Water company halves the energy needed for UV application

United Utilities reduces energy use thanks to analytical sensor

United Utilities is one of the UK's largest water and wastewater companies, supplying seven million people in the North West of England with their drinking water. The company's region covers three million homes and 200,000 businesses in Cumbria, Lancashire, Greater Manchester, Merseyside, and parts of Cheshire and Derbyshire. Every day, United Utilities employees deliver 2,000 million litres of clean water to customers' taps and take the used water away through a 72,000 km network of sewers, before cleaning it and returning it to the environment.

"The cost-saving has been the biggest benefit but the fact I haven't had to touch [the sensors] is a bonus!"
Gavin Sisson
ICA Engineer

Gavin Sisson

Lake Windermere

The challenge United Utilities' Windermere Wastewater Treatment Works is situated on the east shore of one of the Lake District National Park's most famous attractions. Lake Windermere is the largest natural lake in England and has been a popular tourist destination since the nineteenth century. In order to protect this beauty spot and others like it, the Environment Agency enforces strict regulations on the concentration of organic and other chemical substances that can be released into the water. United Utilities staff at Windermere use banks of UV lamps to disinfect the final effluent from the treatment works before it is returned to the environment. As this is an energy-intensive and expensive process, they were looking for ways to reduce energy consumption and costs while improving effluent control.

The solution Endress+Hauser's Viomax CAS51D UV sensor measures absorbance, at a wavelength of 254 nm, and can be used to give an indication of the concentration of organic substances in wastewater, and the subsequent power required to be produced by the UV lamps to ensure complete disinfection. The sensor is used in conjunction with a two-channel Liquiline CM442 transmitter, which is configured to display a transmittance measurement as a percentage. The closer the reading is to 100%, the lower the absorbance measured and therefore the lower the concentration of organics present. Continuously monitoring the transmittance value enables real-time and accurate control of the number of UV lamp banks required to keep the organic levels below the consent limit. In this application, the sensors are used in dual validation and the results between the two devices are compared for increased reliability. This reassures the staff at Windermere that they're not at risk of breaching regulatory limits. The sensors also have an automatic air clean feature, which helps to extend service intervals.

The benefits Having a clearer picture of the concentration levels of organics in the water has led to better control over the usage of UV lamps, prompting

huge energy and cost savings. “One of the biggest costs on site is UV,” explains UU’s Instrumentation, Control and Automation Engineer Gavin Sisson. “Before we used to have two or three banks of UV lamps running continuously but now we generally have just one.” Analysis of the energy usage in June 2016 compared to the same period a year earlier before the sensors were installed shows that the lamps now consume as little as a quarter of the power previously used per day, and on average less than half, depending on the weather and other variables.
The sensors have also brought improvements in plant operation, because they’re so easy to install and maintain. “They don’t drift,” confirms Gavin Sisson. “We had to calibrate the old sensors every couple of months but all these ones need is a quick clean once a week, which is a five-minute task. Across the company, the cost-saving has been the biggest benefit but for me the fact I haven’t had to touch them is a bonus!”

Due to the success at Windermere, the sensors have now been installed at United Utilities sites across Cumbria and it’s hoped the rollout will be extended to Lancashire in the future. As Gavin Sisson explains, “They’re easy to put in. I installed one on my own and it was only a morning’s work – half a day and it’s done. We’re happy with them so there will be more orders.”

Viomax CAS51D UV sensor

Housing for the UV lamps

UV lamps

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