

## Embedding technical expertise in the optimisation of trace metal supplementation strategies for successful biomethane production

*"The work has been an eye-opener for the company in terms of the potential for optimisation of the plant, and a huge benefit in terms of skills transfer to our staff" Michael Mason, Tropical Power Ltd*



Yue Zhang, University of Southampton and Michael Mason, Tropical Power Ltd

**RESULTS:** The project developed methods that are helping a UK company, which has built and is currently operating Africa's first grid-connected anaerobic digester, to determine more precisely the trace element requirements for optimum digestion of their novel agricultural waste feedstocks. We developed a method suitable for use in Africa that uses simple multi-purpose apparatus to test which trace elements are actually required. The methodology was made available to the industrial partner in the form of a training video and a detailed description of the procedures. In addition we helped our partner company interpret historical data from the digestion plant and provided them with a simple spreadsheet-based calculator to allow them to maintain steady state concentrations of essential elements in the digester in proportion to the feed added. The work also added tantalisingly to growing evidence that minor trace elements such as tungsten may play a critical role in the function of these microbial systems.



Tropical Power's grid-connected anaerobic digester in Kenya

**INITIAL AIMS:** Transformation of waste biomass into bioenergy is a key component in 21st century industrial biotechnology. It is increasingly clear that successful biomethanisation of mixed biomass requires complex enzyme systems that are produced by both natural and engineered synthetic microbial communities. Trace quantities of metals, which are required by certain essential metallo-enzymes, are needed to ensure that these microbial systems function in the most effective and productive way. There is a growing commercial market in trace metal supplements, but formulations of these are often generic rather than based on specific requirements. The current project will transfer knowledge and expertise in determining trace metal requirements to a UK company that uses novel waste feedstocks in Africa for renewable biomethane production. This will enable the company to formulate specific trace metal mixtures for optimum plant performance, and the scientific knowledge gained will contribute to the creation of future markets for UK suppliers of tailored supplements.

- Collaboration broadened into new scientific areas help meet bioenergy needs of lower income countries
- Academic and industrial collaborators partnering on stage 1 GCRF application