# The UV Disinfection System Transforming Water Treatment

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With the objectives of safeguarding and future-proofing water treatment top priorities for plant operators, it's time to think outside the box to make change. James Leigh, Business Development Manager, Evoqua Water Technologies, outlines how plants can improve water quality through innovative UV disinfection systems[1] and design approach to existing plants, while protecting budgets and realising sustainability goals.

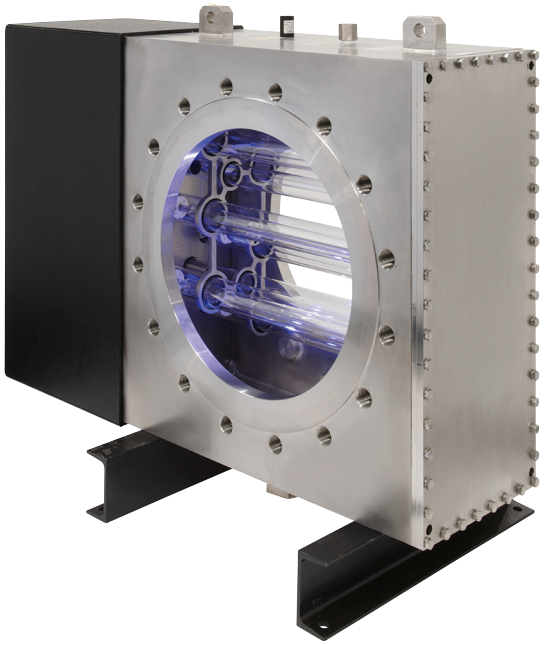
Today, not only do water treatment plants have to meet strict water quality targets, but many also face projected population increases. This means increasing treatment capacity to handle large flows. However, we know for a number of sites this isn't straightforward. Budget and footprint constraints often limit the treatment technology options available.

## TIME TO INNOVATE

Therefore, it's key to evolve our thinking about water treatment and continue to innovate. Let's consider UV (ultraviolet) disinfection technology, as an example. UV disinfection works by damaging the DNA of bacteria and preventing reproduction. It successfully protects against harmful pathogens such as cryptosporidium, as well as the removal of organic and inorganic contaminants, including chlorine, ozone and total organic carbon (TOC).

UV has been delivering improved water quality for plants for decades, but the technology has been out of reach or limited for some plants due to space constraints or hydraulic limitations. This can put these plants at a disadvantage, as UV is a highly effective

[1] Evoqua UV disinfection generator systems undergo third-party validation testing in accordance with the UVDGM (USEPA, 2006). Validated products are tested to confirm a minimum inactivation equivalent of 3 log (99.9%) for microorganisms in accordance with NSF/ANSI 50 and the UVDGM. Performance is not claimed nor implied for any product not yet validated; unvalidated products use single point summation calculations to provide delivered dose recommendations. Performance limitations depend on feed conditions, overall installed system design, and operation and maintenance processes; please refer to Operations Manuals. For more information: contactus@evoqua.com.



chemical-free disinfection process that plants can reap a wide range of benefits from as a multi-barrier approach to disinfection.

## THE ROLE OF NEW TECHNOLOGY

The answer? An industry-first individual post-filter solution (IFO). Traditionally, UV is installed in a duty standby system, on the combined filter outlet of the disinfection process. To save space, a UV—such as our unique Wafer® UV system—is installed on each individual filter outlet before the combined filter channel.

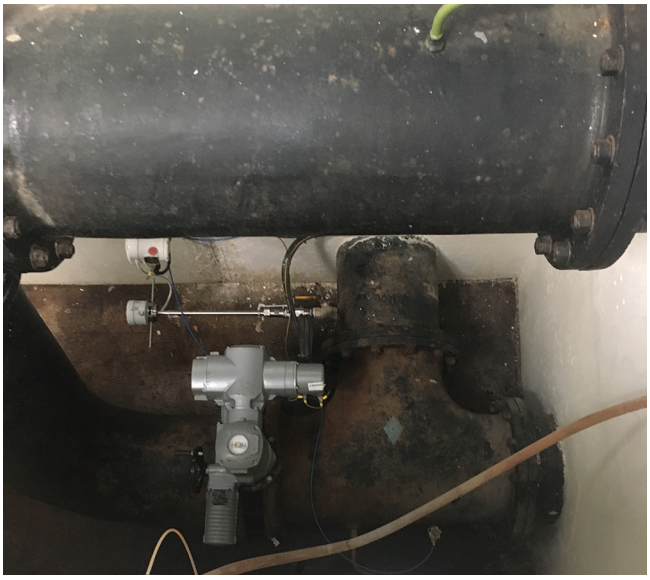
The Wafer system has been engineered to around a third of the size of comparative UV systems and its hydraulically optimised reactor design, which can avoid the need for high energy consumption pumps, and leading polychromatic lamp technology make it one of the most efficient and best performing. Importantly, with the individual post-filter UV approach downtime is avoided. When installing a UV system on each individual filter outlet, there is no interruption to site output and water supply during installation, commissioning, and operation. This makes planning a UV installation simpler and minimises risk of plant outages.

## DEMANDING MORE

Delivering required water quality is critical but any technology solution must deliver more to support a site's budget, operational and sustainability aims. The IFO solution significantly reduces capital project costs as it can be retrofitted versus requiring a new build. On an ongoing basis, the IFO is simple to install, operate and maintain and has low energy consumption due to its lack of pumping requirements, all of which saves time and cost. In fact, these smaller UV systems can save between 40-50% of the costs of a traditional system, when you consider capital and whole life costs.

With sustainability targets to meet, the individual post-filter solution delivers several environmental benefits for operators. As there is no requirement for extending the footprint of a site this saves in terms of carbon footprint and the emissions associated with building work. Secondly, due to optimising the head loss with the Wafer system at the point of installation, this often mitigates the need for further pumping stations, which can reduce operational power consumption and costs by more than 20%.

A key benefit which operators shouldn't overlook the importance of, is increasing site resilience. By utilising a UV at each filter, each filter works in tandem with UV, so sites don't have to shut down the full filter system of a treatment works to service or maintain the UV systems. And this approach adds resiliency by using a multi technology approach to disinfection as UV can be combined with on-site chemical generation systems or ozone technology, for example.



Mosswood filter before Wafer UV system installation

Mosswood filter after Wafer UV system installation

In addition, Evoqua customer data has shown that this approach to UV is able, based on bespoke validation, to provide a higher log reduction than originally needed, allowing sites to provide a higher log reduction or increase flow at current log reduction. This supports the futureproofing of a plant's water supply.

## SYSTEM SUCCESS FOR NORTHUMBRIAN WATER

Northumbrian Water is already benefiting from the individual post-filter solution which it sought to improve reliability and resilience at its Mosswood works in County Durham.

Naturally, the outlet of the plant's twelve rapid gravity filters was quite congested. Evoqua solved the challenge with the plan to install its Wafer® UV system into the outlet of each of the twelve rapid gravity filters within the filter gallery. Each with its own independent monitoring of UVI intensity and UVT, this arrangement gives much more resilience than the more usual duty/assist/standby configuration.

Market research conducted by Northumbrian Water identified that the Wafer system was the only product on the market able to meet the project requirements from an installation and operations perspective. In addition, the Wafer system boasts a superior head loss which is critical for the individual post-filter approach. Importantly, installing the UV systems in the existing filter gallery meant that there would be no need to break ground and build a new disinfection building.

Northumbrian Water trialled the system at one of the filter outlets. The trial was so successful that it is now making significant investments to install similar units on its other filters.

## KEEP THINKING SMALL

To find the best solution to any problem, taking a step back and adjusting the thinking is key. We've seen just how vital this is for water treatment with the development of our UV individual post-filter solution. Not only does the Wafer UV system open up UV treatment to those who traditionally faced restrictions with the technology, but it offers plants a wide range of additional cost, efficiency and sustainability benefits that are crucial for safeguarding and futureproofing a plant. It's certainly time to think small and embrace innovation.

You can find more information on Evoqua and the Wafer UV system at evoqua.com.

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