From: [redacted]
To: [redacted]
Subject: Bioresources bid assessment framework - draft guidance (comments on consultation)
Date: 06 January 2022 19:06:31
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Hello [redacted]
My comments refer to 4.2.4 Sludge Quality. Whilst sludge quality can appear an ambiguous term it is common to see contractual guarantees around sludge quality in new build/upgrade projects in water industry bioresource assets. These will often refer to the dry solids, volatile solids, COD (a measure of energy content) and nitrogen of the sludge; amongst others. These parameters will be monitored closely during the commissioning of 'new' assets, but longer term may not form part of a WaSCs analytical suite – the approach to data gathering varies greatly WaSC to WaSC, site to site.

It is also common in day to day operations for bioresources sites to have targets for and report how much renewable energy (measured in kWh) is produced from one tonne of dry solids – a metric used universally across our industry. And so a site will (should) understand the renewable energy (which is revenue) achievable from the overall sludge mix. But it is also possible to easily evaluate the potential energy (as methane, which can be converted into a kWh equivalence and then monetary value) that could be achieved from any sludge. Whether or not all of that energy is harvested as cash by the WaSC depends on digester conditions (OLR, HRT and others) and if the assets downstream (CHP, biomethane upgrade) are available to process the biogas. But, as I say the potential financial value of that sludge (referred to here as the renewable energy generation potential) is straightforward to assess. Well established tests are in place, in particular Biochemical Methane Potential testing. This test has a market cost of £350-£500, but yields a value of metres cubed of methane per amount of material. Some WaSCs will have the in house capability to measure this already, but many will outsource, often to us. This test has been widely employed across the waste sector too for exactly this purpose, to put a value on a waste material feedstock to AD. From this, the individual receiving the material (sludge in this case) can work out their base costs and calculate if/what gate fee they need to charge to receive the material; or indeed how much they could pay to take it into site and still make a profit.

In summary renewable energy generation potential can be directly measured by the BMP test and this in turn can be used to give a maximum financial value for that sludge. If this were adopted as the main measure of sludge quality it could be applied universally. Indeed it would be relatively straightforward (if costly initially) for a WaSC to rank all of its sludges in terms of renewable energy generation potential. It makes sense for a suite of other parameters to be measured on the same samples being analysed for BMP including total nitrogen, dry, volatile solids. These would enable the trader receiving the sludge to assess the impact on the process and costs (e.g. dewatering, polymer, return liquor treatment) of the traded sludge.

The whole area of BMP, gate fees, digester operation and sludge quality is something that I have published widely on and worked across the water and waste sectors. Selected relevant publications below, which I'm happy to discuss or provide, as needed.

Best wishes,
[redacted]

1. Burgess, A. and Smyth, M. (2016). Biochemical Methane Potential (BMP) Testing of organic wastes. *21st European Biosolids and Organic Resources Conference*, November. Aqua Enviro, Wakefield.

2. Smyth, M., Kabir, M. & Inman, D. (2018). BioWin Modelling to develop strategies to maximise energy generation from seven of Anglian Water's Sludge Treatment Centres. *23rd European Biosolids and Organic Resources Conference*, November. Aqua Enviro, Wakefield.

3. Smyth, M., Minall, R., Stead, T. and Walker, J. (2016). Optimising the energy yield from anaerobic digestion through calorific value analysis: Case studies from Davyhulme and Seafield. *21st European Biosolids and Organic Resources Conference*, November. Aqua Enviro, Wakefield.

4. Burgess, A., Smyth, M., Forgacs, G., Elliott, C. (2017). Waste & Wastewater Characteristics to Minimise OPEX and Maximise Energy Generation. *22nd European Biosolids and Organic Resources Conference*, November. Aqua Enviro, Wakefield.

5. Smyth, M., and Horan, N. (2014). Realising the biochemical potential of feed stocks in the circular economy. In ed. Horan, NJ, *19th European Biosolids and Organic Resources Conference*, November. Aqua Enviro, Wakefield.

6. Horan, N.J. & Smyth, M. (2012). Enhancing energy production, throughput and revenue through analysis and control of volatile fatty acids. *Water & Wastewater Treatment*. February, volume 55, issue 2, 18-19.

7. Horan, N.J., Smyth, M. & Sutherland, J. (2011). Determining Energy Yield from Various Co-digestable wastes. *UKWIR.* ISBN: 1 84057 601 4.

8. Bungay, S, Smyth, M & Tompkins, D (2021). Emissions from digestate – quantification & mitigation. *26th European Biosolids and Bioresource Conference*, November. Aqua Enviro, Wakefield.

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