

## NEREUS Start Conference

Thursday the 31<sup>th</sup> of May 2018

CAPSO St. Omer (France)

### Minutes of the Nutrient Recovery session

Chairperson: Drew Brown Southern Water

Note taker: Emma McAteer HZ

Attendees: Sigrid Scherrenberg (SS), Emma McAteer, Drew Brown (DB), Monique Kartoidjojo-van der Werf (MK), Katie Moore, Seda Sucu, Boudewijn Meesschaert (BM), Rashmi Crouch (RC), Dries Parmentier (DP)

BM - Struvite story is end of story – no use for it in NW Europe, no commercial value

**What do we think of decentral treatment with recovery of nutrients – is it possible in urban areas and what projects have the most benefits?**

DB - Decentralisation offers challenges due to the lack of concentration of nutrients but Southern Water is early on in this process.

BM – experience with small installations at factory level – not so in favour of small companies and decentralisation. If we ever want to make a commercial product from the recovered P it must be of constant quality and if you are decentral you have instability in composition and quality. Could have contamination of Cadmium – toxic for plants. Working with veg companies, you are dependent on the type of veg of the season, all have different specific contamination levels etc. quality and quantity is varying throughout the year, a problem to make a constant struvite product. Also from a process technology perspective – decentral does not allow for continuous processes. Batch processes are harder to handle and do not allow for steady quality.

SS – there is an issue with multiple installations with varying qualities. All of these sites need maintenance and transport of chemicals to site. Does advantage of removing rainwater for example outweigh the disadvantages?

RC – agrees that there needs to be a constant stream for recovery and constant stream is more on a centralised site. There is more understanding required about decentral. Centralised has more benefits.

BM – what do we mean by decentralised? In veg and potato processing plant, most P coming into water at pasteurisation step / blanching. Do we talk about a side stream in decentral, for example the blanching step.

DB – what is the scale of decentral? DuCoop has a different scale than Southern Water

### **What legislation is needed to make reuse of nutrients possible?**

BM – is struvite accepted as a fertilizer in different countries? Until recently struvite was accepted as a soil addition but not as a P fertilizer. It is amazing that everyone is still trying to produce struvite but we cannot get rid of it. It can only be used in south of France in the vineyards. After removing P and struvite you can reduce the dry matter degree of the sludge by 1-2%, this reduces the incineration costs of sludge.

RC – legislation within EU should be the same all over.

MK – we as regional authority are not allowed to produce struvite. Our main task is treated water, surface water and dikes. Producing fertilizers is not a task. In NL all the regional water authorities have a company and then we have another company who are now making fertilizer in Dunkirk.

SS – the water boards incinerate the sludge centrally. There is a new incinerator built in Dunkirk and from the ashes they can recover the P. they say they can recover 99% of the P. struvite recovery is not as high as this so it is more efficient to do it from flight ash and you get the element P and not attached to Mg NH<sub>4</sub>. There are contracts with the waterboards – dry solids % should be within a certain boundary, there are huge contracts to make it feasible.

There is a lot of cost with this option – central vs decentral

BM – P recovery in 2 ways – if the concentration is high enough directly from the water or from the sludge but you need good bio enhanced P removal. P in sludge is not always P, it can be mixed. But not if you have a bio P plant.

RC – P consent is relatively new in the UK. What is the lowest P discharge consent?

SS – in NL the majority in bio P plants but can have additional dosage with Iron Chloride if it rains for example. Now there is a yearly average that levels out over the year. Lowest levels consent are: 0.15 in NL but can be 0.08 in UK according to RC.

### **Is a circular economy approach more appropriate – putting the recovered nutrients back into the system rather than selling to farmers?**

DP – at some plants they are recovering humic acids to see if they can reuse within the plant itself

SS – these are drinking water plants which use ground water to start with which has a high concentrations of humic acids, they take it out and sell it as a soil improver. Legislation is quite difficult

to meet so we are thinking of what can I produce on site and reuse on site instead of transporting etc. There is a problem with getting the enzyme needed to split the cellulose, there are few companies producing and selling the enzymes.

RC – categorizing waste – when leaving the site boundaries. If you can use it without it leaving the site boundary then it is not categorized as waste. Suppliers struggle to provide the amounts of materials for pilot scale – too small or too big.

### **Within the project developing DST; can we help identify specific criteria as inputs for this tool?**

Seda – as the number and scale of technologies is so large and the factors relating to each technology, we want to create a tool to help calculate the factors relating to the technologies and help the decision makers. Interested in what the raw influents are and what are the effluent requirements and can give info on what are the costs – transport, consumables etc. thinking about the constraints per technology.

Input – the monitoring format for the project is valuable for the decision support tool. The features can be defined and calculated per technology. Raw influent from the monitoring format are the basic info.

Need technological assumptions and info on how to calculate cost and analyse environmental impacts. Legislation restrictions should be added as a social factor in the tool. Some factors have economic, social and environmental impact – can vary per partner.

Seda will visit the partners and talk with them to get some qualitative information.

### **Are there any other suggestions about the project; attention points to be considered moving forward in the project?**

BM – be aware of an end use for struvite. 85-90% of P ends up in agriculture. Soils in the region are saturated with P and some parts end up in vegetables and ends up in the wastewater. By making a fertilizer this is a negative impact of circular economy because the soil does not need P. You need to find an alternative to mining instead of creating another fertilizer. Worldwide struvite is seen as the solution but this does not fit as a model for North West Europe. It can be of use in Africa and it dissolves slowly etc but it is no good for Flanders, France etc. the most interesting form of struvite as fertilizer is potassium struvite because you replace the ammonium with potassium. You have to remove the ammonium first otherwise it will bind to the struvite instead due to solubility.

DP – microplastics – find ways to remove, membranes not good enough in some case. Electro-coagulation could be a method to test for this. Dries from Noah Water Solutions – [d.parmentier@noahws.be](mailto:d.parmentier@noahws.be) > Dries is interested to try this out if there are any opportunities with anyone, let him know.

we are doing some cases on heavy metal removal – on municipal wastewater the concentration is just too low to remove them valuably. It is ppb and not ppm and you need ppm to remove it.

DB – heavy metals and micropollutants, if they can be recovered there could be potential value.

RC – I don't think there is a technology yet to remove such low concentrations of heavy metals. You can with ion exchange but the cost is a problem.

DB - The legislation is one of the key limitations and is driving the financial factor.