

Flowers Building 'Night Set-Back' Success

(Operation and Enhancement Strategies to the HVAC Systems reduces Carbon consumption)

Annual savings achieved: **229,320 kWh,** **£19,607,** **122.5 Tonnes CO₂**

Introduction

As part of the Facilities & Property Management Department's continued programme of reducing carbon emissions and energy consumption, we have been working with ABS Consulting to deliver a 'continuous commissioning' initiative in the Flowers Building. This focused on enhancing the control of the air handling and ventilation systems and thereby reducing operational parameters. The Building Manager and Maintenance Manager worked closely with academic departments, the Safety Department and a number of contractors in a structured approach to reducing the number of air changes delivered to laboratory areas during non-core hours. This was achieved without impacting upon academic activities or health & safety considerations.

Methodology

Discussions with users and an investigation of air handling services identified that the system often caused disruption to the user environment, with poor air balance control resulting in user discomfort and difficult working conditions. These investigations also showed that the plant supplying these services was operating 24hours a day, 7 days a week at close to full functionality.

The air handling systems consisted of:

- Two supply air handling units (AHUs) with variable speed fan drives; maximum air handling capacity of 11.48 m³/s and fan motor rating of 55kW.
- Two extract AHUs with variable speed fan drive; maximum air handling capacity of 11.6m³/s and fan motor rating of 22kW.

These were initially re-commissioned to determine whether or not it could operate in accordance with the original design intent. This helped identified that existing dampers had ceased and that to control pressure differentials between the laboratories and adjacent areas, new dampers were required. By introducing motorised dampers it was determined that air volumes could be manipulated while still ensuring that no air imbalance occurred and that equipment rooms housing research instruments could still be provided with 24 hour ventilation for cooling.

Night setback

The electricity consumption profile for the building was measured across a normal week and then the new motorised dampers installed. The electricity profile continued to be measured and the volume of air delivered overnight to the laboratories was reduced to 6 air changes per hour, between 22.00hrs to 07.00hrs, Monday to Sunday. The electricity consumption profile showed an appreciable reduction in energy consumption, equating to the following savings outlined below:

Annual Savings	kWh	£	CO ₂ Tonnes
Flowers Building (initial phase)	229,320	19,607	122.5

Facilities & Property Management Department

The team is now organising further saving opportunities which include the extension of the new air management routine throughout the day during weekends and to commence night setback at the earlier time of 20.00hrs. This is expected to deliver even greater benefits (see below)

Annual Savings	kWh	£	CO ₂ Tonnes
Flowers Building (with additional phases)	565,215	48,326	302

Potential Future Opportunities and additional benefits

The introduction of a similar approach to managing overnight and weekend air routines in other building environments across the College has the potential to provide significant further savings. A benefit appraisal estimating potential annual savings if this air handling strategy was applied within the Sir Alexander Fleming (SAF) and Chemistry buildings is summarised in the table below:

Potential further annual savings	kWh	£	CO ₂ Tonnes
SAF and Chemistry Opportunity	3,145,915	267,403	1,689

Additional benefits are realised by applying this strategy, which include, extending the life of plant & infrastructure supporting these areas, reduced maintenance costs and less plant failures.

The carbon reduction potential from roll-out throughout the UK in similar highly serviced laboratories and air conditioned facilities is substantial; we have therefore submitted this innovative approach to CIBSE for a Low Carbon Performance Award 2010.

Diagram – shows measured electricity consumption profile for the Flowers Building (before and after).

