BUILDING ENERGY MANAGEMENT SYSTEMS

Tony Willis is Technical Sales Director with Sabien Technology Ltd

Working in harmony with a BEMS

A little control of building services systems is a good thing; a lot of control is even better. **Tony Willis** explains why it pays to go beyond existing controls to maximise energy efficiency

When investigating opportunities to improve energy efficiency the logical starting point is to ensure the control systems that are already in place are configured to deliver maximum efficiency. This will involve addressing mechanical issues through regular maintenance, while also ensuring that the building and plant is being controlled effectively.

For example, are the existing control strategies configured to suit the way the building is currently being used? Or have the controls been optimised since they were first commissioned, irrespective of changes in building usage? Indeed, were they commissioned correctly in the first place?

Assuming all of the above has been delivered and the existing control systems have been fully optimised, the next step is to identify and establish areas where further cost and carbon savings can be achieved. Do not assume the existing controls optimise every aspect of performance – this is often not the case and potential energy savings are going unnoticed. Often the energy managers receive push back from their M&E departments or BEMS contractors when they table the idea of additional retrofit controls.

Commercial boiler plant is a case in point where significant energy savings can be achieved, but misconception and confusion regarding boiler load optimisation can lead to it being discounted.

Sabien's M2G unit can work with a BEMS to boost energy efficiency in commercial boiler plant

Connection to a BEMS

In many buildings the boilers will be connected to a BEMS. The BEMS strategies may also work in conjunction with weather compensation, optimum start/stop control and boiler sequencing controls to optimise efficiency.

Unlike boiler load optimisation, BEMS and other standard controls typically do not control the common issue with boiler dry-cycling. Indeed, existing controls are not generally even designed to detect boiler dry-cycling – they have a different role to play. Given that our experience of using boiler load optimisation to control dry-cycling in over 6,000 boilers shows typical savings of 10-25 per cent, with a payback of under two years, there is clearly an opportunity that needs to be investigated.

For instance, one of the key roles of the BEMS is to ensure the building's hot water is delivered to heating systems at the required time and temperature to ensure comfort conditions are maintained within the building. In a commercial boiler room with two or more boilers it will typically do this by monitoring the common boiler return/flow header blended water temperatures from all of the boilers and responding accordingly. It generally won't be monitoring the boilers' individual load temperature profiles.

This is where wasted energy can occur and go unnoticed. Once the heating system is satisfied and the boilers are in standby mode, the boiler(s) will begin to cool down (known as standing losses). When the temperature falls below the set point of the boiler's thermostat or the BMS system set point, the boiler will re-fire to recover this heat loss – even if the building/application requires no heat. This is boiler dry-cycling. A typical BMS configuration (including sequencing, weather compensation) will not identify this or have the capability to prevent it.

This was the case in two office buildings managed by Jones Lang LaSalle (JLL), where Sabien's M2G intelligent boiler load optimisers delivered significant energy savings with a return on investment of just 21 weeks. Both of these buildings were equipped with a BMS but these were not detecting or controlling dry cycling.

Measure and correct

Similarly, at the London headquarters of the Institution of Mechanical Engineers (IMechE) the performance of the BMS was optimised and the gas consumption was measured and corrected to allow for seasonal variations before the M2G units were installed. Subsequent measurements showed a reduction in gas consumption for heating and hot water of 17% - over and above the savings achieved by the BMS.

The point here is that while a fully functional, correctly configured and regularly maintained BMS can deliver good energy savings, there is still scope for retrofitting additional controls, thereby fine tuning the individual boiler plant, to address specific areas of energy wastage.

However, it is essential that any such retrofitted controls do not alter or interfere with the existing control strategy. So, for example, it is not acceptable to try to control boiler dry-cycling by increasing the normal time delay between firing cycles, nor by artificially lowering boiler set points. Both of these strategies will cause direct conflicts with the existing BMS strategy and other controls and potentially compromise comfort conditions within the building.

This was an essential consideration at HMS Sultan, the home of the Defence School of Marine Engineering (DSMarE) and the Royal Naval Air Engineering and Survival School (RNAESS), where 111 M2G units have been installed. "The M2G's ability to work in harmony with our existing BMS and any future BMS upgrades and deployments was a prerequisite for us and this has been proven since the installation of M2G," explained Glenn Chatwood, environment and energy manager at HMS Sultan.

ENQUIRY No. 145
www.sabien-tech.co.uk