

Modelling Bioresources for Industrial Sustainability

Presenter: Dr Aanand Davé, Technical Lead, Decision Lab

Becoming resource efficient with waste water processing represents the first step in a much-needed 'frugal manufacturing revolution'. Configuring a logistics network to transform waste water into usable bi-products including energy means that Water Utilities are not only economically efficient but are also making a net-positive contribution to wider industrial sustainability goals.

Achieving resource efficiency across the water sector will require new approaches, novel modelling and systems thinking that optimises as much of the existing infrastructure as possible. In the UK alone, the waste water sector is valued at £8.7 billion and employs 42,000 people and over 16 billion of waste water and sewage are treated everyday with the vast majority of the cleaned water being returned to the environment.

The standard process currently employed in the UK is unsustainable from an economic perspective. Infrastructure is old and approaching end of life, and the network design has grown organically rather than being planned. In addition, the privatisation of the UK water and waste water sectors in the late 1990s means that there is little cooperation and collaboration between neighbouring water companies and little appetite for viewing the problem at a regional scale. New challenges are currently being faced by Water Companies as the waste water processing market is being de-regulated with water companies now actively competing for the processing of each other's waste. This is all happening at a time of increasing environmental legislation and a need to prove sustainability to the regulator.

Under these circumstances, water companies face many challenges for how to operate their network. Optimising their logistics could be a route to competitive advantage in the new deregulated market, and the key is understanding the sustainability of the operation and ensuring that there is a return on logistics costs and energy return on investment is positive. To support one of the water companies decisionLab undertook a data-hack focused on rapid prototyping of a Simulation model focused on optimising bio-resources logistics, where we modelled the bio-resource allocation to different types of facilities, from waste water treatment sites to digestion sites, in order to minimise costs and test different scenarios.

The outcomes of the event included a proof of concept model which could already be used to support network planning. The hack event itself created a high level of excitement concerning this problem and good stakeholder engagement across the business. It proved how simulation can be used as a design tool at the beginning of a problem to influence the sustainability of the final network solution's triple bottom line (social, economic and environmental).