generated, saving over 1,200,000 l of heating oil. Moreover, thanks to the high biogas yield, the investment costs of this EU supported project were amortised sooner than
expected.

The inventors:
The Biomar AWR process for anaerobic treatment of wastewater is an EnviroChemie invention. The process has been registered for patent.

The principle of the process is copied from nature. For example, similar processes occur during digestion in a cow's stomach.

In our own Research & Development



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Department EnviroChemie develops customer-specific plant solutions, which are then tested in the laboratory, in our own technical centre and through pilot plants. EnviroChemie also regularly participates in national and international research projects.

All EnviroChemie technologies undergo continuous development by our own in-house experts, which means that our products benefit from both 35 years of experience in plant construction and the latest discoveries.

Brief overview of the company:
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64380 Rossdorf, near Frankfurt
Germany
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Founded; 1976
Employees; 400

Solutions: Plants and services for industrial water and wastewater treatment

International: Locations in Switzerland, Benelux, Poland, Romania, Bulgaria, Russia, Austria

www.envirochemie.com

Facts:

Plant technology for energy efficiency and preservation of resources

- produced 2 million m³ of biogas from wastewater during 2009.
- saved 1.2 million l heating oil during 2009
- recovers thermal energy.

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