BIOGAS from Renewables

Industrial Scale

1.000 kW

St. Veit/Glan, Austria

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Abstract

Environmental and climatic advantages of agricultural biogas (a renewable energy source) production are obvious. Biogas, produced by microbiological transformation of organic substances, is a valuable energy source that has no greenhouse potential. Furthermore such a plant strengthens agricultural regions and is able to increase agricultural income.

EnviCare® gives support in design, authority proceedings, biddings, guarantees, order placing, contractions, construction supervision and installation of a biogas plant.

Biogas plant St. Veit a.d. Glan

Ordered by the NAWAROS GmbH, this plant was finished in 2004. 18,000 tons of corn are used in biogas production each year. The plant was designed to reach an availability of 85 – 95 %. The biogas plant is located near St. Veit a.d. Glan (Carinthia, Austria – see Fig. 1) and was (one of) the largest installation in Central Europe at this time.

Fig. 1: Plant location at St. Veit a.d. Glan (Carinthia)

Many lessons were learned during start-up and the first operating years.

Several problems occurred with corrosion, overestimated design of the maximum volumetric organic load of the plug-flow Fermenters, durability of components such as valves or submerged stirrers, operation of the ammonia stripping system, quality of silage and so on, but today most problems are solved and the plants is running quite smoothly.

Fig. 2: Silo stock yard

The fermentation system used in St. Veit consists of two parallel-fed plug-flow pre-fermenter and two serial-fed CSTR post-reactors.

Hydrolysis is performed by the horizontal situated and heated pre-fermenter (see Fig.3) while the vertical situated concrete tanks (see Fig. 4) act as a post-fermentation unit.

The produced gas is collected in gastight EPDM rubber storages mounted on the top of the CSTR fermenters, the raw material is stored in a silo stock yard.

Fig. 3: Pre-fermenter and biofilter

The produced biogas is processed in a combined heat and power station (see Fig. 6) to electricity (1050 kW_{el}) and heat, used for district heating (940 kW) and plant heat consumption (< 230 kW).

Fig. 4: Post-fermenter

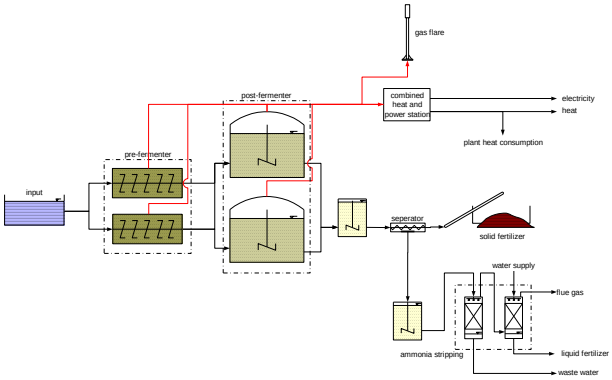

Fig. 5: Process flow diagram

The combined heat and power station was delivered by GE-Jenbacher. Inside works a four-stroke gas engine with an exhaust gas turbocharger (LEANOX-lean mixture process).

After anaerobic fermentation a separator splits up the slurry into a liquid and a solid fraction. The solid fraction can be used as compost in agriculture, the liquid fraction should be treated in an ammonia air-stripping unit (see Fig. 7.)

Fig. 6: Combined heat and power station (1.000 kW_{el})

This was the first time such an unit was integrated in a biogas plant in Austria, it ´s main task was to protect the local wastewater plant from overloading. In addition to that it should produce a high quality product, ammonia sulphate, which should be used as liquid fertilizer.

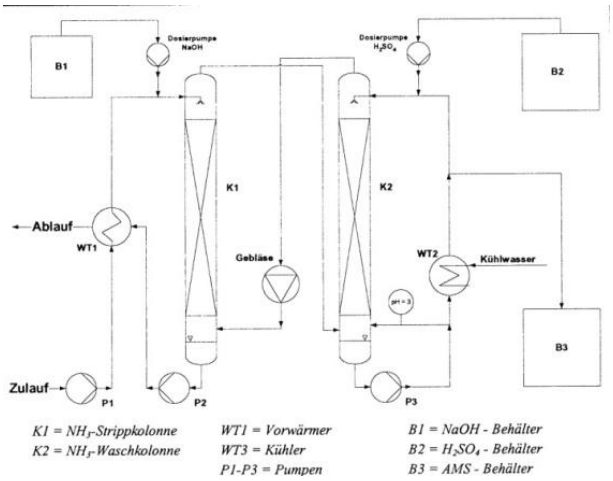

Fig. 7: Ammonia air stripping unit

Unfortunately it never operated well and therefore also the liquid fraction of residues is used as manure in agriculture today.

Malodorous gas cleaning is performed by a biofilter, pollutants like ammonia, hydrocarbons, hydrogen sulfide e.g. are removed by sorption and microbiological treatment. As a result only nitrogen, carbon dioxide, sulphate respectively sulphur and water remains.

EnviCare® offers years of knowledge in development, design, installation and operational practice in environmental technology.

We take care of your environment!