Sustainable Phosphorus Recovery from Sewage Sludge

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A SUSTAINABLE TECHNOLOGY IS REQUIRED

Phosphorus is a vital nutrient for plant and animal production, and the use of phosphorus for agricultural land application is crucial to achieve a high crop production. The amount of the global phosphorus reserve is very uncertain with estimates as short as 48 years [MST, 2013]. Thus, there is a need for securing this vital limited resource. Denmark is dependent on phosphorus import and recycling. A solution is to recover the already used phosphorus from sewage sludge from wastewater treatment plants (WWTPs). The application of sludge as fertilizer in agriculture is practiced at some places, however this usage is limited because of reasons like pollutants in the sludge and hygiene. Therefore, phosphorus recovery in a more pure form is preferable. Additionally, this solution leads to economic savings and environmental benefits because of the reduced usage of chemicals to achieve the stringent limits on phosphorus in the effluent from the WWTPs and reduced scaling problems.

A METHOD FOR PHOSPHORUS RECOVERY FROM SLUDGE

The idea is to develop a sustainable technology to recover phosphorus as struvite, also called MAP, from reject water from digester and dewatering from secondary sludge, see Figure 1.

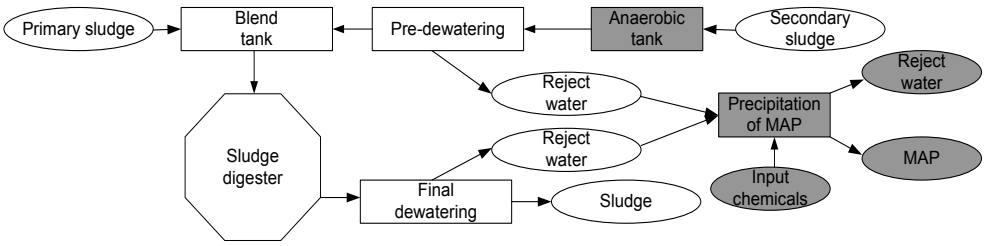

Figure 1: A part of a sludge treatment system in Denmark in a simplified version, adding the grey boxes, which represent the processes of the vision for a sustainable recovery of phosphorus.

In the anaerobic process, phosphorus is released as orthophosphate, and is removed with the water in the pre-dewatering treatment. The phosphorus content from the sludge may be recovered as struvite, which can be used directly for land application as a fertilizer with a good bioavailability, and only a small amount of pollutants included.
To develop this method, more knowledge is required regarding phosphorus's speciation in the sludge before and after the digester and conditions necessary to assist and enhance the struvite formation.
The timing for developing a sustainable solution for securing the limited resource is right and this technology will have a positive impact on the environment in several aspects.

REFERENCE

MST, 2013. *Livcyklusvurdering og samfundsøkonomisk analyse for anvendelse af spildevandsslam* – Miljøprojekt nr. 1459, Miljøministeriet Miljøstyrelsen (MST), Copenhagen