Case Study

Wastewater Asset Optimisation

Dŵr Cymru Welsh Water

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SUMMARY

Challenge

Reduce energy consumption, reduce eCO_2

Solution

Multivariable control of FBDA ASP, blowers

Results

Efficiency improvement, energy saving

Welsh Water has set ambitious targets for lowering greenhouse gas emissions across their entire operation. To help meet these goals, they are implementing measures that reduce electrical energy consumption at key wastewater treatment sites.

The Activated Sludge Plant is a very effective process for the removal of biodegradable nutrients from wastewater streams, but typically requires high levels of energy to supply oxygen to the biomass.

It can be difficult for operators to optimise these process units, due to the highly variable incoming load and the complex interactions within the plant.

PERCEPTIVE SOLUTION

Building on similar projects undertaken for Northumbrian Water, Yorkshire Water and United Utilities, Perceptive Engineering was commissioned by DCWW to conduct a detailed assessment of process performance at a site in South Wales and uncover opportunities for improvement.

The **Perceptive Audit** suggested there was a significant potential for energy saving; a 17% reduction in aeration energy was identified, achievable without compromising the quality of final treated water.

Welsh Water's engineers installed ammonia probes on the inlet and outlet of the ASP (one probe at each point). Perceptive Engineering developed a data-driven, model predictive control scheme, which was commissioned in 2012 and has been in constant use ever since.

RESULTS

Once commissioning was complete on this **Fine Bubble Diffused Aeration** plant (FBDA), electrical blower energy was reduced by more than **25%**. Ammonia control is more robust than before WaterMV was implemented and the risk of compliance failure has been reduced through improved control.

Aeration manifold pressure is more tightly controlled as an integral part of the WaterMV scheme. The result has been a dramatic reduction in the number of blower trips and the cost of maintenance call-outs.

The site has seasonal consent limits; the next phase of the project is to adjust ammonia targets closer to the higher winter-time values, yielding further energy savings. Once proven, seasonal selection will be made automatically by the new control scheme.

Finally, the site uses electricity that is supplied with highly varying seasonal and daily tariffs. A refinement to the control scheme has been added, which automatically minimises consumption during periods of peak cost. The system is configured to **balance energy costs with compliance**.

Operator intervention is negligible and the cost of treatment is minimised at all times.

"We want to explore how we can best control the process during TRIAD periods, when minimum energy consumption is the target. The Perceptive system will help us to do this while staying within compliance limits. We are also going to investigate if we can automatically capture additional energy savings during high tariff periods."

Adam Fairman, Energy Manager DCWW