


Biological Wastewater Treatment

Calbe, Germany Wastewater Treatment Plant



The Calbe Wastewater Authority operates a wastewater treatment plant designed for the biological treatment of municipal waste water in combination with production effluents from a wheat starch factory. The combined treatment of the two waste water streams ensures smooth plant operation even under greatly fluctuating load conditions and compliance with the guaranteed effluent discharge criteria. The biological treatment system is complemented by a downstream filtration stage to achieve a further drastic reduction in the treated effluent phosphate and solids loads.

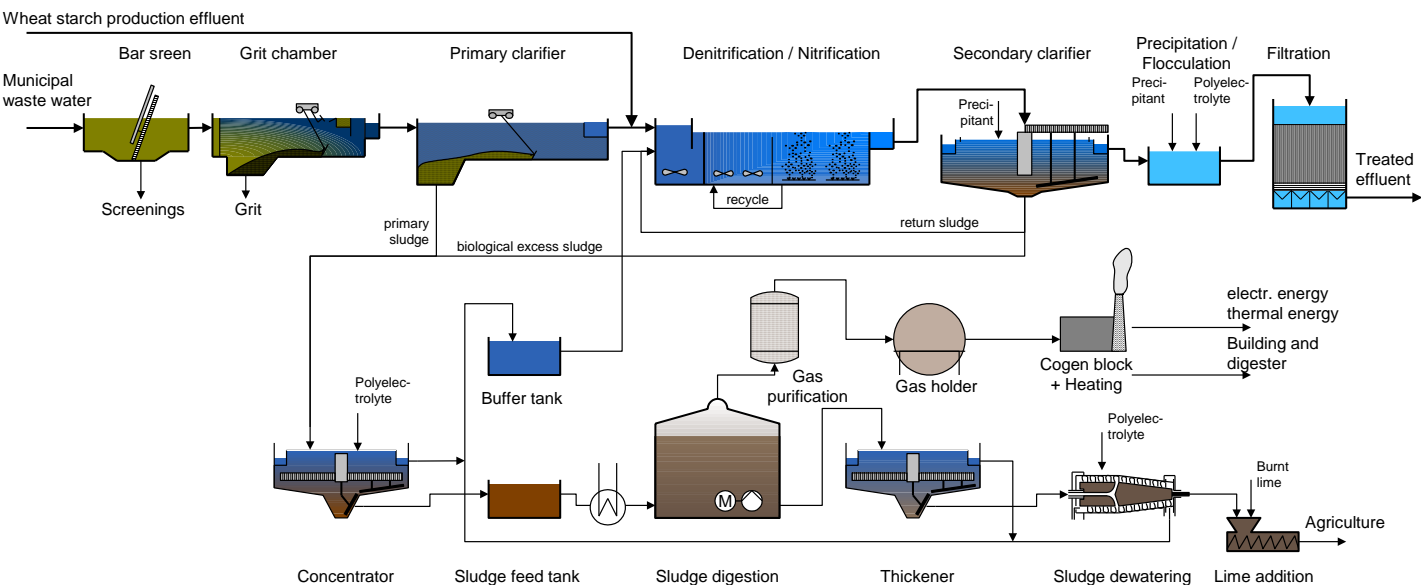


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The digester gas generated by the sludge digester is used to fuel a cogeneration unit. The energy thus recovered is sufficient to cover the plant's electricity and thermal energy demands.

1. Objective

Treatment of industrial and municipal waste water

- Design data

Throughput	16,500 m ³ /d
BOD ₅ load	7,200 kg/d
COD load	12,500 kg/d
Total N	775 kg/d
Total P	330 kg/d
- Treatment criteria

Treatment criteria	
BOD ₅	≤ 15 mg/l
COD	≤ 75 mg/l
Total N	≤ 18 mg/l
Total P	≤ 1 mg/l
pH	6.5 - 8.0

2. Plant concept

- Process steps

Mechanical pre-treatment, nitrification, denitrification, secondary clarification, precipitation/flocculation, filtration, sludge digestion, energy recovery from digester gas (cogen unit) sludge dewatering
- Brief description

The sewage is mechanically pre-treated before being mixed with industrial waste water in the aeration tank. The biological treatment unit comprises a nitrification stage with upstream denitrification step. Here, the biodegradable organic waste water constituents as well as the nitrogen and phosphorus load are biodegraded.

In the downstream secondary clarifiers, the activated sludge

formed is sedimented and drawn off by means of scrapers.

Biological treatment is followed by a flocculation filtration step to achieve a further reduction in the suspended solids and phosphorus loads.

The sludge from biotreatment, flocculation filtration and mechanical pretreatment is concentrated and further biodegraded in a downstream digester. The digested sludge is thickened in a centrifuge and subsequently conditioned with burned lime.

3. Characteristic plant data

- 2 primary clarifiers

Ø	20 m
Clarification area	314 m ² / tank
- 2 aeration tanks

Volume	6,560 m ³ /tank
Denitrification zone	1,560 m ³ each
Nitrification zone	5,000 m ³ each
Depth of water	6.5 m
Fine-bubble diffused aeration	
- 2 secondary clarifiers

Ø	32 m
Depth of water	3.6 m
Clarification area	800 m ² /tank
- 6 flocculation filters (open dual-media filters)

Filtration area	25 m ² /Filter
Ferric chloride dosing station	
- Sludge treatment

1 digester	2,840 m ³
1 thickener	300 m ³
Centrifuge	18 m ³ /h
CaO conditioning	

4. Operating experience

Despite the greatly fluctuating waste water flow and composition, it has been operating largely trouble-free ever since its startup.

All performance data guaranteed by Lurgi Bamag are consistently complied with irrespective of the load conditions.