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## Energy/Environment Report for 07/08

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### Executive Summary

- Historically-rising energy consumption trends reversed despite addition of new build
- Electricity use down by 7% in 2 years saving £160k and 700 tonnes CO<sub>2</sub> each year
- Water use down by 9% in one year saving 32 million litres and £65k each year
- Student Residences Energy Competition – 10% saved across 3000 rooms
- Electricity use in Sports Village cut by 15%
- ‘Our Big Energy Challenge’ – we are a major participant in a Bath-area awareness-raising project. Through this we have trained and mobilised 55 Energy Champions throughout all departments, trained 400+ other staff, distributed awareness-raising materials, improved our communicating of energy info, and made a real step change in many people’s everyday practices.
- Gained re-accreditation under the Energy Efficiency Accreditation Scheme (one of only 200 UK organisations to be so recognised)
- Now have over 500 of our own utility meters throughout the Estate, including 300 on our new automated monitoring system, with new meters added in key areas to allow better management information
- BREEAM ‘Excellent’ (top eco-design standard) achieved for new £21m Woodland Court student residence building
- BREEAM ‘Very Good’ achieved for £7.4m refurbishments in residences
- Solar thermal systems installed on 2 Westwood residence blocks
- Various technical improvements made to improve energy efficiency through new equipment
- Preparation underway for major new legislation (energy labelling of buildings and carbon trading)
- Applying for funding under HEFCE Revolving Green Fund
- Green Transport Plan being reviewed as part of Masterplan process
- Ecological survey of campus carried out as part of Masterplan process
- Sustainable Procurement policy developed
- Student Union achieved ‘Bronze’ award for Sustainability
- Accommodation & Hospitality aiming for Green Tourism award this year
- Business in the Community benchmarking process undertaken to benchmark our environmental performance with other Universities

**Peter Phelps**  
**Energy and Environment Manager**

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## Energy/Environment Report for 07/08

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This brief report has been written to summarise the key activities related to Energy Management at the University for the last academic year, 2007/8. The main purpose is to report back to the Executive of the University and relevant committees, but it is also for an audience including staff, students and the wider public. It is intended that this will form part of an ongoing annual process.

Further details can be found on the website - <http://www.bath.ac.uk/estates/energy/>

### **Summary - consumption totals and trends**

The total expenditure on utilities for 07/08 was just under £5million. This has increased dramatically in recent years due to global energy prices, with a doubling in the last 2-3 years. The total emissions from the University's utility use were just over 20 000 tonnes CO<sub>2</sub>, and the electricity use is the equivalent of 3,500 households; the environmental impact of our operations is clearly not insignificant.

The table attached sets out the University's consumption of utilities, the calculated CO<sub>2</sub> emissions from this and the expenditure in these areas. Attached are also a number of graphs highlighting the breakdown of expenditure, trends in consumption and key areas of usage.

It can be seen from these figures that electricity usage is the priority area in terms of expenditure and environmental impact. It can also be seen that utility usage in academic areas is dominant, especially the more technical departments.

Historically there has been an underlying upwards trend in energy use, and this has not been purely due to additional buildings being added. This situation has started to be reversed, however, as the cumulative graphs show. In 07/08:

- Electricity use was 3.3% down on 06/07
- Electricity use was 6.6% down on 05/06
- This equates to a saving of 1.7 million units (kWh) every year
- This is a saving of over 700 tonnes CO<sub>2</sub> and £160,000 every year
- At this year's prices this is an annual saving of £210,000
- A new highly-serviced laboratory was added within this time, as well as new construction sites, hence the underlying reduction is estimated to be closer to 10%

Gas use is clearly weather-dependent to a large extent. Weather-corrected data shows a slight reduction in usage. This area has much potential for future work, but is largely dependent on the large-scale district heating system that feeds the majority of Parade buildings, and the ability of these buildings to keep the heat in.

Water usage has also historically been rising. In 07/08, however:

- Water use has fallen by 9% from the previous year
- This equates to a saving of 32 million litres (approx 10 times the 50m swimming pool)
- This gives a saving of £65,000 every year.

The final 2 graphs show the top 25 buildings electricity use and the top 25 by floor area. The former, as would be expected, is led by the total residences and the Sports Village, but thereafter dominated by our highly-serviced laboratory buildings. This is seen even more clearly in the second graph.

## **Highlights/achievements**

The following are some of the key activities and achievements for 07/08

- ***Purchasing***

The various contracts for gas and electricity have now been rationalised still further. The tendering of the renewal of the majority of contracts is handled via The Energy Consortium, a HE-purchasing consortium using the Utilyx electronic tendering service. During this period the main electricity contract and the 2 main gas contracts were successfully tendered and negotiated. The market has continued to see highly volatile conditions which have been monitored closely to make a judgement on renewal timings. Variable-price contracts have been investigated, although there is still a preference for fiscal predictability that fixed price contracts bring. Where possible electricity has been bought on green tariffs, although availability on the market is much reduced, accounting for 86% of campus use (100% is not feasible due to VAT reasons).

- ***Financial***

Credibility, clarity and close monitoring have been brought to the budgeting process in an area that is now one of the largest costs to the University. The volatility in the energy market and the variable patterns of consumption (and ever-changing nature of the Estate) make predicting utility budgets an inexact science, but the final outturn gave a 10% underspend on the deliberately conservative budget figures for 07/08.

Utility supplier invoices are notoriously unreliable and we receive up to 65 separate utility invoices monthly; invoice checking procedures have been further tightened with a number of successes and a number of billing errors large and small have been identified and challenged.

- ***Metering and analysis***

Good reliable data is the underpinning of energy management as the analysis of this can raise awareness, highlight problems, set priorities and drive out wastage. Due to the campus nature of the majority of our Estate we have very few meters provided by utility suppliers, hence it is our responsibility to install these.

Two main areas of work have been targeted for improvements:

1. Increasing the number of meters to best practice levels to allow full analysis of complex buildings – this is now a legal requirement in all new buildings, but many of our existing stock have had very few
2. Automating these meters to allow continuous 24/7 real time data to be captured

Good progress has been made in both areas. This year we have added new metering in several key areas:

- 1 South (Chemistry) - for example this had 1 electricity meter to account for £265,000 annual expenditure; we have now installed 22 sub-meters in this building
- Sports Training Village
- 5 West (Pharmacy)
- 4 South (Biology)
- Heat meters (these allow large heating systems such as the main district heating scheme to be sub-metered) – 12 meters added

We now have on campus

- 340 electricity meters
- 90 gas meters
- 70 water meters
- 26 heat meters

There are still significant areas, however, without any level of sub-metering.

Of these meters over 300 are now remotely monitored via our new Ethernet-based AMR (Automated Meter Reading) system. This gives us real-time data for analysis, to pinpoint areas of wastage, for automatic fault-detection, and to allow more realistic feedback to occupiers following behavioural and operational changes. The data has already supported several improvements (see technical improvements below). Additionally, a number of faults that would have been otherwise undetected have been addressed (eg 2 major underground water leaks in Pulteney Court were highlighted saving £22k annually).

A generic metering specification has also been implemented for all new build and refurbishment projects, to ensure that these are sub-metered to the correct extent and interface with our new systems.

- **Technical improvements**

A number of improvements to plant and equipment have been implemented to save energy. Some of these have been funded by the capital allowances from the Our Big Energy Challenge project.

Some examples include:

- 9 West and 3 South - installation of VSDs (Variable Speed Drives) on the fume cupboard ventilation systems to allow closer control and possible future night-time setback - £19k total investment; estimated annual savings between £11 – 15k and at least 55 tonnes CO<sub>2</sub>
- Main boiler house – installation of VSDs on main boiler fans – £8.4k investment; estimated £5-7k and 17 tonnes CO<sub>2</sub> saved annually
- 3 West North – optical fibre laboratory: this case study can be found at <http://www.bath.ac.uk/estates/energy/3wnstory.shtml>. This relatively new building is very energy intensive, with an annual electricity bill of £70,000. Due to the improvements in monitoring data for buildings, and the presence of departmental Champions recruited and trained via the Our Big Energy Challenge project, changes were made to the operating regime of some of the building plant. Annual savings from this are £35k and 160 tonnes CO<sub>2</sub>
- Compressed air desiccant dryer - £7k investment for a £4k and 14 tonnes CO<sub>2</sub> annual saving
- Lighting has been upgraded and automatic controls added in areas such as the Council Chamber, Wessex House staircase landings, Level 3 corridors, 2 West stairs to Level 1, Estates building, and Norwood corridor to Founders Hall.
- Sports Training Village – modifications made to heating circuits, controls and interface with CHP (Combined Heat and Power plant) to ensure this acts as 'lead boiler' and maximises running time.
- Various small-scale improvements such as lagging of pipes in offices to prevent overheating and adding radiator controls.

There have also been numerous improvements undertaken as part of our general maintenance and replacement programmes where more efficient equipment is installed but is

not necessarily the prime reason for the project work. Good progress has been made in ensuring best practice is followed in these circumstances (see section on new build/refurbishments).

- **Awareness-raising**

This has again been a key area of activity in the last 12 months. Highlights include:

- 'Our Big Energy Challenge' – this is a treasury-funded joint project with other local public sector organisations, focussed on staff awareness-raising, run by CSE (Centre for Sustainable Energy) based in Bristol. The network of 55 Energy Champions recruited and trained across all departments in the previous year has been maintained, with regular communications including monthly graphs of key building's electricity usage. These volunteer champions have delivered some real success stories in many areas, with a step change in awareness and normal behaviour and are a vital resource, but being volunteers will have a variable amount of time to dedicate to the project. Resource for central support is also limited, so the degree of activity is highly variable. Awareness-raising materials developed through the project (posters, stickers, post-its, mugs, gadgets and chocolates) have been distributed for use by Champions. Face to face training has been delivered for ~200 staff in Accommodation & Hospitality Services, and ~80 staff in Sports. An on-line training facility was developed by CSE through the project for the majority of staff where face to face training was seen as both impractical and resource-limited - ~130 staff have gone through this, a disappointingly small number despite publicity and incentives.
- Student residence competition – the energy-saving competition in student residences has been run for the second year. Student residence blocks competed against each other to win monthly prizes based on electricity used, and to win an overall prize of a celebratory meal and drinks. Off-campus buildings were also included this year and savings were even greater than in 06/07: total savings compared to last year were £23,000 (= 170 tonnes CO<sub>2</sub>), and over the 2 years £50,000 (= 250 tonnes CO<sub>2</sub>) has been saved. It is planned to run this competition again for 08/09.
- Web pages – within the Estates web pages a central point of reference has been further developed as a staff and student resource for all matters relating to Energy and Environment, as well as demonstrating our responsible approach to interested external parties (including prospective students). Features include background information, a 'What Can I Do?' section, regular internal news articles and links to relevant internal and external sites, including new dedicated pages developed by Accommodation and the Students Union.

- **New build/refurbishments**

It is essential that any additions and modifications to the existing Estate are designed to minimise energy costs as well as to minimise other environmental impacts. The Building Research Establishment 'eco-standard' for buildings (BREEAM) is now embedded in our processes. A commitment to BREEAM 'Excellent' (the highest standard) on new builds and 'Very Good' on major refurbishments has been made, and this has been successful in ensuring that good design and practice has been locked in throughout the building process. Following last year's trial 'quasi-BREEAM' process on refurbishments, a formal approach has been taken to this summer's works. An additional environment brief was developed for the Decant project to supplement BREEAM and ensure minimum standards in key areas.

Construction industry studies have indicated a small uplift in capital costs is sometimes required to meet the high standards required by BREEAM. Life-cycle costs, however, tend to be significantly lower and hence this policy makes financial sense as well as ensuring, and demonstrating, we take our environmental responsibilities seriously.

Some example projects include:

- Woodland Court – a £21m 355 room student residence built to BREEAM Excellent, one of only 3 in the country. The building is designed to consume less energy through the use of energy efficient heating systems, including solar panels, low energy lighting, a precast concrete structure which reduces heat losses, and a natural ventilation strategy. It is also installed with eco-friendly equipment, such as fridges and freezers, uses sustainable building products and materials, and employs sustainable drainage techniques. The design also includes measures to improve the ecology of the site and reduce external lighting spillage.
- Westwood/Eastwood refurbishments – a £7.4m refurbishment of student housing achieving BREEAM Very Good. Features include solar thermal hot water systems in 2 Westwood blocks serving approx 200 student rooms, high efficiency lighting with automatic presence detection for lights and fans in kitchens/bathrooms, and high efficiency boiler plant.
- Council Chamber refurbishment – highly energy efficient glazing has been added, with external 'brise soleil' solar shading, properly insulated walls, heat pump heating/cooling, and high efficiency lighting with presence detection.
- 3 West roof plant – the 17 year old ventilation plant was replaced due to corrosion problems, but in doing so modern speed controls were fitted which will allow major energy savings.
- 5 West 3.30 laboratory – new fume cupboards have been specified, but through spending an extra £19k on Variable Air Volume systems with additional presence detection, it is estimated a £30k annual energy saving will be made

- **Renewables/CHP**

Although the priority should always be for efficiency before renewables, some work on the options for the University have been undertaken. A consultancy study into the options for renewable energy for the campus (eg wind, solar, biomass heating, CHP) was completed in March 07. Some of the options are being studied and taken forward for further investigation.

One key option is in the use of Combined Heat & Power (CHP) – the University has 2 such existing plants, one serving the 50m swimming pool, and a larger unit feeding the main district heating system. This latter unit is currently out of service due to various technical, financial and infrastructure reasons, but an in-depth study of this unit, the district heating system and the long-term strategic direction for both is currently underway. This will include examining the possibilities for biomass as well as further use of CHP.

As part of the summer refurbishments 2 Westwood blocks have had solar thermal systems added to provide hot water. The new Woodland Court and the planned 4 West also have solar thermal systems included.

- **Legal**

- **European Union Emissions Trading Scheme (EU-ETS)**

Due to the scale of our operations the campus fell under this legislation, which is a cap and trade scheme covering our emissions from gas use. We have successfully applied, as part of a consortium of Universities, for exclusion from Phase 2 of this scheme from 2008 onwards as it has been seen by the regulator as an unnecessary administrative burden aimed at very different organisations to our own.

### **Energy Performance in Buildings Directive (EU-EPBD) – Display Energy Certificates (DECs)**

This major piece of legislation requires all public-funded and regularly visited buildings over 1000m<sup>2</sup> floor area to be labelled according to its energy performance from October 2008. The actual energy usage is compared to a national benchmark for that type of building and an A to G rating given (similar to the energy labelling seen on white goods). This rating certificate has to be updated every year, and includes information to show whether the building performance is improving year on year. This certificate has to be displayed in a prominent place near the entrance to the building.

At the University we have 44 buildings that fall into this legislation, and hence 44 separate certificates have to be applied for. The process is complex with the data to be entered in a government software package along with information on occupancy times, usage, floor areas and specialised processes. The nature of university buildings are also very difficult to benchmark, and we have generated composite benchmarks for our multi-use buildings. An accurate benchmark also relies on appropriate metering; although we have good levels of metering in some areas, there are still many buildings without this, and those with new meters will have less than the required 12 months of data.

The other requirement of the legislation is to be in possession of an Advisory Report for every building. This document, containing recommendations on how to improve the building, is generated by answering questions in another software package and auditing each building. Work is underway to produce the DECs and Advisory Reports to meet the legal deadline. It is yet to be seen what interest in these will be taken by the public; there is a possibility that a large number of poorly rated buildings could generate negative publicity for the University. The performance of a building, however, is clearly a function of what happens inside that building as well as its general design, and at Bath we have a large number of highly-serviced scientific buildings which will rate poorly due to the energy-intensive processes within.

### **Carbon Reduction Commitment (CRC)**

This piece of legislation is a 'cap-and-trade' emissions trading scheme similar to EUETS, but will apply to all large businesses and public sector organisations with annual energy bills greater than £500k. Each organisation has to buy carbon allowances each April to cover its emissions, report and surrender allowances at the end of the year, and trade any surplus/deficit on the open market. Unlike EUETS all allowances have to be bought through the auction process. Phase 1 will have a fixed price auction, but after 3 years the Phase 2 carbon price is fully variable according to the market, and will also depend on the capped levels of allowances which will be set by the UK government according to its own emissions reduction targets.

Phase 1 starts in April 2010, with Phase 2 from 2013. It is planned that most funds from the scheme will be recycled back to the participants each year, but plus or minus a bonus incentive payment based on a league table of participants. This bonus payment starts at +/- 10% but is set to increase annually, potentially up to 100%. The recycling of funds each year also does not happen until 18 months after the April auction, and hence has cashflow implications.

The price for the Phase 1 fixed price auction is to be set at £12/tonne CO<sub>2</sub>. The annual payment at auction for the University will be close to £300k, and it is expected that the variable market prices will only be greater than the fixed price.

As well as the financial implications, the burden on the University will also be the resources to be dedicated to this process – annual auctions, reporting, trading, maintaining the registry account of allowances and satisfying the audit trail through evidence packs and data records. This legislation is still under consultation, but this is due to end this autumn and the details are unlikely to change significantly.

- **Other**

#### **Energy Efficiency Accreditation Scheme**

In October 07 we were audited and gained re-accreditation under the Energy Efficiency Accreditation Scheme (one of only 200 UK organisations to be so recognised). This scheme involves an in-depth audit of our energy management activities and processes, and has been since rebranded as the 'Carbon Trust Standard'. It is a widely recognised benchmark of good energy management practice.

#### **HEFCE/SALIX RGF fund**

HEFCE have recently announced its Revolving Green Fund managed by SALIX. It is intended to submit a bid for this and an expression of interest has already been submitted. The fund is already over-subscribed, and the success of our bid will depend on our ability to develop sufficient 'ready to go' projects given our limited resources and the tight timescales.

#### **BITC benchmarking**

Business in the Community have developed a widely used benchmarking process that many FTSE100 companies use to assess their performance, either via the Environment Index or via the more in-depth Corporate Social Responsibility Index. We signed up to a pilot project through HERDA-SW along with the other HEIs in the South West to benchmark our environmental management performance against our peers. This scheme has now become a national project including 60 HEIs, and we will continue to play an active part in this, as well as use it as a framework for improvement.

#### **Student Union Sound Impact Awards**

The Student Union achieved a 'Bronze' award for Sustainability in this national scheme which looks at the SU and the University's performance across a wide range of environmental criteria, and is hoping to achieve a 'Silver' this year, and Estates will continue to support its application.

#### **Green Tourism**

Accommodation & Hospitality Services are aiming for a Green Tourism award this year for its hospitality operations. This is a similar scheme with a wide-ranging environmental audit across the whole range of its operations.

Both the SU and Accommodation should be congratulated on taking these steps to take responsibility for their environmental impacts, and for responding well to pressure from our main customers, our students, who are more and more environmentally-literate and aware, and increasingly expect a high performance from the institution of their choice.

#### **Future plans**

Future plans are to some extent limited by resources – National Audit Office guidelines are such that the 'ratio of resources as full time equivalents (FTEs) to utility spend are around 0.75 to 1.0 FTE per £million of spend'. We have less than 2 FTEs for ~£6million spend. It will also depend on the availability of funds for investment.

- **Purchasing**

There is potential for the University to take a more active approach to buying energy by using variable price contracts rather than the more traditional 1 or 2 year fixed price contracts. This is a more risky and time-consuming approach, however, and a balance needs to be found between the need in this type of organisation for budgetary certainty and potential savings.

- ***Financial***

Invoice checking procedures could be tightened further at some point through automating the process with proprietary software. It is also planned to look at the potential for further devolving budgets and/or sharing savings with academic departments to further incentivise energy-saving behaviour. External funds for investment will continue to be sought.

- ***Metering***

Additional metering will need to be installed in many areas to fill in gaps and to also satisfy new legal requirements such as Building Energy Labelling. The roll out of Automated Meter Reading to obtain real-time data will continue. The resultant data will be shared further with building occupiers and Estates colleagues, and analysed for priority areas of investigation. Automatic monitoring systems via the software will be implemented to allow early warning of deviation from a building's 'ideal' pattern of consumption to highlight equipment failure, leaks and changes in practice.

- ***Other improvements***

Technical improvements will continue to be implemented across the Estate as resources allow, but with a focus on those areas with the best payback or with the best 'visibility' – a key part in changing the behaviour of individual staff will be for the University to demonstrate it is doing all it can to change its own organisational behaviour and acting responsibly. Lighting improvements are seen as a key area with both good payback and a high profile thus further work will be prioritised in this area.

The study on the options and strategy for CHP and the district heating network is also seen as a key plank in our efforts to reduce our footprint, but major investment in this area may be needed.

- ***New build/refurbishments***

The BREEAM process will be continued to be used as a tool to apply to both new build and refurbishment. Further work will be needed to apply these principles to smaller scale works where a formal assessment is not practicable. We will continue to strive to ensure that sufficient funds and time are allowed for both large and small refurbishments to ensure thorough modernisation of the fabric and services of these areas occurs.

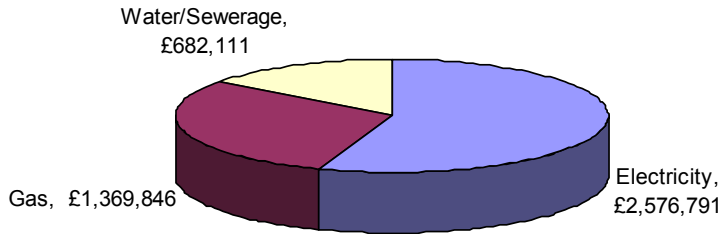
- ***Awareness***

It is hoped that the momentum created by Our Big Energy Challenge and the network of Champions can create a real step change in behaviour patterns amongst all staff, and the spin-off of the project to students will be maximised wherever possible. It will be necessary to embed some of the structures, processes and practices of the project into the organisation to ensure continuity after the project comes to an end. It will also be necessary to look at ways of continuing to motivate and support the Champions given the resources needed to effectively do this. It is also planned to build on the success of the Student Residences Energy Competition and run this again.

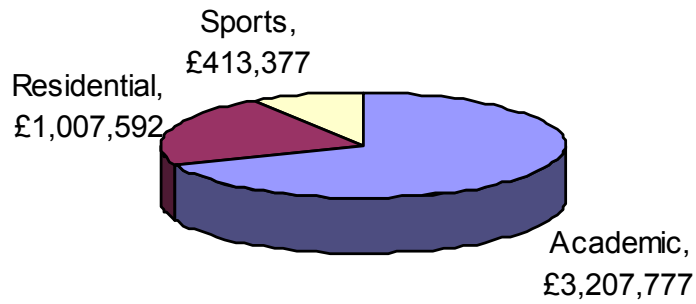
## 07/08 Utilities Totals

<b>GAS</b>	<b>kWh</b>	<b>kg CO<sub>2</sub></b>	<b>£</b>	
<b>On site</b>				
firm	21,931,961	4,254,801	£	525,223.91
interruptible (boiler house)	17,115,828	3,320,471	£	720,185.83
<b>total</b>	<b>39,047,790</b>	<b>7,575,271</b>	<b>£</b>	<b>1,245,410</b>
residential	6,751,066	1,309,707	£	197,810
non-residential	32,296,724	6,265,564	£	1,047,600
<b>Off site</b>				
residential	3,510,027	680,945	£	109,448
non-residential	485,151	94,119	£	14,988
Swindon	997,370	193,490	£	34,403
<b>total</b>	<b>4,992,547</b>	<b>968,554</b>	<b>£</b>	<b>158,839</b>
<b>total non-residential</b>	<b>32,781,874</b>	<b>6,359,684</b>	<b>£</b>	<b>1,062,587</b>
<b>total residential</b>	<b>10,261,093</b>	<b>1,990,652</b>	<b>£</b>	<b>307,258</b>
<b>overall total</b>	<b>43,042,967</b>	<b>8,350,336</b>	<b>£</b>	<b>1,369,846</b>
<b>ELECTRICITY</b>				
	<b>kWh</b>	<b>kg CO<sub>2</sub></b>	<b>£</b>	
<b>On site total</b>	<b>26,141,653</b>	<b>11,031,778</b>	<b>£</b>	<b>2,391,416</b>
residential	2,891,906	1,220,384	£	245,232
non-residential	23,249,747	9,811,393	£	2,146,184
self-generated (CHP)	250,311	105,631		
export (CHP)	0	0	£	-
<b>On site total (net import)</b>	<b>26,141,653</b>	<b>11,031,778</b>		<b>2,391,416</b>
<b>On site total consumed</b>	<b>26,391,964</b>	<b>11,137,409</b>		
<b>Off site</b>				
residential	1,728,075	729,248	£	145,700
non-residential	172,937	72,979	£	13,000
Swindon	241,364	101,856	£	26,676
<b>total</b>	<b>2,142,376</b>	<b>904,082</b>	<b>£</b>	<b>185,375</b>
<b>total non-residential</b>	<b>23,914,358</b>	<b>10,091,859</b>	<b>£</b>	<b>2,185,859</b>
<b>total residential</b>	<b>4,619,981</b>	<b>1,949,632</b>	<b>£</b>	<b>390,932</b>
<b>overall total imported</b>	<b>28,284,029</b>	<b>11,935,860</b>	<b>£</b>	<b>2,576,791</b>
<b>overall total consumed</b>	<b>28,534,340</b>	<b>12,041,491</b>	<b>£</b>	<b>2,576,791</b>
<b>WATER</b>				
	<b>m<sup>3</sup></b>	<b>Water £</b>	<b>Sewerage £</b>	
<b>On site total</b>	<b>284,491</b>	<b>£ 331,390</b>	<b>£</b>	<b>184,276</b>
residential	85,903	£ 97,871	£	55,447
non-residential	198,588	£ 233,519	£	128,830
<b>Off site</b>				
residential	53,592	£ 78,534	£	77,551
non-residential	3,326	£ 5,052	£	5,308
Swindon	1,954	£ 2,375	£	1,667
<b>total</b>	<b>58,871</b>	<b>£ 85,961</b>	<b>£</b>	<b>84,525</b>
<b>total non-residential</b>	<b>203,868</b>	<b>£ 238,571</b>	<b>£</b>	<b>134,137</b>
<b>total residential</b>	<b>139,495</b>	<b>£ 176,405</b>	<b>£</b>	<b>132,997</b>
<b>overall total</b>	<b>343,362</b>	<b>£ 414,976</b>	<b>£</b>	<b>267,135</b>

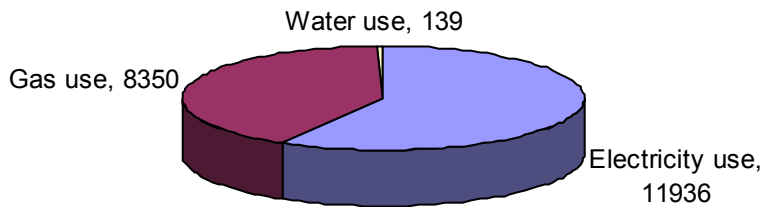
### 07/08 Utility Spend

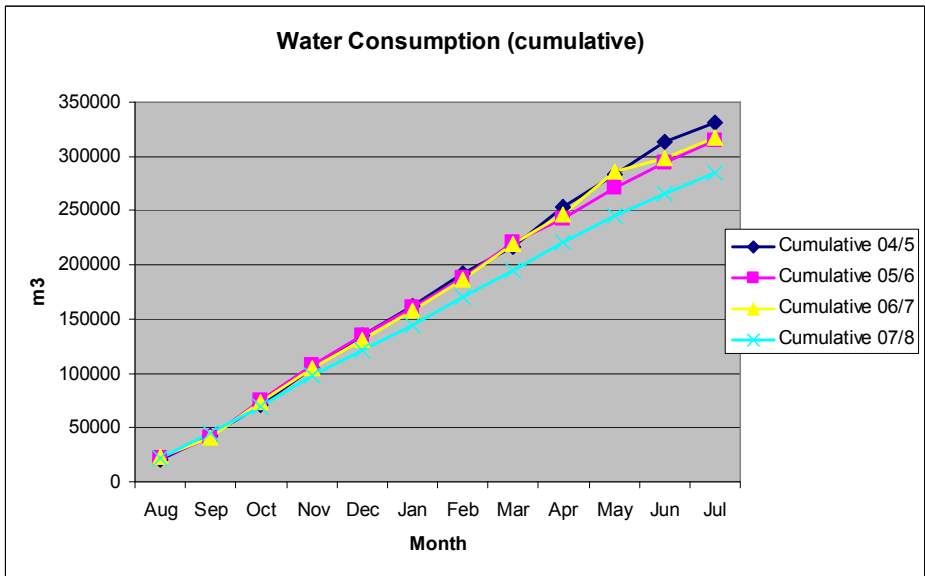
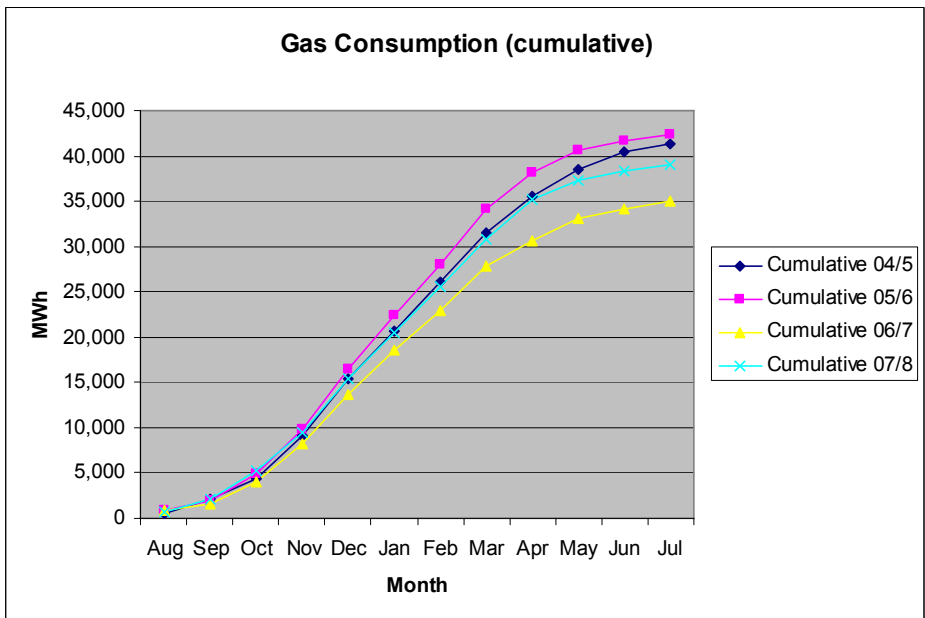
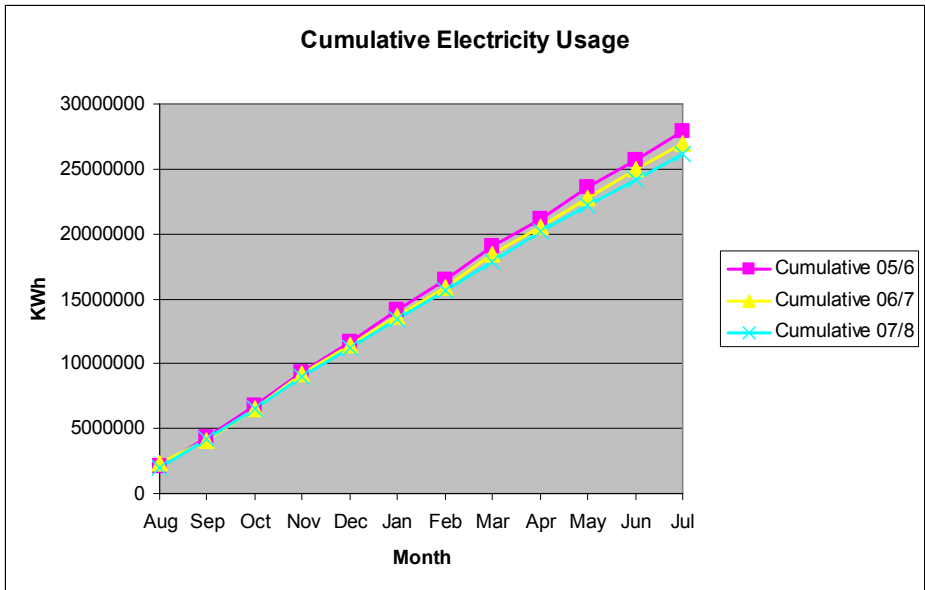


### 07/08 Utility Spend

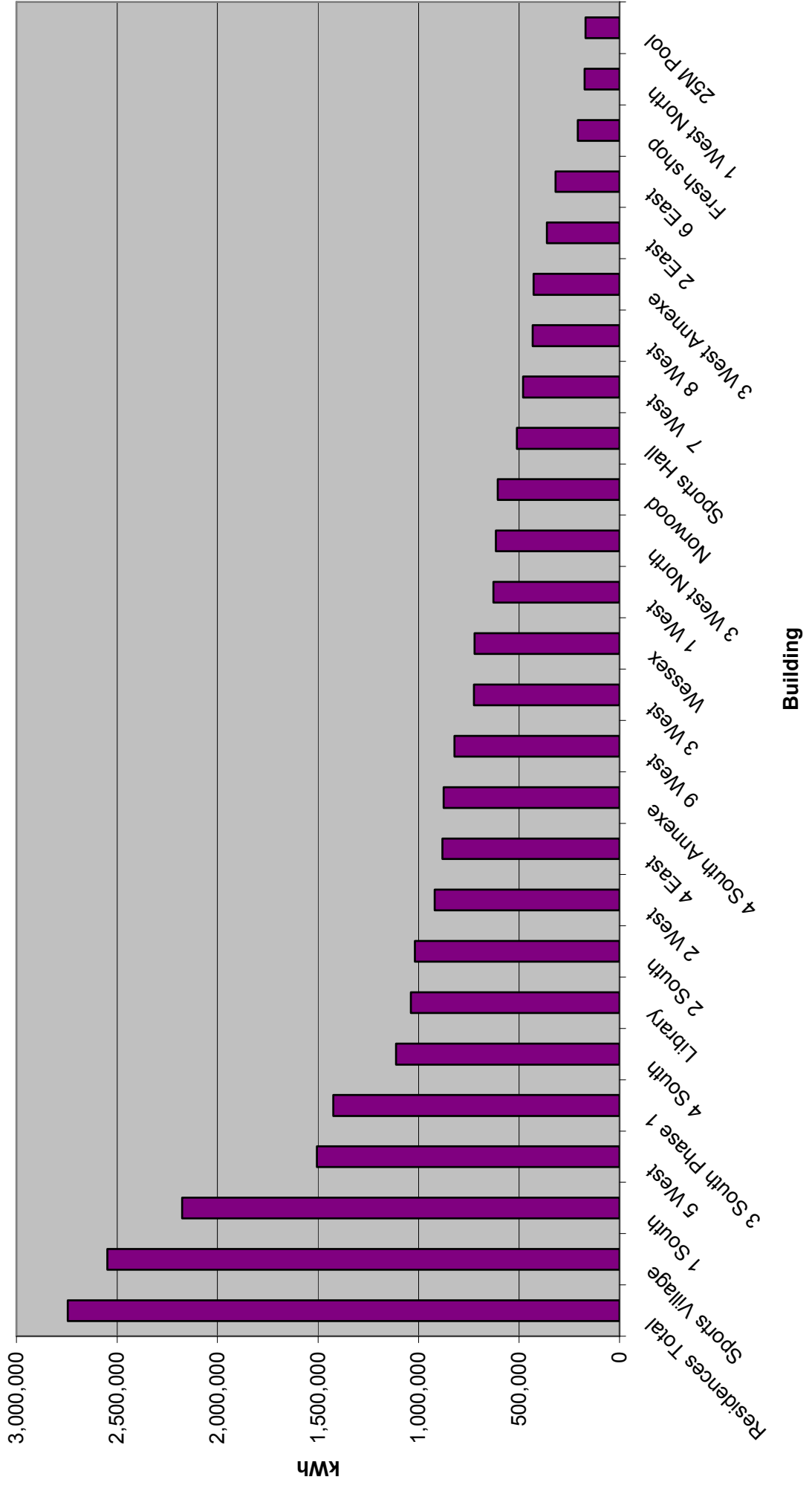


### CO2 emissions due to utility use (tonnes CO2)





**Top 25 Campus Buildings 07-08 Electricity Consumption**



Top 25 Campus Buildings 07/08 Electricity Consumption per m2 floor area

