

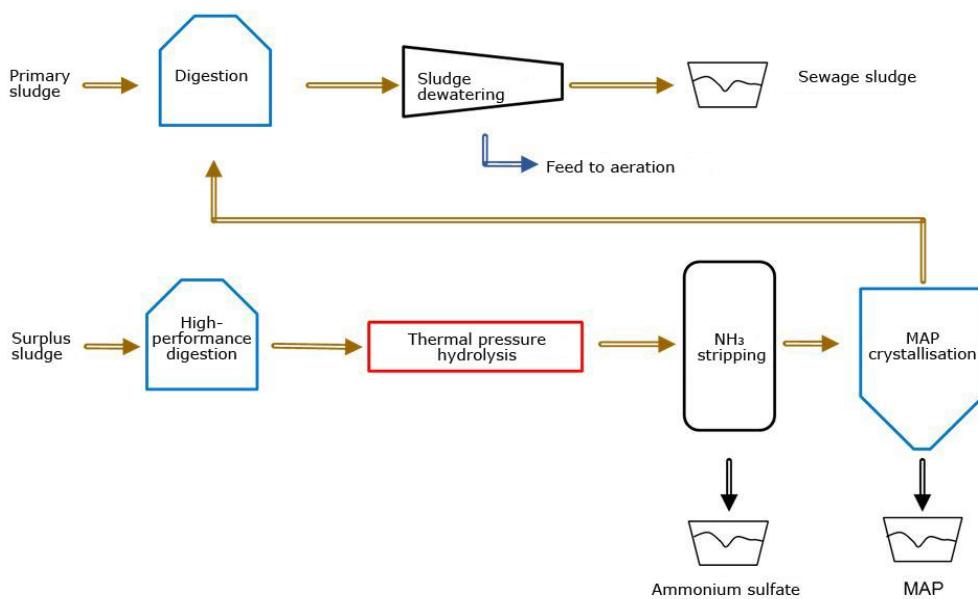
«Phosphorus Recovery» Project

In the spring of 2019 the Felsalbe sewage works in Pirmasens is due to start operating a phosphorus recovery unit. It is being built on the basis of a research project conducted by PFI and the Pirmasens Waste Water Disposal Operation. Construction is well underway.

The process originally developed in the research project entitled «Phosphorus Recovery from Sewage Sludge» has been continuously further optimised since conclusion of the project back in 2011. Alongside phosphorus recovery, the recovery of nitrogen as liquid fertiliser now also constitutes a key component of the new process, thus reducing the remaining nitrogen load of the plant. These measures should significantly reduce the energy consumption of the sewage plant.

The Process

Details of the process were described in 2017 in the [December issue of the Biotechnology Newsletter](#). It is based on the separate digestion of phosphorus-rich surplus sludge and low-phosphorus primary sludge. While the latter is digested in the existing digester, the surplus sludge passes through a new high-performance digester where it undergoes thermophilic digestion providing good levels of digestion even after a short residence time. The sludge is subsequently subjected to thermal pressure hydrolysis. This piece of apparatus was previously installed at the Blümeltal sewage works to increase the yield of digester gas but was subsequently moved to its new location, the Felsalbe sewage works, as a consequence of the sewage sludge centralisation programme. After digestion, the recovery of ammonium sulphate and magnesium ammonium phosphate (MAP), both of which can be used as fertiliser, proceeds in two separate steps. Together with the primary sludge, the surplus sludge treated in this way is used to produce more gas in the digester and the digested slurry dewatered to produce sewage sludge.



Schematic process diagram

In order to implement the process in the Felsalbe sewage works, the existing infrastructure is to be extended by several components. Thus high-performance digestion proceeds in a new elevated stainless steel vessel of 16.5-m overall height. Together with the new crystallisation reactor, this digester is placed in a specially built concrete basin located behind the machine hall, which can also serve as a containment basin in the case of an accident. Owing to the height of the new units, the basin is on the level of the basement of the adjacent hall. The other plant components (TPH, stripping, buffer container, and sludge dewatering) will be found there and in the upper storey of the machine hall.

Progress of Construction Work

Earthworks and the structural work on the concrete basin were recently completed. And contracts were signed in August for construction of the major new components, namely high-performance digestion and crystallisation. These are to be built at the sewage works by the end of 2018. Other tasks include implementation of TPH, installation of the stripping and the gas scrubbing units, as well as expansion and adaptation of the existing vessels and containers to future use. Then follows connection to the existing pipework and the central control engineering of the sewage works. PFI Bioraffinerietechnik GmbH is responsible for technical planning for project implementation and supervision of building work.



Concrete basin for the high-performance digester and MAP crystallisation unit behind the machine hall

Trial operation is scheduled for the spring of 2019. The individual components, starting with the high-performance digester, will come into operation one after the other and be integrated into the existing sewage treatment process. The circuitry and pipework are designed in such a way that all the components can be bridged and taken out of operation for maintenance work or changes in process management. Normal operation is scheduled to start in the course of 2019.

Total investment in the project amounts to € 1.6m. The City of Pirmasens is receiving funding to the extent of € 500,000 from the Rhineland-Palatinate Ministry of the Environment and the Federal German government is contributing € 430,000 via its Environmental Innovation Programme.



On completion of plant construction, the process will be operated in a one-year evaluation phase.

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