

ENERGY MANAGEMENT

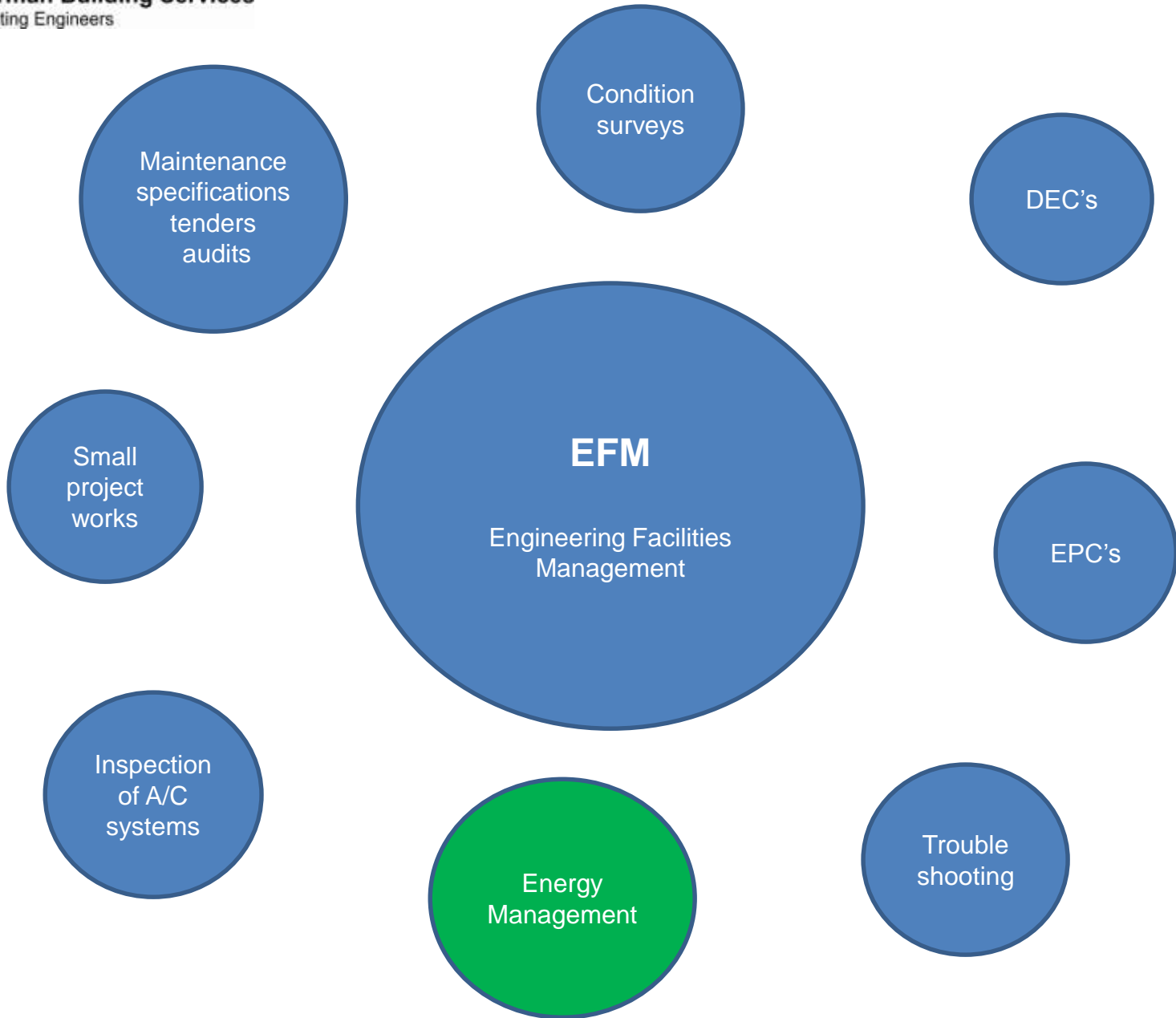
Slaughter and May

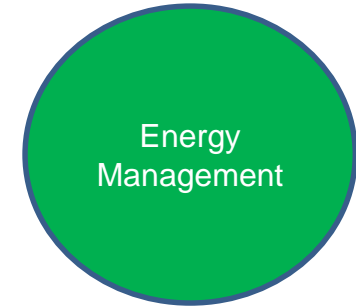
One Bunhill Row
250,000 sq ft

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Waterman Building Services
Engineering Facilities Management







Client

Slaughter and May is a law firm based in London and is ranked by most legal directories in the top 10 law firms in the world.

Several recent surveys confirm Slaughter and May's reputation as the most "prestigious" and most "selective" firm in the United Kingdom.

Slaughter and May show a keen interest in reducing the carbon footprint of One Bunhill Row as partners of the firm are of the opinion that this is the right thing to do.

Energy Assessment

An energy assessment of the building was carried out by the Carbon Trust in January 2007 which concluded that One Bunhill Row was a high energy user compared with similar type buildings and made general reference as to how consumption figures could be reduced.

Slaughter and May created an Energy Sub-Committee (ESC) to review the report, set up a **Building Energy Strategy** programme to reduce the energy consumption of the building and include a method of recording results that could be used to audit results.

Building Energy Strategy

The strategy proposed is to improve upon the energy performance and efficiency of One Bunhill Row by carrying out a systematic review of all energy consuming elements of the plant and equipment installed within the building, determining energy usage and identifying ways in which to reduce this, which in turn will bring down carbon emissions and reduce the overall carbon footprint of the building.

Energy Saving Opportunities

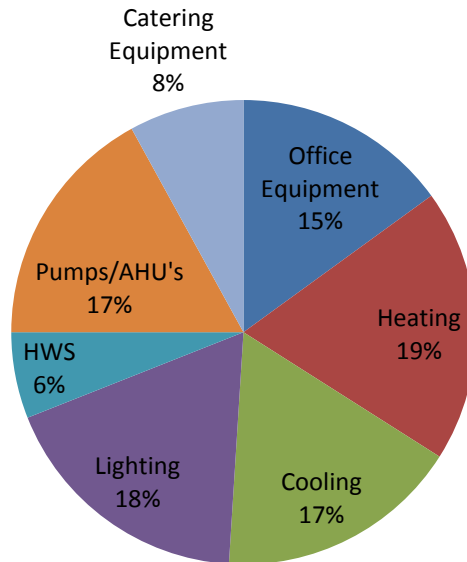
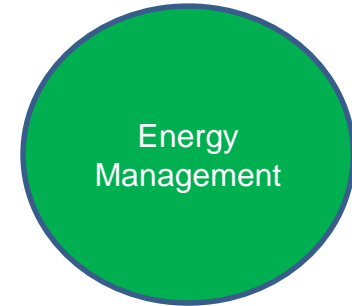
- 1 Review out of hours electrical consumption
- 2 Review internal space temperature settings
- 3 Improve control of IT and small office equipment
- 4 Install time switches to electric water heaters
- 5 Install lighting controls within plantrooms and other areas

Look for easy and quick wins

Implementation of energy saving opportunities

Understand how electricity is distributed throughout the building.

Record - Review - Report



Identify the main users of electricity within the building and then consider methods of reducing their consumption.

If you can't measure it you can't manage it!

Install separate meters on all of the appropriate circuits



Energy
Management

Meters

25 meters installed to record electricity consumption of:
main building services plant
small power
lighting
server room DX cooling system
kitchen areas

Set into three groups on the web based dashboard

Climate

Air conditioning plant

Services

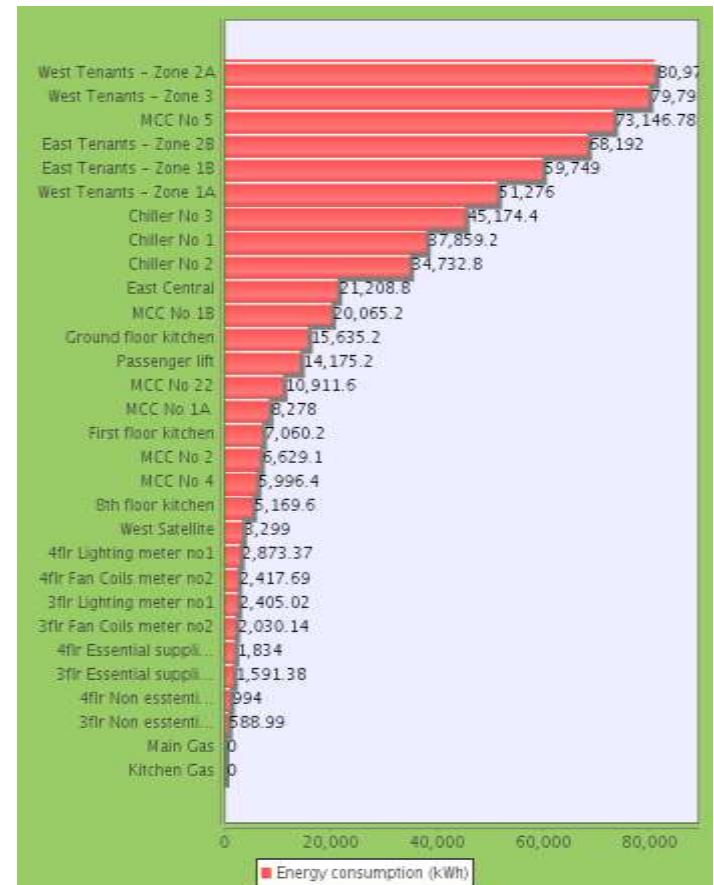
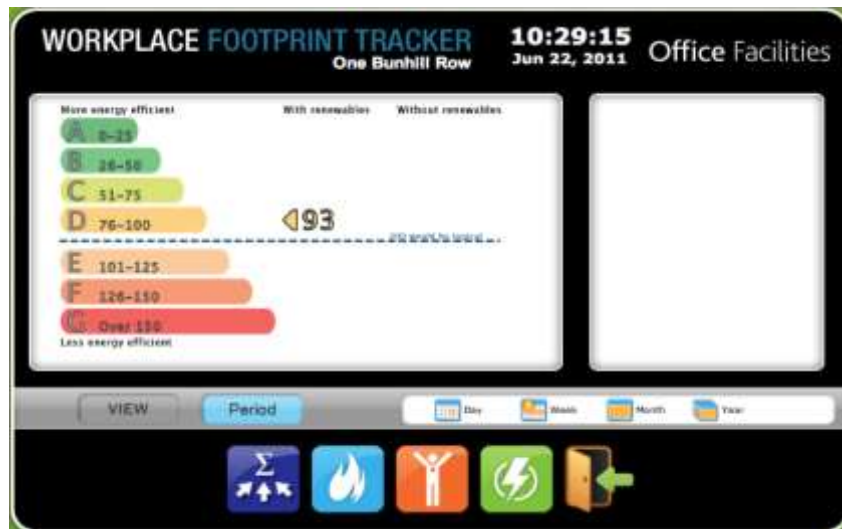
Kitchens, restaurant

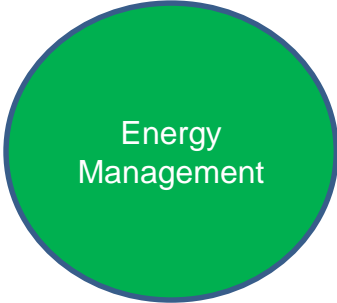
Work zones

Office areas



Workplace Footprint Tracker



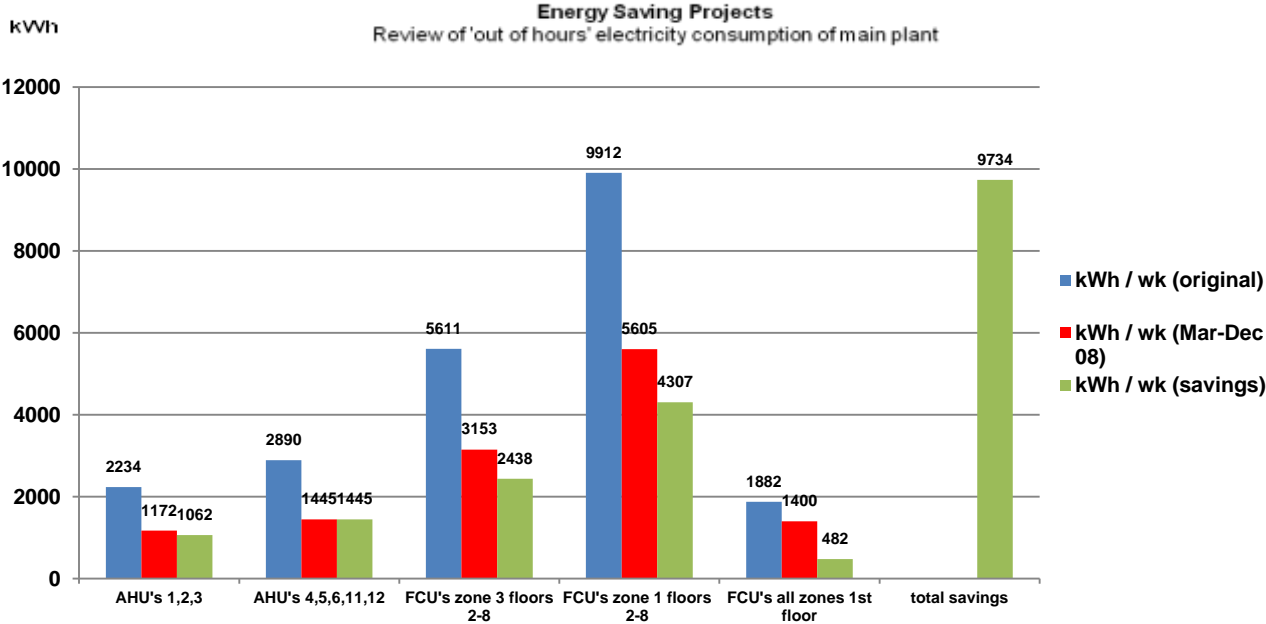


Review out of hours electrical consumption

A review of the Building Management System (BMS) was carried out to identify operating time periods of the main plant and equipment.

One of the main air handling units (AHU's) serving an occupied area of the building was found to be running on a 24/7 basis. Running times were re-set to start up at 6.00 am through to 10.00 pm during weekdays and not to operate over the weekend period.

Fan coil units (FCU's) sited within the office false ceiling voids, which work together with the AHU to provide ambient temperatures to occupied area, were also checked and re-set to operate at these times.



9,734 kWh/week (savings)



Review internal space temperature settings

The ESC has reviewed the design intent calculations for the building and has carried out an exercise to adjust all FCU settings accordingly.

A thorough check of all fan coil unit settings revealed that a large number of units had been adjusted to temperature settings well above the design intent figure.

All fan coil unit settings were adjusted to a design temperature of 21.5 deg C and the ESC are reviewing internal temperatures on a regular basis to monitor comfort conditions within the building.

A building services 'rule of thumb' estimation states that a reduction to the office space temperature of **1 deg C can result in a reduction in energy consumption of 10%**



Install time switches to electric water heaters

The ESC reviewed the operational times of local water heaters serving the toilet and pod areas and implemented the installation of time switches to reduce electricity consumption.

These water heaters were originally operating on a 24/7 basis and have now been restricted to providing hot water between 6.00 am and 10.00 pm during week days and are not in service over the weekend period.

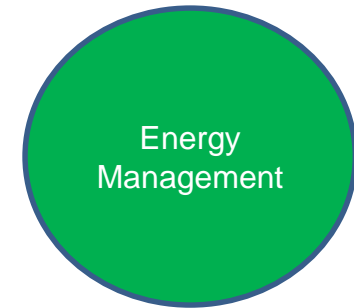
'Red' pod areas on each floor have been selected to give a 24/7 availability to provide hot water to members of staff requiring this facility outside of the core operating period.

Time switches installed as follows:

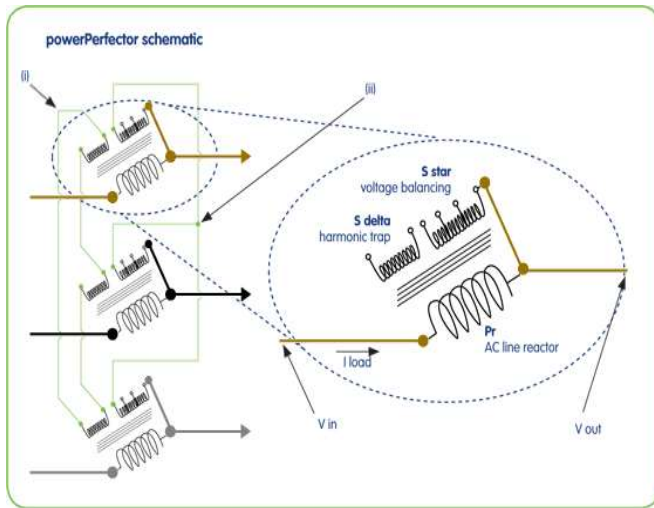
Toilets - October 2007

Pods - January 2008

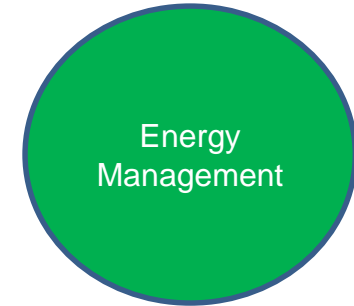
powerPerfector



Two of these units were installed at One Bunhill Row in May 2010 as part of the building energy strategy being implemented by the Slaughter and May sub-committee (ESC). The main feature of the unit is its ability to optimise and improve the incoming voltage for a whole site and therefore cut energy costs.



The **Environment Agency** published a league table in 2011 relating to the annual CO2 reduction performance of all participants in the CRC Energy Efficiency Scheme.



Rank	Organisation	Weighted Score	Emissions CO2	Early Action %
1	Slaughter and May	2092.50	6443	100
1	Dept. of Energy and Climate Change	2092.50	897	100
27	Eversheds	2076	8217	98.5
48	Open University	2052.50	16123	94.92
522	TFL	1582	149366	47.42
1301	Rolls Royce PLC	402	15288	0

Water



CW Booster Set

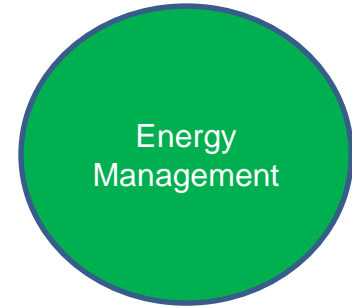
WC's	134	(Female 68, Male 55, Disabled 11)
Urinals	67	(now converted to waterless type units)
Wash Hand Basins	148	
Showers	2	
Cleaner's sinks	10	
Water Heaters	23	
Bib Taps / Wash Down Points	14	

LGF Shower

Shower cubicles (lower ground floor) 10

Potable Water

- Pods x 26
 - Coffee machines
 - Hydroboil water heater
 - Dishwashers
 - Vivreau drinking water taps
 - Kitchen sinks



Local meters have been installed to record water consumption of the various appliances installed within the building to gain an understanding of water consumption.

Design water consumption for OBR is recorded as being 35 litres per person per day.

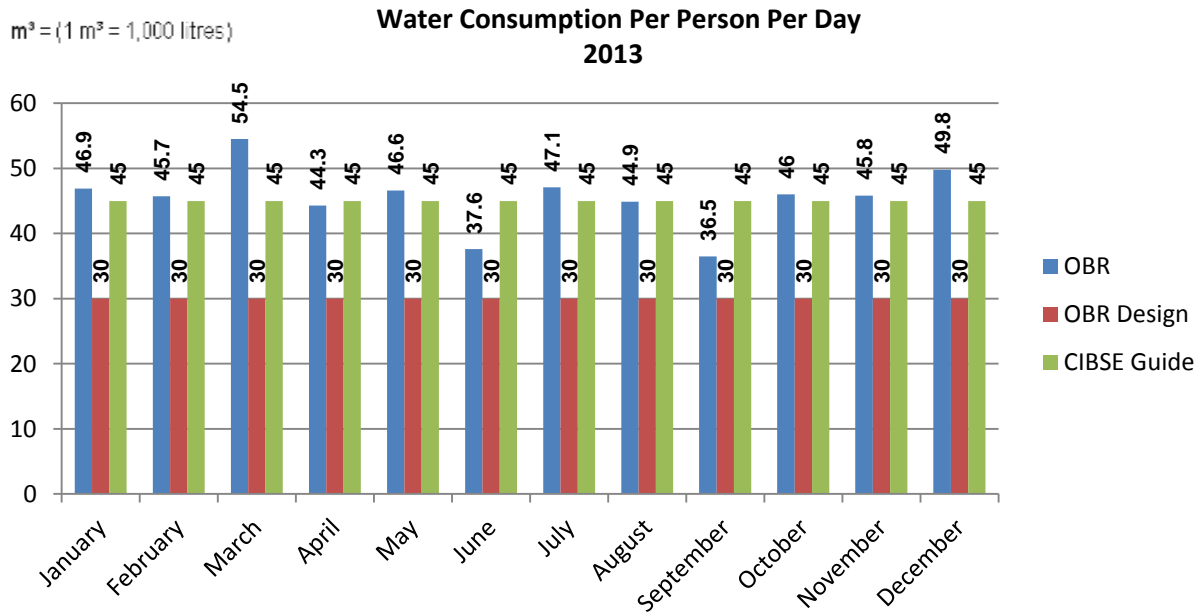
Other consumption figures are considered to be as follows:

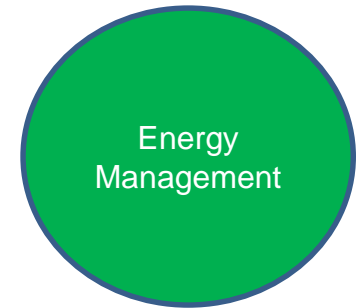
Restaurant 15 litres per meal

Visitors 12 litres per person per day

Showers 50 litres per shower

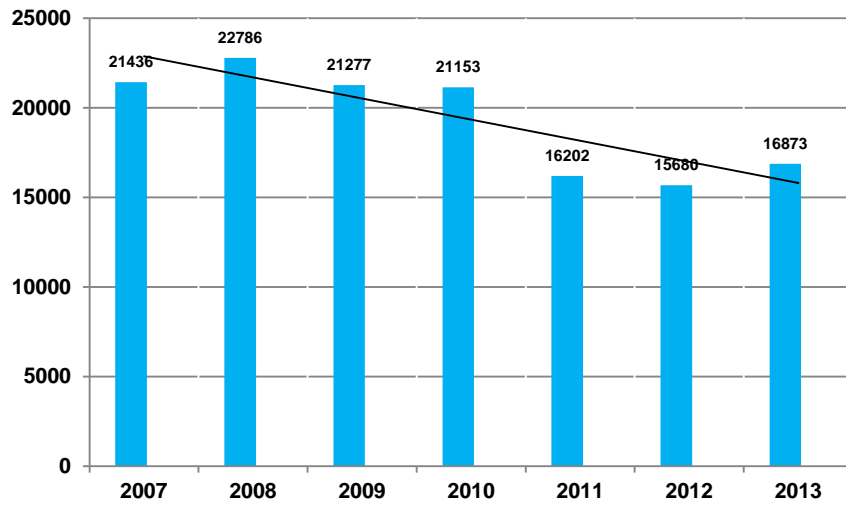
Using the information from local meter readings and access control data, the graph below indicates current water consumption figures.





m³ = (1 m² × 1,000 litres)

Water Consumption

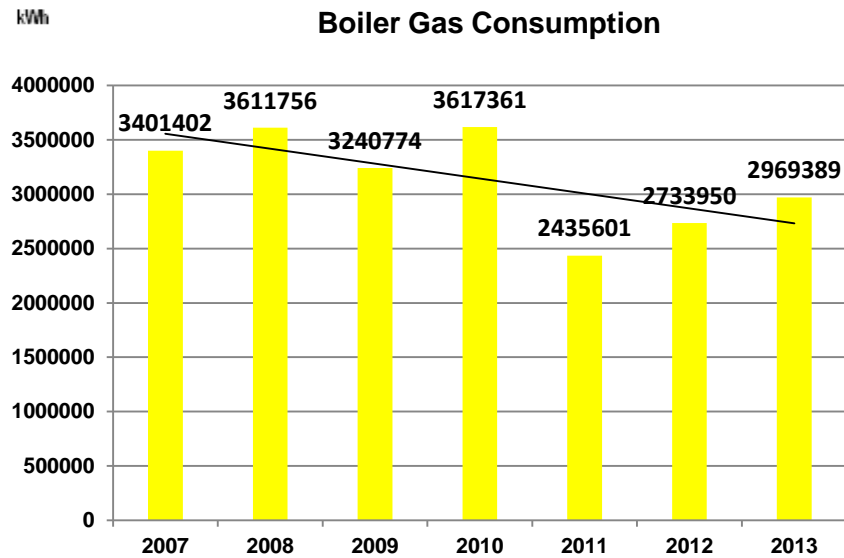


Period	Percentage Reduction/Increase
2007 – 2008	6.3 % Increase
2008 – 2009	6.6 % Reduction
2009 – 2010	0.6 % Reduction
2010 – 2011	23.4 % Reduction
2011 – 2012	3.2 % Reduction
2012 – 2013	7.6 % Increase
2007 - 2013	21.3% Reduction

Gas



The main gas supply into the building is split into two metered supplies, which supply gas to the main boiler plant and cooking equipment in kitchen areas on the 8th, 1st and ground floors.

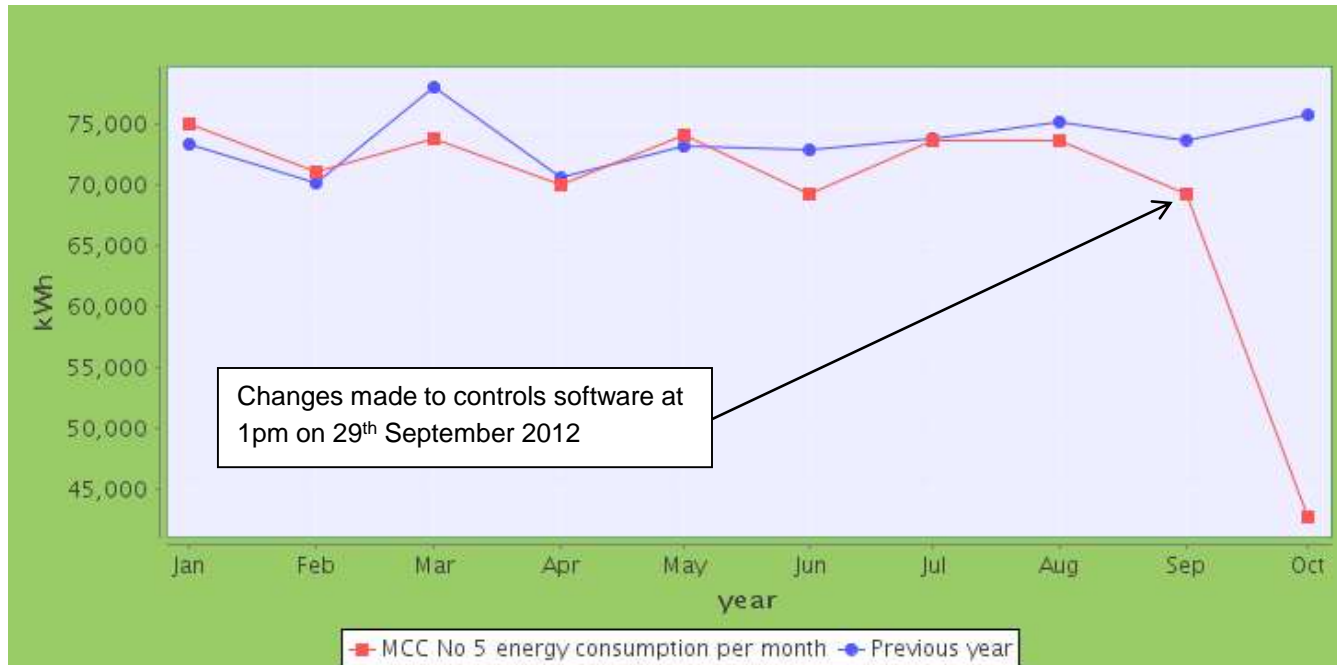


Period	Percentage Reduction/Increase
2007 – 2008	6.2 % Increase
2008 – 2009	10.3 % Reduction
2009 – 2010	11.6 % Increase
2010 – 2011	33.7 % Reduction
2011 – 2012	12.2% Increase
2012 – 2013	8.6 % Increase
2007 - 2013	12.7 % Reduction

The ESC had noted that the demand for chiller pumps to operate did not appear to be in sequence with chiller machine demand and following a detailed investigation of the system some changes to the controls software resulted in pumps only operating on demand as design intent.

MCC5

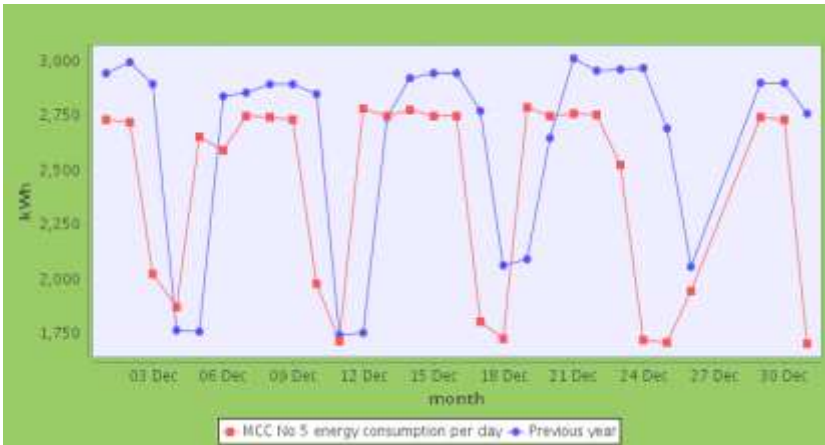
- Air Handling Unit Zone 2 fresh air supply and extract fans
- Air Handling Unit 4 Central Toilets fresh air supply
- **Chiller Pumps**



September 2011

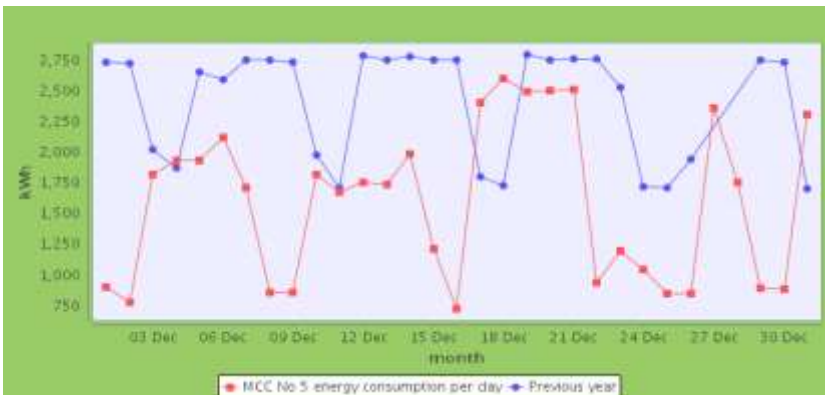
September 2012

Energy Management



Total energy for comparison period (December 2010): **76,481 kWh**

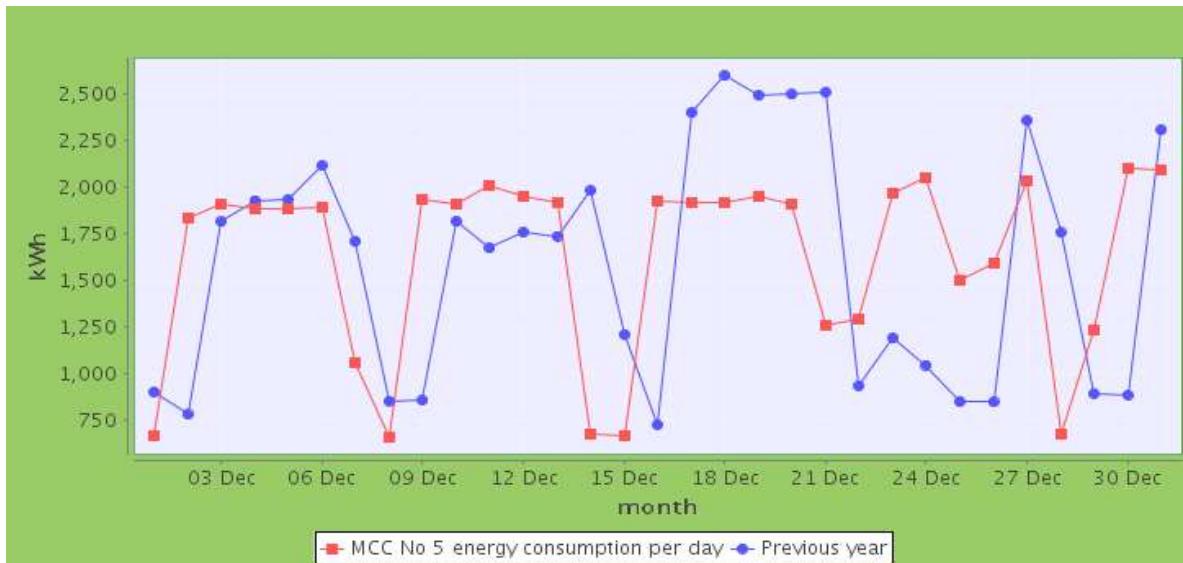
Total energy used for this period (December 2011): **69,910 kWh**



Total energy for comparison period (December 2011): **69,910 kWh**

Total energy used for this period (December 2012): **49,306 kWh**

Energy Management

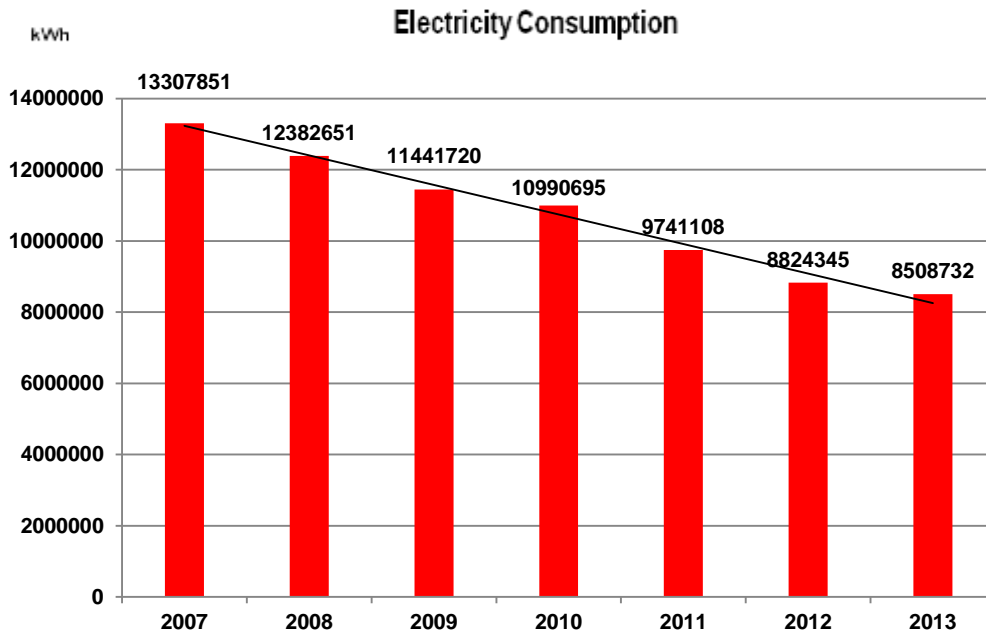
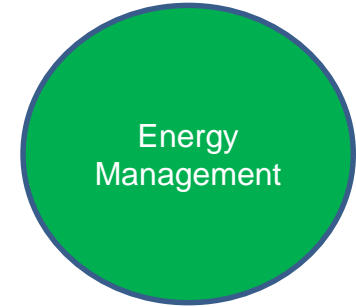


Total energy for comparison period (December 2012): **49,306 kWh**

Total energy used for this period (December 2013): **50,207 kWh**

Higher consumption figures in mid December were due a major Client project

Changes made to controls software in September 2012 has resulted in a monthly reduction in MCC5 electricity consumption of circa 30%



Data Source: EDF monthly tariff invoices

Period	Reduction
2007-08	7.0 %
2008-09	7.6%
2009-10	3.9%
2010-11	11.4%
2011-12	9.4%
2012-13	3.6%
2007-13	36.1%

Energy Saving Projects Considered by ESC

Wind Turbines

No advantages to be gained by taking into consideration the installation of wind turbines on the roof of OBR.

Photovoltaics

The ESC is currently developing a scheme for the installation of photovoltaic cells on level six, eight and main roof areas to produce 28,724 kWh per annum of electricity resulting in an ongoing annual saving of 18,173 kg CO₂.

Ground Source Heat Pumps

the installation of a ground source heat pump system at OBR would neither be economical nor practicable for consideration.

Grey Water

The ESC has decided that costs associated with an installation of this type at OBR would neither be economical nor practicable for consideration.

Biomass Boilers

Not a viable option due to space restrictions within the basement area for a container to store wood pellets close enough to the existing boiler room and the added problem of regular fuel deliveries to site.

Combined Heat and Power

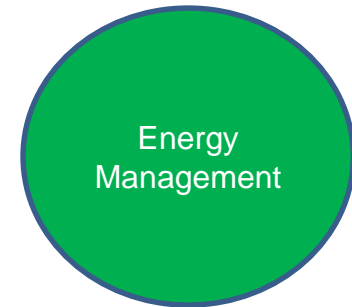
The ESC is currently considering the benefits of installing a natural gas fired CHP generation facility including the option of absorption chillers.

District Heating

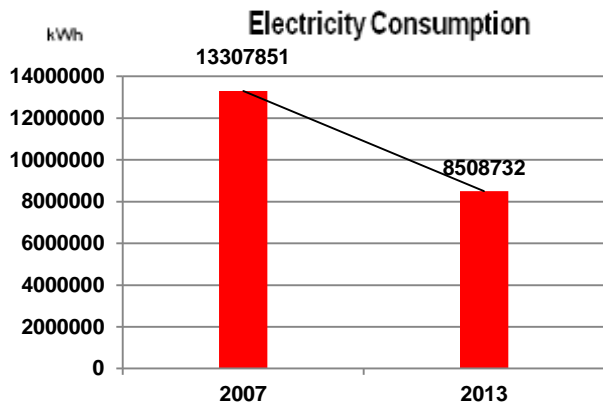
The Esc is currently considering the benefits of connecting to a local District Heating system.

Water Saving Devices

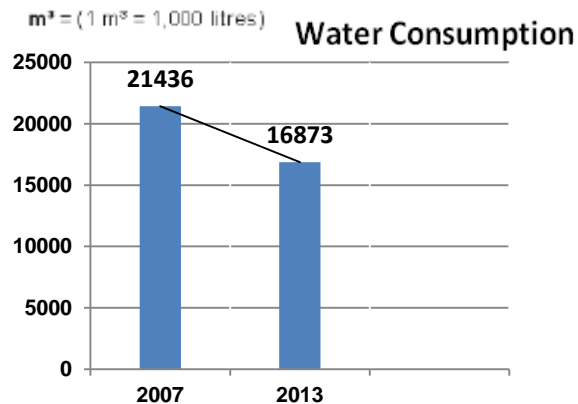
Waterless urinals
Dual flush conversion to WC's
Aerated tap flow nozzles



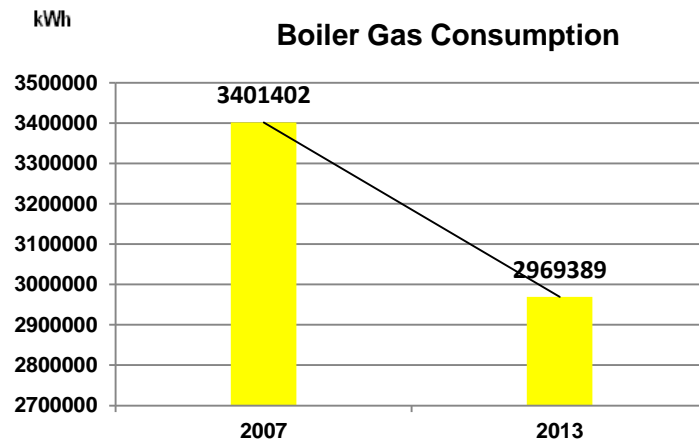
Comparison of Gas, Electricity and Water Consumption at One Bunhill Row



Electricity consumption reduced by 36.1%



Water consumption reduced by 21.3%



Boiler Gas consumption reduced by 12.7%

What Next?

Energy
Management

Continue to run the building efficiently

Energy saving Ideas from you!





Energy
Management

Thank You