

# **Energy Report**

**2007/8**

## **2007/8 Energy Report – Executive Summary**

In the last couple of years there have been frequent sensational headlines regarding world fossil fuel energy reserves, climate change and energy price increases. Over a relatively short period, public awareness and interest has been stimulated on an unprecedented scale.

The University has not been immune to these market issues, experiencing the most volatile price fluctuation in energy costs ever, with increases of 200% in oil, 225% in electricity and 250% in gas prices since August 2007.

For a number of years we have directly employed professional energy management resources within the Estate Office supplemented by regular external consultancy. These combined resources have delivered a managed proactive and systematic programme of best practice initiatives which have been reported annually in the Environment and Energy Reports.

The headline performance indicators from this year's report are as follows:-

### **Energy**

Actual total energy consumption increased by 8% year on year. When adjusted for the much cooler weather and the increased premises area, the like-for-like consumption shows a 0.5% reduction.

Weather-adjusted gas consumption was reduced by 2%, but electricity usage rose 4% despite savings being made at the Medical School. As a result, efforts will continue to be directed in this area, with initiatives such as November 2008's energy awareness campaign "You Have The Power" being launched as a response. Electricity sub-metering is also being improved to aid the targeting of future energy saving projects.

### **Water**

Total water consumption increased by 4%, due to rises at Sutton Bonington and Jubilee Campus. University Park consumption remained static.

### **Costs**

Overall utility costs including taxes rose by 44% to £10.84 million

### **Environmental**

Overall CO<sub>2</sub> Emissions were down by 8%, on top of last year's reduction of 39%, principally due to increased amounts of 'green' electricity being purchased.

### **Turnover**

Total utility costs are now 2.65% of turnover, just below 2005/6's record level of 2.67%.

### **Premises**

The overall premises Gross Internal Area (GIA) has increased by 1.0% compared to 06/07. The major new-build addition was the Sports Hall at Sutton Bonington. Note however that Biomolecular Sciences Phase 2, although completed in 2006/07, doubled its energy consumption in 2007/8, as this period reflected its first full year of occupation.

## **Notes to accompany Executive Summary**

The strategic management of energy is undertaken by the Environment Committee, chaired by the PVC for Infrastructure.

The membership of the Environment Committee for 2007/8 was as follows:-

Prof Alan Dodson	(AD)	PVC, Chair
Mr Chris Jagger	(CHJ)	Estate Office
Mr Tim Rudge	(TR)	Estate Office
Dr John Sutherland	(JS)	Safety Office
Ms Valerie Housley	(VH)	Information Services
Ms Chloe Cheeseman	(CC)	Student Union
Ms Karen Atwood	(KA)	School of Computer Science
Ms Rachel Greatrix	(RG)	School of Nursing
Prof Roy Haines Young	(RHY)	School of Geography
Dr Mandy Roshier	(MR)	School of Veterinary Science
Mr Martin Suthers	(MS)	Lay Member
Mr Gavin Scott	(GS)	Estate Office

As part of its strategy to control consumption and costs, the Environment Committee appoints an Energy Sub-Group to work in detail on particular areas of energy and water efficiency.

The terms of reference are to:-

- Promote energy conservation schemes which offer attractive payback periods
- Review the best long term strategies for energy provision, considering issues such as decentralisation and combined heat and power
- Continue to use innovative purchasing strategies to obtain the best value energy supply contracts
- Actively seek offers of 'green' electricity
- Liaise with our building users to ensure correct hours of operation of heating and ventilation systems are maintained
- Revisit controls settings in our existing buildings to optimise energy usage and reduce waste
- Explore opportunities for new and renewable energy technologies in new building developments
- Promote energy awareness campaigns throughout all of the University's buildings and Schools (see the website at <http://www.nottingham.ac.uk/estate/environment/>)

Note that most figures relate to the University's financial year of August 1<sup>st</sup> 2007 to July 31<sup>st</sup> 2008, with the baseline for comparison being the previous (2006/7) financial year. Utilities continue to be procured via Notice Ltd, which is a wholly owned subsidiary of the University of Nottingham.

# **2007/8 Energy Report**

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## **Introduction**

The annual energy report is produced to provide statistical information over a rolling three-year period. The data includes all of the University's UK building stock with the exception of student houses not located within our campuses.

It concentrates on three sections; the content in broad terms is:

### **Section 1 – Total Energy Report**

Covering total energy costs by campus, floor area (square metres), and full-time student numbers set against the total University turnover.

### **Section 2 – Analysis of Energy Components**

Covering the analysis of electricity, fossil fuels (gas and fuel oil) and water consumption and costs associated directly with the consumption.

### **Section 3 – Environmental Considerations**

Covering carbon dioxide emissions and how the climatic conditions in the East Midlands and weather data affect the required heating load for the University.

### **Section 4 – Appendices**

Covering the individual accounts billed for electricity, gas and water, plus a record of work undertaken during the year.

## **Section 1 – Total Energy Report**

### **1.A. - Energy and Water Costs Summary**

Energy and water costs reached a record high of £9.7 million in 2007/8, up 42% on the 2006/7 figure. The University continued to purchase energy on 'flexible' month-ahead contracts, but was not immune to the background of steadily rising world energy prices, where raw energy prices virtually tripled.

The average price of the University's electricity rose by 39% across the year, and gas was up 36%. Additionally, overall energy consumption rose 8% due to the colder weather – as can be seen later in the report, the temperature was 17.5% cooler over the period.

<b>Energy and Water Costs</b>					<b>Change</b>
	<b>2004/5</b>	<b>2005/6</b>	<b>2006/7</b>	<b>2007/8</b>	<b>'07/8 to '06/7</b>
University Park	£ 3,043,972	£ 4,697,358	£ 3,844,450	£ 5,545,621	44%
Sutton Bonington	£ 725,387	£ 1,149,584	£ 960,900	£ 1,416,933	47%
Jubilee Campus	£ 379,587	£ 530,352	£ 513,198	£ 703,870	37%
Others	£ 292,862	£ 486,098	£ 465,405	£ 641,467	38%
Medical School	£ 1,026,500	£ 1,378,232	£ 1,055,068	£ 1,414,542	34%
<b>Total</b>	<b>£ 5,468,308</b>	<b>£ 8,241,624</b>	<b>£ 6,839,021</b>	<b>£ 9,722,433</b>	<b>42%</b>

Figure 1.A.1 Table of energy and water costs for last 3 years split by campus.

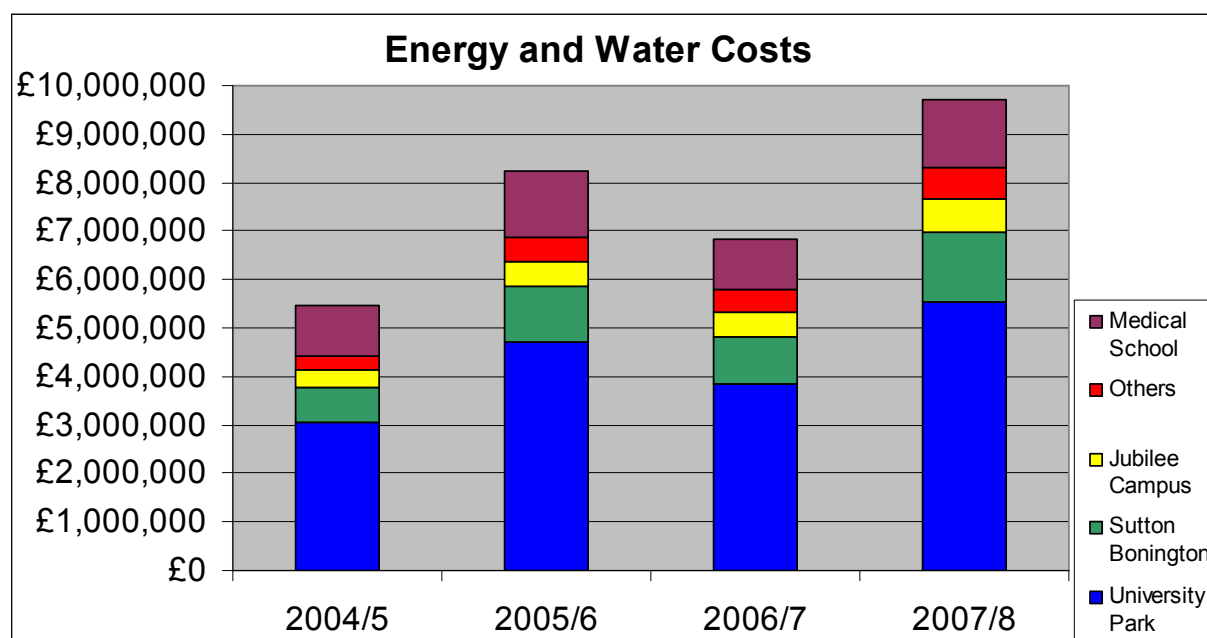


Figure 1.A.2 Graph of energy and water costs for the last 4 years split by campus.

Note that these figures exclude VAT and Climate Change Levy, which are discussed on page 7.

## 1.B. – Utility costs per square metre for each Campus

Campus Costs	Floor Area	Cost/sq.m/annum			
		Electricity	Heating	Water	Total
University Park	310,823	£11.28	£4.16	£2.40	£17.84
Sutton Bonington	55,086	£15.72	£6.29	£3.71	£25.72
Jubilee Campus	46,395	£8.92	£2.39	£3.86	£15.17
Others	40,451	£11.20	£3.54	£1.12	£15.86
Medical School	50,188	£11.31	£15.28	£1.59	£28.18
<b>Total</b>	<b>502,943</b>	<b>£11.55</b>	<b>£5.29</b>	<b>£2.49</b>	<b>£19.33</b>

Figure 1.B.1 Table of energy costs per square metre, split by campus.

The overall floor area increased by 1.0% from 2006/7.

Jubilee Campus has 22% lower costs per square metre than the average; this is of course because of the high energy efficiency of the new buildings there. The highest costs are at the Medical School (45% above average); this is due to the relatively poor thermal efficiency of the heating and cooling systems, the high steam price within the NHS Trust charges, and the unusual building construction with large voids between floors. Our efficiency efforts have been concentrated at the Medical School, which was 72% above the mean two years ago. Sutton Bonington is also relatively high (33% above the mean) because of its elderly heating system, high concentration of laboratory buildings and large numbers of glasshouses.

Note that if taxes (VAT and CCL, see below) are taken into account, our average utility costs are now £21.55 per square metre per annum.

## 1.C - Climate Change Levy and VAT

The total amount of CCL paid by Notice Ltd during 2007/8 was £93,000, almost all of it for gas. This was £9,000 less than last year, reflecting the first full financial year with all of the major buildings on 'green' electricity.

In the majority of tables in this report VAT is also not included. However for completeness some tables have VAT shown where indicated.

If the taxes were included in the total expenditure on utilities the totals can be seen below:-

	2007/8				2006/7
	Electricity	Fossil Fuels	Water	Totals	Totals
Energy Costs	£ 5,807,429	£ 2,661,998	£ 1,253,006	£ 9,722,433	£6,839,021
Climate Change Levy	£ 610	£ 92,378	-	£ 92,988	£102,059
Value Added Tax	£ 601,382	£ 421,910	-	£ 1,023,292	£608,200
<b>Total</b>	<b>£ 6,409,421</b>	<b>£ 3,176,286</b>	<b>£ 1,253,006</b>	<b>£ 10,838,713</b>	£7,549,280

Figure 1.C.1 Table of energy and water costs including Climate Change Levy and Value Added Tax.

The Climate Change Levy (CCL) was introduced in April 2001. This is an energy tax of 0.154p/kWh on gas and 0.479p/kWh on the electricity costs of all non-residential properties, although 'green' electricity is exempt. As mentioned in section 3.A, buying 'green electricity' substantially reduces our CO<sub>2</sub> emissions, but at a financial cost. This is because CCL (and the VAT on the CCL) can be reclaimed on research and residential buildings, but the equivalent costs of buying green cannot be reclaimed. This difference adds around another £120,000 to the annual cost of buying 'green'.

### 1.D - 2007/2008 Costs Broken Down by Campus and Utilities

Energy and Water Costs	Electricity	Fossil Fuels	Water	Total
University Park	£ 3,506,636	£ 1,294,418	£ 744,567	£ 5,545,621
Sutton Bonington	£ 866,220	£ 346,546	£ 204,167	£ 1,416,933
Jubilee Campus	£ 414,014	£ 110,910	£ 178,946	£ 703,870
Others	£ 453,064	£ 143,077	£ 45,326	£ 641,467
Medical School	£ 567,495	£ 767,047	£ 80,000	£ 1,414,542
<b>Total</b>	<b>£ 5,807,429</b>	<b>£ 2,661,998</b>	<b>£ 1,253,006</b>	<b>£ 9,722,433</b>

Figure 1.D.1 Table of energy and water costs split by campus and by utility

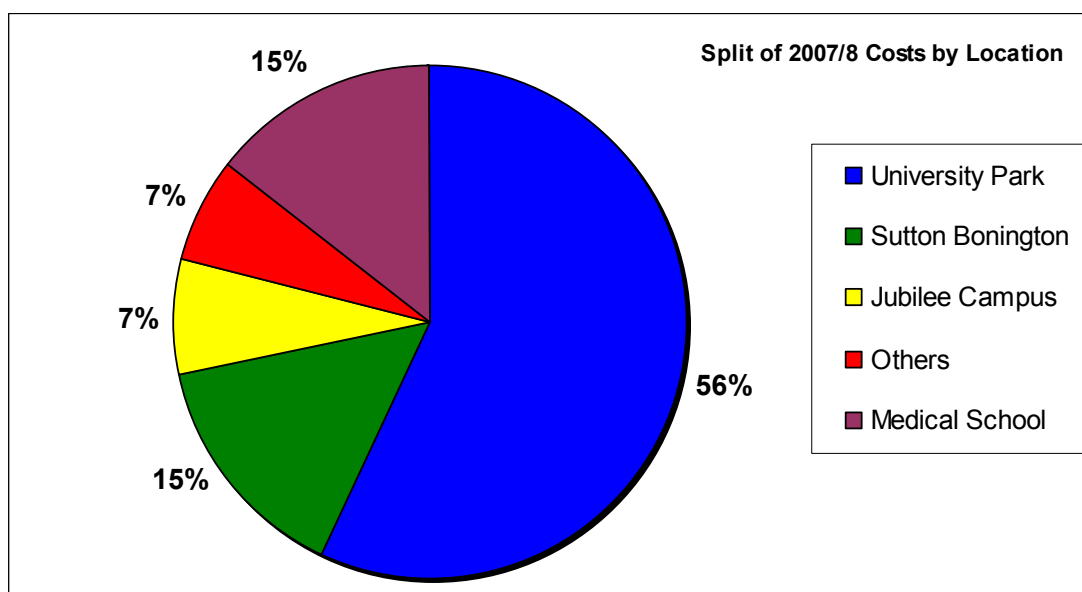


Figure 1.D.2 Chart of energy and water costs split by campus

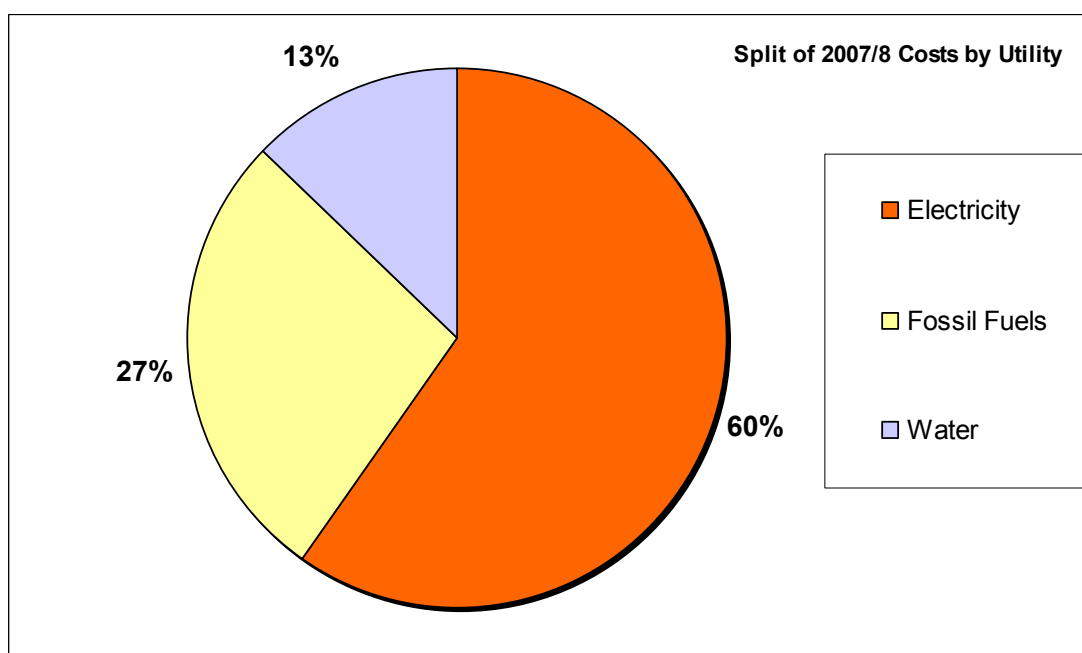


Figure 1.D.3 Chart of energy and water costs split by utility type



## 1.E - Energy Use Summary

Overall energy consumption increased by 8% in 2007/8, the first rise for three years. However, if the effect of the much cooler weather and the increase in floor area (up 1%) are considered, then a final consumption of 200.3MWh could have been expected, so a small saving of 0.5% was actually achieved. The cooler weather should have increased fossil fuel usage by 13%.

Overall the pattern of reduced fossil fuel usage being offset by increasing electrical usage has been continued. Notable amongst the individual building figures are that good economies were made at the Medical School due to BMS controls projects installed in 2006/7. There was an increase in consumption at the libraries in line with the new twenty-four hour opening for exams. We also saw energy consumption at the halls of residence increase by a similar amount to non-residential premises.

Energy Consumption	MWh	MWh	MWh	MWh	Change
	2004/5	2005/6	2006/7	2007/8	'07/8 to '06/7
University Park	116,269	109,088	102,232	111,718	9%
Sutton Bonington	26,706	25,818	26,000	28,605	10%
Jubilee Campus	10,396	9,939	9,553	10,742	12%
Others	10,404	10,544	10,607	11,812	11%
Medical School	34,150	36,516	35,738	36,403	2%
<b>Total</b>	<b>197,925</b>	<b>191,905</b>	<b>184,130</b>	<b>199,279</b>	<b>8%</b>

Figure 1.E.1 Table of energy usage for the last 3 years split by campus.

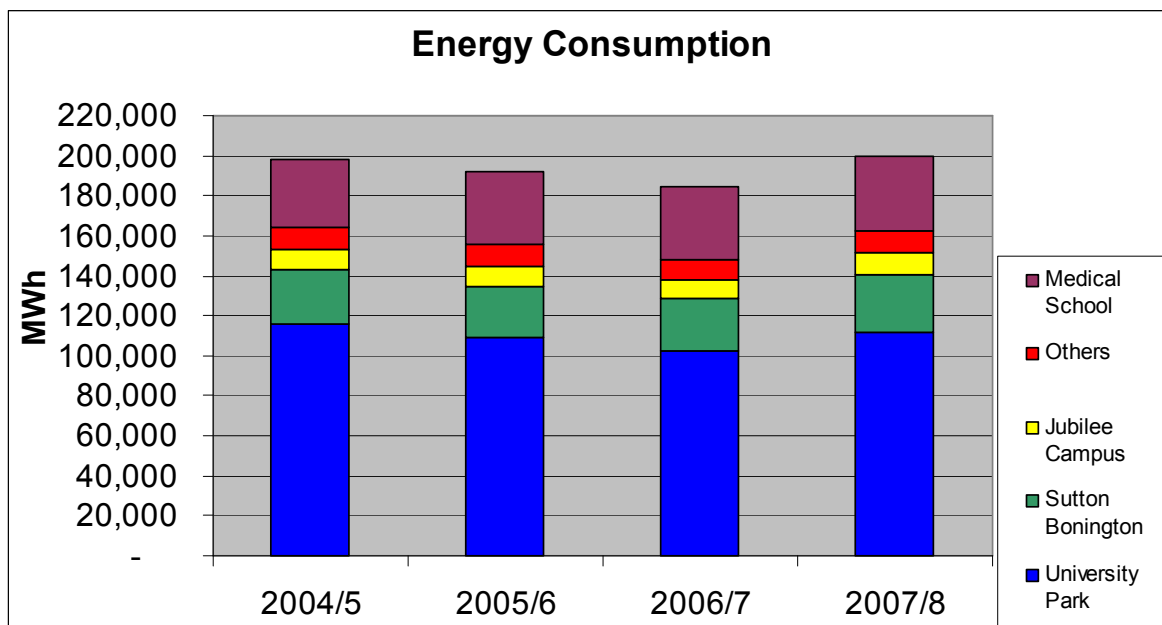


Figure 1.E.2 Graph of energy consumption for the last 4 years split by campus

### 1.F - Energy Use Breakdown by Campus and Utilities

Energy Consumption 2007/2008	MWh	MWh	MWh
	Electricity	Fossil Fuels	Total
University Park	46,046	65,671	111,718
Sutton Bonington	11,073	17,531	28,605
Jubilee Campus	5,279	5,463	10,742
Others	5,148	6,664	11,812
Medical School	10,121	26,282	36,403
<b>Total</b>	<b>77,667</b>	<b>121,611</b>	<b>199,279</b>

Figure 1.F.1 Table of energy consumption for 2005/6 split by campus and by utility

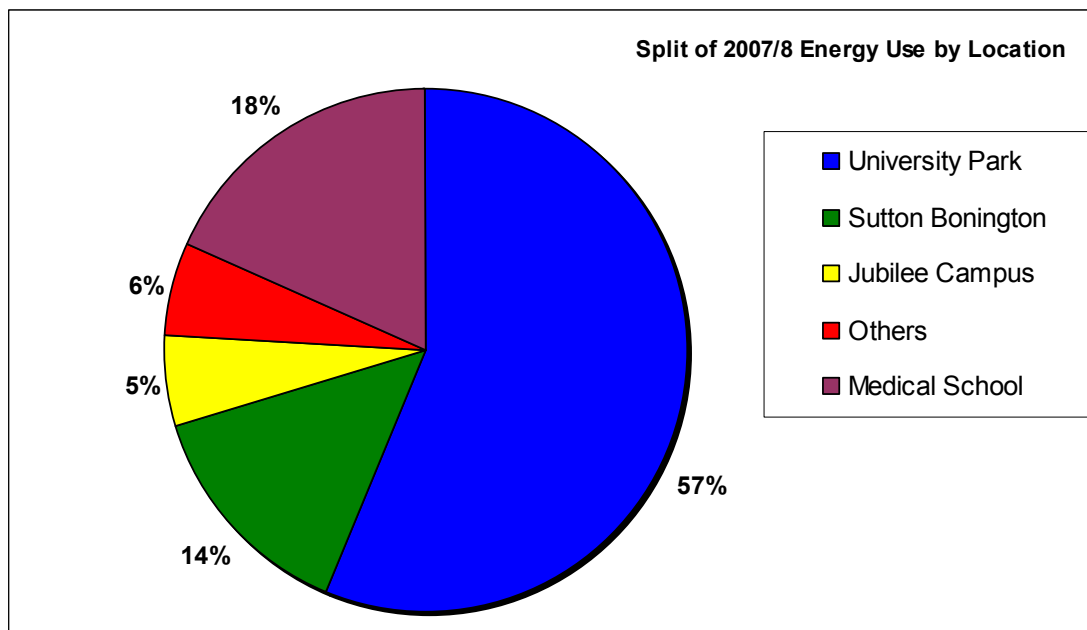


Figure 1.F.2 Pie chart of energy consumption split by campus

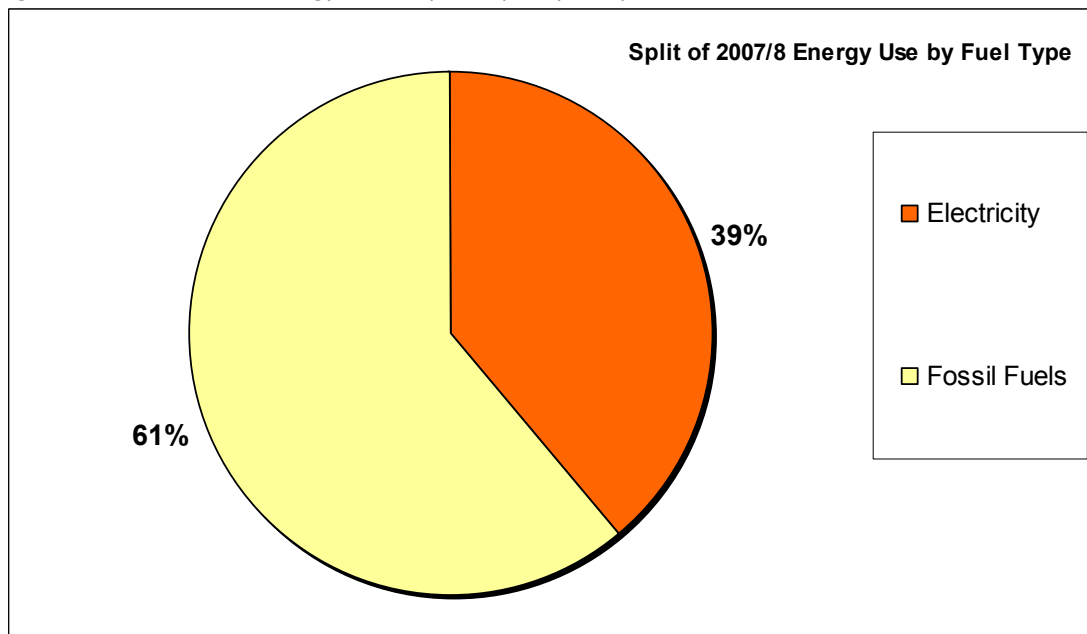


Figure 1.F.3 Pie chart of energy consumption split by utility type.  
Note: Our 'fossil fuels' comprise 99.5% gas and 0.5% gasoil

## 1.G - Energy Usage and Cost Comparison with Gross Premises Area

	2004/5	2005/6	2006/7	2007/8	Change
Floor Area (sq.m.)	465,769	482,144	498,088	502,943	1.0%
Annual Energy Usage (MWh)	197,924	191,905	184,130	199,279	8.2%
<b>Energy Usage Per sq. m.</b>	<b>425</b>	<b>398</b>	<b>370</b>	<b>396</b>	<b>7.2%</b>

Figure 1.G.1 Table of last four years energy usage and floor area.

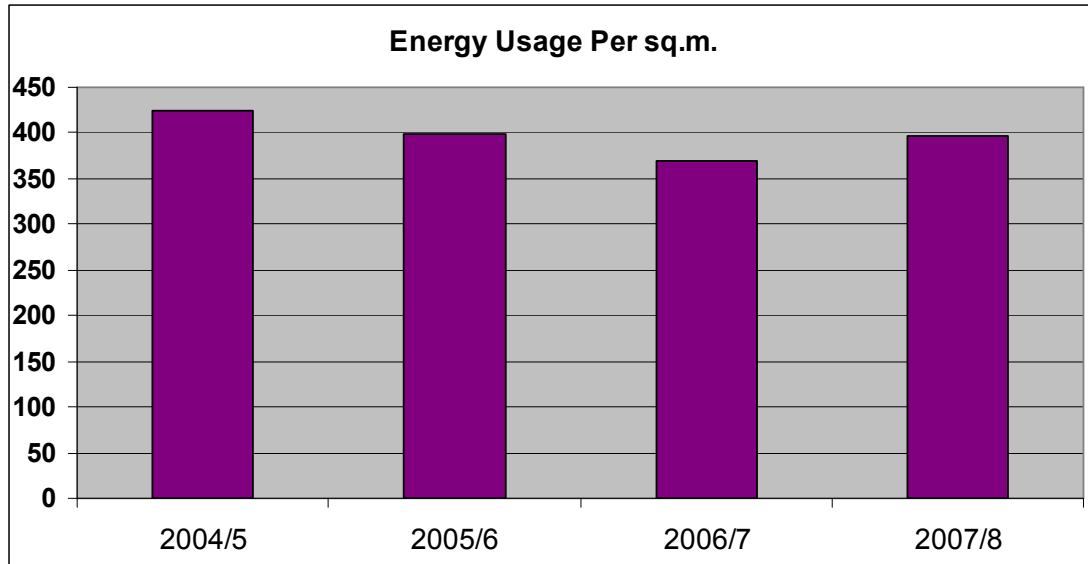


Figure 1.G.2 Graph of last four years energy usage per unit floor area.

	2004/5	2005/6	2006/7	2007/8	Change
Floor Area (sq.m.)	465,769	482,144	498,088	502,943	1.0%
Energy and Water Costs	£ 5,468,308	£ 8,241,624	£ 6,839,021	£ 9,722,433	42.2%
<b>Utility Cost Per sq. m.</b>	<b>£ 11.74</b>	<b>£ 17.09</b>	<b>£ 13.73</b>	<b>£ 19.33</b>	<b>40.8%</b>

Figure 1.G.3 Table of last four years energy and water costs and floor area (excluding taxes).

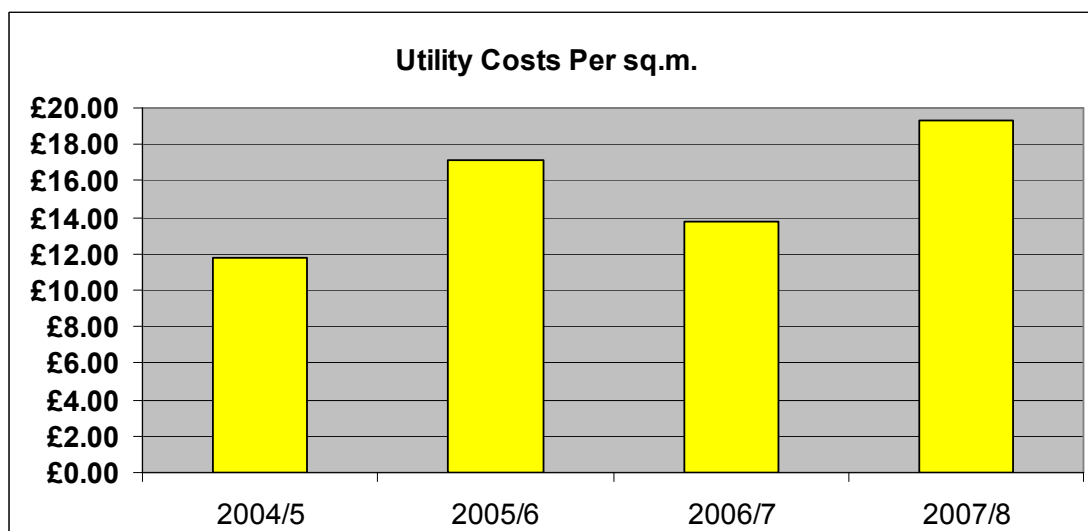


Figure 1.G.4 Graph of last four years energy and water costs normalised by floor area.

## 1.H - Energy Usage and Cost per FT Student

	2004/5	2005/6	2006/7	2007/8	'07/8 to '06/7
FT Student Numbers	23,740	24,680	25,308	25,745	1.7%
Annual Energy (MWh)	197,924	191,905	184,130	199,279	8.2%
<b>Energy / Student (kWh)</b>	<b>8,337</b>	<b>7,776</b>	<b>7,276</b>	<b>7,740</b>	<b>6.4%</b>

Figure 1.H.1 Table of last four years energy usage and full-time student numbers.

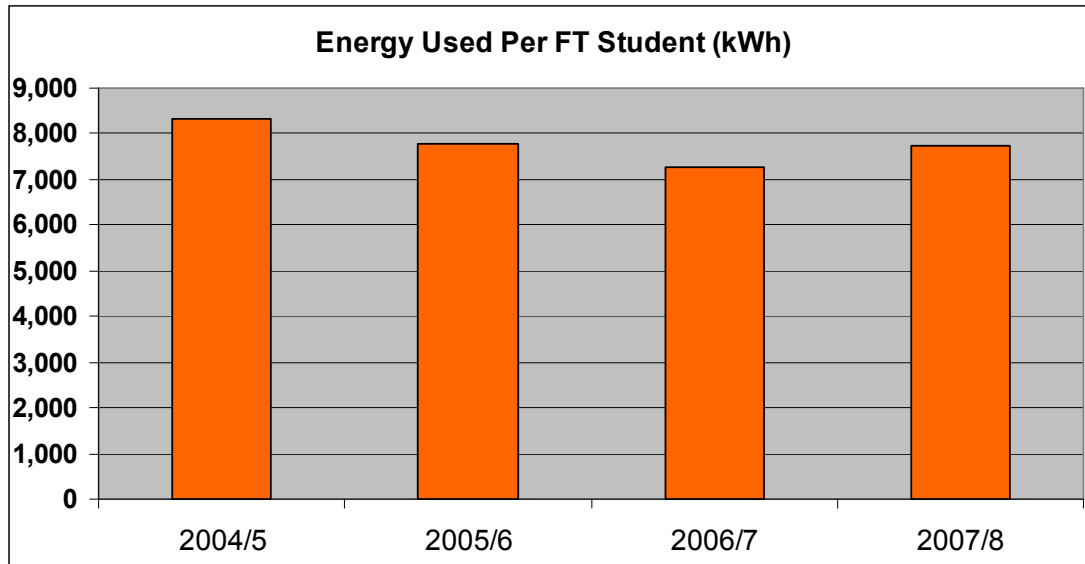


Figure 1.H.2 Graph of last four years energy usage per full-time student.

	2004/5	2005/6	2006/7	2007/8	'07/8 to '06/7
FT Student Numbers	23,740	24,680	25,308	25,745	1.7%
Energy and Water Costs	£ 5,468,308	£ 8,241,624	£ 6,839,021	£ 9,722,433	42.2%
<b>Utility Costs / Student</b>	<b>£ 230.34</b>	<b>£ 333.94</b>	<b>£ 270.23</b>	<b>£ 377.64</b>	<b>39.7%</b>

Figure 1.H.3 Table of last four years energy and water costs and full-time student numbers.

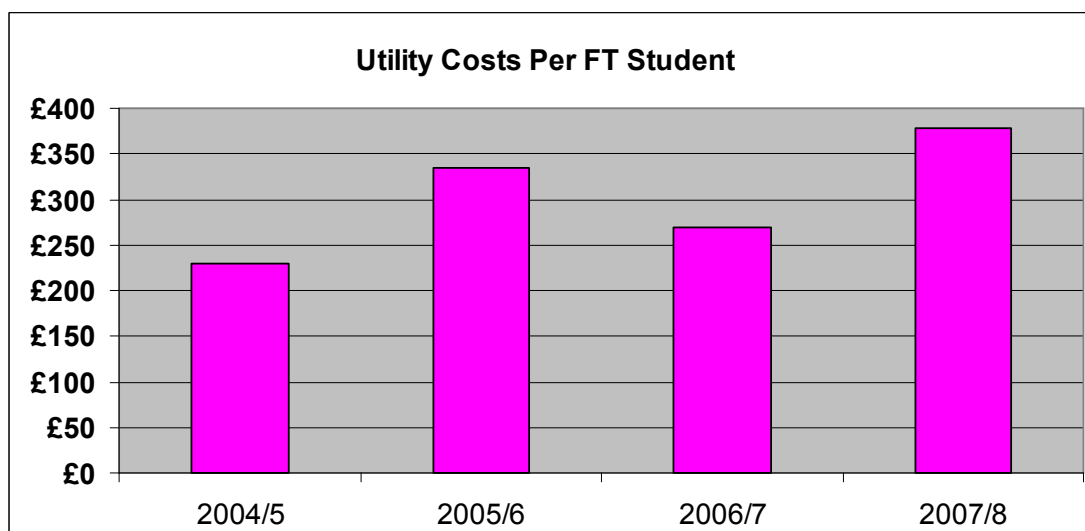


Figure 1.H.4 Graph of last four years energy and water costs per full-time student.

Note: The statistics on student numbers exclude students not currently studying in Nottingham.

## 1.I - Utility Costs as a Proportion of University Turnover

Percentage of Turnover (£ 000)	2004/5	2005/6	2006/7	2007/8	Change '07/8 to '06/7
Utility Costs inc. taxes	£ 6,156	£ 9,465	£ 7,549	£ 10,839	43.6%
Total University Turnover	£ 326,400	£ 353,944	£ 383,351	£ 409,354	6.8%
Percentage	1.89%	2.67%	1.97%	2.65%	34.5%

Figure 1.I.1 Table of last four years energy and water costs (including taxes) and total University turnover.

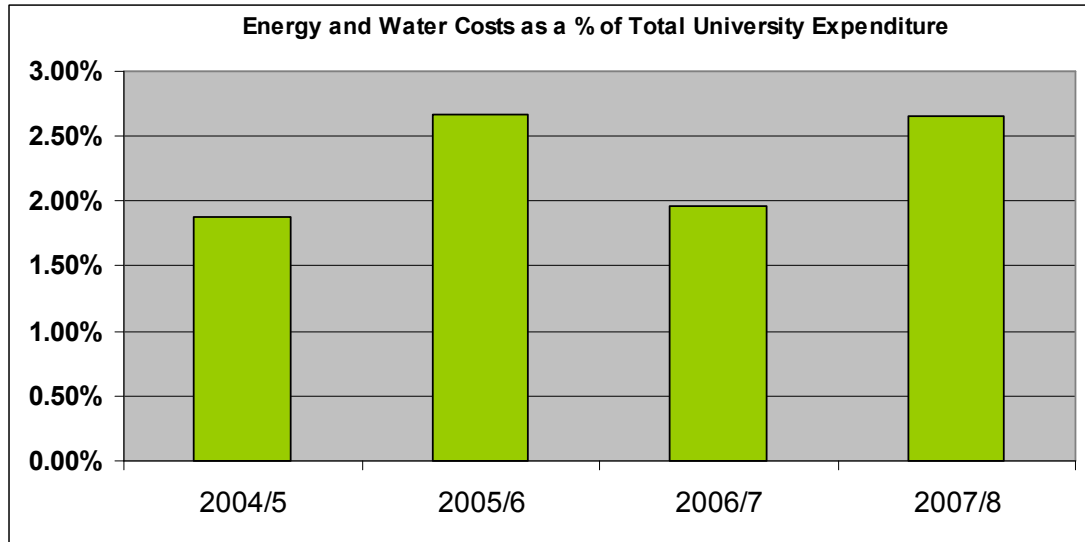


Figure 1.I.2 Graph of last four years energy and water costs normalised by total University turnover.

## 1.J – Comparison to Russell Group Universities – 2006/7

	Energy use/ student (kWh)	Energy/sq.m (kWh/sq.m GIA) non- residential	Utility Costs/ income(%)
Imperial College	14333	385	2.38
Edinburgh	8453	388	2.30
Oxford	7360	343	1.37
Birmingham	7109	475	2.20
King's College London	6961	417	1.79
Cambridge	6776	291	1.14
U.C.L.	6516	340	1.68
Liverpool	6425	319	2.61
Warwick	6231	440	1.86
Newcastle Upon Tyne	5373	320	2.38
Manchester	5277	306	1.66
Glasgow	5164	337	2.06
Bristol	5065	381	2.48
<b>Nottingham</b>	<b>4825</b>	<b>384</b>	<b>2.08</b>
Southampton	4430	392	2.21
Sheffield	3657	272	1.93
Leeds	3224	221	2.25
L.S.E	2886	313	1.57
Queen's University Belfast	2884	255	1.73
Cardiff	2514	233	2.17

Figure 1.J.1 Table of Estates Management Statistics for the 2006/7 financial year.

The statistics in table 1.J.1 provide a range of comparators to other major Universities, as reported in the EMS returns for 2006/7. Note that this is the most recent year where data is available for comparison, but is one year behind the most recent information presented elsewhere in this report.

Energy use per m<sup>2</sup> at Nottingham is on the high side compared to other institutions in the Russell Group (being 7<sup>th</sup> highest); this in part reflects the higher utilisation of space at Nottingham. Non-residential space per student is just 12.6m<sup>2</sup> at Nottingham, compared to an average of 14.8m<sup>2</sup> for the Russell Group (excluding London institutions, Oxford, and Cambridge). This difference of approximately 15% represents a more intensively used estate.

Utility costs as a percentage of income for Nottingham has fallen from the 05/06 high of 3.0% to 2.08% - this compares favourably to other institutions' average of 2.09% (Russell Group excluding London institutions, Oxford, and Cambridge). The amount paid per kWh for energy at Nottingham was 3.7 pence against an average of 4.4 pence. The year 06/07 saw a sharp decline in utility costs from the extremely high costs in 05/06.

## **Section 2 – Analysis of Energy Components**

### **2.A - Electricity Consumption**

After the pause in electricity consumption growth during 2006/7, usage was again on the increase, up 4% on the year. With the exception of the Medical School, where savings were made as a result of better controlling the constant temperature pumps, consumption was up about 5% everywhere else.

The majority of this growth is not weather-related (as we have only a small amount of electric heating), but is primarily due to longer opening hours in many buildings.

Electricity Consumption	MWh	MWh	MWh	Change	Floor Area (m2)
	2005/6	2006/7	2007/8	'07/8 to '06/7	
University Park	44,380	43,784	46,046	5%	310,823
Sutton Bonington	10,475	10,536	11,073	5%	55,086
Jubilee Campus	4,912	5,047	5,279	5%	46,395
Others	4,134	4,727	5,148	9%	40,451
Medical School	10,204	10,328	10,121	-2%	50,188
<b>Total</b>	<b>74,105</b>	<b>74,422</b>	<b>77,667</b>	<b>4%</b>	

Figure 2.A.1 Table of electricity usage for the last 3 years split by campus.

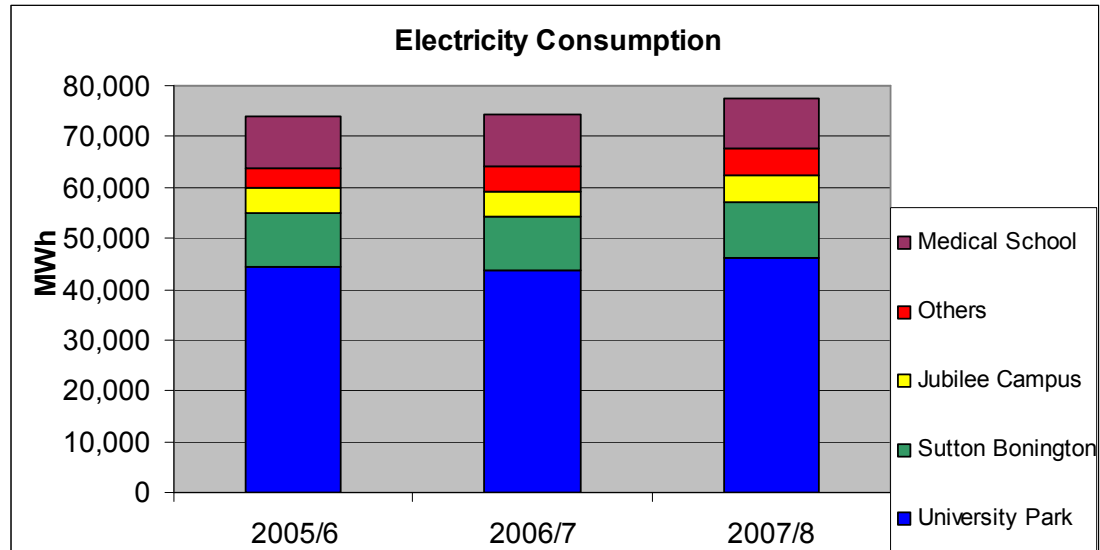


Figure 2.A.2 Graph of electricity usage for the last 3 years split by campus.

See Appendix A for a detailed breakdown of consumption on an account by account basis.

## 2.B - Electricity Costs

The University continued with the flexible purchasing policy first adopted in October 2005, meaning that energy for the main sites was bought monthly rather than annually. During 2006/7 we were able to benefit from the large falls in energy prices that occurred between September 2006 and February 2007. The average price for electricity was 5.38p/kWh across the financial year. However, electricity prices rose strongly from August 2007 right up to August 2008 due to rising world oil prices and gas shortages within the UK. As a result, the average price paid for electricity rose to 7.48p/kWh (up 39%) for the last financial year.

The tender for the University's 'sub-100kW' sites (representing 36 smaller properties, such as sports grounds) was awarded to Eon to commence April 1<sup>st</sup> 2008. As prices were rising rapidly and were expected to fall, a stop-gap 6 month summer contract was taken. Even though the price of summer electricity is significantly lower than an annual contract, the unit price averaged 7.443p/kWh, up from 7.013p/kWh for the previous two years price.

Electricity Costs				Change
	2005/6	2006/7	2007/8	'07/8 to '06/7
University Park	£ 2,522,336	£ 2,278,818	£ 3,506,636	54%
Sutton Bonington	£ 614,473	£ 564,816	£ 866,220	53%
Jubilee Campus	£ 300,457	£ 280,469	£ 414,014	48%
Others	£ 286,388	£ 305,536	£ 453,064	48%
Medical School	£ 463,000	£ 572,510	£ 567,495	-1%
<b>Total</b>	<b>£ 4,186,654</b>	<b>£ 4,002,149</b>	<b>£ 5,807,429</b>	<b>45%</b>

Figure 2.B.1 Table of electricity costs for the last 3 years split by campus.

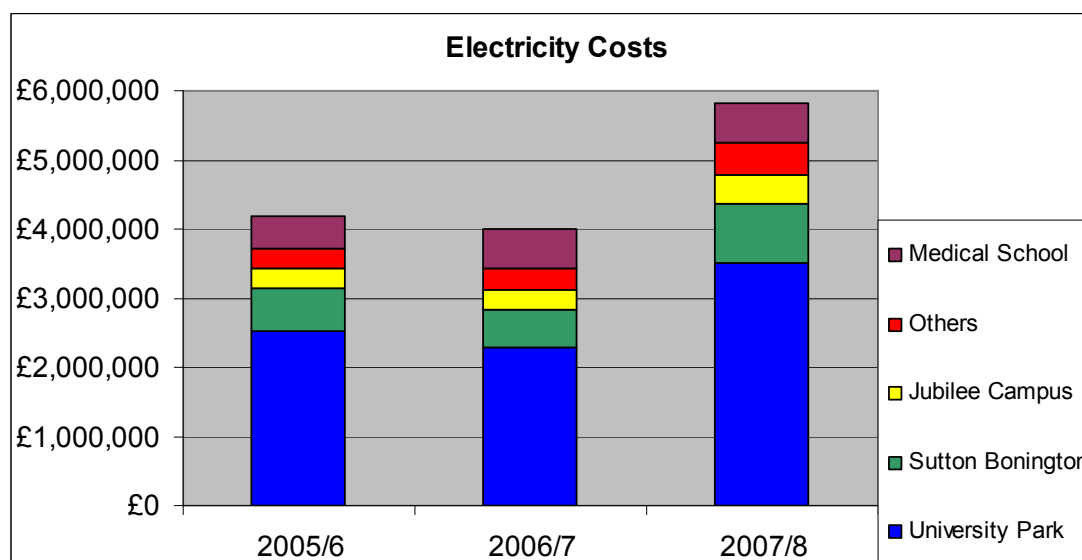


Figure 2.B.2 Graph of electricity costs for the last 3 years split by campus.



## 2.C - Fossil Fuel Consumption

Consumption of fossil fuels rose by 11% in 2007/8. This was actually a good performance in light of the much colder weather experienced during the period; the decrease in temperature indicating that increases averaging 13% could have been predicted.

Useful savings of around 9% were made at the Medical School as a result of the BMS heating controls installed during 2006/7.

Although new-build was not a major factor during the year – Sutton Bonington Sports Hall at 180 MWh being the only brand new addition – Biomolecular Sciences Phase 2 did almost double its gas usage to 1,822 MWh as the building had its first year of full use. Usage at Jubilee Campus was disproportionately high as the hours of opening increased in several buildings.

Fossil Fuel Consumption	MWh	MWh	MWh	Change	Floor Area (m <sup>2</sup> )
	2005/6	2006/7	2007/8	'07/8 to '06/7	
University Park	64,708	58,448	65,671	12%	310,823
Sutton Bonington	15,343	15,463	17,531	13%	55,086
Jubilee Campus	5,027	4,506	5,463	21%	46,395
Others	6,410	5,880	6,664	13%	40,451
Medical School (Steam)	26,312	25,410	26,282	3%	50,188
<b>Total</b>	<b>117,800</b>	<b>109,708</b>	<b>121,611</b>	<b>11%</b>	

Figure 2.C.1 Table of fossil fuel usage for the last 3 years split by campus.

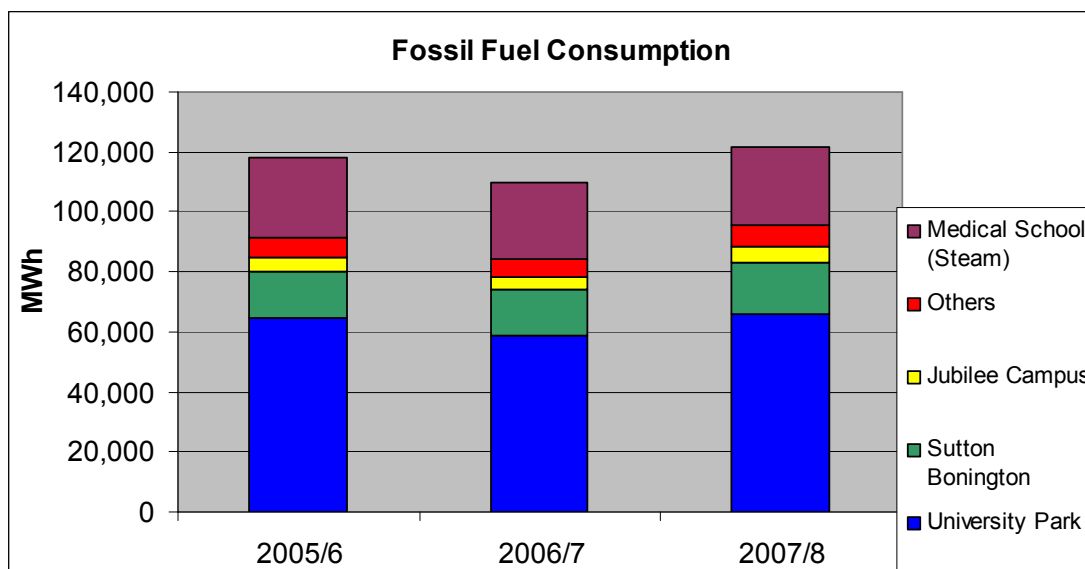


Figure 2.C.2 Graph of fossil fuel usage for the last 3 years split by campus.

See Appendix B for additional information showing a detailed breakdown of consumption on each account.

## 2.D - Fossil Fuel Costs

The University continued with the flexible purchasing policy first adopted in October 2005, meaning that energy for the main sites was bought monthly rather than annually. During 2006/7 we were able to benefit from the large falls in energy prices that occurred between September 2006 and February 2007. The average price for gas was 1.61p/kWh across the financial year. However, gas prices rose strongly from August 2007 right up to August 2008 due to rising world oil prices and gas shortages within the UK. As a result, the average price paid for gas rose to 2.19p/kWh (up 36%) for the last financial year.

Note that the cost per unit of steam at the Medical School – which is a pass-through cost from the NHS Trust – increased disproportionately, although their electricity costs (see 2.B.) actually declined.

Fossil Fuel Costs	2005/6	2006/7	2007/8	Change '07/8 to '06/7
University Park	£ 1,507,478	£ 921,632	£ 1,294,418	40%
Sutton Bonington	£ 349,059	£ 242,356	£ 346,546	43%
Jubilee Campus	£ 116,892	£ 76,186	£ 110,910	46%
Others	£ 148,485	£ 107,072	£ 143,077	34%
Medical School (Steam)	£ 849,032	£ 417,046	£ 767,047	84%
<b>Total</b>	<b>£ 2,970,946</b>	<b>£ 1,764,292</b>	<b>£ 2,661,998</b>	<b>51%</b>

Figure 2.D.1 Table of fossil fuel costs for the last 3 years split by campus.

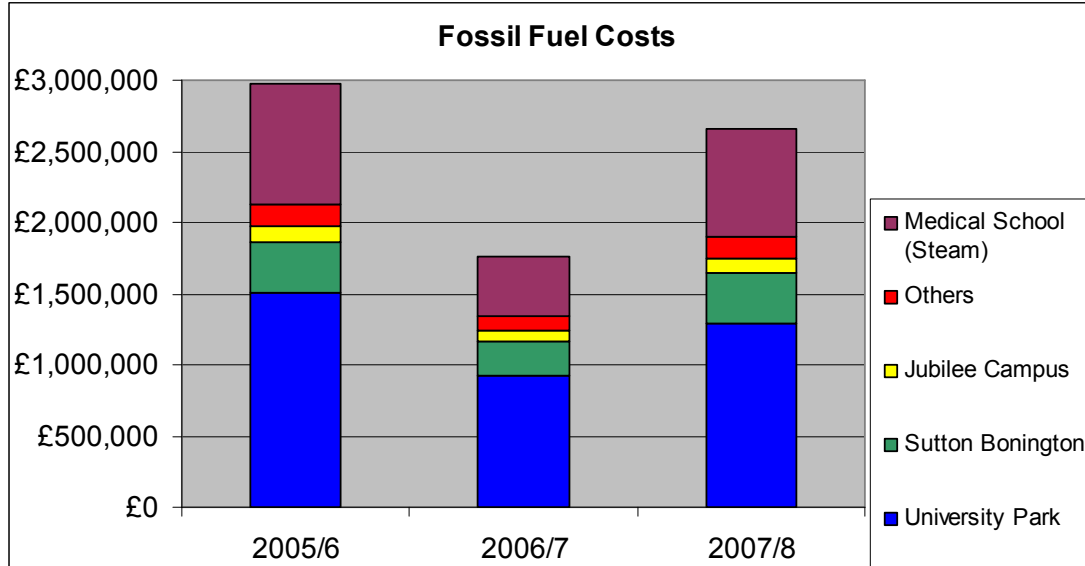


Figure 2.D.2 Graph of fossil fuel costs for the last 3 years split by campus.

Note: 'Firm' gas is the standard gas supply used by the majority of smaller buildings in the UK. However many larger installations use an 'interruptible' supply. Whilst this is slightly cheaper, Transco reserve the right to stop the supply for several days a year, forcing users to switch to an alternative fuel source, such as oil.

## 2.E - Water Consumption

Water consumption increased by 4% in 2007/8, due primarily to increases at Sutton Bonington. The Sutton Bonington increase is thought to be principally down to leaks on the mains, several of which were identified and repaired over the year. A programme of leakage detection work will be undertaken in 2009 to ensure that this is controlled.

Note that total water consumption was 925,590 cubic metres in 2004/5, 24% higher than the current level.

Water Consumption	cubic m.	cubic m.	cubic m.	Change	Floor Area (m2)
	2005/6	2006/7	2007/8	'07/8 to '06/7	
University Park	546,497	473,754	475,458	0%	310,823
Sutton Bonington	162,052	102,870	134,277	31%	55,086
Jubilee Campus	76,534	75,818	84,037	11%	46,395
Others	22,987	20,940	11,841	-43%	40,451
Medical School	43,118	43,628	41,862	-4%	50,188
<b>Total</b>	<b>851,188</b>	<b>717,010</b>	<b>747,475</b>	<b>4%</b>	

Figure 2.E.1 Table of water usage for the last 3 years split by campus.

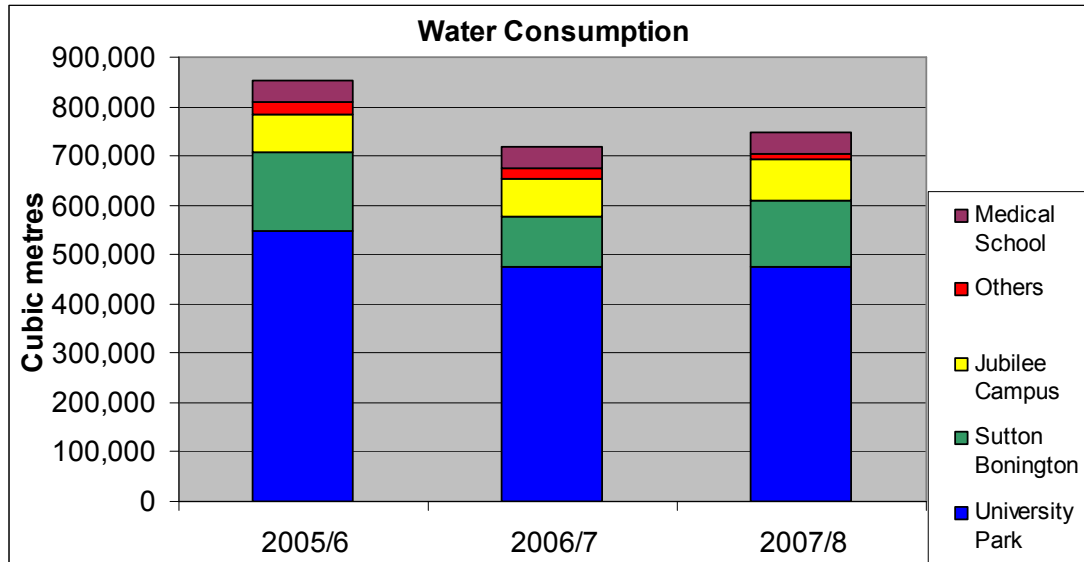


Figure 2.E.2 Graph of water usage for the last 3 years split by campus.

See Appendix C for a detailed breakdown of consumption on an account by account basis.

## 2.F - Water Costs

Severn Trent increased their prices for water supply and sewerage by around 7.5% in April 2007, on top of the previous year's rise of 16%. This meant that although overall consumption was up by only 4%, the cost increase in our financial year 2007/8 worked out much higher.

The price of water plus sewerage at smaller sites was increased by a further 4.7% in April 2008 from £1.94/m<sup>3</sup> to £2.0321/m<sup>3</sup>. At University Park (ECO 250 Tariff), the price of winter water rose 3.0% in April 2008 from 41.16p/m<sup>3</sup> to 42.38p/m<sup>3</sup>. Summer water (May to September) also rose 3.0%, from 76.83p/m<sup>3</sup> to 76.83 p/m<sup>3</sup>. Sewerage rates were up 2.6%, from 73.16 p/m<sup>3</sup> to 75.06p/m<sup>3</sup>.

Surface water drainage, which is usually based on site area, went up 2.8 % from April 2008.

Water Costs				Change
	2005/6	2006/7	2007/8	'07/8 to '06/7
University Park	£ 667,544	£ 644,000	£ 744,567	16%
Sutton Bonington	£ 186,052	£ 153,728	£ 204,167	33%
Jubilee Campus	£ 113,003	£ 156,543	£ 178,946	14%
Others	£ 51,225	£ 52,797	£ 45,326	-14%
Medical School	£ 66,200	£ 65,512	£ 80,000	22%
<b>Total</b>	<b>£ 1,084,024</b>	<b>£ 1,072,580</b>	<b>£ 1,253,006</b>	<b>17%</b>

Figure 2.F.1 Table of water costs for the last 3 years split by campus.

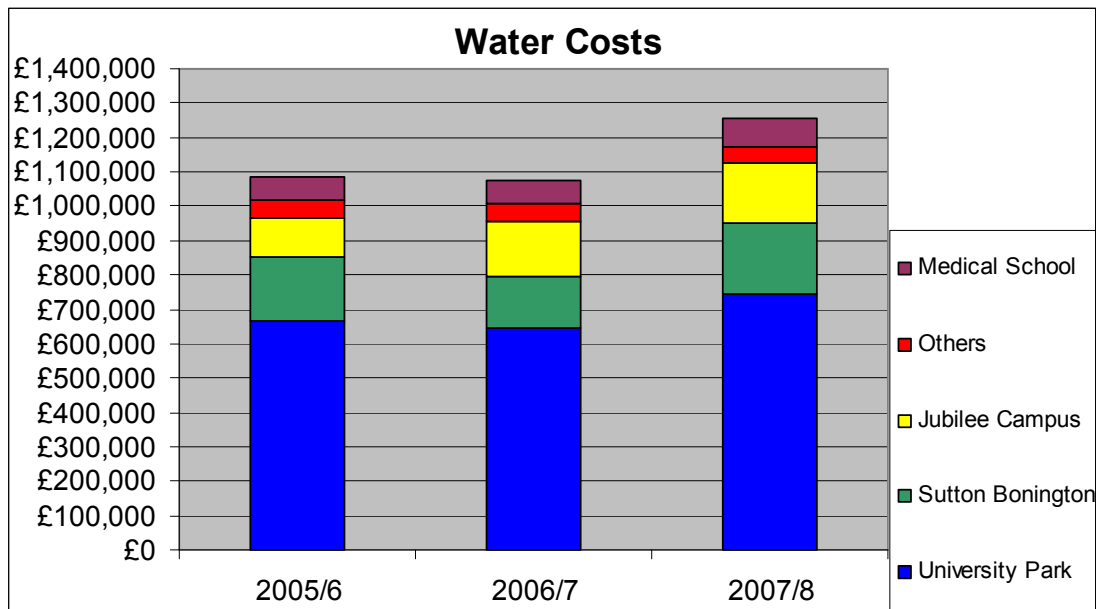


Figure 2.F.2 Graph of water costs for the last 3 years split by campus.

## Section 3 – Environmental Considerations

### 3.A - Carbon Dioxide Emissions

Overall emissions of carbon dioxide from all sources fell again during 2007/8, as a full year's worth of 'green' renewable electricity from Gaz de France was included rather than ten months worth in 2006/7. See section 1.C regarding the additional tax costs of buying renewable green electricity.

University Park was included in the EU Emissions Trading Scheme Phase 1 – the calendar year of 2007 was the third year of operation of the Scheme. The University beat its target of 13,569 Tonnes by 2,325 Tonnes (17.1%), emitting 11,244 Tonnes of CO<sub>2</sub> from the campus. Note that this scheme only covers fossil fuel emissions from University Park and covers the calendar year, unlike the tables and graphs here which show the University's financial year.

CO2 Emissions	Tonnes	Tonnes	Tonnes	Change	Floor Area (m2)
	2005/6	2006/7	2007/8	'07/8 to '06/7	
University Park	28,419	14,243	12,478	-12%	310,823
Sutton Bonington	6,721	3,693	3,331	-10%	55,086
Jubilee Campus	2,740	1,552	1,361	-12%	46,395
Others	2,640	2,015	1,739	-14%	40,451
Medical School	8,509	8,381	8,475	1%	50,188
<b>Total</b>	<b>49,030</b>	<b>29,883</b>	<b>27,384</b>	<b>-8%</b>	

Figure 3.A.1 Table of CO<sub>2</sub> emissions for the last 3 years split by campus.

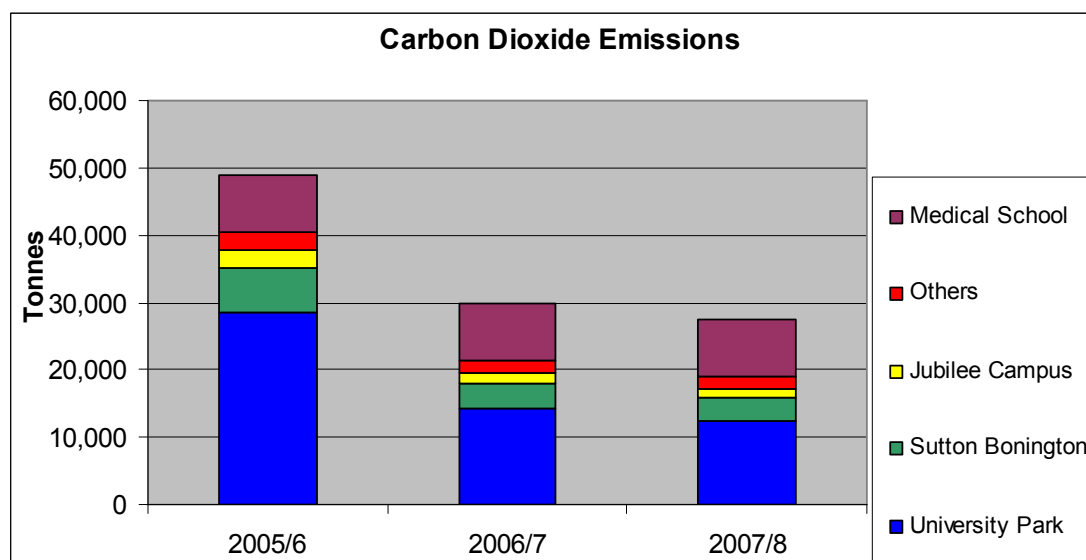


Figure 3.A.2 Graph of CO<sub>2</sub> emissions for the last 3 years split by campus.

Conversion factors used are supplied to us by the Carbon Trust - units are Tonnes of Carbon Dioxide emitted per MWh of energy consumed. Note that DEFRA (the Department for Environment, Food and Rural Affairs) are now recommending that for electricity a constant conversion value is used until 2010, although real emissions vary year on year due to the different mix of fuels used in power stations nationally.

Carbon Dioxide (CO<sub>2</sub>) is released into the atmosphere when fossil fuels are burned, and is considered the most important of the 'greenhouse' gases – gases that are thought to be responsible for a man-made warming of the atmosphere. The UK government has a target of reducing national CO<sub>2</sub> emissions by 12.5% from 1990 levels by 2010.

### 3.B - Carbon Dioxide Emissions Breakdown by Campus and Utilities

CO2 Emissions	Tonnes	Tonnes	Tonnes
2007/2008	Electricity	Fossil Fuels	Total
University Park	-	12,478	12,478
Sutton Bonington	-	3,331	3,331
Jubilee Campus	323	1,038	1,361
Others	473	1,266	1,739
Medical School	3,482	4,994	8,475
<b>Total</b>	<b>4,278</b>	<b>23,106</b>	<b>27,384</b>

Figure 3.B.1 Table of CO<sub>2</sub> emissions split by campus and by utility

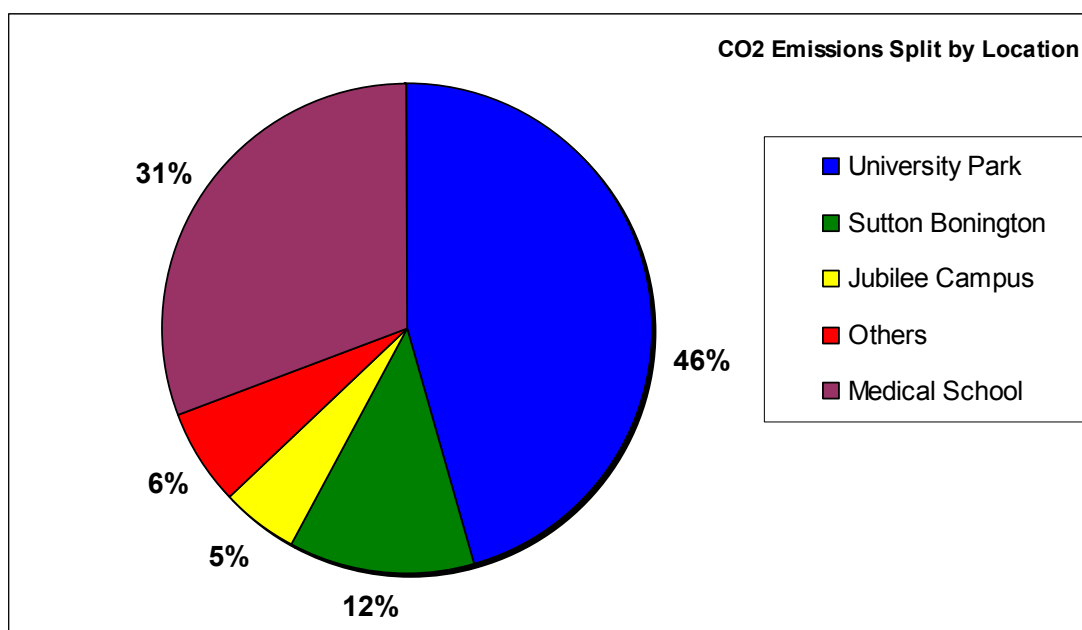


Figure 3.B.2 Chart of CO<sub>2</sub> emissions split by campus

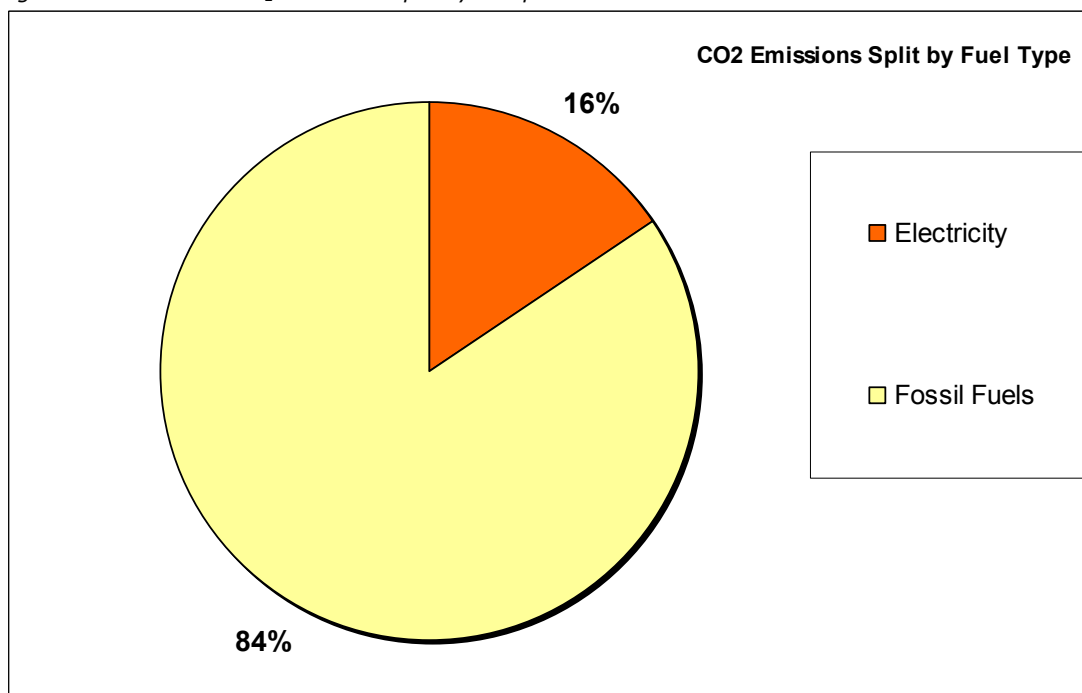


Figure 3.B.3 Chart of CO<sub>2</sub> emissions split by source fuel type

### 3.C - Weather Data – Degree Days

Using this year's degree day information indicates consumption of fossil fuels should have increased by about 13%, as 2007/8 was significantly cooler than 2006/7. For the purposes of this report, 75% of the change in degree days has been used, as production of domestic hot water typically accounts for about 25% of usage.

Degree days are determined by comparing the mean daily temperature to a set temperature, in this case 15.5 Celsius. For instance, a day where the outside temperature averaged 5.0C would be counted as 10.5 degree days. The values are summated over a calendar month and the total provides a reasonably accurate guide as to the relative heating load that should be required.

	Deg. Days 20 Yr Avg	Deg. Days 2005-06	Deg. Days 2006-07	Deg. Days 2007-08	'06/7 to '05/6 Change
Aug	35	33	27	35	29.6%
Sep	76	52	24	66	175.0%
Oct	162	90	88	136	54.5%
Nov	270	280	227	246	8.4%
Dec	338	345	295	331	12.2%
Jan	362	353	269	275	2.2%
Feb	312	328	272	300	10.3%
Mar	283	337	264	299	13.3%
Apr	217	215	133	233	75.2%
May	137	114	127	102	-19.7%
Jun	74	43	49	65	32.7%
Jul	35	12	32	36	12.5%
<b>Total</b>	<b>2,301</b>	<b>2,202</b>	<b>1,807</b>	<b>2,124</b>	<b>17.5%</b>
			<b>Weather modifier (75%)</b>		<b>13.2%</b>

Figure 3.C.1 Table showing last three years monthly degree days and average degree days.

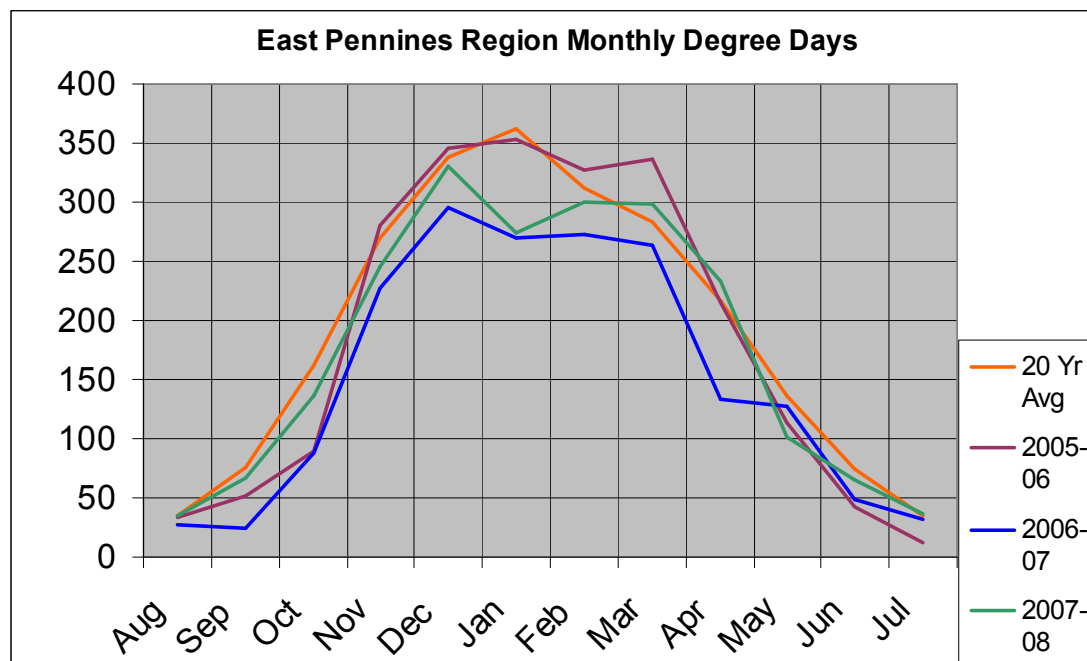


Figure 3.C.2 Graph showing last three years monthly degree days and average degree days

## Section 4 – Appendices

### 4.A - Appendix A – Electricity Data

Electricity Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change	
Main Campus		kWh	kWh	kWh	£	£	£	
University Park	1000	45,983,960	43,712,298	5%	£3,500,649	£2,273,184	54%	OK
Lenton Eaves Cottage No.2	1464	35,683	35,219	1%	£3,061	£2,699	13%	OK
Lenton Lodge	2251	18,700	29,282	-36%	£2,000	£2,244	-11%	Est
Lenton Eaves Cottage No.1	1464	7,100	6,310	13%	£726	£547	33%	OK
Redcourt Lodge	2222	900	1,048	-14%	£200	£144	39%	Jul Est
<b>Total of 5 accounts</b>	<b>Totals</b>	<b>46,046,343</b>	<b>43,784,157</b>	<b>5%</b>	<b>3,506,636</b>	<b>2,278,818</b>	<b>54%</b>	
Electricity Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change	
Sutton Bonington		kWh	kWh	kWh	£	£	£	
Sutton Bonington Campus	6800	10,627,338	10,036,282	6%	£811,274	£527,690	54%	OK
New Dairy		300,000	330,497	-9%	£40,000	£25,039	60%	Est
Eviton House (68 College Road)	5891	35,923	50,000	-28%	£2,658	£3,000	-11%	OK
Melton Lane Building A	5433	18,000	29,431	-39%	£2,000	£2,255	-11%	Est
St.Michael's Flats Nos 8&9	6843	17,000	17,153	-1%	£2,000	£1,274	57%	Est
St.Michael's House (Flats 1-5)	6841	17,000	16,900	1%	£1,000	£650	54%	OK
St.Michael's Flats Nos 6&7	6842	11,000	10,947	0%	£1,300	£838	55%	Est
Manor Farm NU Press 2	6910	8,300	11,576	-28%	£1,400	£926	51%	Est
44 College Road	6814	7,587	2,551	197%	£683	£250	173%	OK
24 College Road	6805	6,747	4,230	60%	£665	£367	81%	OK
Manor Farm NU Press 1	6910	6,000	6,172	-3%	£800	£524	53%	Est
50 College Road	6819	4,059	4,407	-8%	£442	£380	16%	OK
St.Michael's Close (Flats 10-15)	6840	4,000	4,137	-3%	£500	£361	39%	Est
New Dairy Herdsman's House		3,072	2,338	31%	£462	£309	50%	OK
40 College Road	6811	2,828	4,491	-37%	£339	£386	-12%	OK
45 College Road	6815	2,323	5,246	-56%	£195	£439	-56%	OK
Bunny Park Farm	6860	2,000	8	24900%	£200	£13	1438%	Est
Manor Farm 3 Pump House Kingst	6910	0	0	n/a	£156	£64	144%	Est
Manor Farm Soar Irrig. Pump Kegw	6910	0	0	n/a	£146	£51	186%	Est
<b>Total of 20 accounts</b>	<b>Totals</b>	<b>11,073,177</b>	<b>10,536,366</b>	<b>5%</b>	<b>£866,220</b>	<b>£564,816</b>	<b>53%</b>	
Electricity Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change	
Jubilee Campus		kWh	kWh	kWh	£	£	£	
Jubilee Campus	7000	4,357,201	4,140,523	5%	£339,594	£226,592	50%	
Newark & Southwell Halls	7000	752,472	735,642	2%	£56,696	£39,862	42%	
Jubilee Sports Centre	7301	169,128	171,043	-1%	£17,724	£14,015	26%	
<b>Total of 3 accounts</b>	<b>Totals</b>	<b>5,278,801</b>	<b>5,047,208</b>	<b>5%</b>	<b>£414,014</b>	<b>£280,469</b>	<b>48%</b>	
Electricity Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change	
Others		kWh	kWh	kWh	£	£	£	
King's Meadow Campus	6901	2,973,529	2,516,639	18%	£235,718	£161,569	46%	
Clinical Sciences (City Hospital)	3325	1,000,000	1,046,165	-4%	£110,000	£69,000	59%	
Derby Medical School	3561	842,869	831,339	1%	£70,457	£49,948	41%	
14-22 Shakespeare Street	6101	87,000	87,629	-1%	£10,000	£6,586	52%	Est
Unit 8, Edison Village (Synergy Hou	6891	31,592	26,897	17%	£2,619	£1,866	40%	
Sports Ground - Highfields	6311	30,000	30,596	-2%	£3,700	£2,342	58%	Est
Unit 6, William Lee Buildings	6883	28,000	28,855	-3%	£3,500	£2,205	59%	Est
Unit 5, William Lee Buildings	6885	27,000	27,913	-3%	£3,300	£2,142	54%	Est
Unit 8, William Lee Buildings	6884	25,000	25,541	-2%	£3,000	£1,971	52%	Est
Cumber Lodge	6900	23,470	24,975	-6%	£1,943	£1,964	-1%	
Boat House	6321	20,000	20,000	0%	£1,900	£1,200	58%	Est
Grove Farm - Old Farmhouse	6121	17,000	17,429	-2%	£2,100	£1,362	54%	Est
8 Peachey Street	6102	16,000	16,375	-2%	£2,000	£1,283	56%	Est
Grove Farm	6123	16,000	16,474	-3%	£2,000	£1,291	55%	Est
Grove Farm - Changing Rooms	6122	10,672	9,973	7%	£827	£807	2%	
<b>Total of 15 accounts</b>	<b>Totals</b>	<b>5,148,132</b>	<b>4,726,800</b>	<b>9%</b>	<b>£453,064</b>	<b>£305,536</b>	<b>48%</b>	
Electricity Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change	
Medical School		kWh	kWh	kWh	£	£	£	
Medical School		7,933,327	8,006,364	-1%	£454,311	£451,645	1%	Jul 07 estd
Embedded Units (Q.M.C.)		2,187,665	2,321,387	-6%	£113,184	£120,865	-6%	Jul 07 estd
<b>Totals</b>	<b>Totals</b>	<b>10,120,992</b>	<b>10,327,751</b>	<b>-2%</b>	<b>£567,495</b>	<b>£572,510</b>	<b>-1%</b>	



## 4.B - Appendix B – Fossil Fuel Data

Gas Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change
Main Campus		kWh	kWh	kWh	£	£	£
Central Heating Station	1000	29,277,699	26,407,559	11%	£550,390	£392,939	40%
Rutland Hall & Sherwood Hall	2191	2,925,496	2,836,231	3%	£77,325	£64,650	20%
Hugh Stewart Hall	2181	2,567,048	2,099,392	22%	£50,907	£32,798	55%
Cripps Hall	2171	2,448,481	2,175,787	13%	£48,299	£34,104	42%
Derby Hall	2121	1,858,442	1,782,678	4%	£36,503	£28,933	26%
Bio-Molecular Sci Ph.2	1353	1,822,161	939,220	94%	£40,884	£13,327	207%
Bio-Molecular Sci Ph.1	1353	1,685,619	1,413,794	19%	£33,211	£22,835	45%
Lenton & Wortley Hall	2141	1,675,591	1,522,367	10%	£32,927	£23,968	37%
Nightingale Hall	2161	1,649,550	1,513,115	9%	£32,551	£23,880	36%
Swimming Pool	1571	1,631,493	1,090,421	50%	£31,762	£16,828	89%
Willoughby Hall	2211	1,540,767	1,360,967	13%	£29,962	£21,745	38%
Lincoln Hall	2151	1,423,083	1,446,353	-2%	£28,052	£23,427	20%
Florence Boot Hall	2131	1,134,588	992,943	14%	£22,405	£15,883	41%
Boots Science Building	1581	1,123,223	837,792	34%	£21,829	£12,956	68%
Ancaster Hall	2101	970,947	945,751	3%	£19,077	£15,474	23%
Cavendish Hall	2111	949,001	1,013,551	-6%	£18,669	£16,429	14%
Tower, MRI etc	1271	947,690	1,078,416	-12%	£18,501	£17,600	5%
Jesse Boot Conference Centre	1481	918,797	852,521	8%	£18,647	£12,652	47%
Institute of Hearing Research	1401	866,781	882,602	-2%	£16,652	£13,552	23%
Trent Building, Law & Social Sci etc	1101	675,055	574,344	18%	£13,484	£9,543	41%
Sports Centre, Main Campus	1221	666,558	532,031	25%	£13,414	£8,730	54%
Arts Centre & School of Music	1501	542,891	462,640	17%	£10,596	£7,413	43%
Staff Club Lenton Mount	1181	513,402	478,010	7%	£10,085	£7,399	36%
Wolfson Building	1421	463,012	399,565	16%	£9,097	£6,479	40%
Lenton Firs - Built Environment	1431	428,418	408,571	5%	£8,453	£7,130	19%
Lenton Hurst	2411	408,679	231,199	77%	£8,098	£3,924	106%
D.H.Lawrence Lakeside Pavilion	1631	356,210	321,743	11%	£7,023	£5,189	35%
MMMEM (Production Engineering)	1371	338,337	167,657	102%	£6,919	£2,707	156%
Cripps Hall	2171	306,878	305,495	0%	£5,980	£4,556	31%
Redcourt	2221	286,257	297,295	-4%	£5,495	£4,852	13%
Cripps Health Centre	1231	258,603	240,858	7%	£5,021	£3,719	35%
Innovative Technology Research C	1641	240,586	272,871	-12%	£6,723	£5,395	25%
Portland Building	1111	232,367	165,951	40%	£4,634	£2,705	71%
New Studio (Built Environment)	1439	209,098	152,679	37%	£4,329	£2,358	84%
Lenton Grove (History)	1211	177,522	103,334	72%	£3,510	£1,923	83%
Sherwood Hall	2200	176,860	176,135	0%	£3,521	£2,749	28%
Lenton Close Annexe (Cripps Hall)	2175	145,142	164,530	-12%	£2,840	£2,694	5%
Paton House (Built Env.)	1441	133,336	141,697	-6%	£2,490	£2,217	12%
Lenton & Wortley Hall	2141	117,098	141,380	-17%	£2,289	£2,055	11%
Lenton Eaves (UNSSC)	1461	111,632	116,513	-4%	£2,708	£2,336	16%
Cavendish Hall Extension	2115	108,655	104,044	4%	£2,090	£1,526	37%
Lincoln Hall	2151	108,635	119,388	-9%	£2,149	£1,890	14%
Rutland Hall Extension	2195	103,993	98,776	5%	£1,996	£1,453	37%
Cavendish Hall	2111	103,139	97,237	6%	£2,054	£1,470	40%
Portland Building	1111	101,604	59,322	71%	£2,083	£859	142%
Orchards	1161	91,050	55,197	65%	£1,803	£941	92%
Sustainable Research Building	1436	90,473	80,028	13%	£1,882	£1,278	47%
Playgroup	1411	89,081	87,223	2%	£1,752	£1,415	24%
Sports Centre, Main Campus	1221	86,514	120,766	-28%	£1,621	£2,327	-30%
Rutland Hall	2191	64,937	90,516	-28%	£1,279	£1,412	-9%
Warden's House Sherwood Hall	2207	62,923	53,067	19%	£1,223	£790	55%
Former Warden's House, Cavendis	2113	62,100	56,696	10%	£1,181	£865	37%
J.Boot C.C. Annexe (Cottage)	1482	52,307	55,804	-6%	£1,028	£904	14%
Lenton Lodge	2251	49,801	47,587	5%	£2,219	£769	189%
Warden's House Rutland Hall	2194	40,134	34,488	16%	£794	£590	35%
1 Nightingale Close (Nigh.Hall War	2321	37,404	29,863	25%	£758	£478	59%
Warden's House Ancaster Hall	2105	35,237	31,380	12%	£699	£511	37%
Paton Cottage	####	34,294	29,872	15%	£669	£451	48%
5A Wortley Hall Close (Eco-House)	2296	23,583	15,878	49%	£477	£238	100%
Warden's House Florence Boot Hal	2133	22,499	29,456	-24%	£432	£461	-6%
Energy Learning Unit (old Squash C	1223	8,113	-4,423	n/a	£149	£284	n/a
Sherwood Hall	2200	6,807	7,686	-11%	£134	£112	20%
Lenton Firs Lodge West	2241	3,370	27,310	-88%	£73	£460	-84%
New Eco-houses		162	0	n/a	£189	£113	n/a
China House (Lenton Fields)	2163	80,000	75,000	7%	£800	£550	45%
<b>Total of 65 accounts</b>	<b>Totals</b>	<b>65,671,213</b>	<b>58,448,119</b>	<b>12%</b>	<b>£1,294,418</b>	<b>£921,632</b>	<b>40%</b>

#### 4.B - Appendix B – Fossil Fuel Data continued

Gas Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change
Sutton Bonington		kWh	kWh	kWh	£	£	£
Main Boilerhouse	6800	10,155,872	8,256,292	23%	£198,921	£129,570	54%
Animal Houses Boilerhouse	6800	2,328,479	2,250,242	3%	£44,715	£35,286	27%
Plant Sciences	5711	2,270,520	2,361,977	-4%	£44,191	£37,677	17%
Veterinary School	5721	1,595,114	1,416,859	13%	£36,223	£21,350	70%
Portakabins (T.C.R. unit)	5301	197,145	258,440	-24%	£4,077	£4,220	-3%
Sports Hall SB (New)		179,465	0	n/a	£2,894	£0	n/a
The Elms (Environmental Science)	5161	129,853	152,494	-15%	£2,514	£2,410	4%
Main Building (Sutton Bonington)	5011	106,748	96,733	10%	£2,101	£1,519	38%
Food Hall	5081	70,733	59,067	20%	£1,389	£892	56%
Sports Pavilion Sutton Bonington - (	5621	69,754	111,658	-38%	£1,247	£1,677	-26%
Food Sciences Building	5701	61,406	61,028	1%	£1,170	£876	34%
St.Michael's Flats Nos 8&9	6843	45,227	37,675	20%	£835	£509	64%
St.Michael's Flats Nos 6&7	6842	44,737	58,700	-24%	£1,060	£1,069	-1%
St.Michael's House Flat 1	6841	41,590	33,371	25%	£726	£554	31%
Bonington Hall Laundry & Gym	5881	31,695	39,002	-19%	£626	£565	11%
St.Michael's House Flat 5	6841	31,084	29,691	5%	£553	£495	12%
St.Michael's House Flat 2	6841	27,817	23,456	19%	£493	£389	27%
Sports Hall Sutton Bonington	5221	27,151	67,847	-60%	£508	£1,074	-53%
Bonington Hall Warden's House	5842	26,860	33,840	-21%	£532	£569	-7%
Hathern House, Bon. Hall (4)	5831	26,823	57,701	-54%	£499	£894	-44%
St.Michael's House Flat 3	6841	20,370	14,959	36%	£344	£249	38%
52 College Road	6820	19,767	14,057	41%	£397	£241	65%
24 College Road	6805	19,274	16,824	15%	£385	£300	28%
St.Michael's House Flat 4	6841	3,132	12,049	-74%	£131	£186	-30%
North Laboratory	5091	757	790	-4%	£15	£12	25%
Eviton House (68 College Road)	5051	0	-1,436	-100%	£0	£227	-100%
<b>Total of 25 accounts</b>	<b>Totals</b>	<b>17,531,373</b>	<b>15,463,316</b>	<b>13%</b>	<b>£346,546</b>	<b>£242,356</b>	<b>43%</b>
<b>Gas Invoices</b>							
<b>Jubilee Campus</b>		<b>2007/8</b>	<b>2006/7</b>	<b>% change</b>	<b>2007/8</b>	<b>2006/7</b>	<b>% change</b>
		<b>kWh</b>	<b>kWh</b>	<b>kWh</b>	<b>£</b>	<b>£</b>	<b>£</b>
Newark Hall	7130	1,238,077	1,133,403	9%	£24,680	£18,998	30%
Melton Hall	7110	743,170	578,668	28%	£14,517	£8,896	63%
Southwell Hall	7120	670,970	585,392	15%	£13,452	£9,518	41%
Computer Sciences (DCS) & The A	7040	645,756	517,679	25%	£12,742	£8,536	49%
The Exchange (CTF)	7030	535,971	337,197	59%	£10,770	£5,985	80%
New Business School	7080	527,618	414,285	27%	£10,588	£6,741	57%
Dearing Building (FOE)	7050	408,992	319,198	28%	£8,129	£5,575	46%
Business School North (SMF)	7020	336,190	188,938	78%	£6,881	£3,537	95%
Jubilee Sports Centre	7301	216,604	282,458	-23%	£6,417	£6,177	4%
Atrium Catering HWS	7040	139,713	148,986	-6%	£2,734	£2,223	23%
<b>Total of 10 items</b>		<b>5,463,061</b>	<b>4,506,204</b>	<b>21%</b>	<b>£110,910</b>	<b>£76,186</b>	<b>46%</b>
<b>Gas Invoices</b>							
<b>Others</b>		<b>2007/8</b>	<b>2006/7</b>	<b>% change</b>	<b>2007/8</b>	<b>2006/7</b>	<b>% change</b>
		<b>kWh</b>	<b>kWh</b>	<b>kWh</b>	<b>£</b>	<b>£</b>	<b>£</b>
King's Meadow Campus	6901	3,343,079	2,788,266	20%	£66,053	£44,557	48%
Clinical Sciences (City Hospital)	3325	1,500,000	1,312,419	14%	£38,000	£28,000	36%
Derby Medical School	3561	903,775	737,064	23%	£17,967	£11,851	52%
14-22 Shakespeare Street	6101	260,597	197,401	32%	£5,245	£3,237	62%
Clumber Lodge	6900	171,158	175,252	-2%	£3,170	£3,101	2%
Sports Ground - Highfields new sup	6311	140,126	179,021	-22%	£2,714	£2,896	-6%
Grove Farm - OIL	6122	89,130	294,728	-70%	£4,164	£9,999	-58%
8 Peachey Street	6102	85,474	64,081	33%	£1,752	£1,076	63%
Unit 5, William Lee Buildings	6885	50,502	50,456	0%	£939	£784	20%
Unit 8, William Lee Buildings	6884	48,085	22,099	118%	£1,427	£634	48%
Unit 6, William Lee Buildings	6883	33,231	30,304	10%	£638	£496	15%
Sports Ground - Highfields - tea roc	6311	24,773	0	n/a	£438	n/a	n/a
Boathouse - OIL	6321	13,957	29,016	-52%	£570	£441	-1%
<b>Total of 13 accounts</b>		<b>6,663,887</b>	<b>5,880,107</b>	<b>13%</b>	<b>£143,077</b>	<b>£107,072</b>	<b>34%</b>
<b>Steam Used</b>							
<b>Medical School</b>		<b>2007/8</b>	<b>2006/7</b>	<b>% change</b>	<b>2007/8</b>	<b>2006/7</b>	<b>% change</b>
		<b>kWh</b>	<b>kWh</b>	<b>kWh</b>	<b>£</b>	<b>£</b>	<b>£</b>
Medical School		21,612,968	20,848,006	4%	£631,498	£341,903	85% Jul 08 estd
Embedded Units (Q.M.C.)		4,668,665	4,562,317	2%	£135,549	£75,143	80% Jul 08 estd
		<b>26,281,633</b>	<b>25,410,323</b>	<b>3%</b>	<b>£767,047</b>	<b>£417,046</b>	<b>84%</b>

## 4.C - Appendix C – Water Data

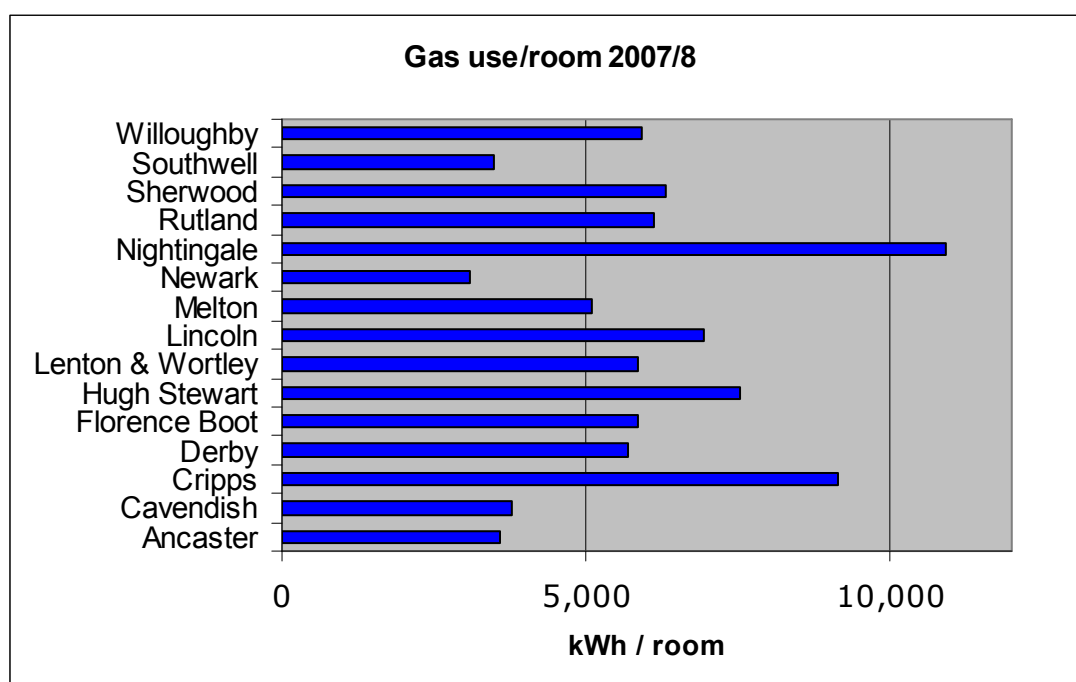
Water Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change
Main Campus		cubic m.	cubic m.	cubic m.	£	£	£
Main Supply, Sth. Entrance	1000	444,714	436899	2%	£0	£0	n/a
Nightingale Hall	2161	10,890	11,590	-6%	£0	£0	n/a
Science Area	1000	8,979	9699	-7%	£0	£0	n/a
Jesse Boot C C Banqueting	1481	2,948	3,874	-24%	£0	£0	n/a
Jesse Boot Conference Centre	1481	2,489	7,049	-65%	£0	£0	n/a
Lenton Hurst	2411	1,102	1148	-4%	£0	£0	n/a
Redcourt	2221	1073	404	166%	£0	£0	n/a
Lenton Eaves (UNSSC)	1461	755	791	-5%	£0	£0	n/a
Lenton Lodge	2251	754	565	33%	£0	£0	n/a
Lenton Firs - Built Environment	1431	512	371	38%	£0	£0	n/a
Paton House (Built Env.)	1441	346	405	-15%	£0	£0	n/a
Beeston Lane Gardeners' Compour	1511	318	334	-5%	£0	£0	n/a
Playgroup	1411	294	254	16%	£0	£0	n/a
Lenton Grove (History)	1211	230	285	-19%	£0	£0	n/a
5A Wortley Hall Close (Eco-House)	2296	54	86	-37%	£0	£0	n/a
Water and SWD	1000	0	0	n/a	£445,139	£354,000	26%
Main Campus Invoices	1000	0	0	n/a	£299,428	£290,000	3%
<b>Total of 17 accounts</b>	<b>Totals</b>	<b>475,458</b>	<b>473,754</b>	<b>0%</b>	<b>£744,567</b>	<b>£644,000</b>	<b>16%</b>
Water Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change
Sutton Bonington		cubic m.	cubic m.	cubic m.	£	£	£
Landcroft Lane meter	6800	124,649	90,255	38%	0	£0	n/a
College Road meter	6800	8,132	10,214	-20%	0	£0	n/a
St.Michael's Close	6841	1,276	2,032	-37%	2,558	£3,782	-32%
Bunny Park Farm	6860	220	369	-40%	103	£428	-76%
S.B. Campus Water Costs	6800	0	0	n/a	104,754	£71,400	47%
S.B. Campus Trade Effluent	6800	0	0	n/a	96,730	£78,100	24%
Trough, Kegworth	6910	0	0	n/a	22	£18	22%
<b>Total of 7 items</b>		<b>134,277</b>	<b>102,870</b>	<b>31%</b>	<b>£204,167</b>	<b>£153,728</b>	<b>33%</b>
Water Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change
New Campus		cubic m.	cubic m.	cubic m.	£	£	£
Jubilee Campus	7000	60,773	52,712	15%	123,726	£105,000	18%
Newark Hall	7130	14,377	14,627	-2%	31,200	£29,505	6%
Southwell Hall	7120	7,990	7,631	5%	18,927	£16,989	11%
Jubilee Sports Centre	7301	473	386	23%	3,818	£3,710	3%
Triumph House	6701	400	432	-7%	1,026	£1,039	-1%
Charnock Ave Sports Pavilion	7201	24	30	-20%	77	£85	-9%
Triumph House	6701	0	0	n/a	172	£215	-20%
<b>Total of 7 items</b>		<b>84,037</b>	<b>75,818</b>	<b>11%</b>	<b>£178,946</b>	<b>£156,543</b>	<b>14%</b>
Water Invoices		2007/8	2006/7	% change	2007/8	2006/7	% change
Others		cubic m.	cubic m.	cubic m.	£	£	£
King's Meadow Campus	6901	6,800	6,099	11%	35,000	£30,232	16%
Clinical Sciences (City Hospital)	3325	1,800	11,000	-84%	3700	£15,000	-75%
Sports Ground - Highfields	6311	1,034	971	6%	2,072	£1,780	16%
Grove Farm - Changing Rooms	6122	980	1,088	-10%	1,150	£1,205	-5%
14-22 Shakespeare Street	6101	399	613	-35%	796	£1,163	-32%
Boat House	6321	361	709	-49%	718	£1,284	-44%
Clumber Lodge	6900	246	158	56%	326	£188	73%
Unit 5, William Lee Buildings	6885	92	113	-19%	545	£579	-6%
Unit 6, William Lee Buildings	6883	57	55	4%	612	£800	-24%
8 Peachey Street	6102	38	97	-61%	157	£295	-47%
Unit 8, Edison Village (Synergy Hou	6891	34	37	-8%	157	£185	-15%
Unit 8, William Lee Buildings	6884	0	0	n/a	93	£86	8%
<b>Total of 12 accounts</b>		<b>11,841</b>	<b>20,940</b>	<b>-43%</b>	<b>£45,326</b>	<b>£52,797</b>	<b>-14%</b>
Water Recharges		2007/8	2006/7	% change	2007/8	2006/7	% change
Medical School		cubic m.	cubic m.	cubic m.	£	£	£
Medical School		31,062	32,828	-5%	£63,000	£52,512	20%
Embedded Units (Q.M.C.)		10,800	10,800	0%	£17,000	£13,000	31%
		<b>41,862</b>	<b>43,628</b>	<b>-4%</b>	<b>£80,000</b>	<b>£65,512</b>	<b>22%</b>

#### 4.D - Appendix D – Halls of Residence

#### 4.D. Gas Consumption in Halls of residence

	No. of Rooms	2006/7 Gas kWh	2007/8 Gas kWh	2006/7 Gas kWh/room	2007/8 Gas kWh/room
Ancaster	272	945,751	970,947	3,477	3,570
Cavendish	279	1,117,595	1,057,656	4,006	3,791
Cripps	317	2,645,812	2,900,501	8,346	9,150
Derby	327	1,782,678	1,858,442	5,452	5,683
Florence Boot	194	992,943	1,134,588	5,118	5,848
Hugh Stewart	341	2,099,392	2,567,048	6,157	7,528
Lenton & Wortley	307	1,663,747	1,792,689	5,419	5,839
Lincoln	221	1,565,741	1,531,718	7,085	6,931
Melton	146	578,668	743,170	3,963	5,090
Newark	400	1,133,403	1,238,077	2,834	3,095
Nightingale	151	1,513,115	1,649,550	10,021	10,924
Rutland	267	1,607,408	1,631,678	6,020	6,111
Sherwood	261	1,601,937	1,646,415	6,138	6,308
Southwell	193	585,392	670,970	3,033	3,477
Willoughby	260	1,360,967	1,540,767	5,234	5,926
<b>Totals</b>	<b>3936</b>	<b>21,194,548</b>	<b>22,934,216</b>	<b>5,385</b>	<b>5,827</b>

Figure 4.D.1 Table showing last two years annual gas consumption in halls



Graph 4.D.2 Graph showing gas consumption per room in halls

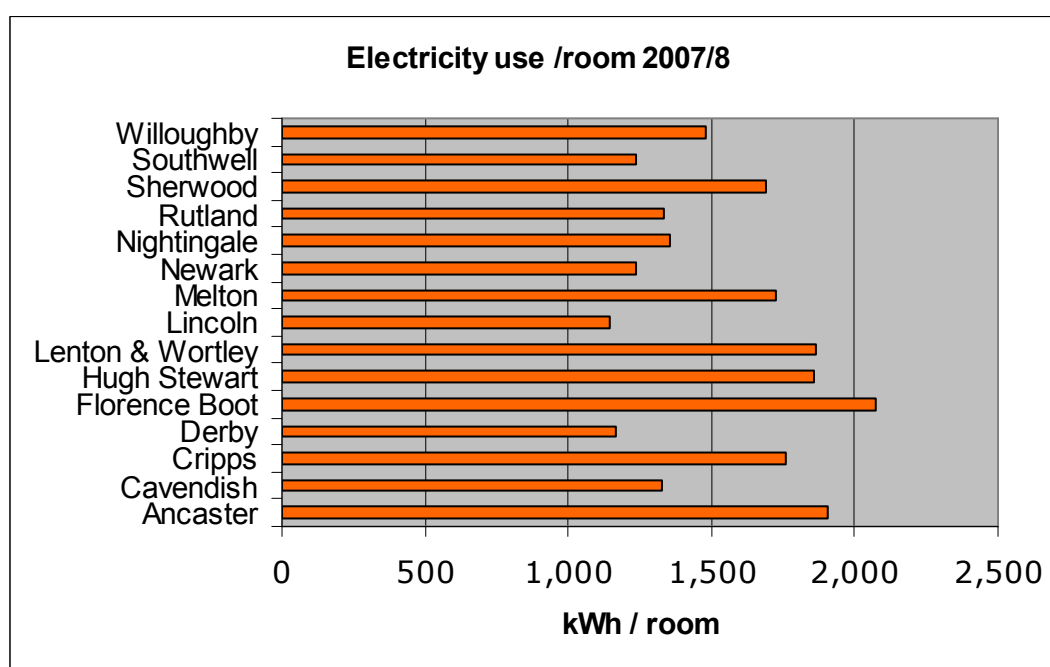
Note that this metric rates Nightingale and Cripps Halls as being particularly inefficient. However, although these halls still do have single glazing it may well be that they just have relatively large circulation spaces to heat; on a usage per metre squared basis Nightingale is only 19% above the mean for all halls, and Cripps is 15% above.

#### 4.D - Appendix D – Halls of Residence continued

#### 4.D. Electricity Consumption in Halls of residence

	No. of Rooms	2006/7Elec kWh	2007/8Elec kWh	2006/7 Elec kWh/room	2007/8 Elec kWh/room
Ancaster	272	509,687	517,680	1,874	1,903
Cavendish	279	343,410	369,430	1,231	1,324
Cripps	317	425,087	556,814	1,341	1,757
Derby	327	374,429	381,157	1,145	1,166
Florence Boot	194	385,714	401,833	1,988	2,071
Hugh Stewart	341	617,960	633,068	1,812	1,857
Lenton & Wortley	307	537,466	573,337	1,751	1,868
Lincoln	221	252,489	252,490	1,142	1,142
Melton	146	181,119	252,272	1,241	1,728
Newark	400	496,217	495,071	1,241	1,238
Nightingale	151	151,705	204,519	1,005	1,354
Rutland	267	357,439	356,891	1,339	1,337
Sherwood	261	437,327	440,575	1,676	1,688
Southwell	193	239,425	238,578	1,241	1,236
Willoughby	260	373,629	385,310	1,437	1,482
	3936	5,683,103	6,059,025	1,444	1,539

Figure 4.D.3 Table showing last two years annual electricity consumption in halls



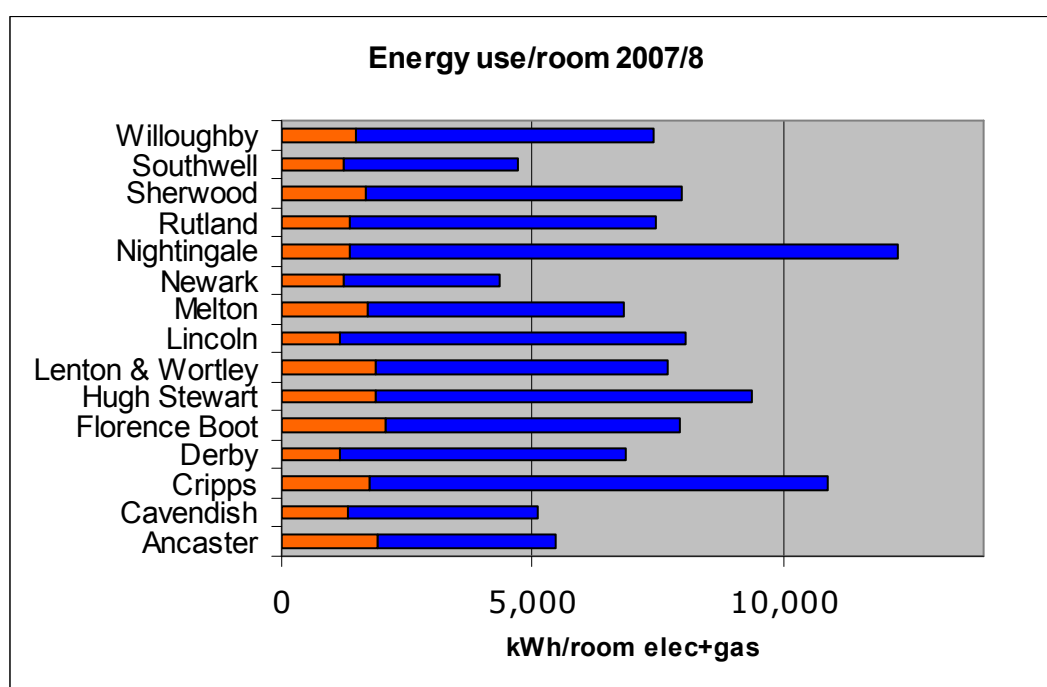
Graph 4.D.4 Graph showing electricity consumption per room in halls

#### 4.D - Appendix D – Halls of Residence continued

#### 4.D. Energy Consumption in Halls of residence

	No. of Rooms	2007/8 Elec kWh	2007/8 Gas kWh	2006/7 Elec kWh/room	2006/7 Gas kWh/room
Ancaster	272	517,680	970,947	1,903	3,570
Cavendish	279	369,430	1,057,656	1,324	3,791
Cripps	317	556,814	2,900,501	1,757	9,150
Derby	327	381,157	1,858,442	1,166	5,683
Florence Boot	194	401,833	1,134,588	2,071	5,848
Hugh Stewart	341	633,068	2,567,048	1,857	7,528
Lenton & Wortley	307	573,337	1,792,689	1,868	5,839
Lincoln	221	252,490	1,531,718	1,142	6,931
Melton	146	252,272	743,170	1,728	5,090
Newark	400	495,071	1,238,077	1,238	3,095
Nightingale	151	204,519	1,649,550	1,354	10,924
Rutland	267	356,891	1,631,678	1,337	6,111
Sherwood	261	440,575	1,646,415	1,688	6,308
Southwell	193	238,578	670,970	1,236	3,477
Willoughby	260	385,310	1,540,767	1,482	5,926
<b>Totals</b>	<b>3936</b>	<b>6,059,025</b>	<b>21,194,548</b>	<b>1,539</b>	<b>5,385</b>

Figure 4.D.5 Table showing electricity and gas consumption in halls



Graph 4.D.4 Graph showing energy consumption per room in halls

#### **4.E – Appendix E – Major areas of work during 2007/8**

- Renewal of the heating controls for the corridors at the Nottingham Medical School. This now integrates all of the building's heating and ventilation systems onto one BMS system for the first time. Gas and electricity savings are predicted to pay back the £43,000 installation costs in just over a year.
- Further extension of the electricity submetering project, Elcomponent 'MeterRing', at University Park. Approximately 70 more meters were fitted, extending coverage to the halls of residence and the Sports Centre. Half-hourly readings are recorded by the system in the Estate Office, allowing consumption patterns to be seen at weekends and overnight. Total cost was £42,000.
- Installation of new heating controls to Portland Lecture Theatre C11 and the student support office. Payback periods of under two years are predicted for an installation cost of £11,000.
- Further expansion of the BMS heating control system to cover two smaller installations; the Admissions Office and the Great Hall in Trent Building. Payback of the combined installation costs of £12,000 should be met from savings in the gas bills within four years.
- Freshers Fayre: September 2007. For the first time, the environmental team had a presence at the University's Freshers Fayre. The stall was at the fayre throughout the four day event providing environmental advice and awareness over a wide range of issues including energy efficiency. Two designs of coasters were handed out to students including one highlighting basic energy advice.
- Improved website: September 2007 – February 2008. Throughout the year the environment pages of the estates web site have expanded and introduced many unique ways of informing staff and students about environmental issues and improving awareness. A main section introduced to the website is the Virtual Campus that allows one to move throughout rooms in a typical house and a typical academic building.
- Hall CO2 snapshot competition: February 2008 – May 2008. An inter hall competition was launched throughout all University Park and Jubilee campus halls to increase student environmental awareness. The competition focused on three main environmental issues over a period of three months asking students to focus on one initiative on a specific month. February focused on electricity consumption, March on waste produced and April on water usage.
- The University has had two successful Eco-Action weeks, one in November 2007 and the second in April 2008. Eco-Action is an awareness week that has environmental activities that staff and students can get involved in. The first was initially a trial to determine if future events would be successful, and from that the second awareness week was organised. During the April week, a selection of

energy events took place including an environmental presentation, a 'Big Switch Off' campaign asking staff to turn off a majority of non-essential electrical items off before going home that evening, and a film highlight issues surrounding the oil industry.

- A PC shutdown scheme was begun in February 2008 for large computer rooms that have 24 hour access. IS have added a script based system to all computers in Cripps South and in the computer room at Jubilee Library DLRC. The scripts monitor the use of every computer in the room and if the computer has not been used during a 30 minute period, and if no one is logged on, then the PC will shutdown. This exercise should save around 300-400 kWh of electricity a year per PC, or £30-40 depending on each PCs usage. Monitoring of Cripps South is being done using the Elcomponent system.
- A report entitled 'Energy Management at the University of Nottingham' was produced in July 2008. This describes the full list of energy management technologies employed at the University over the last decade.