

# BOOTHAM SCHOOL

A LESSON IN REDUCED ENERGY COST AND LOWER EMISSIONS



Founded in 1823, Bootham School is an independent Quaker boarding school located in the city of York. Operating as a charity, this unique and successful school, blends a mix of sensitive grade 2\* listed Georgian buildings with new modern construction to create a fully equipped campus for 500 students, of which approximately 140 are boarders.

The Quaker value of simplicity, which supports taking good care of the earth and trying to leave the world in a better place after we have left, has driven the school to actively support sustainability and tackle environmental issues relating to its campus.

Craig Pierotti, Estates Manager, Bootham School, explains, "As part of our development plan a new Art Centre was constructed which provided us with the opportunity to invest in sustainable initiatives such as Photovoltaic panels, green roofs, greywater recycling, LED lighting and sophisticated boiler controls."

As a boarding school, with residency on campus, a vibrant programme of summer schools and lets, and one of the city's oldest swimming pool on site, there is a 24/7 near 365 need for hot water produced from the modern boiler house facilities. The school decided to supplement the existing boiler plant with an on-site combined heat and power (CHP) system.

**Customer**  
Bootham School

**Sector**  
Education

**Location**  
York, North Yorkshire

**Application**  
Central heating and domestic hot water

**Products**  
Totem T25 m-CHP  
MSS5000

**Partners**  
Brentwood Consulting  
Engineers  
John Wright Electrical &  
Mechanical



EXPERTLY ENGINEERED FOR YOU



The school worked with Brentwood Consulting Engineers, contractor John Wright Electrical and Mechanical and Adveco, who recommended the installation of two Adveco TOTEM T25 m-CHP units and Adveco MSS5000 for a pre-fed boiler system. Electrical generation by the CHP would decrease the energy import of the school, making operational savings, as well as lowering carbon dioxide emissions. The thermal storage tanks would provide a reservoir of heated water from the CHP to a secondary hot water circuit which then operates constantly through the entire school and boarding houses enabling the drawing off of hot water at any point.

In modelling Bootham School, Adveco assumed an offset in boiler energy use with an assumed boiler efficiency. Brentwood Consulting Engineers calculated their figures based on the billing data. Both methods are subject to some degree of error, however, each method derived figures in the same order of magnitude.

Adveco provided Bootham school with a Full Maintenance Contract, effectively a full term warranty covering all moving parts and controls, that guarantees long-lasting CHP unit efficiency. Key system variables are routinely monitored by a remote system that enables the overall performance of the appliance to be tracked.

“One of the attractive things about Adveco is that the engines are refurbished/replaced every three years,” says Craig. “Whilst there are high servicing costs, we factored all of that into the total lifecycle costs. This means after 10 years rather than replacing the whole unit we can simply extend the contract with Adveco saving the capital cost of installing new units.

An Adveco Totem m-CHP installation was undertaken, with two 25 kW units providing

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a 50kW electrical baseload, these units were then commissioned by Adveco and have been running since January 2018.

“The installation was completed on time, to cost, and successfully due to the team effort. Everyone was on board and got on with it, otherwise I don't think we would be in the situation where we are, producing the results we are today,” says Craig “It's absolutely fantastic!”

Running data obtained for the first three months was analysed against the pre-contract predictions which shows that the units are performing better in terms of cost savings per run hour, and by extrapolating the figures to give a full year's running (6,677 hours) the pay-back periods for the project will be achieved and Bootham School should save an estimated £36,996, slightly more than Adveco predicted. Importantly, the CHP system also enables the school to adhere to its Quaker values with CO<sub>2</sub> savings of more than 115,500 (kg.CO<sub>2</sub>). The NO<sub>x</sub> emissions are also greatly reduced with emissions from the TOTEM units less than 40 mg/kWh of electricity output.

Commenting on his experience of the project, Craig admits, “We've reached out a couple of times to Adveco, and we incur minor power interruptions in the city centre which does cause the CHPs to trip. It is something that can't be helped because of the way they are intrinsically linked to the grid. Adveco are constantly monitoring the CHP's for us and contact us only when they want to come and service the units. It is literally fit and forget. They are brilliant, any problems have been dealt with very professionally, the service and back up has been outstanding. We are now looking at how we can connect other parts of the school onto the system to make satellite boiler houses redundant, making further savings in maintenance and the capital cost of refurbishment.”

## TOTEM M-CHP

- Purpose-built for operation on natural gas
- Combined Heat and Power range with outputs of 10, 20, 25 and 50 kW
- Total cogeneration efficiency up to 107.4%
- Ultra-low emissions: NO<sub>x</sub> at <12 mg/kWh and <10 mg/Nm<sup>3</sup>,
- CO at <10 mg/Nm<sup>3</sup>
- Unparalleled reliability.
- Eligible for full points under the revised POL02 category of the 2018 BREEAM New Construction Scheme, even when installed in high pollution urban areas.

