

TREND CASE STUDY

Wasting energy is a crime at HMP Edinburgh

First published February 2017

With an operational capacity of 870, Her Majesty's Prison (HMP) Edinburgh is one of Scotland's largest secure facilities. As part of its operational policy HMP aims to use energy as efficiently as possible and maintain suitable climate conditions, which is why it uses a Building Energy Management System (BEMS) from Trend.



Part of the Scottish Prison Service (SPS), HMP Edinburgh is a large community facing facility that houses offenders predominantly from courts in Edinburgh, the Lothians and Borders. Located in the west of the city, the building of the prison started around 1914, and has recently been rebuilt to modern standards.

Whilst HMP Edinburgh might have a slightly different remit compared to the vast majority of multi-occupancy premises, when it comes to saving energy and reducing expenditure on this resource, it shares many of the same concerns. SPS has a defined energy management strategy in place and has worked closely with Trend for almost 20 years. Part of this relationship currently includes the operation of a framework service contract for BEMS maintenance.

Ronnie Macdonald is Energy & Engineering Services Manager at SPS, and states, 'We have comprehensive BEMS installed

at all of our main establishments, which over the years had been set up by a number of different system integrators, all with their own ideas about user interface configuration, control strategies and the most appropriate technology. We identified that through greater consistency in relation to technologies, strategies and staff interaction, we could realise significant operational and energy efficiencies. We therefore decided to call Trend in to see what could be done.'

Following an initial site visit, Stuart Lonie, Trend's Business Development Manager, suggested that a Trend Controls Survey would be the best way to review how the building was being used and identify opportunities where energy savings could be made. He comments, 'As the use of a building changes, so does the profile of its building services and it needs to be able to adapt to maximise efficiency.

A Trend Controls Survey report provides an in-depth overview of findings following an on-site survey which is undertaken by a Trend energy engineer. It includes recommendations to facilitate further quantified improvements, which can be presented as a full business case with expected return on investment (ROI). This was exactly what Ronnie was looking for.'

First things first

Prior to the survey, a set of objectives was agreed upon. These included the identification of hardware and cabling that had reached the end of its service life, as well as devices that had become obsolete or difficult to service. Any viable enhancements to the BEMS that could increase energy efficiency through hardware and software upgrades, in addition to improvements in information display and accessibility, were also identified. The findings also needed to outline a schedule of priced upgrades and replacements.

The survey took two weeks to complete and soon after the report was presented to the SPS which recommended a specific course of action. In order to carry out the works, a competitive tender was conducted, which was won by Paisley based Craigan Controls Limited – a Trend Technology Centre (TTC) with a high level of expertise in specifying, configuring and maintaining BEMS. However, from



the outset the process was a team effort, with the SPS managing the project and experts from the Trend team offering technical assistance and advice whenever required.

Taking a view

One of the primary reasons for having a BEMS is to be able to access and use information that is presented, via an easy to understand format. The Trend 963 Supervisor is a graphical, real-time user interface that makes it possible to monitor specific activities and make any necessary changes.

Trend's Stuart Lonie comments, 'The SPS wanted to ensure that each 963 Supervisor across the SPS estate could adopt the same platform. This meant developing the same graphics, text, colours and measurement values. Since the application of the new standard, problems are easy to identify and, what's more, it enables plant and building services to be monitored in real time and changes to be made where necessary. It even learns the structure of a system so that it can make adjustments to how the building services are configured.'

Being able to ascertain exactly how much energy is being used in various parts of the building would offer a significant advantage. To that end all existing sub-meters were brought up to a good working condition and, where necessary, additional devices were installed and configured in a way that enabled information to be supplied to the 963 Supervisor in a consistent format.

'We wanted to give particular attention to the mechanical control panel, as this provides us with the most cost effective level for sub-metering,' states Ronnie. 'The reason being that it is directly responsible for the building's air handling units (AHUs), pumps, fans and associated equipment – components that can represent over 40 per cent of the total electricity consumption of a prison. We knew that if we could get this under control then significant energy savings could be made.'

The sub-meters now provide a full energy usage profile every 30 minutes, which when plotted provides a detailed usage pattern over 20 days that shows variations between day, night and weekend consumptions. This data is then assimilated into a daily total, which can also be viewed as part of a 3-year profile showing comparisons between weekdays and weekends and furthermore allows seasonal patterns to be identified and compared. This is a vast improvement on the previous configuration, which simply focused on previous week, month and overall energy demand, all of which failed to give information in a useful format. Once the new control strategy was implemented, the mechanical control power usage could be clearly identified and electrical savings measured.

'As a result of the work carried out directly from the recommendations in the Trend Energy Controls, there has been a significant reduction in electricity use associated with the mechanical control panel on the BEMS related element alone,' says Ronnie. 'The amount of electricity coming through the mechanical control panel to the building prior to the exercise averaged 41 per cent and this figure was cut to 33 per cent afterwards – an eight per cent saving

on-site electricity. This equates to many thousands of pounds in savings, and the ROI period for all works, including the replacement of outdated and obsolete plant, was very favourable and fell well within the defined requirements of the SPS.'

HMP Edinburgh now operates heating & ventilation systems under a demand led strategy, whereby provision of services are based upon the real-time demands of each individual heating, domestic hot water, and ventilation system across all of its buildings. The BEMS controls these systems at part load by default and automatically increases output as and when required, in other words energy is only consumed when actually required. A good example is ventilation rates which are set at 80% of capacity by default, and automatically increase to 100% dependant upon monitoring of CO₂ levels in extracted air.

Onwards and upwards

Ronnie Macdonald of SPS believes that the entire exercise has transformed the way energy is used at HMP Edinburgh and the results of the BEMS optimisation programme have exceeded initial expectations. He concludes, 'It was always my belief that we could get far more out of our BEMS. The Trend Controls Survey, however, was the real turning point in enabling us to go back to basics, clearly assess what was possible and identify which activities could provide the best results. I'm delighted with what's been achieved and we will use this experience to roll out similar programmes across other SPS sites.'

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