

# First Biogas International AG

## The References

Biogas plants, object #78, slaughterhouse waste; Engranat, Switzerland



### The "Engranat" biogas plant, Orsonnens, County Fribourg, Switzerland

The "Engranat" biogas plant was commissioned and set into operation at the end of 2008. It is a modern biogas plant which is specializing in treating and processing mostly blood, rumen and pig manure and feeds the produced electricity into the local grid. There are about 10'000 tonnes of manure, food and slaughter house waste digested per year. The electricity production per year is about 1'800 MWh.

#### Plant layout

The biogas plant consists of three parts: the digestion part, the substrata hall and the substrata processing hall.

#### The digestion part

There are two digesters of 1'075 m<sup>3</sup> net volume each. The digesters are running at about 38°C. They are fully insulated and have a plastic tube heating system which is mounted on the inner walls.



On top of the post-digester, there is a gas storage mounted. From there, the raw gas is fed to the CHP-units. All substrata are mixed up in a 200 m<sup>3</sup> premixing pit. From there, the substrata can be pumped directly into the digesters. Two tanks with fat and glycerin stand on top of the premixing pit. They are heated and insulated in order to keep the material liquid which is pumped directly into the digesters.

### The substrata hall

A large substrata hall stores big amounts of cereal waste that arrives in fall. There's also horse and chicken dung being stored. These substrata are welcomed in order to have a good mix of materials to be digested. They also level out seasonal fluctuations of the supply of substrata.



### The substrata processing hall

Blood, rumen and meat and food waste are delivered to the main hall. In a sterilization unit, the blood is heated up to 130°C at 3 bars for 20 minutes. Thus, once passed through the digesters and mixed up with other substrata, it is allowed to use it as a fertilizer in the end. Blood yields a good amount of gas but has a lot of nitrogen, as well as pig manure. Attention has to be paid not to inhibit digestion by an increased amount of ammonium. Therefore, regular samples are taken from the digester and analyzed in the lab. Thanks to a variety of organic substrata available a perfect mix of materials can be digested which allows the plant to run at its limits and thus in a very efficient way.



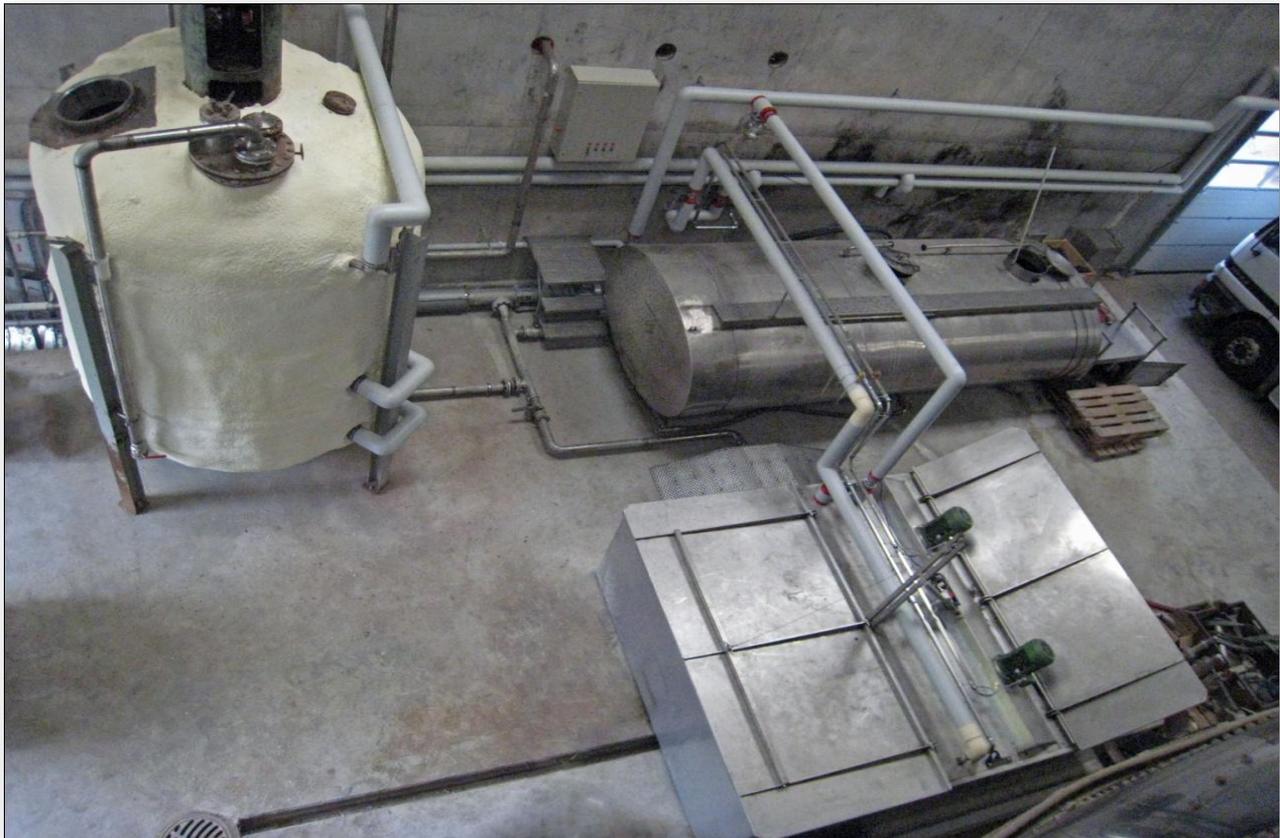
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Food waste is arriving in bins. They are emptied into the sanitizing unit which chops, stirs and heats up the material.

Food waste is sanitized at 80°C for one hour. After that, the pulp-like material is pumped directly into the digester.





The sanitizing units for blood and food waste.

### Energy production

The biogas produced is burned in two high-tech gas engines of 440 kW<sub>e</sub> total. The electricity is fed into the grid and sold as green energy. The excessive heat is used for the sanitizing units and for heating the nearby pig barns and some shops. The CHPs can be remotely accessed over the internet to check optimal operating.



### Contribution to the environment

With the production of biogas from renewable resources and waste, the production of CO<sub>2</sub> from fossil fuel plants can be reduced. The liquid manure as an end product of the biogas plant is readily used by the local farmers. Due to the anaerobic digestion, there's no more smell, the manure is easily absorbed by the plant roots and emissions to the ground water are highly reduced. The manure is balanced out and rich in nutrients and the farmers

substitute more and more their chemical fertilizers by this manure, also of course due to the rising costs of fertilizer.