



Company waste water treatment plant  
Gemüse-Meyer



# Gemüse-Meyer Company waste water treatment plant

## The FAR-SBR\* process - an innovative form of biogas plant operation

Many agricultural biogas plant, especially renewable primary product plant, require comparably high retention times to achieve near-complete rotting of the substrates fed in. This means that the fermenter is often constructed using high hydraulic retention times because it is operated on the principle of completely mixed reactors.

The biomass retention time, which serves to ensure rotting of the substrates fed in, is therefore practically identical with the mere hydraulic retention time. Despite this the rotting rates of such fermenters is often insufficient, and this can be seen from a high concentration of volatile organic fatty acids (known as VFA) which still are transformed to the holding tank for digested organic matter.

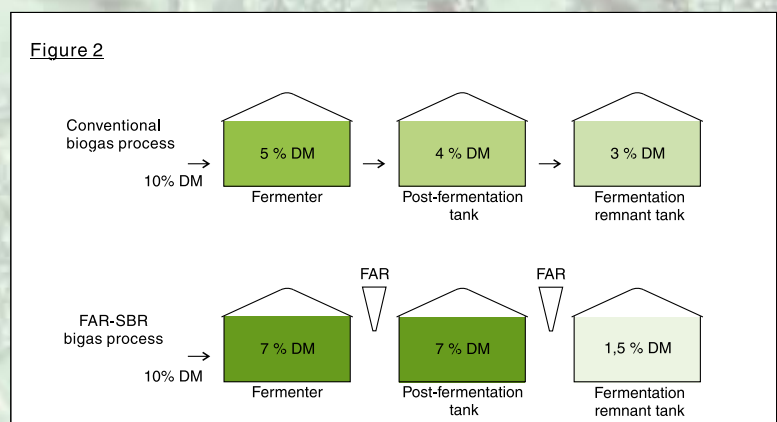
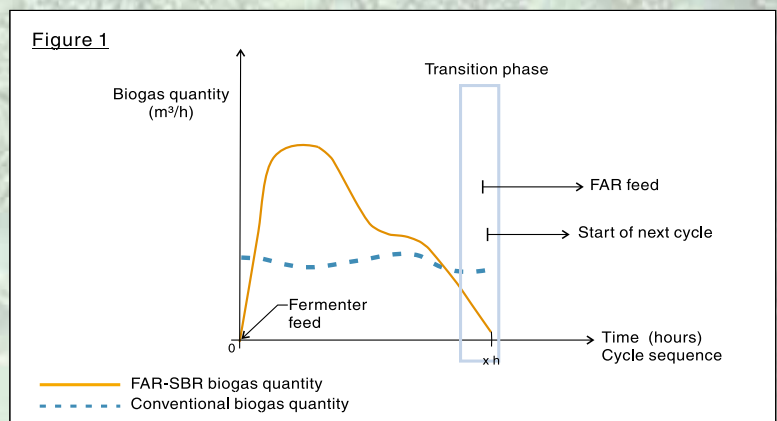
The cause of this is partly uncontrolled feeding rates, incomplete mixing coupled with bypass hydraulics, uncontrolled biomass losses in addition to throughput and displacement operation modes which are unfavourable in terms of process engineering.

The FAR-SBR process can be of considerable help in these cases. Regulated feeding into the fermenter takes place intermittently from the pre-storage and solids dosing areas. Immediately after feeding, the biogas quantity produced rises to a maximum before decreasing again uniformly after this (Figure 1).

Feeding of the digested sludge enrichment reactor (FAR) takes place during the transition phase, and the next feed (next cycle) to the fermenter only takes place after this.

Separation into an overlaying „thin“ fraction and a sedimented „highly-concentrated“ fraction takes place in the FAR during this cycle. Both of these fractions can be distributed either to the fermenter, the post-fermentation tank or the holding tank for digested organic matter.

The result is a biomass concentration in both the fermenter and the post-fermentation tank, which results in a more stable, higher and better-quality biogas yield (i.e. with higher methane content). In addition to this, the holding tank for digested organic matter is only fed the almost completely rotted substrate with very low residual concentrations. Odour emissions are therefore minimised.



As a comparison, Figure 2 shows the organic dry matter (DM) content of individual tanks. There are lower organic dry substance concentrations in the holding tank for digested organic matter due to the fact that biomasses have been displaced towards the fermenter and post-fermentation tank. This results in higher rotting rates due to the considerably increased biomass retention times.

The operating method can be further optimised to increase gas yields through the use of dynamic simulation. LimnoTec has excellent qualifications for this work, since we have advanced to become one of the leading service providers in the dynamic simulation sector in Germany over the last few years.

\*FAR = Faulschlamm-Anreicherungs-Reaktor means digest sludge enrichment reactor



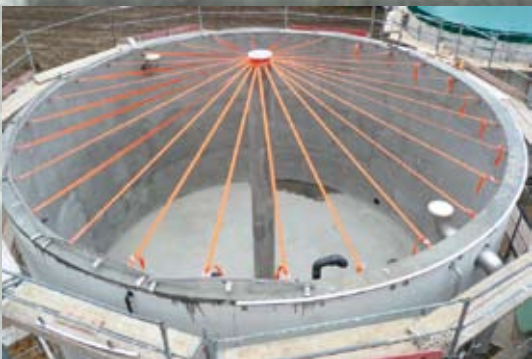
Solids infeed



Fermenter I + II with FAR I+II



Combined basins



Holding tank for digested organic matter with gas membrane



SBR biology

In a continuation of the original objective of cleaning vegetable process water, Gemüse-Meyer is setting new standards with the construction of a new treatment works and is integrating a complex energy and circulation management system taking both economical and ecological points of view into account.

At Gemüse-Meyer, a total of 60.000 t vegetables is currently being processed per year, mostly peel vegetables and potatoes. This continuous increase in production quantities is in close correlation with an annual increase in water consumption with simultaneous extremely high wastewater pollution levels due to organic peel residues (COD/BOD). This means that the decision to clean the organically-polluted process water and to return it to the works circulation on the one hand, and to use the organic transported loads for energy generation in the form of methane gas using anaerobic fermenting on the other hand, makes complete ecological and economical sense.

The new construction of this process water treatment plant is currently being realised with an investment volume of 4 million euros at Gemüse-Meyer in Twistringen. The plant concept, developed by LimnoTec, is based on a completely new combination of known and established process elements, such as

- mesophile and thermophile fermenting
- methane gas power generation by means of combined heat and power unit
- aerobic preliminary purification using SB reactors
- ultrafiltration
- reverse osmosis
- production of extra-pure water

and with a whole row of new process stages:

- FAR digested sludge enrichment
- MAK algae mass culture
- sludge washing

The most important decision criteria in the choice of plant concept were the minimisation of operating costs with simultaneous realisation of flexible plant operation (intermittent usage) and the reduction of the excess sludge proportion from the nutrient solution. In order to be able to completely use waste heat resulting from methane gas power generation, a further investment stage for the drying of the fermentation residue and manufacture of an organic fertiliser substrate is planned.

## Characteristic data

■ Vegetable processing	60.000 t/a
■ Process water consumption	100 m <sup>3</sup> /d
■ Vegetable waste	45 m <sup>3</sup> /d
■ Start of construction	March 2007
■ Completion of construction	November 2007

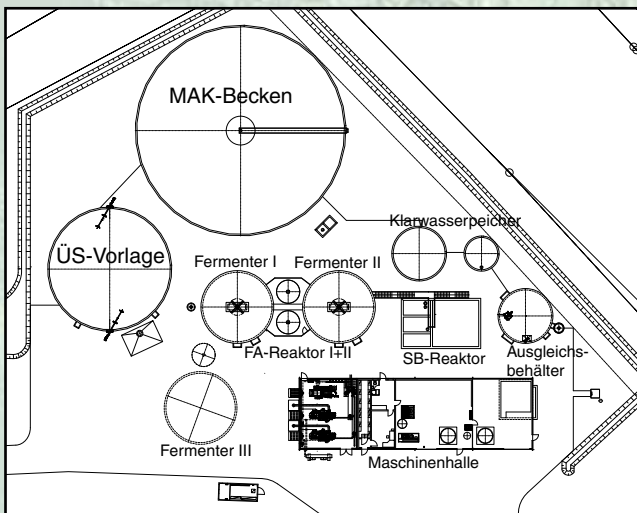


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General layout PBA Gemüse-Meyer

Please visit our homepage and find out more about us.

We would welcome any questions, and will gladly provide information.

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Der Umwelt zur Liebe

- ▶ Biogastechnik
- ▶ Verfahrenstechnik
- ▶ Optimierung von Biogasanlagen
- ▶ Schalungsbautechnik
- ▶ Dynamische Simulation

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