Department of Estates

UNIVERSITY OF BATH

Annual Energy and Environment Report (April 2020)

The University Strategy to 2021 reaffirms that one of our core values is a commitment to environmental best practice. Our Environmental Policy can be found at http://www.bath.ac.uk/estates/docs/Environmental_Policy_2016.pdf. This report is normally prepared on behalf of the Sustainability & Carbon Management Steering Group (S&CMSG) and reports on our progress to Council via the University Executive Board (UEB). S&CMSG is currently not convening while preparation of our new Climate Action Framework (https://www.bath.ac.uk/announcements/university-of-bath-to-develop-ambitious-climate-action-framework/) is under way. The reporting period covered is the 2018/19 academic year.

Summary

- Electricity use down 2% over last 2 years despite two major new buildings being built (4% or £160k worth of improvement if these are taken into account).

- Energy consumption and water usage lower than in 2005 despite significant growth over that period. When growth taken into account:
  - Electricity use per m^2 floor area 31% lower
  - Gas use per m^2 floor area 28% lower
  - Water use per m^2 floor area 49% lower
  - Saving £1.5m annually

- Carbon emissions down 35% since 2005, a period of significant growth in the University's student population and physical infrastructure. Emissions per m^2 building floor area are down 54% over the same period. Review of carbon strategy and targets underway.

- Self-generated electricity accounts for almost 7% of total use – CHP (Combined Heat and Power) plants generated £235k worth of electricity, enough to power 540 houses, while also recycling their waste heat on site. 15 million units generated on site over the life of these units, saving 6000 tonnes CO_2 and £1.5m in total.

- Chemistry (1 South) building water use halved since 2015 and total running costs reduced by £100k

- 4,110 bags of charity donations collected and donated to British Heart Foundation instead of going to landfill, raising £58k from 'end of term' unwanted food, clothing, crockery and appliances. A total of £554,000 has been raised since the campaign began in 2012.

- Award winning 'Protecting What Matters', 'Leave No Trace', and 'Student Switch Off' campaigns continue to run in student-facing areas.

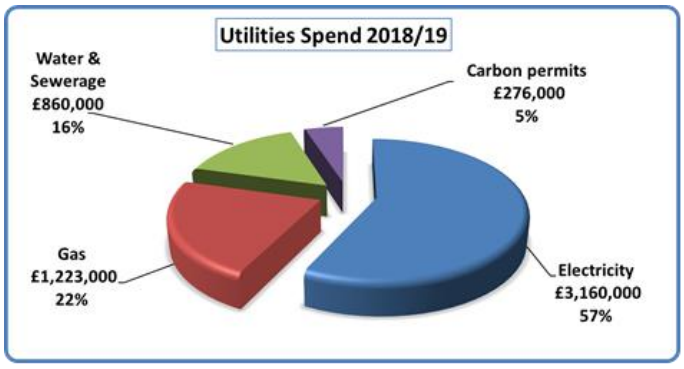
- University continues to operate with 100% green renewable electricity supply, across the whole estate.

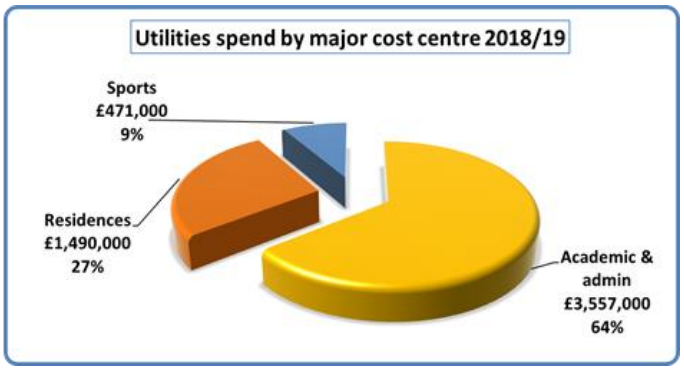
- New ambitious Climate Action Framework under development

1.0 ENERGY AND WATER USE

1.1 Financial Impact

Spend on utilities was around £5.5 million in 2018/19, up from £5m the previous year. As can be seen this is dominated by electricity costs. Residential and Sports spend is not insignificant, but the rest of the University dominates the picture.





1.2 **Consumptions** (See Appendix 1 & 2 for relevant graphs)

Comparing 2018/19 with previous year:

- electricity imported (i.e. bought) down 2% despite completion of two major new buildings (Milner and Polden)
- taking new build into account then the underlying trend is that electricity is 4% down, saving £160k a year
- electricity per unit building floor area down by 6%
- self-generated electricity down on last year due to reliability issues - 6.5% of total University use (6% from CHP - combined heat & power and 0.5% from solar panels)
- gas use down 4% on last year but heavily weather-dependent (weather-corrected use up 4%)
- water use (274,017m^3) down by 8% on last year, saving almost £60k a year
- water use per m^2 floor area of 1,001 litres/m^2, down 11% on last year
- taking new build into account this water reduction is 12% saving £100k a year

Electricity: Total electricity 'consumed' (i.e. imported/bought in plus self-generated) has been rising in recent years due to new buildings and growth in student numbers. Ongoing increases in self-generation and energy efficiency savings have partially offset this. 2018/19 saw an absolute fall in electricity use of 3%, despite two major new buildings coming online.

Gas: Heavily dependent on weather, data is 'normalised' using statistical temperature records. Last year was the mildest winter since 2015/16 and hence data is corrected for this. The long-term trend shows gas use is almost level, even with a significant expansion in the Estate. Gas use also increases as our electricity self-generation increases through gas-fired CHP. However, this rise is more than offset by the financial and carbon savings.

Water use was up in 2015/16 due to a major leak in the underground supply pipework, but otherwise has reduced year on year through efficiency savings.

Longer term trends:
Long term trends still tend downwards, with all utilities still below 2005/6 levels. The graphs in Appendix 1 also highlight the influence of recent new buildings on consumptions. Over the 13 year period the following buildings/facilities have been added (not all shown on graphs):

- 4 South Annexe
- Woodland Court
- 4 West
- 5 West server room
- East Building
- Student Centre
- 1 West phase 1 (extension)
- Chancellors' Building
- The Quads/Lime Tree
- The Edge
- Virgil Building
- 10 West
- 4 East South
- Milner
- Polden

This expansion continues apace, with the new School of Management building due to open later this year. **Due to ongoing work on efficiency the actual annual usage of energy and water has reduced by around £1m-worth since 2005, despite this significant growth**. Factoring in growth, whilst also allowing for any old buildings/facilities that have been discontinued, **annual energy spend is £1.5m less than it would have been otherwise.** This trend, however, is going to be harder to maintain as most of the 'easy wins' in energy efficiency have been completed. Much potential remains but will require significant investment with greater people resource and/or longer financial paybacks.

Taking growth into account, consumption data per m^2 building floor area shows the efficiency of our built estate has significantly increased:

- Electricity use per m^2 floor area 31% down in 13 years
- Gas use per m^2 floor area 28% down in 13 years (weather-corrected)
- Water use per m^2 floor area 49% down in 13 years

2.0 IMPROVEMENTS MADE

2.1 Technical improvements

A number of improvements have been implemented since the last report. These include:

Lighting upgrades to deploy the latest high efficiency LED fittings with automatic controls and daylight dimming. LED fittings have an added benefit of a longer life and lower maintenance cost compared to standard lamps. Critically, these works also improve the appearance of the refurbished areas, enhancing the teaching and learning environment. Areas recently improved include the STV Gym, the STV café, the STV Concourse, and the whole of 3 South. As an example, for 3 South the investment was £50k with a 7 year payback, saving 13 tonnes carbon annually.
Lighting upgrades have now been carried out to a significant proportion of the estate (approx. 40% of our floor area) with a priority of areas with the best paybacks – although there is much still to do, the remaining areas will involve longer financial paybacks than the initial projects, typically 8-12 years, with an investment of around £4m required.

New Polden solar PV panels – in March 2019, the project to install a solar photovoltaic (PV) system on the roof of the new Polden accommodation was completed. The roof mounted array consists of 250

modules, is the largest at the University of Bath with a peak capacity of 70kW, with 100% of the electricity generated used on site. The annual output from the solar array will be over 63,000kWh, which will save around £9,000 in electricity costs, saving 18 tonnes of CO_2 per year.

Main boiler house – in 2018 a major £7m investment was made to upgrade our district heating system that feeds the main Parade buildings. The boilers were replaced by high efficiency units with improved controls. The whole network has been changed to a more flexible, reliable and effective method of heating these core buildings. The new system will save approx. 10% in gas use, saving £50k and 370 tCO_2 annually – much work has gone on since this install to optimise the controls and improve the efficiency.

Fabric improvements: two refurbishment projects are currently underway on campus that will also save on heating costs, although energy saving was not the prime reason for the projects being instigated (and note the typical long paybacks for such projects).

- 4 East roof replacement (£1.5m spend) - £10-20k per year gas saved
- 2 West windows (£1.5m spend) - £10-20k per year gas saved

Building controls: ongoing optimisation of the controls of our buildings heating and ventilation via the Building Management System (BMS) has focussed on some of our recent new buildings. Typically, 5% savings can be achieved by reviewing the controls software and consumption patterns in a systematic manner in the years following completion. A review of 10 West, 4 East South and The Edge has identified £17k/year potential savings. Implementing these savings, unfortunately, is a lengthy process and resource-intensive due to the complexity of our modern buildings and their control software, but has the potential to realise good efficiency savings as well as creating a more comfortable environment for the occupants. We are also continually reviewing the process for handing over of new buildings to minimise these problems at the outset, but this is an issue across the whole construction industry, and we have collaborated with our academics on helping solve this problem both within the university and beyond (see https://www.bath.ac.uk/projects/bath-campus-building-energy-performance-evaluation/).

A fundamental review of our future BMS strategy is currently underway to identify how best we meet the carbon reduction challenge, futureproof our systems, and take advantage of the development of fully integrated ‘smart buildings’.

Water reduction: in 1 South Chemistry a major water reduction was made in 2017 which cut the building’s water use for specialist lab equipment by 11,000,000 litres a year, saving £30k annually. This year we have further reduced the consumption by analysing the detailed consumption data and worked with departmental staff to look at all remaining pieces of lab equipment to identify the source of the remaining continuous usage. This was eventually discovered and found to be using approx. 1,000,000 litres a year and was stopped, saving £3k annually. Overall, since a peak in 2015, this building’s water use, which was typically 15% of all non-residential use, has halved. This, combined with the previous in-depth work to improve the fume cupboard controls and ventilation systems, has reduced the annual running costs of this building over the last few years from typically £350k to around £250k.

2.2 Student Switch Off

The award-winning student residences energy-saving competition 'Student Switch Off' continues to deliver savings and raise awareness with new students. Each year typically 1500-2000 first year students sign up and pledge to behave in an energy efficient way. Students are provided with top tips on various social media, plus competitions, quizzes, training, and regular updates including how much electricity they have been using. A 'Beer & Curry' prize is awarded to the winning hall, and there are a number of other prizes given away during the competition.

This campaign runs at over 40 universities in the UK; Bath continues to be a leader amongst these in implementation. Thanks to a combined effort between Estates, AHS staff, the SU, and student volunteers, higher levels of engagement are achieved than most other institutes. Last year 69 student 'ambassadors' were recruited and trained to undertake peer-to-peer promotions, 1600 climate quiz entries were received, and over 500 students were engaged in face to face visits. This year a 3% reduction in electricity use was achieved, on top of previous years savings. The University have been running the campaign for the last 10 years and over this time have saved 680,000kWh, the equivalent energy of boiling the kettle for over 20 million cups of tea.

2.3 Metering

2,000 'smart' meters continuously monitor gas, electricity, water and heat usage across campus. Consumption data feeds back every half hour, creating a powerful information system collecting half a million data points every week. This data source is vital to allow our energy use to be managed in a targeted manner. Analysis of the data highlights energy wastage, allows prioritisation of areas for improvement, and measures the impact of energy efficiency projects. It can also be used to flag up problems with buildings and plant, or with supplies (such as underground water leaks) and allow these to be fixed before they affect building users. Our metering system is due to be upgraded to the latest technology and software, and a project to address this is underway.

2.4 Self- generation

Renewables

Our solar photovoltaic (PV) generation capacity continues to grow with a new 70kW (peak) system on the new Polden accommodation in addition to the 4 systems already present on:

- East building - 24kW
- Chancellors' Building - 50kW
- 10 West - 22kW
- 4 East South - 36kW

With the new Polden system starting to operate in March a further 32,000 units was added to the output, with a total of 135,000 units of electricity (~£17k worth) generated in 2018/19. In addition, we receive £15k a year from the government Feed In Tariff scheme for our older systems. Our output from these systems is enough to power 42 typical houses and saves 38 tCO_2 annually.

There is some scope for further roof-mounted PV systems and plans are being developed to maximise these, which could potentially triple our current capacity. This will require an investment of around £600k with paybacks of 8-10 years, but the maximum will generate only 1-2% of our current annual demand. The priority should always be for demand reduction which has a much better return on investment and effort (the 'greenest' energy is that which is not used in the first place).

Four blocks of the Westwood residences, Woodland Court and 4 West all benefit from solar thermal systems. Used to generate hot water they typically produced around 22,000kWh of heat each year. Due to the age of these systems and reliability issues some of these have been recently decommissioned, with plans to replace them with solar PV where possible.

Combined Heat & Power (CHP)
Gas-powered CHP is a particularly efficient form of generating electricity as it allows the waste heat to be 'recycled' locally on site. There are now 4 CHP engines on campus:

- CHP for Chancellors' Building and The Quads: installed 2013, with waste heat going to provide heating and hot water to both buildings, saving £85k and 350 tonnes CO_2 each year.
- CHP in Sports Training Village: installed in 1997, with waste heat going to heat the swimming pool. This typically saves £35k and 90 tCO_2 each year.
- 2 'mini' CHP engines supply electricity and hot water to the new Polden residences

These systems generated 1.8 million units of electricity in 2018/19, enough to power 520 houses and a financial value of around £225k. They also generated around 2 million units of heat that was captured and used on campus; this heat would have otherwise been wasted through conventional generation at a power station. (For more info see http://www.bath.ac.uk/estates/energy-sustainability-environment/The_University_Power_Stations.html). Over their lifetime so far these systems have now generated over 15 million units of electricity, saving a total of 6000tCO_2 and £1.5m.

2.5 New buildings

BREEAM (Building Research Establishment Environmental Assessment Methodology) is generally used on major new buildings as an 'eco-design' process. BREEAM is not always formally implemented but used in a pragmatic way, enhanced with specific targets for energy and carbon efficiency. Industry best practice around 'Soft Landings' is also implemented with new and refurbished buildings. This approach has been used on the newly built Milner Centre and Polden student residences. Both have been built with enhanced insulation, beyond the minimum required by building regulations, with excellent airtightness, sophisticated lighting and controls, and natural ventilation where possible. Polden also has a novel intelligent heating control system that allows user control of the electric heating with automatic shut off when rooms are empty or windows open, combined with a pair of small CHPs to provide hot water to the building.

The new School of Management has been modelled to establish its predicted energy performance. The results of this are:

- Electricity use – 1071MWh/year = £150k/year = 4% increase in campus use = 69kWh/m2
- Gas use – 739MWh/year = £25k/year = 1.6% increase in campus use = 47kWh/m2

3.0 UTILITY FINANCIALS

3.1 Procurement

Flexible energy procurement contracts are used to procure electricity and gas rather than the traditional fixed price, fixed term contracts. This 'hedging' approach allows purchases up to 18 months in advance and responses to changing market conditions, capturing market falls, defending against market rises, and minimising risk.

The University collaborates with around 40 other universities and public sector bodies through a consortium which operates a framework contract and trading 'basket'. In 18/19 a saving of £345k was achieved through this method (£127k cashable, £98k cost avoidance, and £120k traded). This has been partly through trading strategy and through aggregation with other universities. Since the start of the flexible frameworks in 2011 a total saving of £5,025k has been achieved.

Electricity is bought on a 'green' renewables tariff; this applies to 100% of the campus electricity supply and all our off campus supplies too. Long term Power Purchase Agreements are also being investigated for a portion of our supply direct from a renewables developer.

3.2 Longer term costs

Gas and power costs are subject to global markets and are heavily influenced by the international oil price. This commodity cost is only a proportion of the overall price, especially for electricity; non-commodity charges (Climate Change Levy, Renewables Obligation, distribution and transmission charges etc.) now make up over 60% of the price of electricity and are increasing significantly. This rise is in part to pay for UK investment in renewables, infrastructure, and other new generating plant (e.g. Hinkley Point C). These charges are set by government, OFGEM and the distribution companies and are set to increase significantly over the next few years. The impact of these are **a 20-30% cost increase over the next 2-3 years i.e. an extra £1-1.5m annual cost to the University, even without any growth in the Estate.**

The University has significant peak electricity charges during the winter weekday peak hours of 5-7pm. As well as reducing demand during this time, self-generation can be used to offset these costs, hence another significant benefit of CHP – our systems are designed to run during this period every day. The use of large-scale battery storage to minimise these costs is being investigated, along with other demand side response approaches. These peak charges are due to change significantly next year due the new Targeted Charging Review from OFGEM with potentially major financial impacts for the University, although these were unclear at the time of writing.

Competition in the commercial water market for commercial customers was introduced in recent years via the national regulator OFWAT, but so far this has had only a marginal financial effect, with no real benefit to the University. This will be kept under review, especially after the recent OFWAT review of the industry.

3.3 Funds for investment

In 2015 the University successfully bid for £600k from a HEFCE/SALIX Revolving Green Fund for investment in efficiency projects adding to our existing £250k fund. These are both 'revolving' funds whereby energy savings are fed back into the fund for future use and hence are self-replenishing. Both funds continue to be re-invested in energy saving projects. The original revolving fund has now been spent 3 times over saving £1.35m and 6,700 tCO_2 to date

4.0 CARBON

4.1 Carbon Management Plan (CMP) and progress against targets

For 2018/19 our carbon emissions were

- 15,952 tCO_2, down 13% on last year
- 60 tCO_2/m^2 floor area, down 17%

In April 2011 the University produced a Carbon Management Plan (CMP) described as an exemplar for the HE sector by the Carbon Trust. This included the following target for reducing emissions:

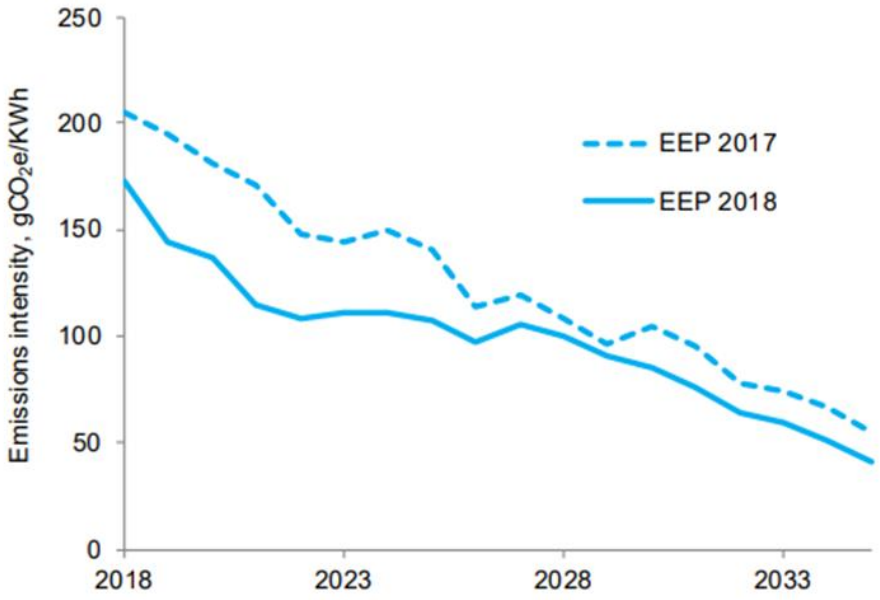
- To reduce direct Scope 1 and 2 CO_2 emissions (due to electricity and gas use) by 43% by 2020 from a 2005 baseline

This target was an absolute target i.e. any growth will clearly make the target even harder to achieve. The target was set before the major changes in funding in the UK HE sector and before major expansion in the University. It allowed for a degree of growth, but actual growth has been much greater than anticipated and hence the original carbon target is increasingly challenging. A review of the University's carbon targets is underway through the Climate Action Framework.

A 35% reduction has been achieved against the target baseline, and we expect to achieve a 36% reduction by 2020. If there had been no growth in the University, the target would have been achieved. The University is performing better than the sector average: two thirds of universities are projected to not meet their original 2020 emissions targets. In terms of relative carbon emissions, **CO_2 per m^2 building floor area is 54% down since 2005**. The relative CO_2 per student and CO_2 per £ financial turnover have fallen by similar amounts.

4.2 UK electricity grid carbon factors

As well as the weather, a major influence on carbon emissions outside the university's control is the grid conversion rate from a unit of electricity to CO_2. These are set each year by government (DEFRA) and are calculated according to the changing UK electricity generation mix.



Projected UK Grid Emissions Intensity. Source: BEIS

(It should be noted that these projections, although from BEIS, contain significant uncertainty, and beyond 2020 make assumptions that go beyond current Government policy)

These have been falling over recent years, but the factor fell significantly in 18/19 and this is expected to continue as increased low carbon generation is used. This report is based on the 18/19 factor of 0.283 kg CO_2e per unit of electricity. Until 2016/17 it was fairly level at around 0.5 kg CO_2e (the grid was already decarbonising but there was a lag in the updating of the official factors). For the next reporting year, the factor is expected to be 0.136 kg/CO_2e, hence **the University's electricity carbon footprint, which has already almost halved, will halve in one year due to the grid alone, with further falls beyond.**

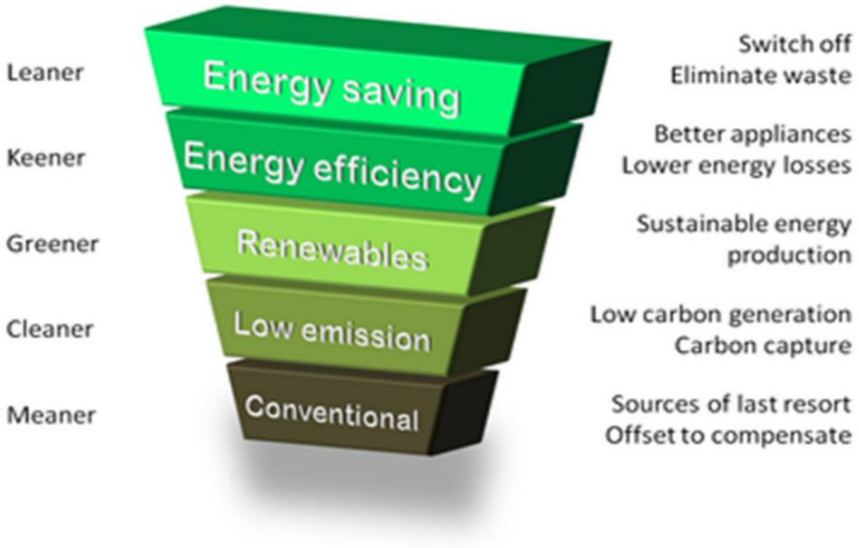
This is positive news but highlights a fundamental change in priorities if the University is to save carbon. To save carbon now and moving forward there will need to be a much greater emphasis on reducing gas use rather than electricity. The focus up to now, in common with other organisations, however, has been on saving electricity as it has always been higher carbon and higher cost. Electricity is significantly more expensive than gas (approx. 5 times the cost per unit), and is increasing in cost, highlighting a fundamental tension now arising in saving carbon which has not been present before. The majority of energy-saving technologies employed in recent years such as LED lighting, Variable Speed Drives for pumps and fans, the installation of solar PV panels, etc. have all focussed on electricity saving. CHPs, which consume gas to produce electricity, used to save carbon, but this no longer the case. There is still, however, a good financial saving to be made from all these technologies.

There also needs to be a focus on the electrification of heating through the use of technologies such as electric heat pumps instead of conventional gas boilers. This is already planned in the domestic sector with gas heating for new houses to be banned from 2025. Converting an existing non-domestic building to heat pumps is not a simple process, however, and will require significant investment. It will also not be possible in certain University buildings without some fundamental changes to their fabric and insulating properties. This is clearly a highly capital-intensive process with poor returns in financial terms alone, although it will much improve the aesthetics and comfort of a building.

4.3 Carbon offsetting

Carbon offsetting has been subject to much debate but may have a part to play in the University's approach to achieving carbon targets. The most credible carbon offset strategies sit alongside ambitious and successful carbon reduction work, ensuring that maximum action is taken in the short term, whilst recognising that in the mid-to-long term, it is imperative that emissions are mitigated as far as physically possible, including in organisational areas that may need radical restructuring to be compatible with a low carbon future. The correct hierarchy of carbon reducing actions is depicted below.

Offsetting is not yet fully developed, especially for local UK schemes, and the burgeoning interest in carbon offsetting in the context of numerous climate emergency declarations and net zero strategies has the potential to substantially increase demand in the market. There is potential for the carbon offset market to change reasonably significantly in the short-to-mid-term, due to simple supply and demand. Changes to international rules around the Kyoto Protocol and the Paris Agreement due in 2020 may also increase the demand for UK-based projects. The cost of offsetting is likely to rise over time.



4.4 Future uncertainties

The uncertainty around the future electricity grid factor has already been highlighted. In addition, there are indications that the national gas grid could be developed in the future to accommodate lower carbon options such as hydrogen and biomethane, but the future direction is uncertain. Other uncertainties surround the availability of technology to allow electrification of heating – e.g. heat pump technology that can operate at higher temperatures suitable for more conventional heating systems.

As well as the uncertainties around future energy prices, there is a lack of clarity regarding the future of UK carbon pricing and carbon related legislation. Despite being a frequently discussed topic on the domestic and international stage, substantial policy proposals are yet to emerge. To achieve necessary emission reductions it is widely agreed that more wide-spread and more expensive UK carbon pricing will have to be implemented in the future. In addition, the government may choose to pass legislation mandating particular practices in certain sectors to achieve carbon reduction goals.

There are also a number of differing interpretations of how carbon emissions should be calculated and reported. As an example, carbon accounting for green tariffs is complex and although all our electricity is certified as renewable supply this is not reported here as zero carbon. Actual energy use as well as carbon emissions will continue to be reported using DEFRA guidance, being open and clear about any assumptions.

4.5 Existing Carbon legislation

Carbon Reduction Commitment (CRC)
This legislation required the University to purchase annual carbon emissions permits, with an annual cost of around £350k to the University. This legislation was replaced by a simple uplift to the existing Climate Change Levy in April 2019. Under the CRC our emissions were 16,027 tCO_2 in the year to April 2019 (a different carbon accounting methodology is used by this legislation).

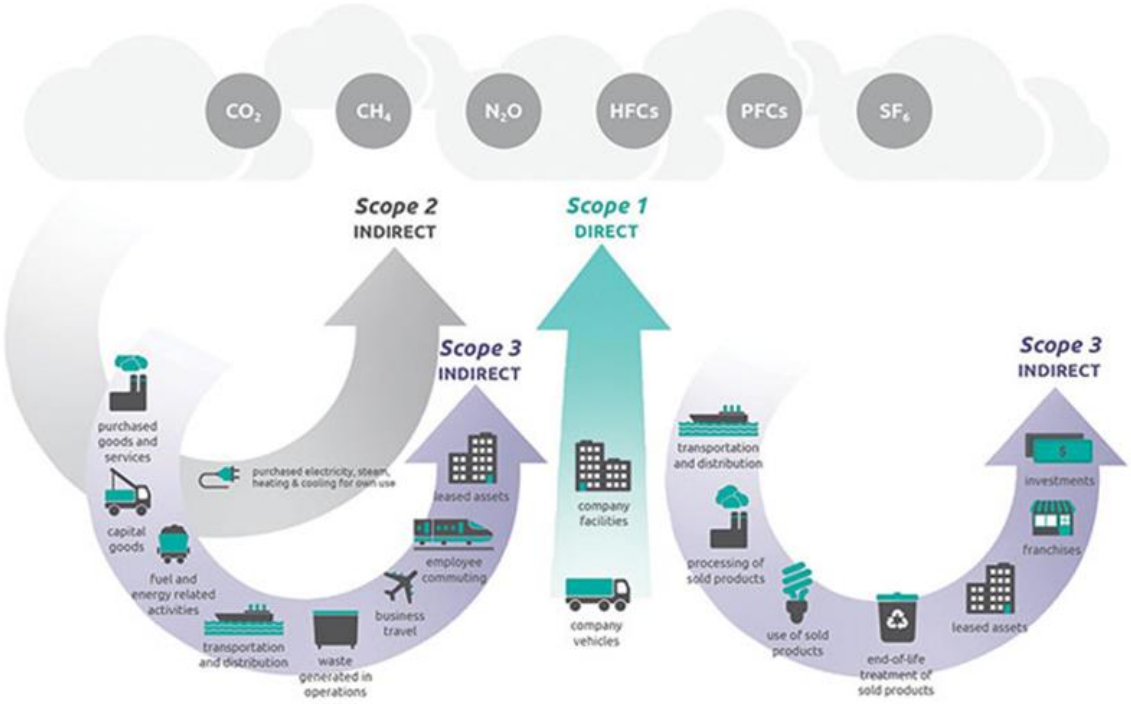
Display Energy Certificates (DECs)
This legislation requires all public-sector buildings to display a certificate showing the energy performance of a building based on actual consumption and must be updated annually. It shows a rating

based on a comparison with a theoretical benchmark building. Also shown on a DEC are the ratings for the previous two years showing if the energy performance of the building is improving.

The University has to provide 70 DECs. Many of our science/laboratory buildings are poorly rated due to the simplistic benchmark for laboratories, and due to the energy-intensive research equipment in the buildings concerned. Our ratings in all categories have improved with an overall improvement of 29% for the campus since 2009. An interactive website showing all our DECs is at www.esos-energy.com/portal-uob.

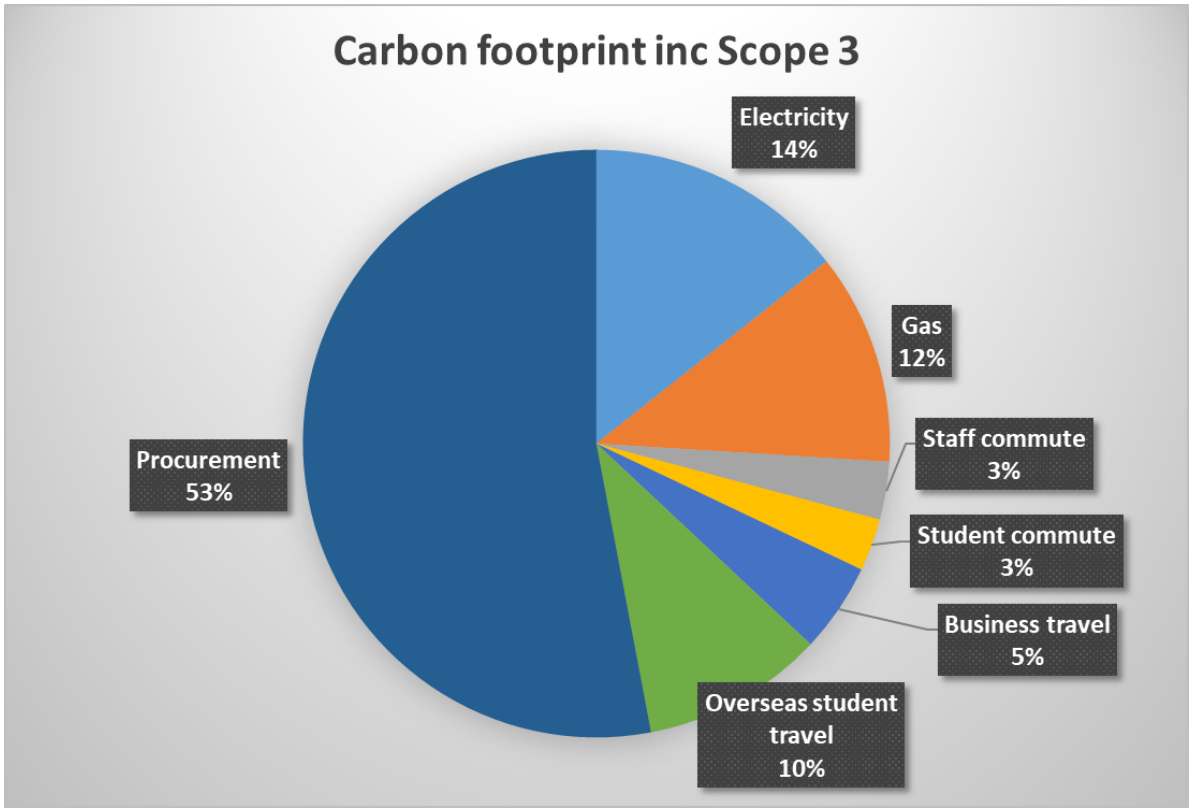
4.6 Scope 3 Emissions

Greenhouse gas emissions are categorised into three groups or 'scopes' by the most widely used international accounting tool, the Greenhouse Gas (GHG) Protocol. Scope 1 covers direct emissions from owned or controlled sources (e.g. gas boilers and own vehicles). Scope 2 covers indirect emissions from the generation of purchased electricity. Scope 3 includes all other indirect emissions that occur in a company's value chain.

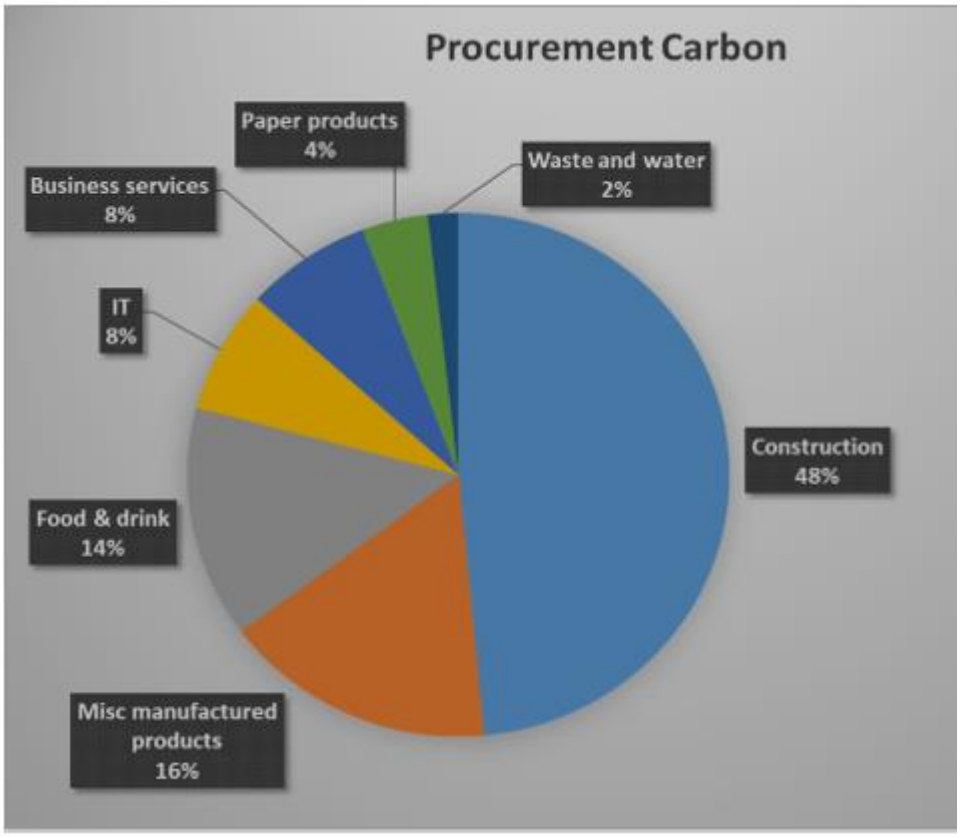


For the University the major elements of Scope 3 emissions are due to travel and due to the procurement of goods and services. Historically these have not been measured, and the majority of activity and detailed reporting refers to Scope 1 & 2 only. Some estimates of the total carbon footprint have been made – see below.

Total University estimated carbon emissions (Scopes 1,2&3)



University Scope 3 carbon emissions due to procurement (estimated)



5.0 TRANSPORT

The University's Environmental Policy includes a specific objective to minimise carbon emissions from regular commuting to and from campus by encouraging the use of car sharing, public transport, cycling or walking. It is estimated that in 2018, 55.4% of all staff and students' trips to campus were by bus, with 7% on foot, and 2.6% by bicycle, despite the hilly topography from the city centre to campus.

The University estimates emissions associated with commuting travel using historic travel survey data, plus more recent annual traffic count data. The last travel survey was undertaken in 2014. The emissions per annum for staff and student commuting based on 2018/19 staff and student numbers and the 2018 traffic data are:

- Staff 2,609 tCO_2
- Student 2,372 tCO_2
- 0.275 tCO_2 per FTE staff/student – 5% higher than the 2014/15 baseline

Set against the staff and student population increasing by around 49% between 2007/8 and 2018/19, the annual transport surveys indicate that in this period:

- Daily vehicle flows have decreased by 2%
- Car trips per FTE staff/student head have fallen 31%
- Bus trips per FTE staff/student head have risen 6%
- Cycle/Walk trips per FTE staff/student head have risen 21%

6.0 BIODIVERSITY

The University is responsible for the woodlands and parkland areas of the campus. The following recent improvements have been made:

- Work has continued to improve pathways through the wooded areas on campus to improve the social amenity as well as actively supporting bat life on campus by providing suitable flight routes.
- Removal of some non-native flora from woodland areas and ongoing replacement with native wildflower species.
- The pond created in 2014 has become well established.
- 350 tonnes of fallen leaves are collected each year, which after composting will be used to help grass and planting schemes.
- Waste coffee grounds from all coffee outlets on campus are mixed with leaf mulch to go back on flower borders and grassed areas or used to feed the indoor plants.
- Instead of removing fallen wood, this is stacked to create natural hibernacula in the woodland areas to encourage hedgehogs, and to form insect hotels.

A number of trees have been removed as a result of campus developments; in accordance with the existing tree strategy, each tree has been replaced with one or more saplings. An arboriculturist consultant has developed a campus-wide tree management plan, to provide long term management and development of the trees on campus, which has been submitted to the council as part of the LEMP proposals and is now being implemented.

7.0 SUSTAINABLE PROCUREMENT

In Sept 2018 the University's Sustainability and Carbon Management Steering Group approved a new 'Responsible Procurement Code of Practice'. This replaced the previous Sustainable Procurement Policy. The new Code of Practice acknowledges that over recent years there has been recognition across industry that previous definitions of Sustainable Procurement which encompass the traditional 'three pillars' of 'Environmental, Social, and Economical', do not stretch far enough to cover some of the more recent considerations that must be made when procuring the products and services that organisations require. Beyond the three pillars (and the standard price and quality considerations), this now includes broader ethical considerations such as bribery and corruption, fraud and human rights abuse as required under the Modern Slavery Act.

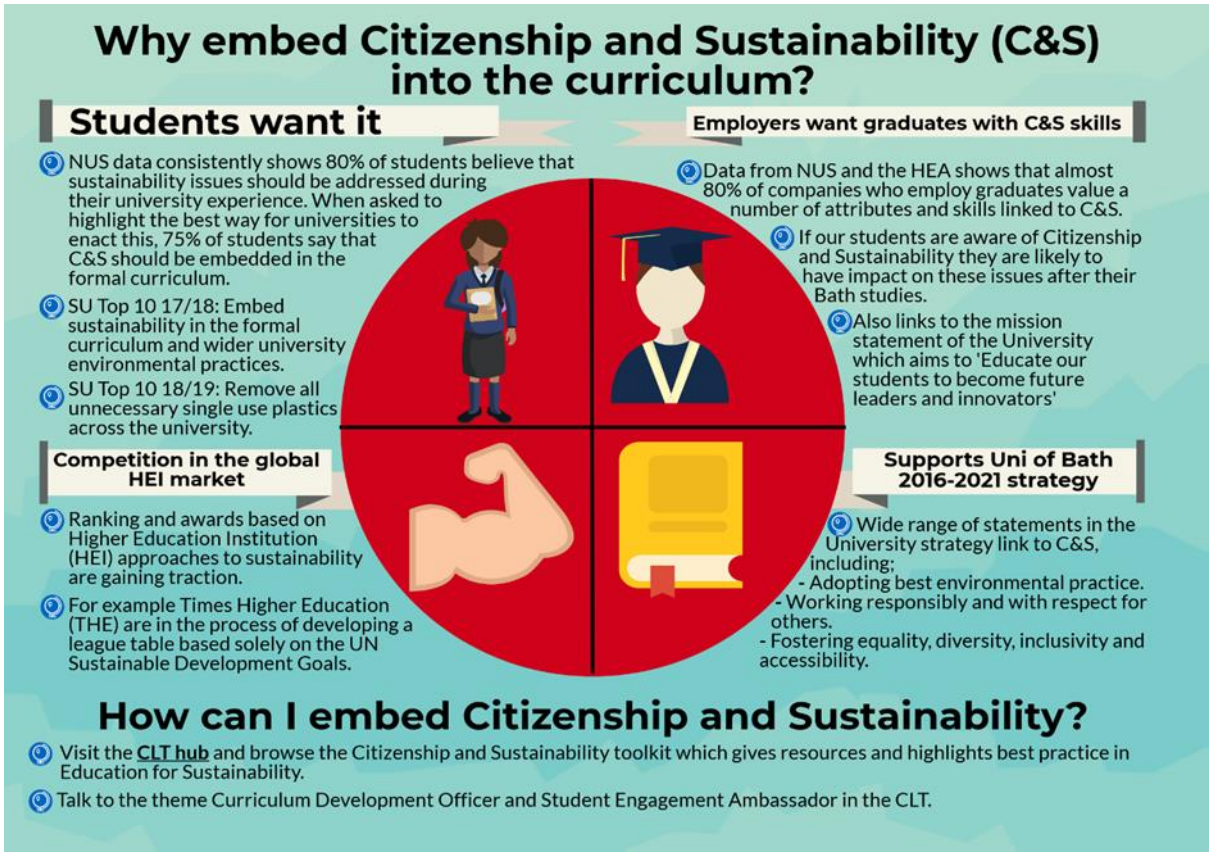
To support the practical implementation of the Responsible Procurement Code of Practice the University has developed a tool that will help identify the level of risk and/or potential opportunities that may exist when procuring goods and services across the full range of categories that the University procures. This new tool uses market knowledge to populate a category matrix and is updated as risk and opportunities change and emerge. This information is used to help manage each category of expenditure and inform how the University should approach individual procurement exercises.

The Fairtrade Foundation awarded the University of Bath Fairtrade Status in 2009. The University won a gold award for Best Fairtrade University at the South West Fairtrade Business Awards in both 2018 and 2019 in recognition of our commitment to ethical and responsible food sourcing. The University promotes the awareness and sale of Fairtrade products through promotional events during Fairtrade Fortnight, a range of Fairtrade products in eateries, including all tea and coffee, and information about Fairtrade products displayed in commercial outlets and online. In retail outlets are over 130 Fairtrade products and Fairtrade products are sold throughout hospitality outlets across the University. Fairtrade tea, coffee and sugar are served as standard at all internal meetings, conferences and events and can be purchased through the in-house catering service, Food Direct. The University is currently reviewing its Fairtrade status.

8.0 CURRICULUM

Citizenship & Sustainability is one of 9 principles that underpin the University's ongoing curriculum review project. Recognising the need for a shared understanding of the principle, guides have been created to inform staff and students what the principle of Citizenship & Sustainability means and provide context as to why it should be embedded into curricula. An 'off the shelf' workshop has been designed and created in order to help staff to engage their students with the principle, identify where the principle is already embedded in their course and encourage students to suggest ways in which the principle could be further addressed in their studies. A short, interactive session aimed at supporting lecturers with embedding Citizenship and Sustainability into curricula has also been added to the Bath Course (Part 2) and received positive feedback. The guides and workshop are available on the CLT Hub Citizenship & Sustainability page.

The CLT hub page has been designed to support staff, providing examples of where and how the principle is already embedded into courses at Bath, as well as external examples and highlighting of curriculum development resources and tools. Support and guidance continues to be provided to curriculum development teams as they progress towards the next, more detailed phase of the curriculum review and design project, requiring them to design courses that embed the 9 principles of the project.



9.0 OTHER

9.1 Accommodation & Hospitality Services (AHS)

This department runs a number of initiatives under the 'Protecting What Matters' and 'Leave No Trace' campaigns and supports Estates' initiatives such as 'Student Switch Off'. The campaign launched in 2016 across the University's accommodation, hospitality and retail outlets. Leave No Trace encourages all University students, staff and visitors to reduce their environmental impact.

The Leave no Trace loyalty card scheme is run in all outlets to help reduce the number of disposable containers used. If a reusable mug or food container is used in place of a disposable alternative, a stamp on a loyalty card and a discount is received. In September 2018 a charge for disposable coffee cups was introduced to further encourage people to bring their own mug and reduce the number of disposable cups used. In 2019 an exchange cup scheme was introduced in the Pitstop and 4W cafe.

AHS has also been working on minimising unnecessary single use plastics. This started in 2017 reducing straws, plastic cutlery, plastic cups, coffee cup lids and containers. In 2018 the project expanded to all sections within AHS reducing the amount of cleaning bottles used each month and linen no longer being wrapped in plastic. More recently a scheme to recycle toothpaste tubes and crisp packets has been introduced across student residences. Food waste is also being addressed: a 'munch box' scheme is available at certain outlets to sell off surplus food at a discount.

The end of term 'Pack For Good' campaign run in conjunction with Estates, the Students' Union, the Student Community Partnership, the local council and Bath Spa University has continued to be

successful with 4,110 bags of charity donations given to the British Heart Foundation which has raised an estimated £58,000 for the charity. A total of £554,000 has been raised since the campaign began in 2012.

9.2 Students' Union

The student body is increasingly aware of the environmental impacts of not only their own activities, but also the practices of the University, as evidenced by the latest SU Top 10. Particular areas of focus for campaigns have previously been divestment from fossil fuels, sustainability in the curriculum and reducing plastic waste. A number of Farmers' Markets have also been run using local ethical suppliers. Various SU societies have also been active in this area – for example the local People & Planet society held a 'Environmental Careers Evening' - http://blogs.bath.ac.uk/careers/2018/03/09/environmental-careers-part-1/ as well as continuing their various campaigns.

The SU's action on sustainability and tackling climate change has escalated hugely from previous years, and for the first time, sustainability will be a core part of the Union's strategy, signalling a tangible commitment of the SU to radically tackling the climate emergency. The most recent Top 10 calls for the University to "commit to radical action in its university strategy to combat the climate crisis". The SU has developed a new 'Climate Shift' initiative: with a commitment to improving its own sustainability plans, as well as lobbying the University and developing and supporting student engagement.

The SU fully recognises that its own enterprise drives up carbon emissions and therefore is committed to look at its own practices, particularly with regards to its events and commercial operation. The SU has also signed up to the NUS Green Impact Accreditation to provide a framework to reach considerably improved standards in terms of sustainability.

As a member-led organisation, the SU supports and backs action from students and students' groups on sustainability: particularly People & Planet and Bath University Amnesty Society. Members of these two groups overwhelmingly supported and participated in SU-led activities on tackling climate change, particularly the "Summit" held in the SU during Semester 1. The Summit paved the way for a new mode of consultation and decision-making that is already yielding results. A policy idea to incentivise sustainable travelling has been brought to the University management's attention; as of next academic year, sponsoring companies will be scrutinised more strictly on their sustainable credentials, and the provision of vegetarian and vegan options as our Farmers' Markets will greatly improve.

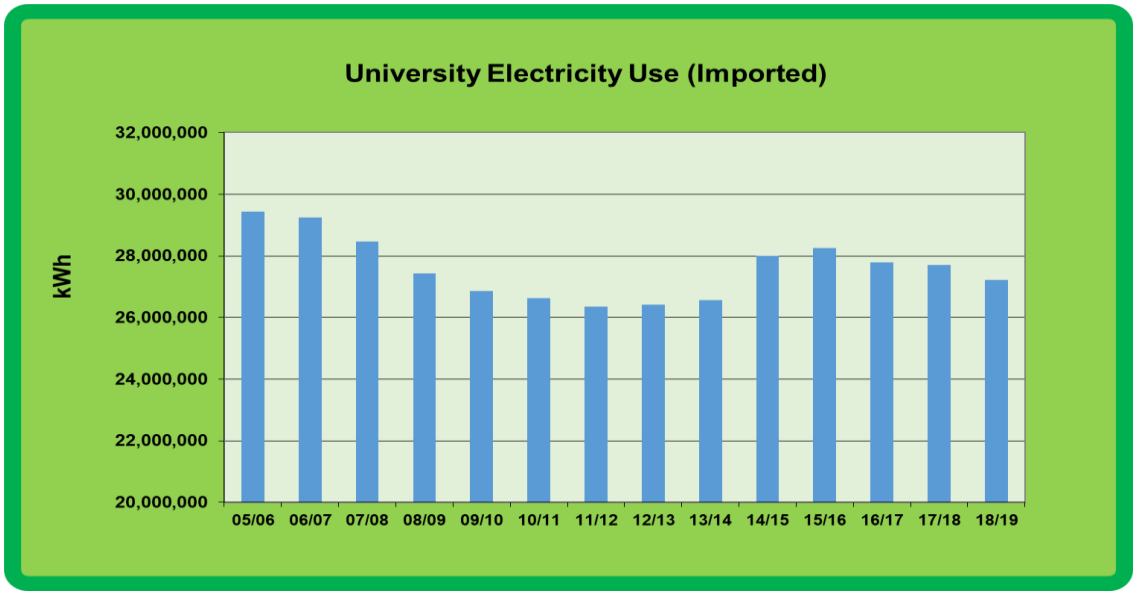
The SU will remain committed to radically changing its operation over the next few years to tackle the climate crisis, and at the same time, it will continue demanding that the University does the same.

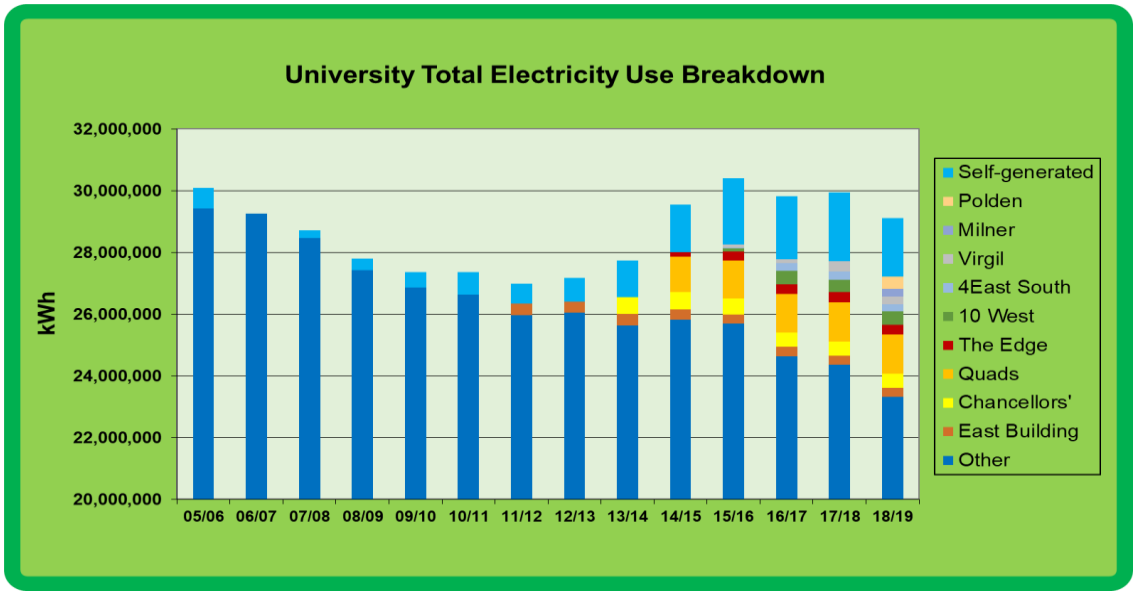
10.0 UNIVERSITY SUSTAINABILITY RESEARCH

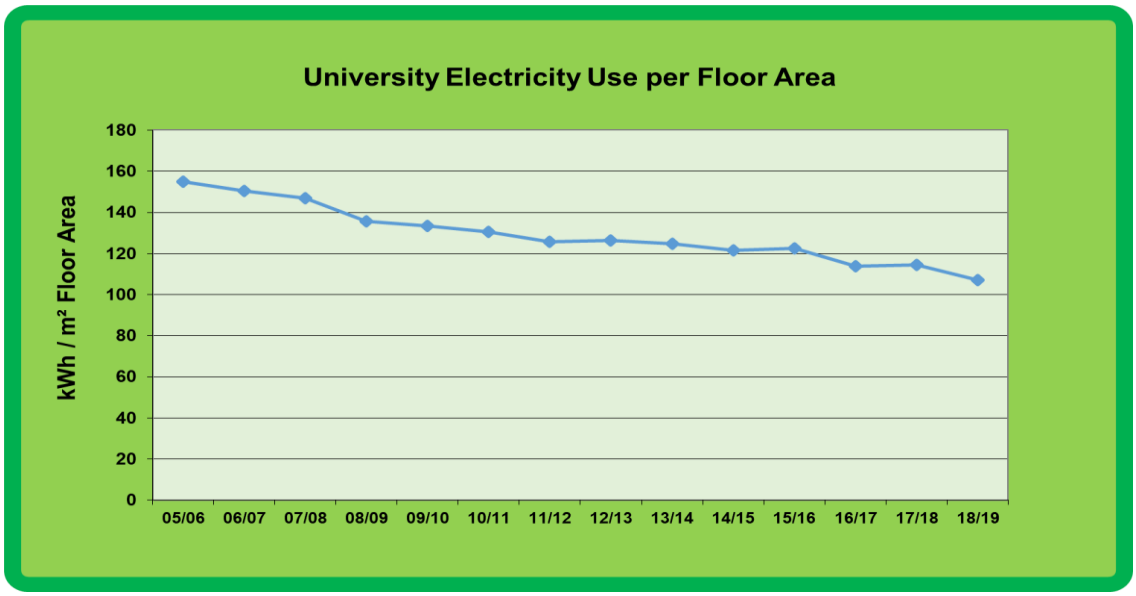
Although this report is predominantly focussed on 'operational' sustainability matters for the University, it should be highlighted that much of the research the University carries out also has significant positive environmental impact. For more details of our sustainability research see http://www.bath.ac.uk/research/ and http://www.bath.ac.uk/i-see/

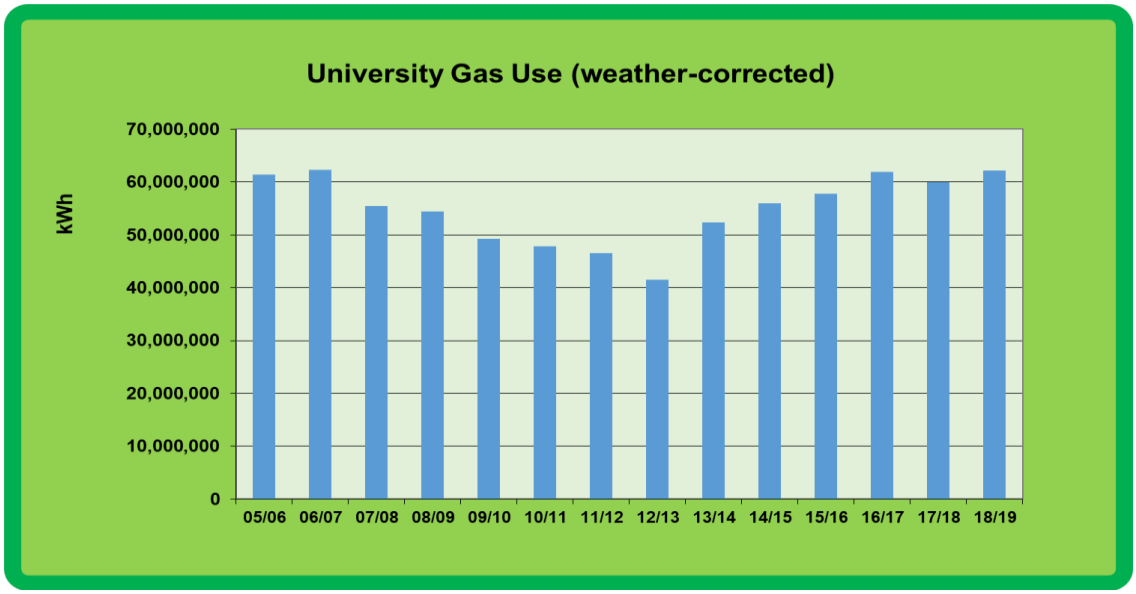
Peter Phelps - Energy and Environment Manager – April 2020

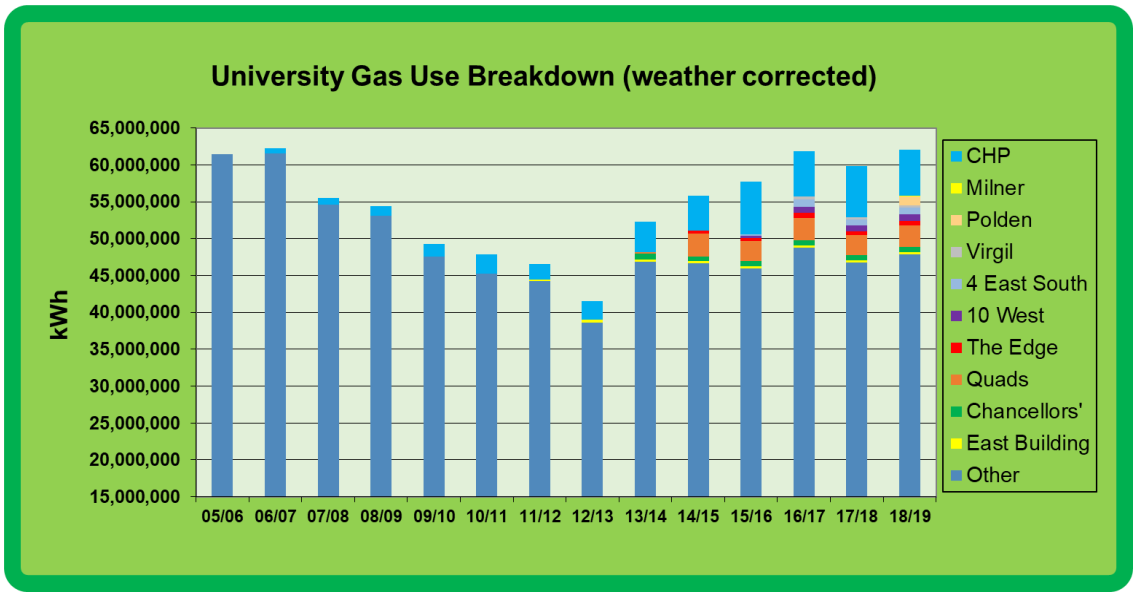
APPENDIX 1 – University Energy and Carbon graphs

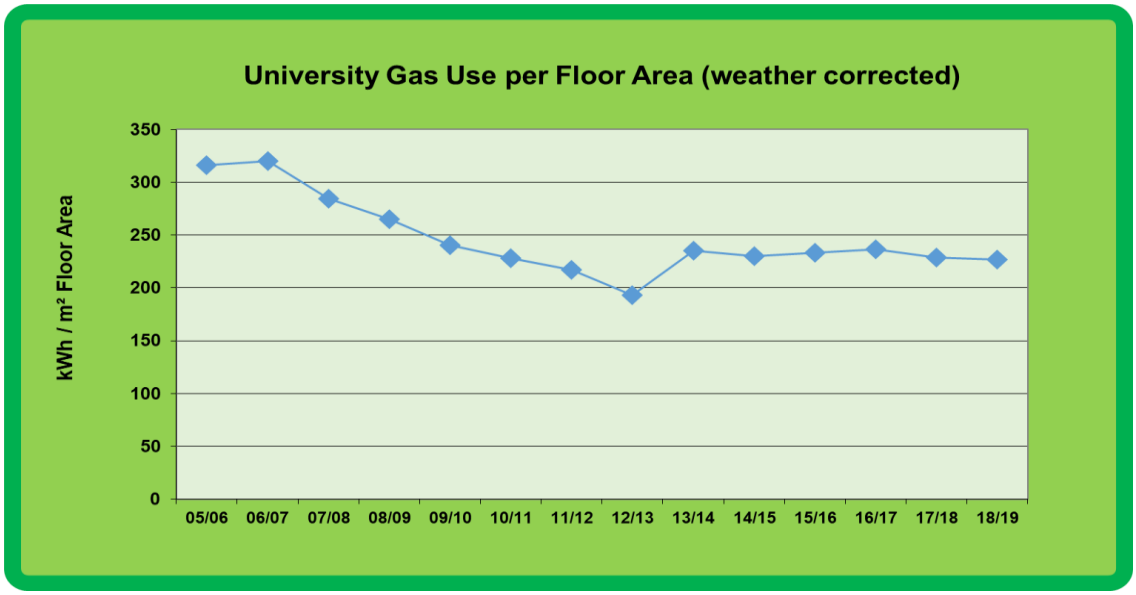


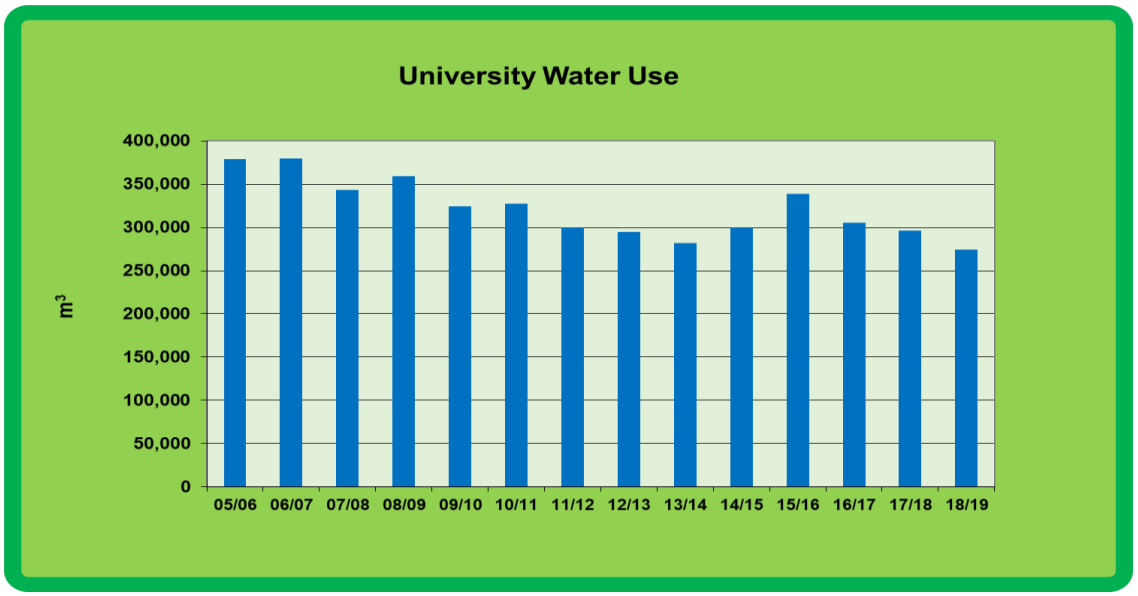


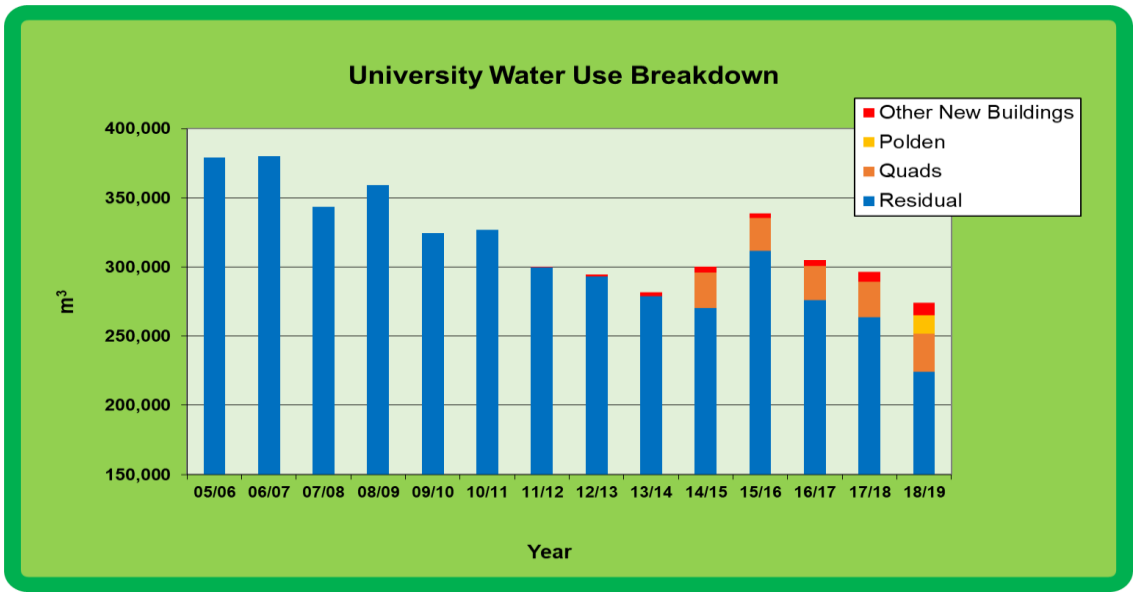


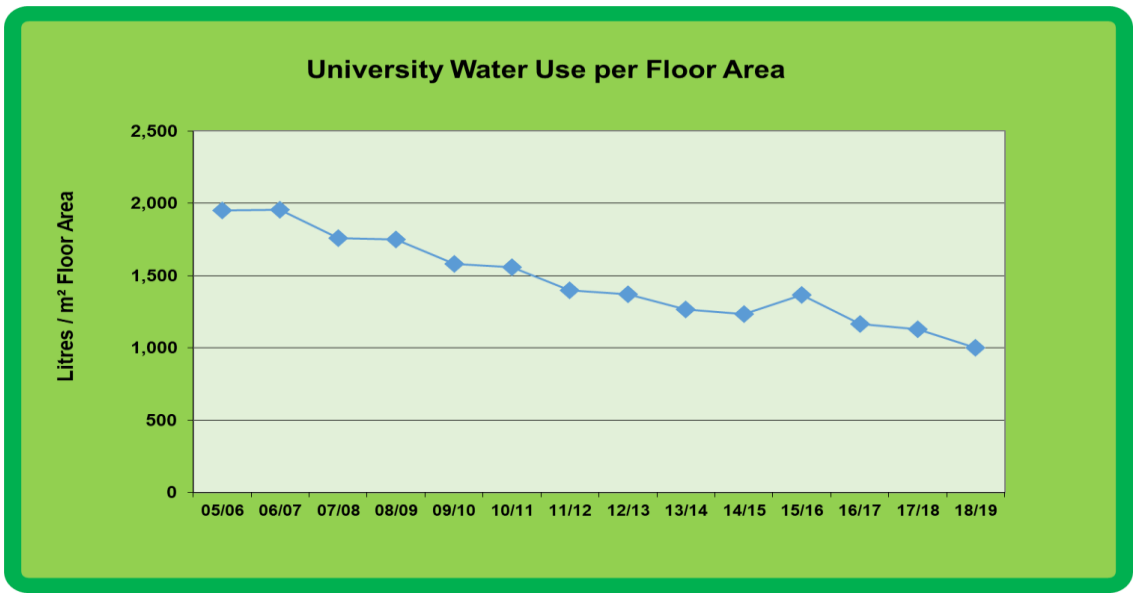

University Gas Use (weather-corrected)
kWh
70,000,000
60,000,000
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
0
05/06 06/07 07/08 08/09 09/10 10/11 11/12 12/13 13/14 14/15 15/16 16/17 17/18 18/19

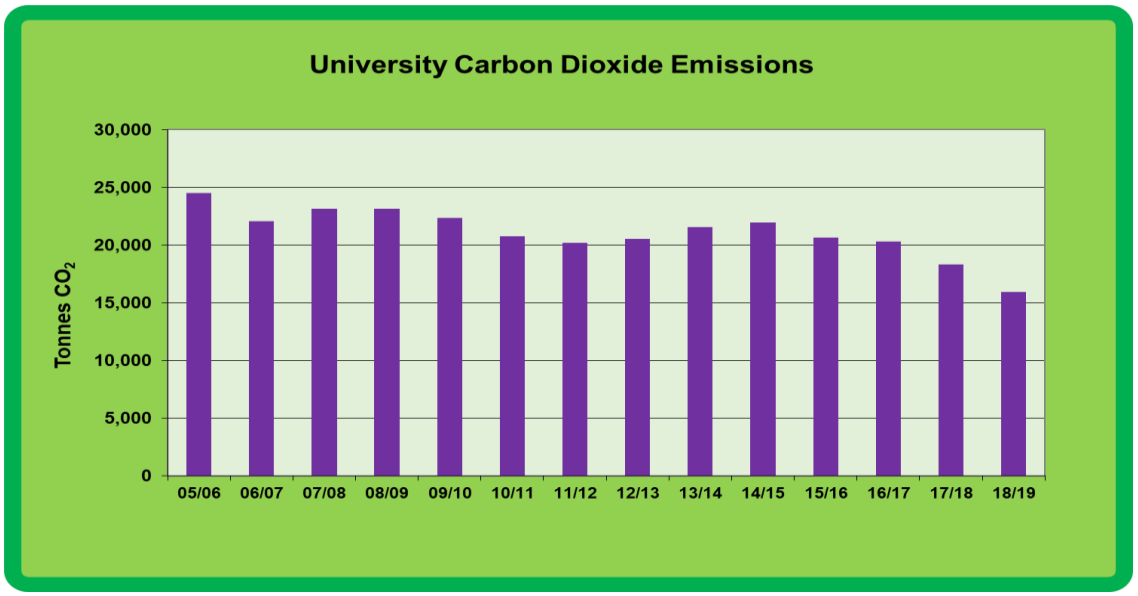

University Gas Use Breakdown (weather corrected)
kWh
65,000,000
60,000,000
55,000,000
50,000,000
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
05/06 06/07 07/08 08/09 09/10 10/11 11/12 12/13 13/14 14/15 15/16 16/17 17/18 18/19
CHP
Milner
Polden
Virgil
4 East South
10 West
The Edge
Quads
Chancellors'
East Building
Other

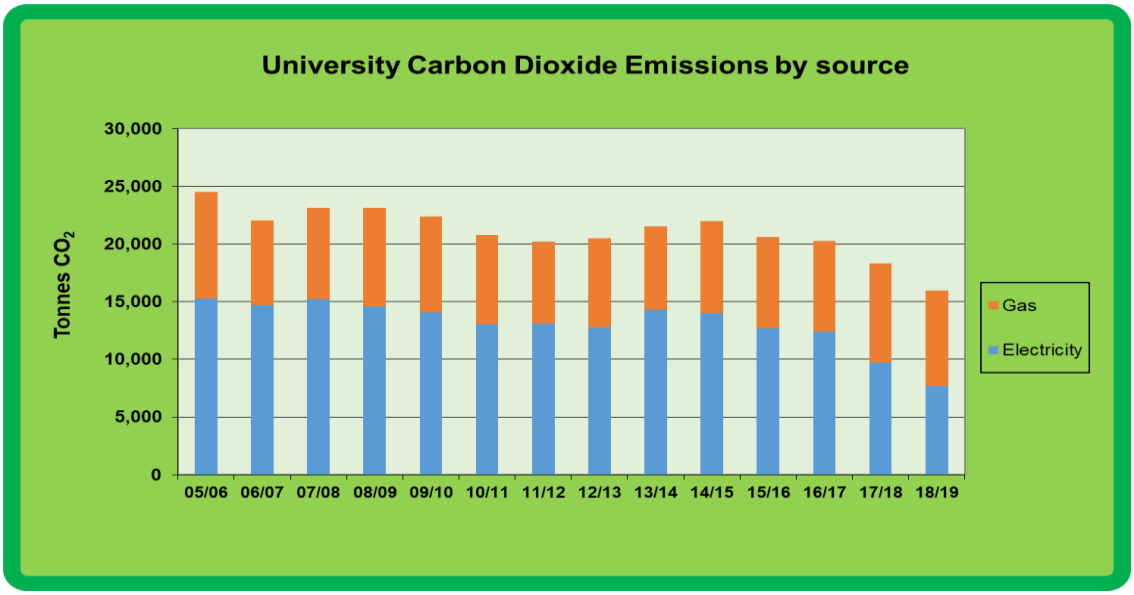

University Gas Use per Floor Area (weather corrected)
kWh / m² Floor Area
350
300
250
200
150
100
50
0
05/06 06/07 07/08 08/09 09/10 10/11 11/12 12/13 13/14 14/15 15/16 16/17 17/18 18/19

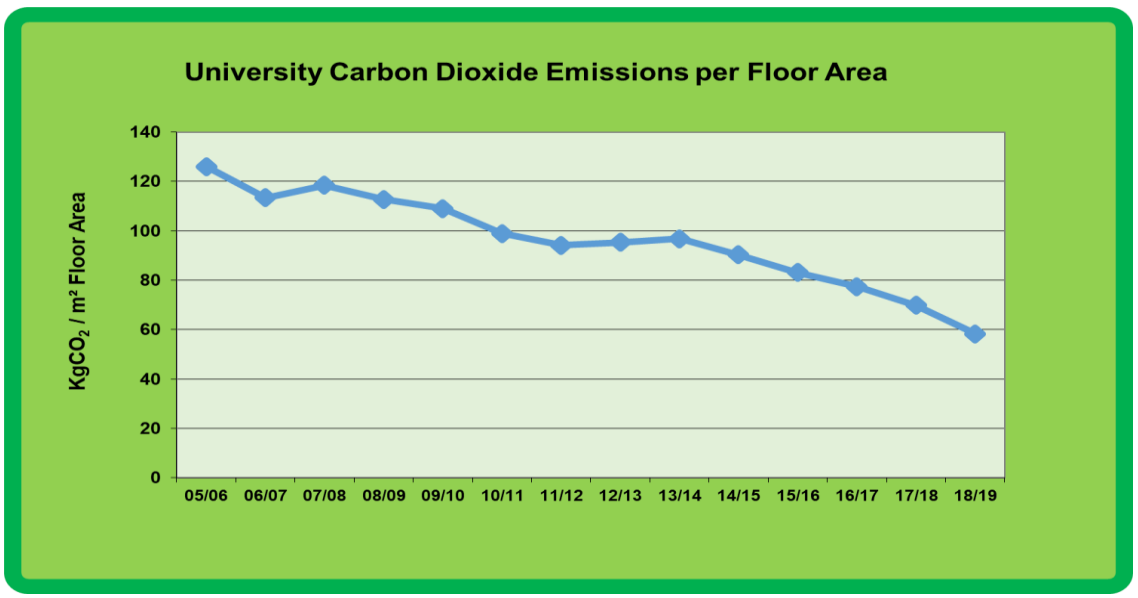

University Water Use
m³
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
05/06 06/07 07/08 08/09 09/10 10/11 11/12 12/13 13/14 14/15 15/16 16/17 17/18 18/19


University Water Use Breakdown
Other New Buildings
Polden
Quads
Residual
m³
400,000
350,000
300,000
250,000
200,000
150,000
05/06 06/07 07/08 08/09 09/10 10/11 11/12 12/13 13/14 14/15 15/16 16/17 17/18 18/19
Year


University Water Use per Floor Area
Litres / m² Floor Area
2,500
2,000
1,500
1,000
500
0
05/06 06/07 07/08 08/09 09/10 10/11 11/12 12/13 13/14 14/15 15/16 16/17 17/18 18/19

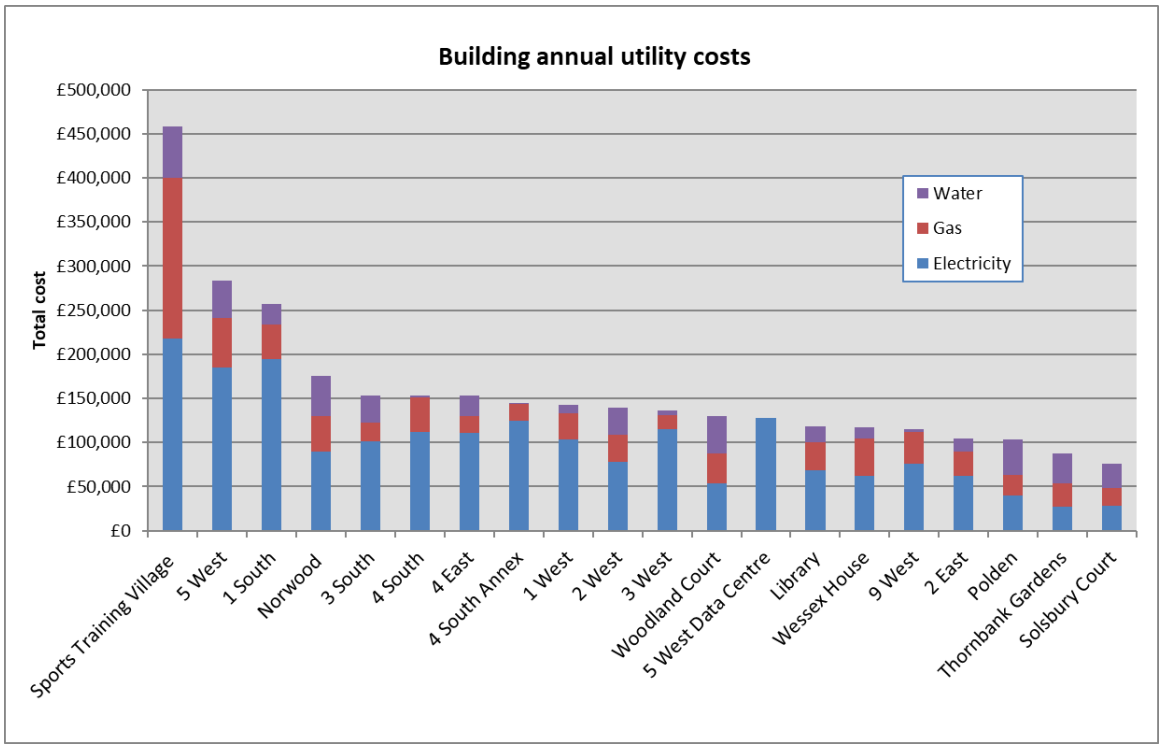

University Carbon Dioxide Emissions
Tonnes CO_2
30,000
25,000
20,000
15,000
10,000
5,000
0
05/06 06/07 07/08 08/09 09/10 10/11 11/12 12/13 13/14 14/15 15/16 16/17 17/18 18/19


University Carbon Dioxide Emissions by source
Tonnes CO_2
30,000
25,000
20,000
15,000
10,000
5,000
0
05/06 06/07 07/08 08/09 09/10 10/11 11/12 12/13 13/14 14/15 15/16 16/17 17/18 18/19
Gas
Electricity

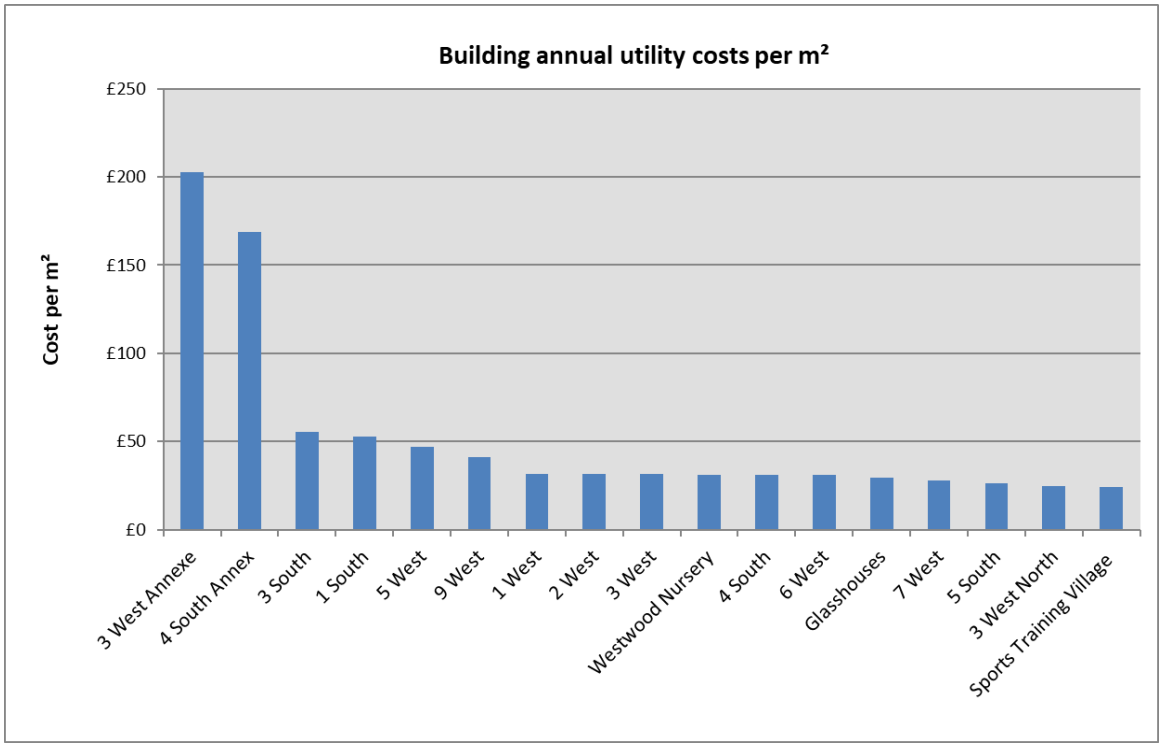

University Carbon Dioxide Emissions per Floor Area
$KgCO_2$ / m^2 Floor Area
140
120
100
80
60
40
20
0
05/06 06/07 07/08 08/09 09/10 10/11 11/12 12/13 13/14 14/15 15/16 16/17 17/18 18/19

APPENDIX 2 – Building Energy and Carbon graphs

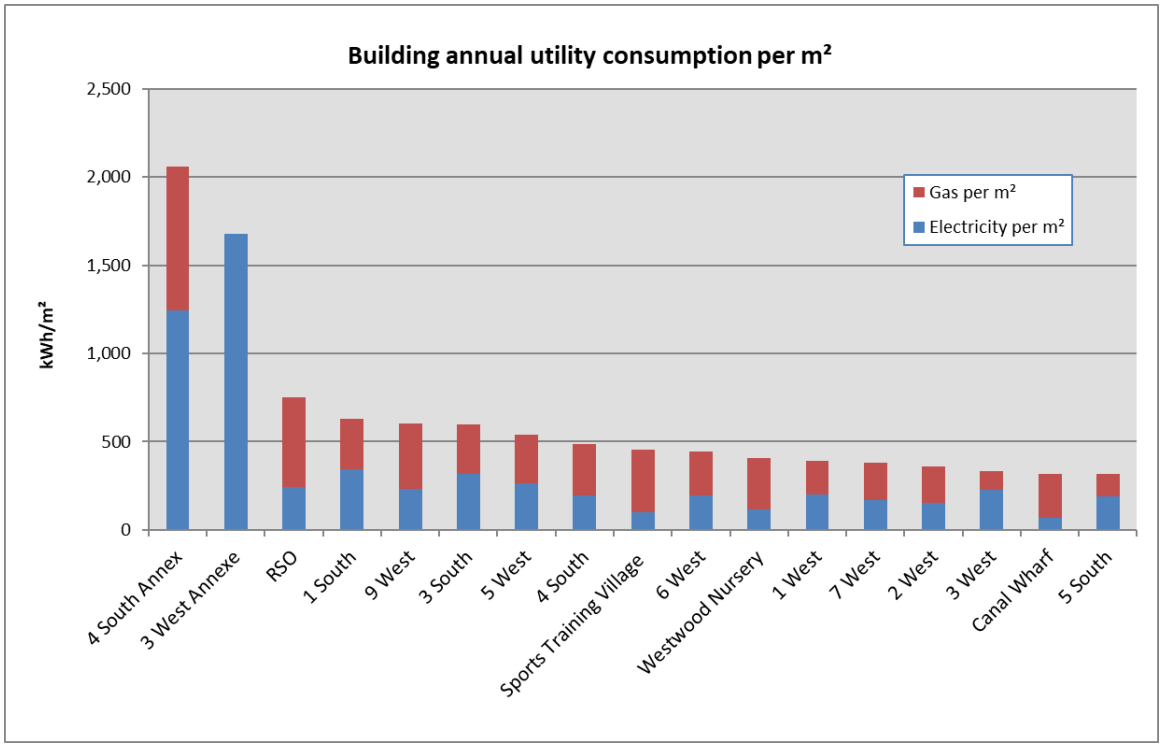
Buildings utility cost graph showing breakdown (18/19 data):



Buildings utility cost/m² (excluding data centres):



Buildings energy kWh/m² (excluding data centres):



Buildings energy carbon emissions (Scope 1&2 only):