

Biogas plant Pumping station III



Maize silage, rye (corn/GPS) 95 t/d = 34.600 t/a

Pumping station III biogas plant (2.5 MW_{el})

Solids storage takes place in four bunker silos. The fermentation juice produced is collected in the fermentation juice pumping works and pumped into the post-fermentation container. A vehicle weighbridge has been installed to determine the amount of solids delivered.

The fermentation container is fed with solids using three pusher plates and a grain silo. Screw conveyors are used to transport solids out of the containers through a transport pump including substrate admixing. Control of the materials delivery takes place centrally in the operations building using pneumatic valves.

The two fermentation containers are each fitted with a central paddle mixer for circulating the substrate and to ensure avoidance of any suspended solids mats. Heating of the substrate is carried out by stainless steel heating pipelines fitted in the fermentation container.

The gas produced in the fermentation containers is fed directly into the post-fermentation container and the separate gas holder. The concrete in the fermentation container gas zone and in the post-fermentation container is protected using a gastight PEHD membrane cast in the concrete. The post-fermentation container is also fitted with a membrane gas holder roof. In this, and the separate gas holder as a film storage unit, excess gas from the fermentation containers and from the post-fermentation container can be temporarily stored until power generation.

The post-fermentation container is also fitted with a stainless steel heating circuit for heating the substrate. Circulation in the post-fermentation container takes place through three long-shaft paddle mixers fitted in the container wall.

The biogas temporarily stored in the post-fermentation container is fed to the separate gas holder via a pipeline with a condensate separator. From here, the gas is dried out through an increase in gas pressure.

In order to be able to use the produced gas quantities of around 1.000 m³/h optimally both economically and ecologically, the biogas is transported to the city of Braunschweig through an earth-laid pipeline after passing through a gas measurement device which records quantity and quality. There it is converted by the Braunschweig energy provider BS/ENERGY for power generation and heat provision for Braunschweig residents using two gas motors (2 x 1 MW_{el}).



Bunker silo



Pushing plates



Grain silo



Fermentation container I + II



Paddle mixer in fermentation container (during installation)



Post-fermentation container



Fermentation backlog container



Gas holder (during installation)

The required sensible heat for the biogas plant itself is produced using an additional combined heat and power unit with 500 kW performance. The power produced is fed into the mains network.

The condensate removed from the condensate shaft upstream of the gas holder is transported into fermentation backlog container no. 3 via a condensate pump. The fully fermented substrate is transported from the post-fermentation container into the three fermentation backlog containers. The fully fermented substrate can be removed using the output station at the fermentation backlog container. Each unit is fitted with three submerged circulation paddles to prevent accumulations.

In addition, there is a facility for transporting fully fermented substrate out of the fermentation backlog container into two press screw separators via a pump. Both these machines are capable of de-watering substrates with a dry matter content of between 5 - 7 % and 28 - 32 %. The separated solids are put into intermediate storage next to the works premises in a separate solids warehouse and transported away from there.

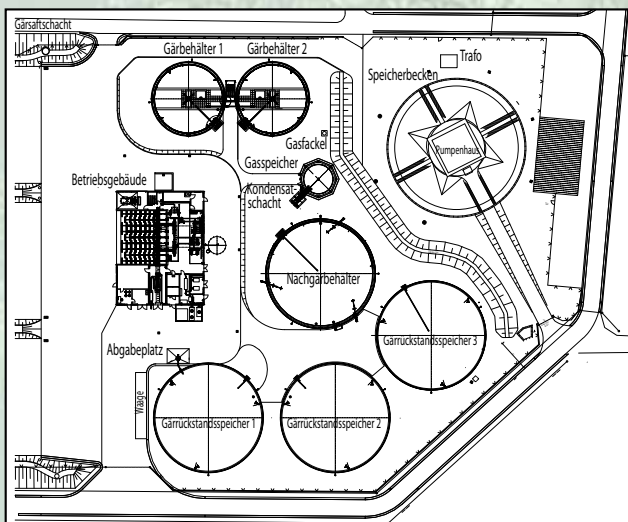
The biogas plant is completely controlled using PLC. The process control system (PCS) is superordinated over the PLC. Both PLC and PCS are used to determine or calculate all regulation and control strategies, especially feed cycles with the various solid types. Such determinations or calculations are used as regulation or control values for operating the plant. For this reason, the plant is continuously undergoing a varying and self-optimising calculation process.

Characteristic data

- Combined heat and power unit with gas spark-ignited engines (2 x 1 MW_{el}, 1 x 500 kW_{el})
- Silage plate (4 x 3.200 m²)
- Fermentation container (2 x 5.000 m³)
- Post-fermentation container (3.500 m³)
- Fermentation backlog container (3 x 3.500 m³)
- Gas holder roof on post-fermentation container (1.500 m³)
- Separate gas holder (500 m³)
- Works premises (1.150 m²) in solid construction, with combined heat and power plant, pumps and materials handling system, switchgear, pressure increase etc.



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General layout biogas plant Pumping station III

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