Where is the end of waste?

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Resource Recovery from Waste hosted a specialist session on "End-of-Waste" at the European Biosolids and Organic Resources conference organised by Aqua Enviro in November 2017. Achieving End-of-Waste (EoW) is important now that the Resource Recovery from Waste projects start to work towards commercialisation of new technologies and applications that can recover resources from, for example, industrial landfills, bioenergy residues and wastewater. Research and subsequent commercialisation efforts are riddled with regulatory challenges of which the EoW process is an important part. With this session we aimed to clarify how we can best achieve EoW in practice, especially with the Environment Agency's Definition of Waste panel being closed for new applications for a considerable time. What lessons can we learn from the regulator and companies active in this space?

In the specialist session, Clive Humphreys from the Environment Agency explained the basic requirements for achieving EoW:

1. Distinct product that is different from original waste.
2. Clear and demonstrable market, which may need to be developed as part of achieving EoW.
3. Product can be used in same way as non-waste alternative, usually this is assessed through comparison with an appropriate 'virgin' material.
4. Product can be stored and used with no worse environmental effects than the material it replaces.

To achieve the EoW status, companies need to be able to demonstrate that all four criteria are met. A range of guidance and tools are available from the gov.uk website to help with this. One tool allows users to compare the characteristics of their material with pre-tested 'virgin' materials intended for use in a small number of defined markets (such as construction, animal bedding, soil improvers and fuels). The *'Is it waste?'* tool helps users determine whether their material is waste, and/or whether it could achieve EoW status. The output from this tool could previously have been submitted to the Environment Agency's Definition of Waste panel, who would provide their opinion on the status of the material. This panel is currently closed to new applications, but after consultation is expected to reopen in April 2018 albeit with a proposed service-charge for applicants. There is no formal requirement to obtain a view from the regulator – companies are free to self-certify if they think they have evidence that meets the EoW criteria. This is normally perceived as a risky approach, since it leaves businesses more open to future challenge from the regulators.

The EoW test criteria are open for interpretation, which provides on the one hand a welcome flexibility in a regulatory system sometimes perceived as rigid; but it also adds to the complexity of the assessment process. Two points were highlighted at the specialist session.

First, there is a degree of subjectivity in the assessment of a product being "distinctly" different from the waste it is derived from. Through discussion at the event it became clear that simple physical sorting of wastes was rarely sufficient, and that a chemical or biological conversion was important. However, what is considered a sufficient transformation remained vague and a clarification in the EoW guidance would be useful.

Second, the requirement to compare the recovered material with a virgin equivalent can represent a major barrier. For example, compost oversize used for energy recovery (in non-WID biomass

facilities) would need to be compared to virgin wood, making it nearly impossible to achieve EoW for this material. With commercially viable solutions few and far between, compost oversize is stockpiled with detrimental consequences for people and the environment while embodying an economic liability for compost operators. Given that this test really is about the risk associated with using a recovered material in a certain way, Ian Martin from the Environment Agency suggested that an alternative approach would be to perform a more traditional (absolute) risk assessment for the recovered material to demonstrate that it would not pose an unacceptable risk to human health and the environment under a range of foreseeable use scenarios in the intended market. This approach can only be taken in the rare absence of a suitable and practical comparator, and is more complicated and data-hungry than the comparator-test and hence the latter is commonly used.

Michael Daly from Ostara shared a positive experience with the EoW application for their struvite product manufactured during wastewater treatment and marketed as a phosphate fertiliser. The EoW process was uncharacteristically fast, taking 7-8 months from draft application to achieving EoW status for struvite produced by the Ostara PEARL process under specific conditions set out by the Environment Agency. In this period a total of three drafts went to the Definition of Waste panel for comments. The application itself was only 8-9 pages, yet there were extensive appendices with supporting information. It was believed that the key to this quick and positive application process was the inclusion of the following information:

- Data from a similar product and application in the US, as well as suitable market data from Europe and the US. The Definition of Waste panel indicated which data were needed.
- The product was of consistent quality over time, as proven with data from an independent laboratory. Determination of quality included nutrient delivery, potentially toxic element concentrations (PTE) and pathogens.
- The PTE levels were within the regulatory limits as determined by modelling two different and realistic (one high and one low) application rates.
- A scientific study comparing their struvite to other struvites and phosphate fertilisers.
- Market analysis to demonstrate demand i.e. providing evidence that struvite would not simply be stock-piled.
- List of benefits compared to the standard reference product.

The provision of transparent and robust data is key to achieving EoW. Generating such data in the UK can require a trial regulatory position and the application procedure can be fuzzy and time-consuming, requiring deliberation with the regulator and specialist advice. Sometimes it is easier to run a trial abroad and consequently this may mean that companies in the UK are unlikely to grasp early-entrant benefits. Data on inputs, treatment processes, and outputs are required. This is a challenge with some materials (such as treated sewage sludge) as there is no simple way to ensure the required consistency in the input material. However, there is a great deal of interest in regulation of this area, as Ofwat encourages the development of a 'bioresources' market in which sewage sludge can (theoretically) be traded and used as a feedstock in a range of third party AD facilities. This poses new challenges, as it is not clear yet what happens with all substances in the sludge during the digestion process and when applying the digestate to land; consequently impacting on the regulator's position regarding EoW for this supply chain.

Whilst the UK has established its own approach to EoW, and has standard (quality) protocols for a number of recovered products, these forthcoming changes to the EU fertiliser regulations will potentially impact on the market for fertilisers from organic wastes. Kristy Blakeborough-Wesson from Secanim explained how proposed changes would see organic (waste-) based materials enter the EU market. As a minimum, fertilisers traded to the EU will need to adhere to the new

regulations, which could provide an alternative approach to demonstrating EoW where materials are intended for supply as fertilisers. However, partial harmonisation with EU fertiliser regulations could protect the UK market where higher standards are already in place; and further EoW mechanisms could be developed outside the EU. The updated EU regulations are expected to be implemented in 2020 and there are still opportunities to influence the proposals via REA, ADBA, Defra and EA.

While we realise that circular economy is not a synonym for 'the end of waste', using wastes as resources is a necessary part of the circular economy, provided they can be used without harm. We also need to be wary of the negative impacts of creating impenetrable hurdles for achieving EoW. A rational, balanced approach is needed that takes into account the economic, technical, social and environmental values associated with the various options available for the downstream processing of wastes; in conjunction with a continued striving for waste prevention and sustainable natural resource use.