District Heating and Cooling Networks

ADVANCED WATER TECHNOLOGY

UNIVERSITY OF EDINBURGH

University of Edinburgh enhances energy efficiency with EnwaMatic Water Treatment Technology

The University of Edinburgh, one of the world's leading academic and research institutions, is investing in long-term energy efficiency and sustainability with support from water treatment specialist Enwa.
The University has eight operational EnwaMatic Side Stream Filtration units across it's Estate, each tailored to match the unique requirements of large district heating networks, district cooling and smaller stand-alone buildings. These units are treating 842,000 litres of closed loop system water.

George Square DHN - EnwaMatic Bespoke EM BS 300 HP

Engineering challenges across an historic Estate

The University of Edinburgh is the UK's fourth largest university, with 50,000 students enrolled across five campuses in the city. It is not only a teaching centre but also houses research laboratories and extensive libraries as well as collections of art, anatomy, and manuscripts.
With over 500 buildings under its care, the University's Estates Engineering team faces significant challenges in maintaining critical indoor environments and achieving energy efficiency across its infrastructure. These challenges are compounded by the diverse age and structure of buildings across the estate.

The University operates five main energy centres: Easterbush, King's Building, Holyrood North and South, and George Square. These centres include combined heat and power (CHP) units to provide heating and hot water through the University's district heat network, as well as electrical power.

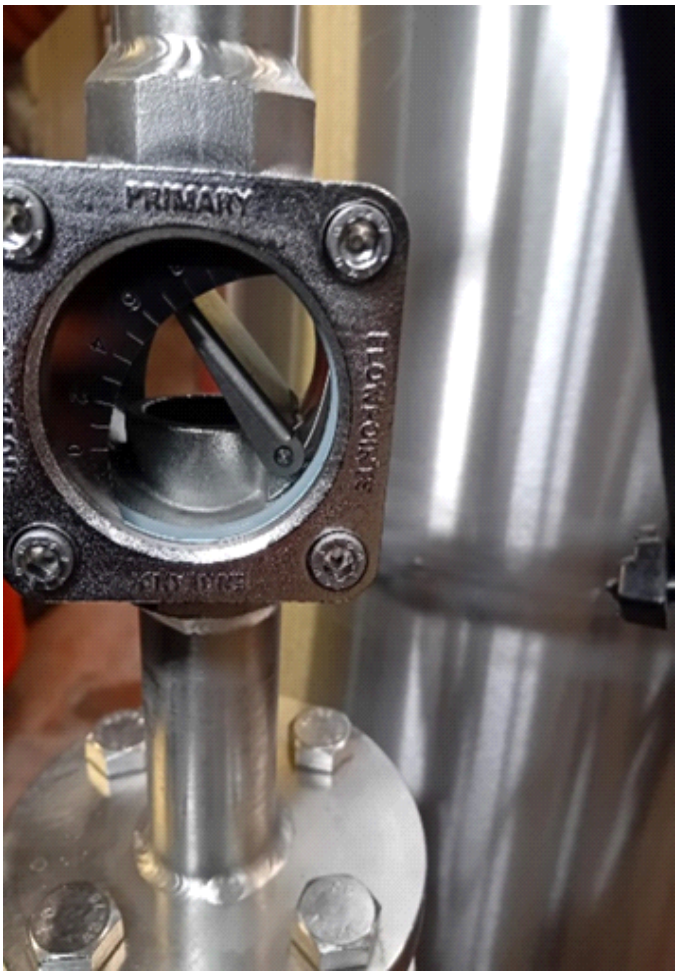
Reliable and efficient water treatment is a critical element of these systems, as it protects equipment, efficiency and system integrity.

Transition to non-chemical water treatment

When considering what type of approach to take to ensure water quality, the University weighed several factors. Water quality has a significant impact on the performance of CHP systems and district heating, so it was an important decision which led them to select Enwa's EnwaMatic side stream filtration and water treatment system. Kevin Cameron, Building Services Engineer at the University of Edinburgh, highlights how this approach protects and supports the University's district heat network:

> *"Adding ENWA side stream filters to our district heating systems helps keep the water clean by removing suspended particles such as rust, magnetite, and other debris. The filters run on a small by-pass flow, so the main system flow is not interrupted. Cleaner water has reduced blockages and fouling in heat exchangers and pipework, which has improved heat transfer and keeps pumping energy lower."*

There are other benefits from the Enwa approach. The risk of pipe bursts from poor water quality is a key concern in such a large estate. Despite using plastic-coated steel pipework, contaminants and poor water quality can create weaknesses, particularly in pressurised systems operating at 3.5 bar and temperatures between 75°C and 80°C. Chemical water treatment can introduce additional complications. Leaks not only damage infrastructure but can also release treatment chemicals, complicate clean-up and increase costs. The University therefore specified Enwa's non-chemical side stream filtration method, which uses physical filtration and calcite/dolomite pH adjustment without the need for conventional chemical inhibitors.



PN16 visual flow indicator

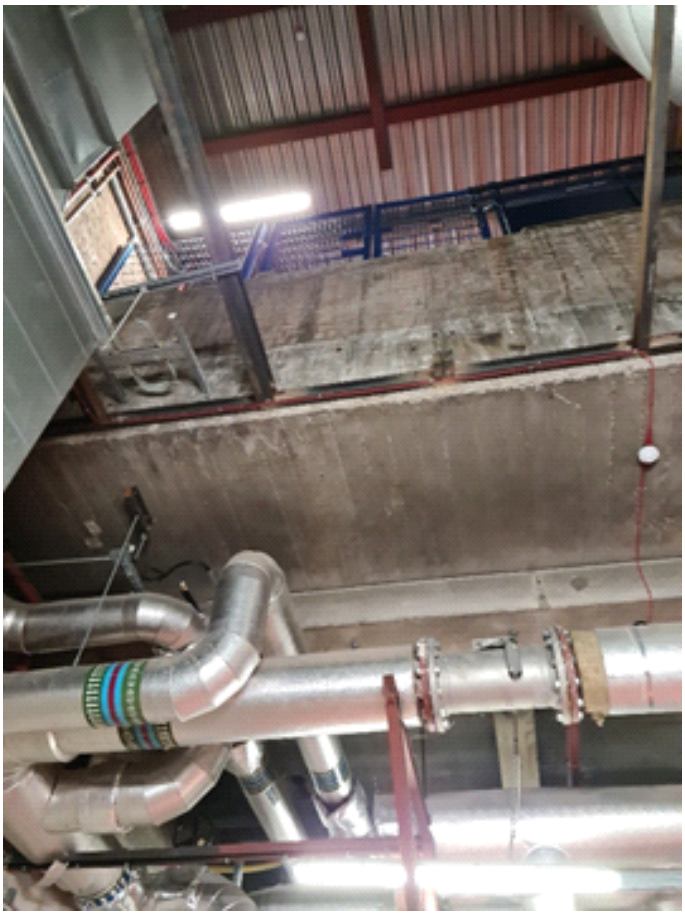
Kevin adds: "We have a mix of newer district heating networks and considerably older systems, with direct feed and plate heat exchangers used. Since install, the units have already contributed to fewer pipe failures, a major drop in the need for chemical treatment, and hopefully longer life for pumps, valves, and other equipment. The result is a more efficient and reliable heating network, with reduced operating and maintenance costs"

Bespoke solutions for a complex campus

Of the eight Enwa units installed, seven were custom-built to meet specific system and spatial requirements.

The final technical solution begins with a condition survey by Enwa's engineering team to understand the exact challenges of a site. Units are then designed to meet the technical requirements of the system, and to fit into the space available. Equally important is that there is sufficient room for ongoing maintenance of the unit. For example, headroom above the unit is required, so bespoke units can be designed to allow for low ceilings and tight spaces.

This flexibility was especially beneficial in retrofitting at the University of Edinburgh, where older buildings can have restricted access and compact plant rooms. At George Square, a large bespoke EnwaMatic unit was winched into place for installation and commissioning.



Access route to George Square Energy Centre

Diagnostics and ongoing support

The EnwaMatic systems integrate easily into the University's district heating network, supporting the busy Engineering team who can focus on other tasks. Monthly ppm checks on the units have largely replaced more time intensive chemical dosing and maintenance, freeing up the Estates team for other priorities. Each EnwaMatic unit features integrated alarm and fault detection systems, allowing the in-house engineering team to identify and address issues promptly. If further support is needed, Enwa's technical team remains readily accessible.

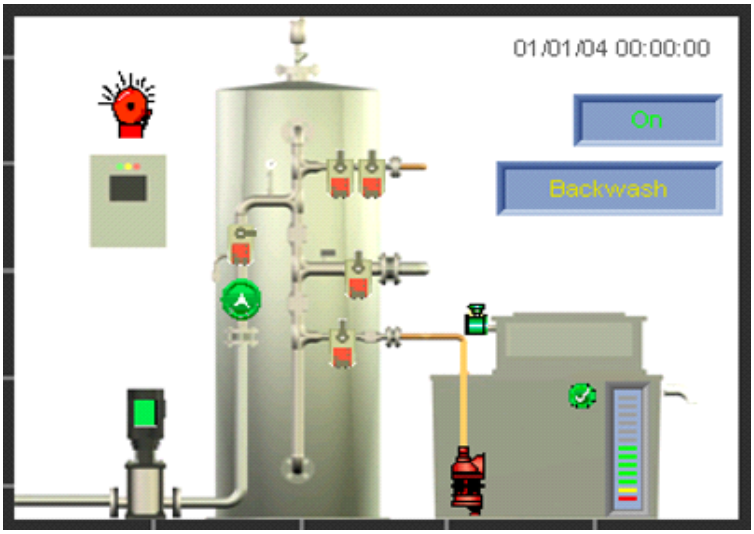
"Enwa's systems save our team considerable time and help us maintain the reliability of our heating and cooling networks. The built-in diagnostics give us peace of mind, and the bespoke design means they suit our largest systems and fit even our most awkward plant rooms"

Supporting a low-carbon future

The water treatment strategy is part of a broader programme by the University of Edinburgh to cut carbon emissions and improve energy performance. Since 2002, the University has invested over £20 million in low-carbon and renewable power initiatives, including it's growing network of CHP energy centres. These facilities have delivered annual savings of 8,500 tonnes of CO_2 and £1.5 million in energy costs.

This commitment extends to projects like the £11 million Easterbush CHP scheme, which provides power, heating, and cooling to research and veterinary facilities. Such initiatives align with the University's strategy to leverage its operational investments in support of broader sustainability goals, including divestment from coal and tar sands sectors.

By integrating Enwa's water treatment solutions, the University of Edinburgh not only enhances the resilience of it's energy systems but also advances it's mission to operate in a sustainable, cost-effective and environmentally responsible manner.



Bespoke PLC interface allows University engineers to identify alarms and verify correct operation