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EBNet Placement Support
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Anaerobic Digestion Plant Optimisation

– online training workshop by ADBA May 2021

A great, timely and flexible award that supports the needs of the researcher
- Dr Sanjay Nagarajan, Queen's University Belfast

Anaerobic digestion (AD) plant optimisation training was organised by the UK Anaerobic Digestion and Bioresources Association (ADBA). The training was delivered by Dr Angela Cronjé, a technical consultant with ROOTS recycling and organics Ltd who has >15 years' experience in the AD industry. Due to the ongoing COVID restrictions the course was delivered online.

The course was split into different sections, starting with an overview of optimisation of AD. The focus was predominantly on food waste AD but some pointers to agri-residue AD were given. Three major factors, namely monitoring process data, analysing data and trends and making changes to optimise performance were highlighted.

In light of this, the next section was focussed on introducing the microbiology and typical biological reactions within the digester. Specific attention was given to the acetogenesis and methanogenesis stages. Then as a first indicator to optimising AD, the signs of a healthy digester were discussed. Primarily, the need for a balanced microbial consortium for stable operation was established.

During an intermediate open discussion, the advantages and disadvantages of using a seed inoculum from an existing active digester vs cow slurry was also pointed out. The digester start-up was meant to have a fragile consortium, but upon stepping up the feedstock loading gradually, the optimal balanced consortia could be established. The ability of the mature consortium to either go into a recoverable or an unrecoverable phase due to change in operating parameters, mainly feedstock type and loading were pointed out.

The process metrics section was then introduced. Key metrics for benchmarking the AD system were discussed. The data collection and analysis aspects to detect trends and abnormalities were reviewed. Typical inhibitory concentrations of O_2 , H_2S , VFA, NH_4^+ , heavy metals and other compounds and their effects on AD were mentioned. Other metrics suggested for monitoring were biogas quality, temperature, pH, FOS/TAC, salt concentration, nutrient demand and trace elements. Organic loading rate was also proposed to be a key factor detrimental to the health of the digester.

Troubleshooting was discussed next, where real life examples of a failing digester and measures to recover and restore performance was presented. Examples of crust/scum formation on the digester surface and measures to overcome these to boost biogas yields were shown. An extensive discussion happened around this area where operators of various AD plants had questions along these lines. Finally, the process design section summarised the whole course to reiterate that optimisation of the process should happen from the beginning. Feedback forms were collected after the course and an open floor discussion also happened to exchange ideas, problems and relevant solutions to improve AD performance.

