Environmental Sustainability Team

University of Salford MANCHESTER

Energy, Water & Carbon Management Plan

University of Salford

Energy, Water and Carbon Management Plan 2018-2030

March 2020

Version 4.0

Document Control Information			
Author	Summary of changes	Version	Authorised & Date
Bec Bennett & Nia Prys-Williams	Review of document, update to key performance indicators and energy performance target in line with ISO 50001 requirements. Update of document to new format.	V4.0	Environmental Projects Board, April 2020
Clearlead Consulting	Creation of document in consultation with Environmental Sustainability Team	V1.0-V3.0	Environmental Projects Board August 2019

Table of Contents

1. Executive Summary

In 2011, we launched our first Carbon Management Plan with targets to reduce scope 1 and 2 carbon emissions by 43% by September 2020 compared to a 2005/06 baseline. As of end of academic year 2017/18 we had already reduced our scope 1 and 2 carbon emissions by 64%. This has been achieved partly through reductions in energy use on campus through investment, partly through reductions in grid electricity emissions factor, and partly through the divestment from our student accommodation in 2007/08.

Our new Energy, Water and Carbon Management Plan builds on our significant progress in carbon reduction to ensure we can achieve our objective of a scope 1 and 2 81% reduction by 2030 and work towards net zero carbon by 2038 in line with the Greater Manchester carbon reduction strategy. Environmental sustainability is a core element of our ambitious University Campus Masterplan, launched in the last year. Central to the plans is an energy strategy that takes a major step towards a zero-carbon future, while providing high quality spaces for residential, teaching, research and commercial uses that are cost-effective to run. University of Salford buildings will undergo refurbishment to make them highly energy efficient, with maximum potential for renewable energy generation. In the meanwhile, we will carry out extensive audits on our existing buildings to identify opportunities for improvements, implement where technology, scale and finances allow and develop and submit businesses cases for funding for larger projects.

The 2005/06 baseline is to be used for absolute carbon emissions, and this has therefore been adopted under the Energy, Water and Carbon Management Plan (EWCMP). Other relevant baselines are included in the Objectives, Targets and Action Plan include the academic year 2016/17 as a baseline for energy, gas and water consumption, to be used in the University's ISO50001 Energy Management System.

Carbon emissions are broken down into three categories by the Greenhouse Gas Protocol in order to better understand the source.

Scope 1 – All Direct Emissions from the activities of an organisation or under their control. Including fuel combustion on site such as gas boilers and fleet vehicles.

Scope 2 – Indirect Emissions from electricity purchased and used by the organisation. Emissions are created during the production of the energy and eventually used by the organisation.

Scope 3 – All Other Indirect Emissions from activities of the organisation, occurring from sources that they do not own or control. These are usually the greatest share of the carbon footprint, covering emissions associated with business travel, procurement, waste and water.

The EWCMP focuses on Scope 1 and 2 emissions, an addendum to this document covers Scope 3 emissions.

2. Background and context

2.1 Background

Situated in Salford, to the North West of Manchester City Centre, we have three campuses with 27 principal buildings providing teaching to around 16,000 students. In the 2016/17 Academic Year (the "audit" year selected for this Plan), we spent around £2.1 million on energy and water, of which electricity is the dominant cost at around 73%, with gas making up around 19%, and water and district heating and cooling the remainder at around 8%. Total carbon emissions from energy use for the same period were 8,901 tCO2.

Energy costs are expected to rise significantly over the next three years (and beyond), with electricity in particular expected to rise as a result of measures announced under the Electricity Market Reform, and gas as a result of the closure of the CRC Energy Efficiency Scheme following the 2018/19 compliance year, and the recovery of the lost revenue by HM Treasury by the loading of the Climate Change Levy, particularly onto gas. We calculate that CCL changes alone will increase costs by around 11% in the next 3 years, and by at least 15% up to 2025. Upwards pressure on commodity prices because of investment decisions in new electricity generation and distribution systems and gas resource depletion and geopolitical factors make it likely that energy prices will rise still further over the period.

We launched our first Carbon Management Plan in 2011, which included a commitment to reduce Scope 1 and 2 carbon emissions by 43% by 2020 compared to a 2005/06 baseline. As of 2016/17 we had already reduced our carbon emissions by 55% over the period and hence initiated the development of a new Energy Water and Carbon Management Plan (EWCMP).

We have recently developed and published a Masterplan in conjunction with Salford City Council. Our reason for developing the new Masterplan are to improve the student experience and placemaking. Research shows that today's students are environmentally-engaged and seek learning environments which are sustainable and efficient. This has been incorporated into the Campus Masterplan, particularly through an Energy Strategy and recognition of a physically green campus. The Campus Masterplan Energy Strategy recommends an all-electric approach for the campus by 2030 in order to achieve the targeted carbon reduction emissions. This will require an increase in efficiency in new and existing buildings, use of low carbon and renewable energy technologies on campus as well as taking advantage of decarbonisation of the grid.

2.2 Methodology

In developing this Plan we have partnered with external consultancy, ClearLead Consulting Ltd. First we held an Energy Risk and Opportunity Workshop in July 2018 together with ClearLead, involving colleagues from across the University. We also conducted a PESTLE (Political, Economic, Social, Technological, Legal and Environmental) analysis to determine

the internal and external issues that can affect our ability to achieve the intended outcomes of our Energy Management System, which are:

- To enhance the energy performance of all activities of the University of Salford Estates and Facilities Division;
- To fulfil compliance obligations;
- To comply with the policy and achieve environmental objectives.

These activities have helped us develop a list of energy-related issues and associated risks and opportunities, together with actions to address them. In total over 60 issues were identified, of these 20 were prioritised as potentially having a significant impact (see Table below).

Internal Issues	External Issues
Systems and Procedures: Budget / funding process for energy saving initiatives Setting of Utilities Budget Procurement systems and frameworks Consultation on technological issues	Compliance Issues: Minimum Energy Efficiency Standards (MEES) Requirement for EPCs / DECs Changing legislation and awareness of legislation (existing, new and amended)
Development Activities and New Projects: Implementation of Masterplan Communication and visibility of projects Consultation process during a building design Ability of new buildings to achieve expected energy performance	
Buildings and their Use: Managing building user's expectations Building manager's engagement in energy performance Old systems within buildings e.g. heating, lighting, IT. Heating and Cooling Expectations / Policy Old inefficient 1960s buildings	
Building Management System Issues: Access to BMS for relevant parties BMS Performance BMS sensors in wrong place e.g. on West or East-facing walls or near heat sources Training and competency of staff on installed building systems e.g. BMS	

ClearLead also developed an Energy and Water Review tool to review all of our current and historic energy use, costs and associated carbon emissions.

The purpose of the energy review was:

- To establish an appropriate baseline for measurement of energy use and carbon emissions.
- To derive suitable energy, water and carbon benchmarks and key performance indicators (KPIs) which can be used to set targets and measure performance going forward.
- To accurately quantify energy use, water use and carbon emissions for the University's main campuses, buildings and end users, and to use this as the basis of derivation of areas of significant energy use and opportunities for energy performance improvement in line with the requirements of ISO 50001:2018.
- To establish relationships between energy and water use and key driving variables, in order to develop a forecasting methodology. This in turn will be used to calculate future energy and water use and carbon emissions, and then used to establish what level of reduction is required to meet any future targets.

3. Energy and Water Review

3.1 Baseline and Key Targets

Through the Higher Education Funding Council for England (HEFCE) carbon management programme we initially adopted the sector target published in January 2010. HEFCE advocated targets for the higher education sector for reduction in Scope 1 and 2 carbon emissions of 43% by 2020 when compared to a 2005 baseline.

We adopted the 2005/06 academic year as our baseline for carbon emissions accordingly. To the 2018/19 Academic Year, we had achieved an actual reduction of around 64%. This has been achieved partly through reductions in energy use on campus through investment, partly through reductions in grid electricity emissions factor, and partly through our divestment of our student accommodation in 2007/08.

The 2005/06 baseline is to be used for absolute carbon emissions, and this has therefore been adopted under the Energy, Water and Carbon Management Plan. Other relevant baselines are included in the Objectives, Targets and Action Plan (see Section 4) and include the academic year 2016/17 as a baseline for energy, gas and water consumption, to be used in our ISO50001 Energy Management System.

Our Campus Masterplan Energy Strategy suggested a target to reduce carbon emissions by 81% by 2030, through adoption of an energy strategy which would see the Campus move to an all-electric model, with heat pumps to provide heating and cooling, and with grid electricity supplemented by the limited implementation of building-mounted solar PV. This target and an aspiration to move towards net zero carbon by 2038 was adopted and published via the Mayor of Manchester's Green Summit in March 2018.

Our Carbon Reduction Objective:
To reduce scope 1 and 2 carbon emissions from 2005/6 baseline by 81% by 2030 and work towards net zero carbon by 2038

3.2 Benchmarks and Key Performance Indicators

Potential benchmarks and key performance indicators (KPIs) have been explored. Obvious KPIs are those that relate energy and water use and carbon emissions to a driving variable, such as floor area or student numbers. This subject is more complex than perceived as there is more than one variable affecting energy and water use. This is explored further in Section 3.5 Energy and Water Forecast, below.

Data has been obtained from the Higher Education Statistics Authority (HESA) and used to compare our 2016/17 performance against that of our peers using suitable normalised KPIs i.e:

- Energy use / floor area / year (kWh/m^2/year)
- Water use / full time equivalent (staff and students) / year (m^3/FTE/year)
- Carbon emissions / floor area / year ($kgCO_2e/m^2$/year).

As these are the accepted KPI's used within the sector, they have been adopted as the over-arching KPIs within our Environmental and Energy Management System.

For energy use, on a total kWh/m^2 (gross internal floor area) basis the University of Salford performs at around 193 kWh/m^2/year (119^{th} out of 161) as shown in Figure 1.

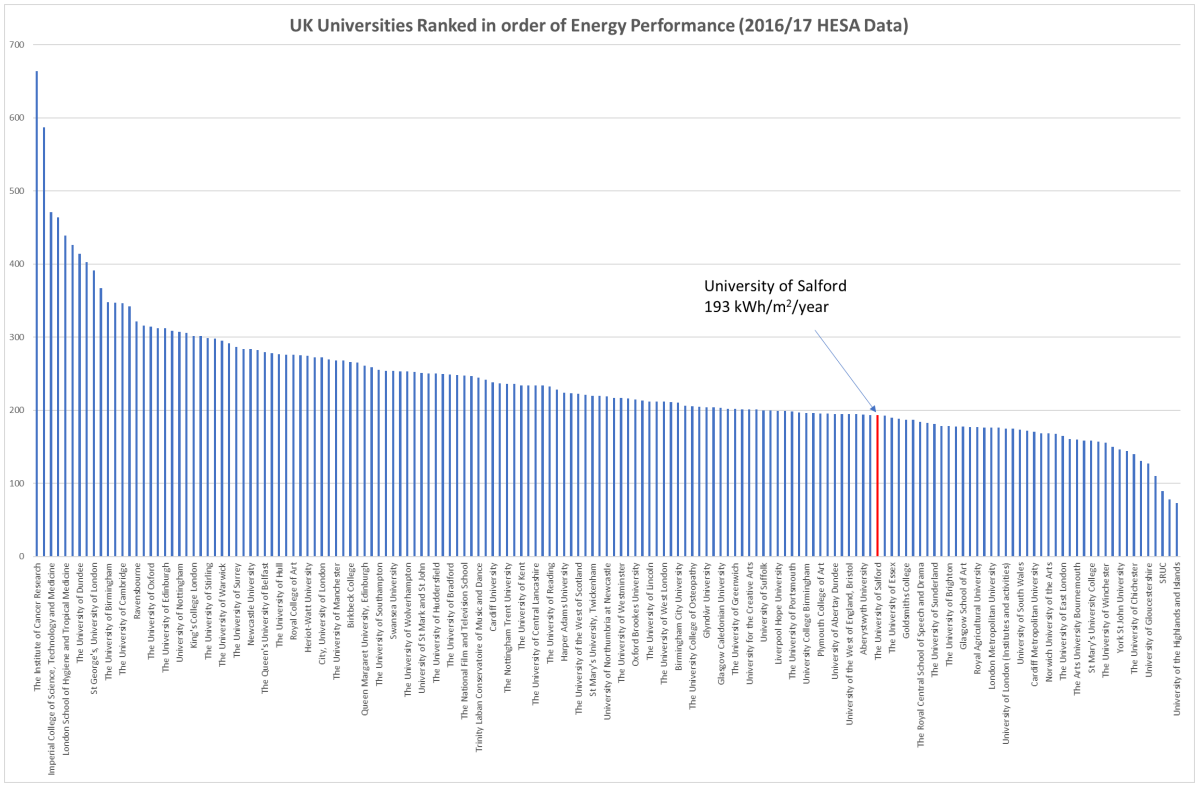

Figure 1 - Comparative Energy Performance of UK Universities (HESA data)

For water, the University's performance is 5.7 m^3/FTE/year (123rd out of 161) as shown in Figure 2.

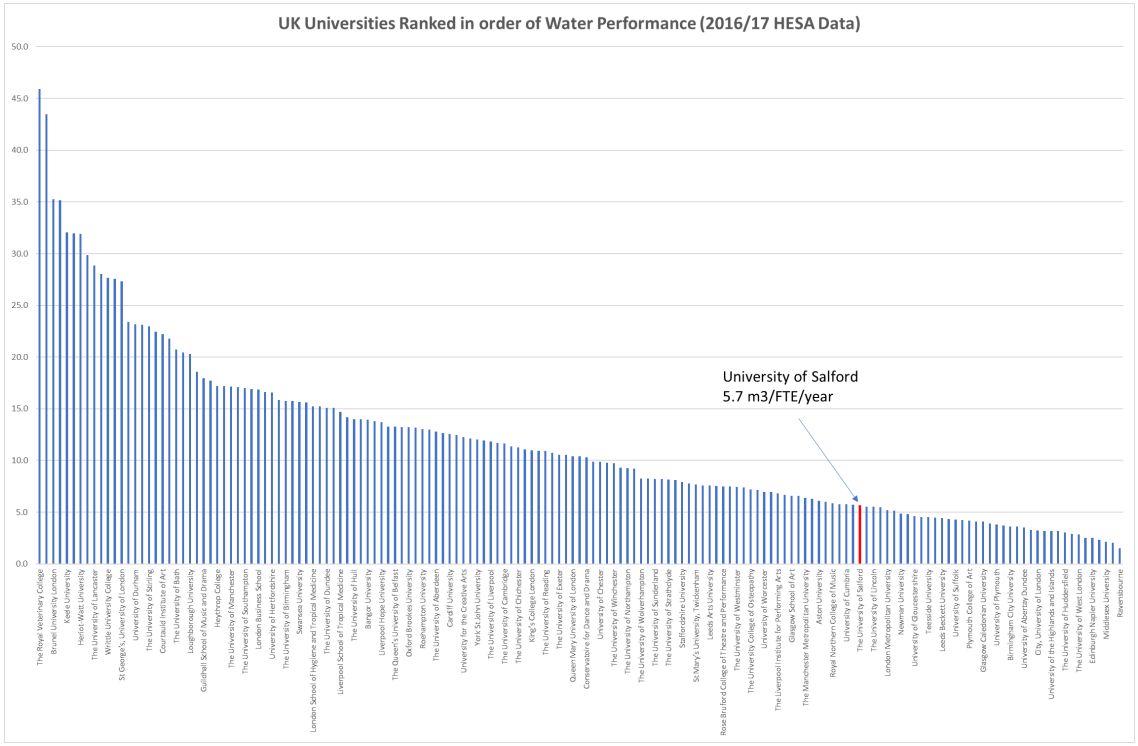

Figure 2 - Comparative Water Performance of UK Universities (HESA data)

For Scope 1 and 2 carbon emissions, the University's performance is 54.8 $kgCO_2e/m^2$/year (97th out of 161) as shown in Figure 3.

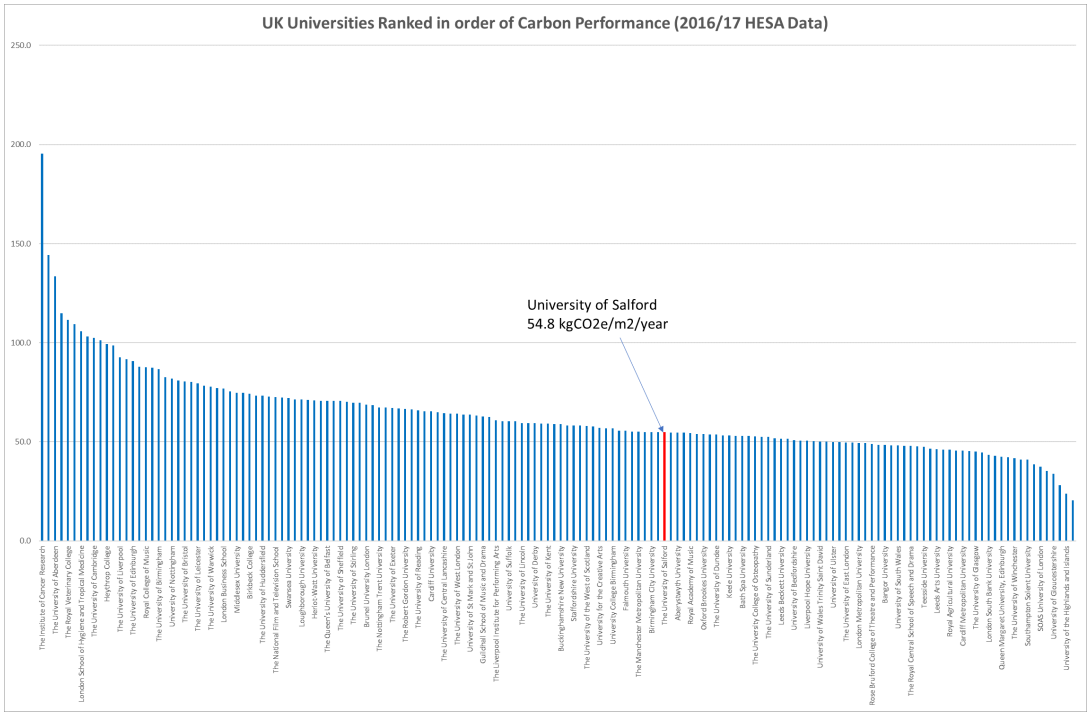

Figure 3 - Comparative Carbon Performance of UK Universities (HESA data)

3.3 Energy and Water Review Results

In line with the requirements of ISO 50001:2018, an Energy and Water Review has been carried out. The review used data from the 2016/17 academic year (year ending 31st July 2017), which was the last year for which full data was available at the time the review as carried out (May/June 2018). A review of available historical data was also undertaken as part of the Energy Review dating back to the base-line year 2005/06, obtained from the University's HESA returns and is included in section 3.5, Figure 14.

The purpose of the review is to accurately quantify the energy and water use and carbon emissions, and then to determine the areas of Significant Energy Use (SEU). SEUs have determined on the basis of both individual buildings (as was already standard practice at the University, in accordance with existing metering arrangements) and also by end user, i.e. heating, cooling lighting, etc. The intention of this approach is to allow insights into where energy is used across the campus and within individual buildings, and therefore where practical measures to reduce energy and water use might be applied in future. In most cases, there is no metering available to derive the breakdown of energy use by end user at building level, so an approach of using available benchmark data adjusted for individual buildings (based on knowledge gained through a campus walkover) was adopted, backed by sub-meter data where it was available.

Data has been drawn from the University's SystemsLink and Active Energy Manager data platforms. Data includes both main (fiscal) meters for gas, electricity and water, and sub-meters.

The overview of the University's energy and water use, cost and emissions is shown in Table 1, below.

Table 1– Overview of Current Utilities Use, Costs and Carbon Emissions (2016/17 data)

Utility	Total Usage	Units	% Use	Total Cost (£)	%	Total Emissions tCO_2/year	%
Gas	16,223,546	kWh	49.6%		18.7%	2,913	32.7%
Electricity	14,858,829	kWh	48.6%		73.2%	5,954	66.9%
District Heating	495,226	kWh	1.6%		0.7%	0	-
District Cooling	93,704	kWh	0.3%		0.7%	0	-
Total Energy	**31,671,305**	**kWh**	**100.0%**		**93.3%**	**8,867**	**99.6%**
Water	99,829	m^3			6.7%	34	0.4%
Total All				**£2,114,820**	**100.0%**	**8,901**	**100.0%**

The headline data is summarised in Figures 4 and 5, below.

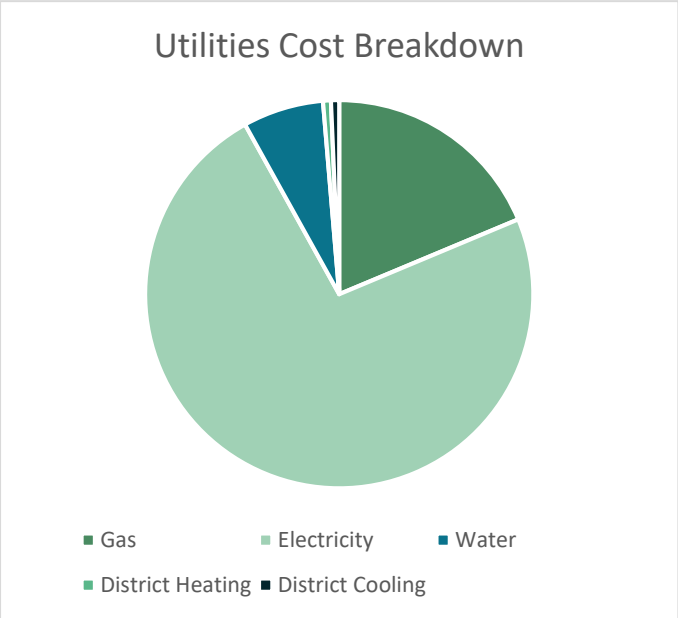

Figure 5 - Breakdown of Utilities by Cost

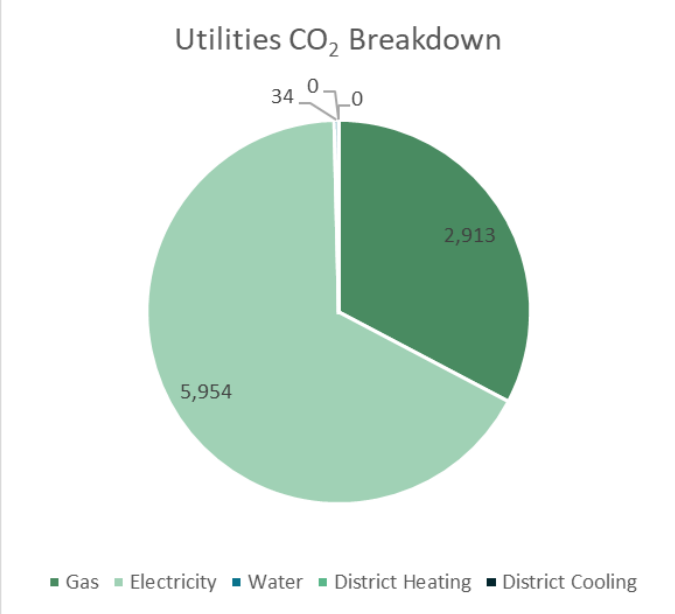

Figure 4 – Breakdown of Utilities by Emissions

The Energy Review tool is designed to be updateable on an annual basis and contains a number of analysis features, such as the ability to rank buildings on the basis of the agreed KPIs i.e. total annual energy use in kWh, energy use by floor area (kWh/m^2), total annual spend, spend by floor area (£/m^2), and total annual emission, as well as emissions by floor area (tCO_2/m^2). Analysis against student numbers was not incorporated as a KPI, due to the lack of clear correlation between with energy consumption.

Examples are shown in the following Figures 6 to 11, below.

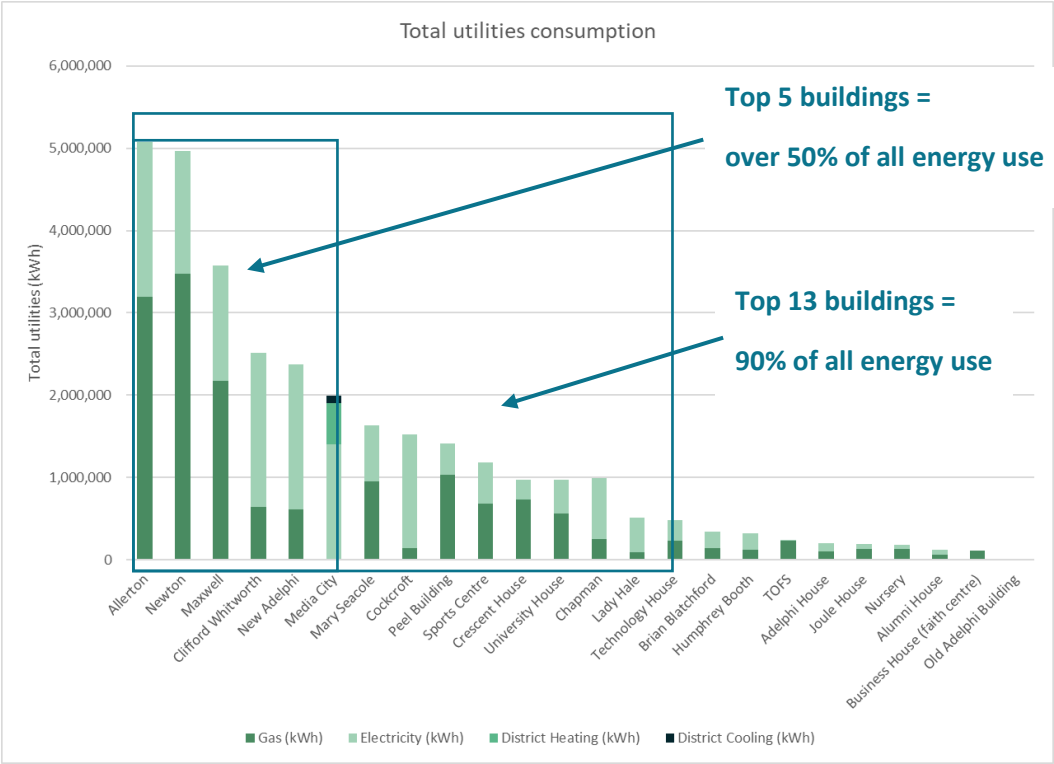

Figure 6 – Building Energy Consumption, ranked largest to smallest

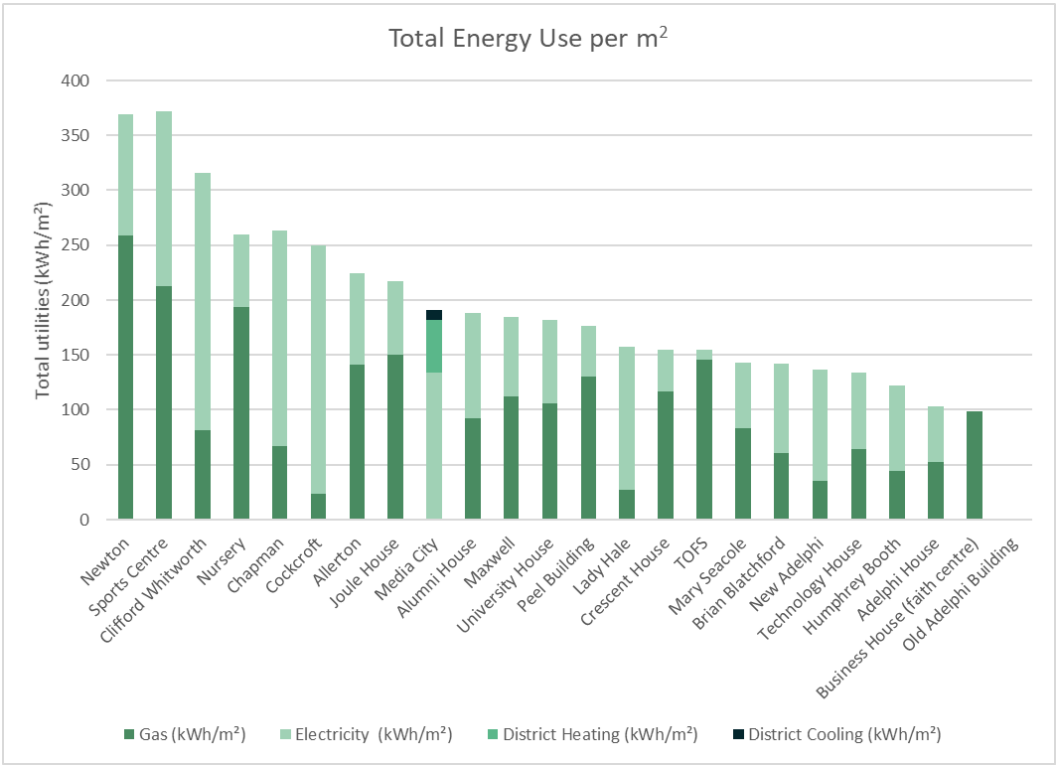

Figure 7 – Building Energy Consumption per m² floor area, ranked largest to smallest

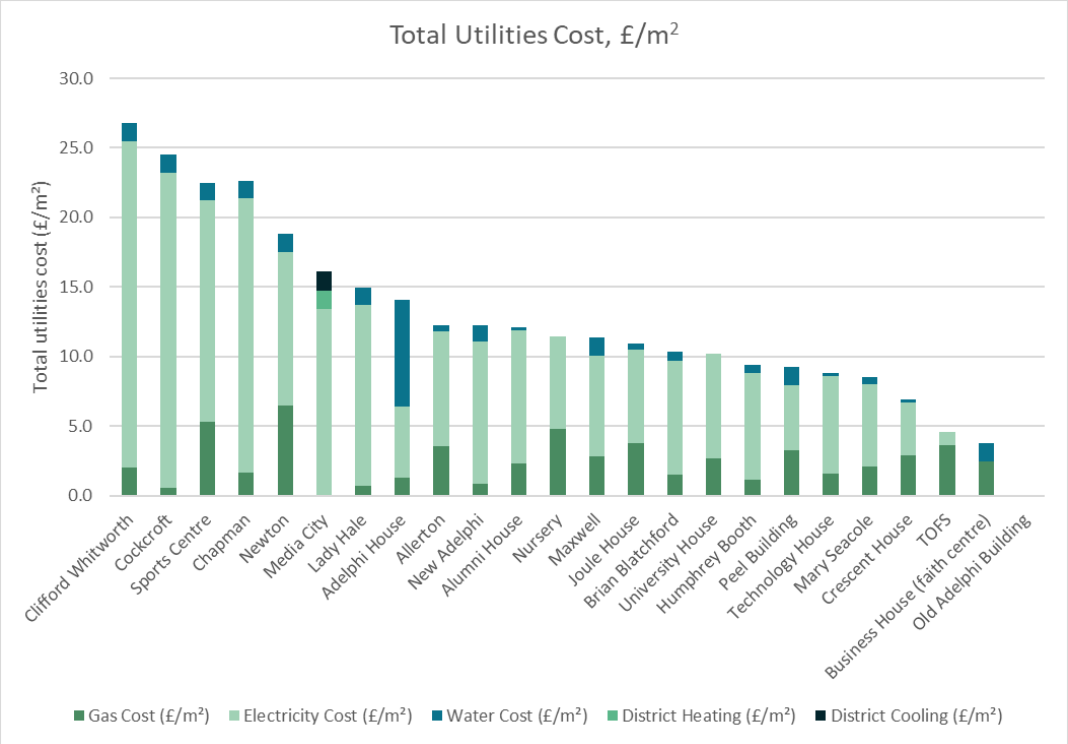

Figure 9 – Building Energy Cost per m² floor area, ranked largest to smallest

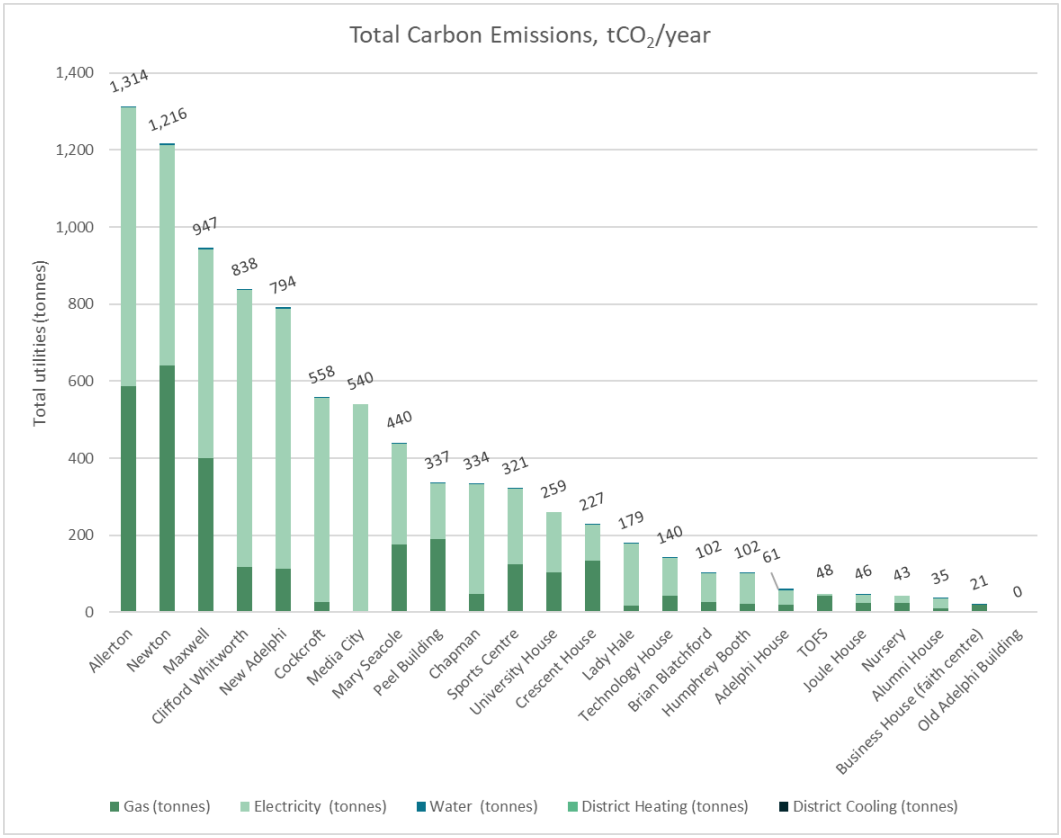

Figure 10 – Building Energy-Related CO_2 Emissions, ranked largest to smallest

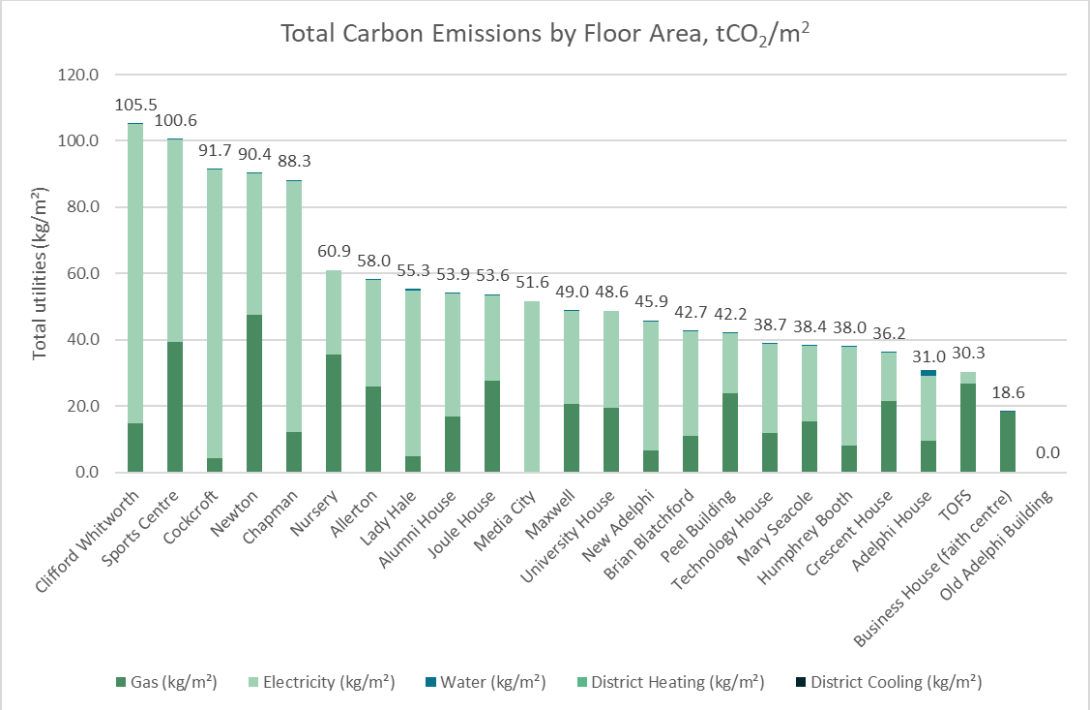

Figure 11 – Building Energy-Related CO_2 Emissions, ranked largest to smallest

In terms of Significant Energy Uses, as noted above, analysis may be made by both building and by end use.

In building terms, it is obvious and notable that the largest buildings are the highest users, with the top 5 largest buildings using around 50% of our total annual energy use, cost and emissions, and the largest half of the estate being responsible for around 90% of our energy use, cost and resultant emissions. As such these are deemed our significant energy uses (SEUs) under the ISO50001 Energy Management System, since they are likely to offer considerable potential for energy performance improvements. These are the subject of detailed energy audits as detailed in the Action Plan presented in Section 4.

The Energy Review tool also allows the user to "slice" the data at individual building level in order to identify Significant Energy Uses by end use category, for example heating, domestic hot water, cooling, fans and pumps, lighting, data centre, office equipment, laboratories, swimming pool and so on. Whilst not absolutely accurate (due to the absence of sufficient end user sub-metering), it does serve as a useful indicator of which services are the Significant Energy Uses, and therefore where future energy and carbon emissions reduction efforts might best be targeted. It is not the intention that this approach be used as a formal SEU measure in the ISO50001 system at this stage, however, this could be adopted at a later date when the level of sub-metering allows for energy used by such end-uses to be more accurately measured. For the time being, the analysis presented in the following Tables and Charts is used to inform thinking on the targeting of energy efficiency measures under the ISO50001 system.

Table 2 – Breakdown of Energy Use by End User across all Buildings

End User	Gas (kWh/year)	Electricity (kWh/year)	Total Energy (kWh/year)
Heating	14,647,692	63,105	14,710,797
Domestic Hot Water	1,459,601	95,000	1,554,601
Swimming pool	109,122	0	109,122
Chillers & A/C	0	1,129,765	1,129,765
Fans and pumps	0	1,935,829	1,935,829
Lighting	0	6,126,992	6,126,992
Labs	7,131	0	7,131
Data centre	0	43,042	43,042
Office equipment	0	4,139,799	4,139,799
Catering	0	391,211	391,211
Other	0	1,523,016	1,523,016
Buildings total	**16,223,546**	**15,447,759**	**31,671,305**

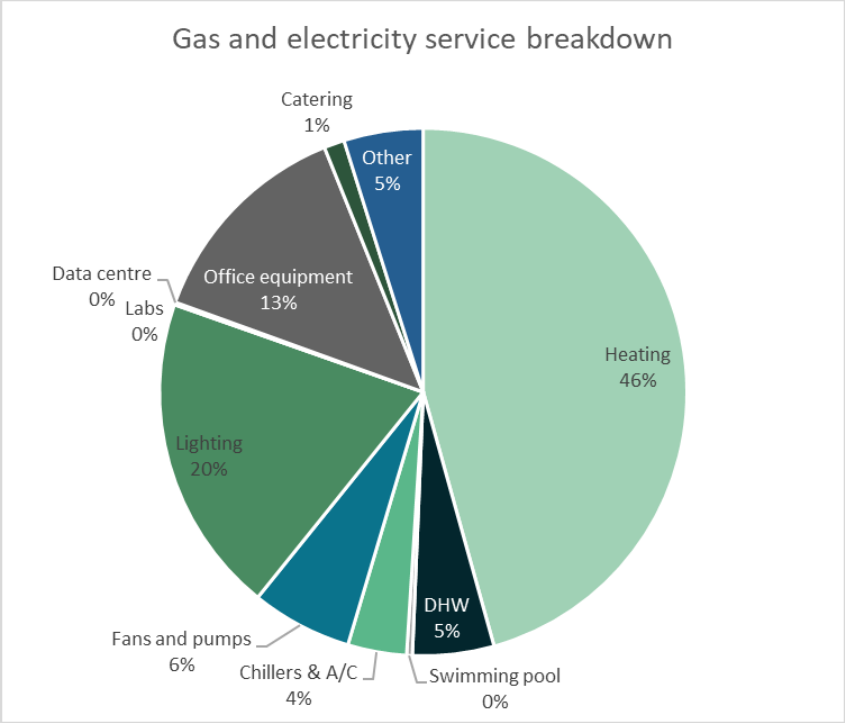

Figure 12 – Breakdown of Energy Use by End User across all buildings

As can be seen, in SEU terms, the largest energy users ranked by end use category are:

Table 3 - Significance of End Users by Size

End User	Breakdown of Use %
Space Heating	45%
Lighting	19%
IT and Office equipment	14%

Fans and pumps	6%
Domestic Hot Water	5%
Chillers & A/C	4%
Catering	1%
Swimming pool	<1%
Data centre	<1%
Labs	<1%
Other	6%
Total	**100%**

The table above indicates that the SEUs in terms of end users are space heating, lighting, IT and office equipment, fans and pumps, DHW and chillers & A/C, which together account for over 90% of overall consumption. Other users can be considered insignificant at this stage at a campus level as their percentage consumption is 1% or less of the total (unless they are found to have significant potential for energy performance improvement as identified through detailed energy audits).

3.4 Energy Market Context and Risk Assessment

The current market for electricity, gas and water has been examined in the context of fuel supplies and availability, anticipated market condition and future pricing, legislative impact and taxation, together with an examination of the risks and opportunities faced by the University. The output of the Assessment in included in Appendix 1 for information.

One point worth noting is that the unit costs of electricity and gas are forecast to rise markedly in future. According to forecasts carried out by the Department for Business, Energy and Industrial Strategy (BEIS), the cost of electricity is forecast to rise from current (2018) levels by around 28% to 2028, before falling back to an overall rise of around 8% by 2035. Gas prices are forecast to rise by around 90% between now and 2030 before levelling off.

The forecast rises are shown in Figure 13, below.

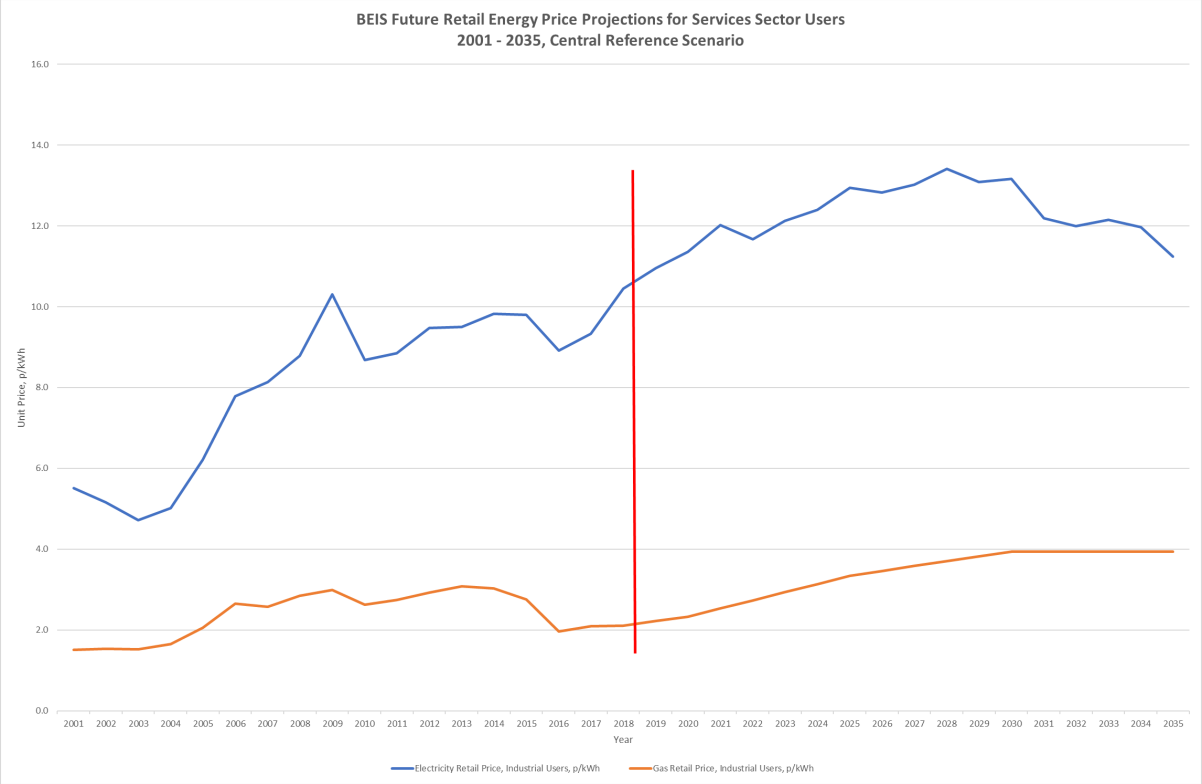

Figure 13 – Forecast Rise in Electricity and Gas Unit Costs to 2035 (BEIS, Services Sector, Central Reference Scenario)

3.5 Energy and Water Forecast

Following the Energy Review, historic energy and water use and carbon emission data along with data on floor area, staff and student numbers and turnover has been obtained from the University's HESA (formerly HEFCE) returns. Together with heating and cooling degree day data, this has been used to explore the relationship between energy and water use and the various driving variables. It has been found that the strongest correlation for energy use (gas and electricity) is a combination of floor area, staff and student numbers (expressed as FTEs) and heating degree days (for water any combination tried gives a much weaker correlation though there are uncertainties in the data which make this analysis less reliable).

Our Campus Masterplan has been considered for planned new build and refurbishment works in order to obtain a reasonably accurate projection of floor area going forward to 2030/31 and forecast student numbers from 2017/18 to 2022/23 (and an estimate has been used thereafter to 2030/31) have also been considered. Degree days are difficult to predict, so an average figure has been assumed.

Using the Forecast tool an estimate of gas and electricity to 2030/31 has been generated.

The resulting profile (showing total energy use) is shown in Figure 14, below:

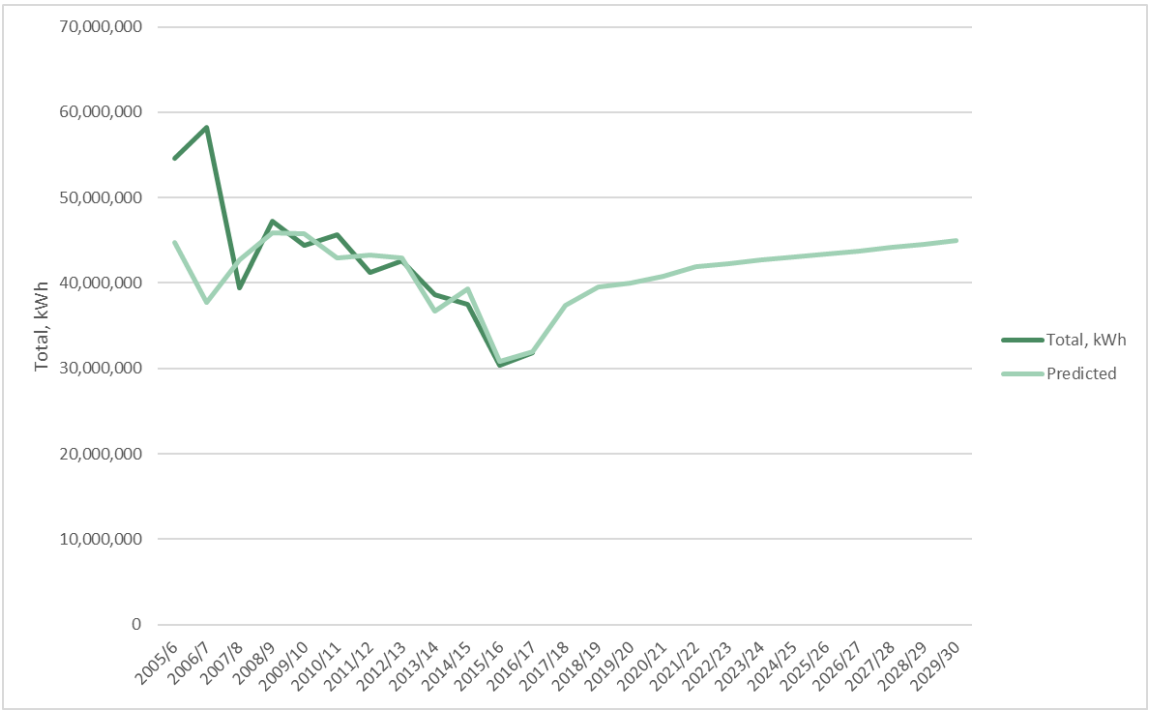

Figure 14 – Predicted Energy Use to 2030/31

This has then been overlaid with forecast gas and electricity price rises (derived from the BEIS Forecast referred to in Section 3.4, Figure 13), forecast grid electricity emission factors (again derived from BEIS) and forecast rates of Climate Change Levy (currently set only as far ahead as 2019/20, so with an RPI-based inflation factor built in thereafter).

The result is a forecast of both energy costs and Scope 1 and 2 carbon emissions between now and 2030/31.

This is then used to model various energy use and emission reduction scenarios to give a "top down" view on what measures we will need to put in place to achieve our 81% carbon emissions reduction target by 2030/31, and also what would be a sensible interim target to be achieved by implementation of the EWCMP.

The model also provides a view of the energy and emissions "Value-at-Stake", as discussed in Section 3.6 below.

3.6 Value at Stake

The Value-at-Stake analysis examines the consequences of "doing nothing" in terms of energy and emissions management, versus the impact of "doing something". For the purposes of this analysis, we have taken the energy use as forecast by the methodology described in Section 3.5 above, overlaid with forecast energy price rises, carbon emissions taxes and forecast grid electricity factors. The impact on overall utilities costs is shown in Figure 15, below.

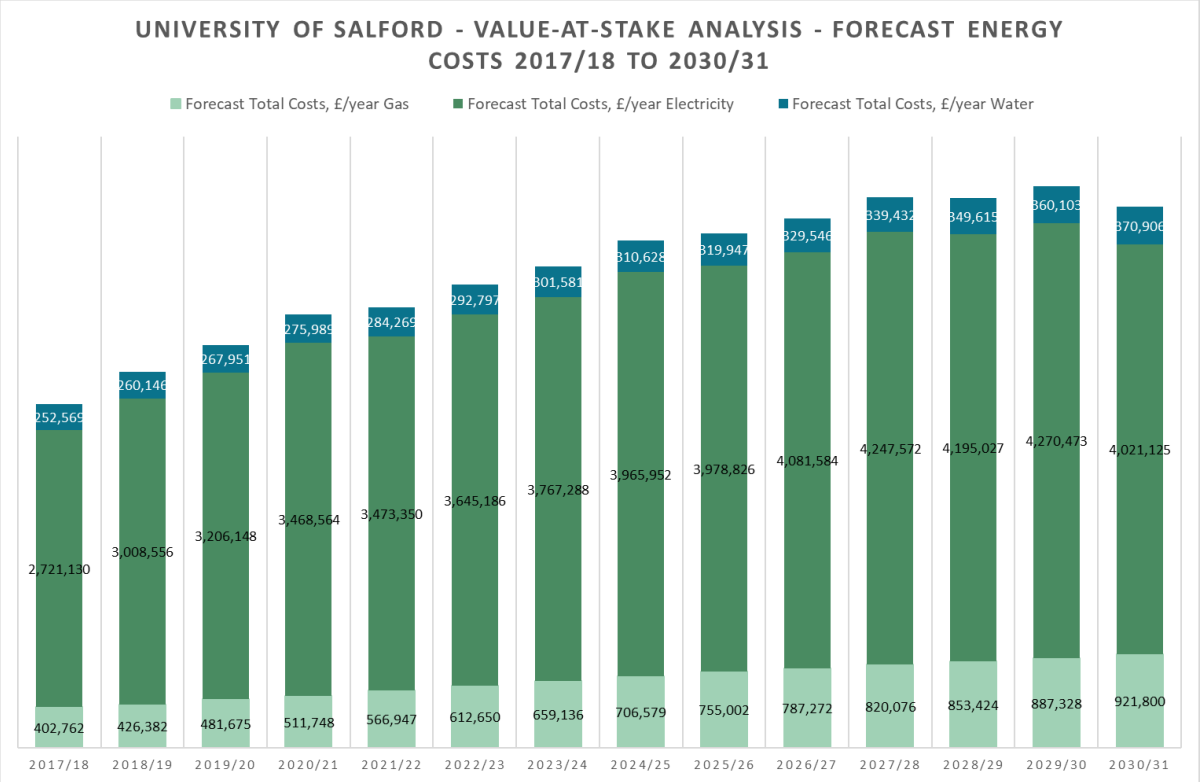

Figure 15 – Value-at-Stake – Impact on Overall Utilities Costs, 2017/18 to 2030/31

It can be seen, that without action on energy, water and emissions management, costs are forecast to increase from current levels of £2.8 million per year, to £4.6 million per year by 2030/31, an increase of 64% at today's prices.

The same analysis for carbon emissions is shown in Figure 16, below.

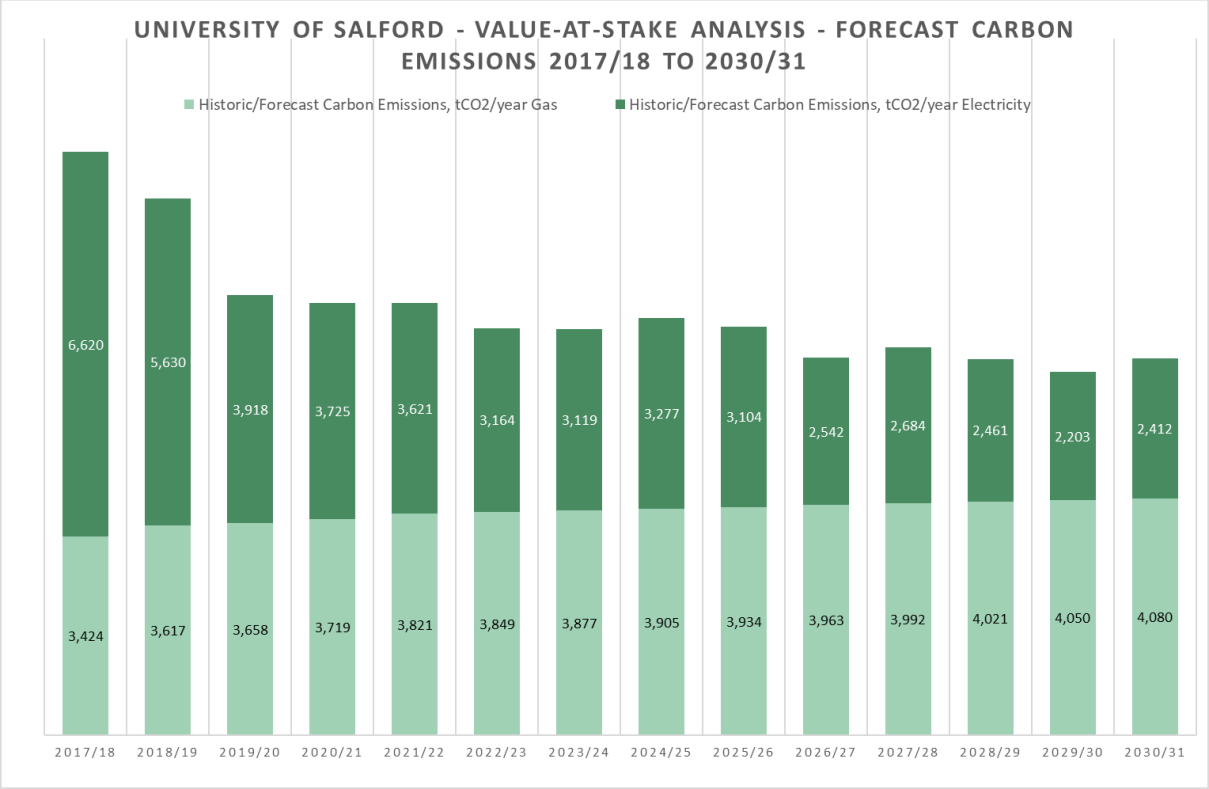

Figure 16 – Value-at-Stake – Impact on Overall Carbon Emissions, 2017/18 to 2030/31

In the case of carbon emissions, the chart shows that, over the period to 2030/31, emissions will actually fall, driven largely by the successive decarbonisation of the electricity supply grid as forecast by BEIS, despite increasing consumption. Emissions from gas use, however, will continue to rise slightly in line with increasing consumption.

It can be seen, that without action on energy and emissions management, emissions overall are forecast to fall from current levels of around 10,000 tCO_2e per annum to around 6,600 tCO_2e per annum by 2030/31, a decrease of 35%. When compared to the 2005/06 baseline, the overall reduction is around 65%.

The question of what could be achieved through pro-active measures to reduce energy and water use and consequent costs and carbon emissions is the true Value-at-Stake and is addressed in Section 4 – Energy and water Objectives, Targets and Action Plan.

4. Energy and Water Objectives, Targets and Action Plan

4.1 Development of Energy and Water Objectives and Targets

The aim of our Energy Water and Carbon Management Plan is to review our current position and to develop appropriate Objectives and Targets for the five-year period 2017/18 to 2022/23. This will help set the direction to achieving our long-term targets of reducing carbon emissions by 81% by 2030 and net zero carbon by 2038. Targets set under the EWCMP will be SMART (Specific, Measurable, Actionable, Relevant and Time-bound).

The analysis undertaken during the development of the EWCMP has resulted in two approaches to setting potential new realistic and achievable targets over the coming five-year period to 2022/23 and beyond to 2030/31. The first is a "top-down" view of the emissions "glidepath" required to meet the 2030/31 target, taking into account the impact on energy use of increasing student numbers and expanded floor area, together with the anticipated impact of grid decarbonisation as used in the forecasting tool described in section 3.5 above.

The results of the top-down forecast are shown in Figure 18, below:

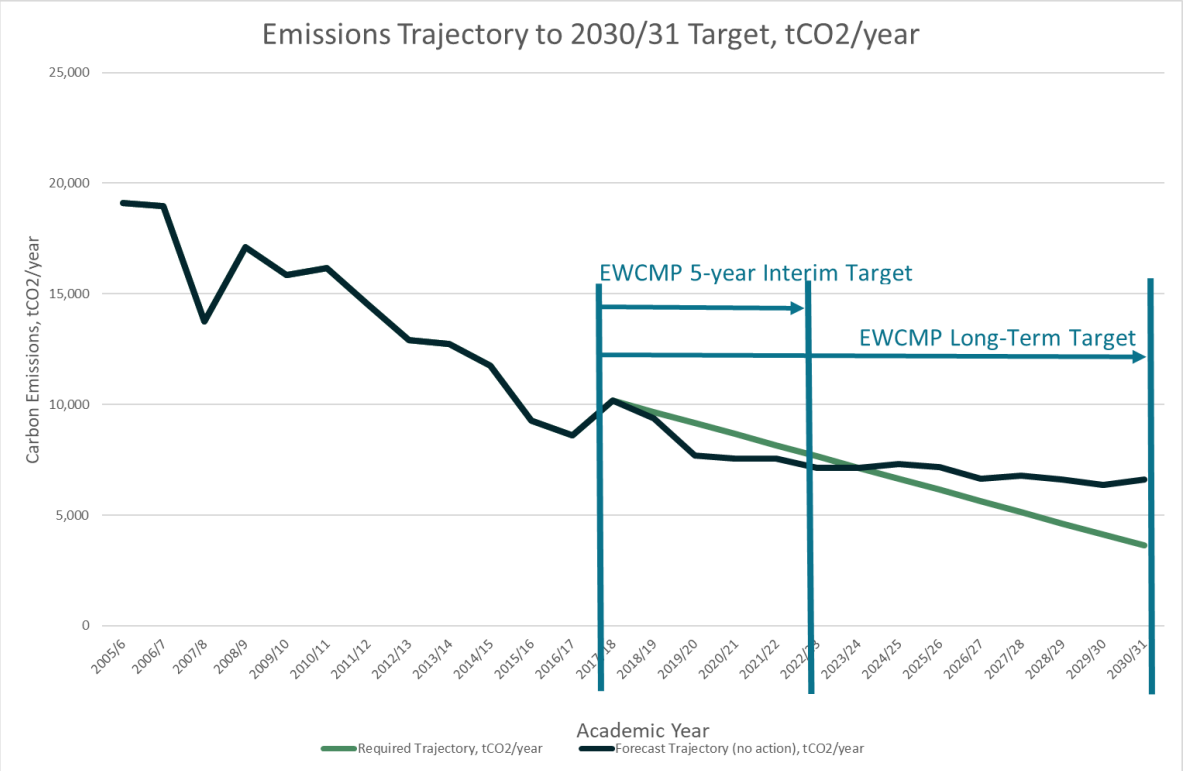

Figure 18 – Historic Emissions and Future Trajectory to 2030/31

The dark blue line tracks historic Scope 1 and 2 carbon emissions as reported by the University through HESA as far as 2016/17, with emissions from 2017/18 being forecast by the Energy and Emission Forecasting tool, given that energy use is expected to rise driven by future expansion, which in turn is offset by the reduction in emissions from electricity use as a result of grid decarbonisation.

The green line shows the required emissions reduction to hit the target of 81% emissions reduction by 2030/31. What is interesting to note is that the model suggests that if we did nothing between now and 2022/23 (the period covered by the EWCMP), even with rising energy use driven by future expansion, emissions will continue to fall as a result of the reduction in emissions from electricity use due to grid decarbonisation. This alone is sufficient to maintain a reasonable trajectory towards the 2030/31 target. Beyond 2022/23, however, rising energy consumption dominates over grid decarbonisation, and action would be required to hit the 81% reduction target. **It is, however, imperative that action be taken over the next five years to reduce energy use and carbon emissions, rather than wait until the period after 2022/23, not least of all because of the cost savings that could be achieved in the meantime by taking early action.**

The second approach is a "bottom-up" view of the potential measures which we could implement (independent of grid decarbonisation which is expected to happen anyway). This includes measures already considered (as detailed in the following section), such as investment in energy efficiency, BMS optimisation, implementation of training and awareness programmes, improved maintenance, a switch to all-electric buildings using heat pumps and investment in renewable energy sources.

Based on an initial analysis and limited review of our built estate, it is estimated that the implementation of realistic and cost-effective energy efficiency measures could give rise to gas savings of around 14% and electricity savings of around 28% against current energy use.

The switch to all-electric buildings has the potential to reduce gas use by up to 90% (leaving only a residual amount for catering use) but would increase electricity use by around 20 to 25% over and above business as usual.

The deployment of solar PV is limited only by the amount of capital and suitable building and land space available for deployment. The Masterplan Energy Strategy concluded that there was sufficient building space available to allow for up to 7% of electricity needs to be met by solar PV. This figure has therefore been adopted in the modelling.

For water, the available data is poor, but based on limited observations and discussions around water leakage, it is estimated that it would be reasonable to set a target to reduce water use by 20%.

It has been agreed that the University adopt a series of Objectives and Targets to ensure that emission reductions are achieved in the interim period, and that progress is made towards implementing measures which will see meaningful carbon reductions in the run up to 2030/31.

4.2 Energy, Water and Carbon Objectives and Targets

EEMS Objective Ref:	Objective / Target	Review Date	Performance Indicator(s)	Baseline	Owner	Status
OBJ0002	Develop an Energy Management System in line with the ISO 50001 standard by September 2019.	30th September 2019	Audit Results	N/A	Energy Management Officer	Achieved October 2019
OBJ0003	Reduce University Scope 1 and 2 carbon emissions by 81% in absolute terms by 2030/31. Interim Target to reduce emissions by 71% in absolute terms by 2022/23. Interim Targets (cumulative): Year 1 - 2018/19: 51% Year 2 - 2019/20: 62% Year 3 - 2020/21: 64% Year 4 - 2021/22: 67% Year 5 - 2022/23: 71%	31st July 2023 (with annual interim reviews by September each year).	Absolute Scope 1 and 2 carbon emissions Relative carbon emissions (CO_2e/m^2)	Academic year 2005/06	Director of Estates	LIVE On Track Year 2 – 2018/19: 66%
OBJ0017	To improve energy performance by 20% by 2030/31	31st July 2023 (with annual interim reviews by end of September each year).	Total Relative Energy Use kWh/m^2	Academic Year 2016/17 214 kWh/m2	Director of Estates	LIVE On Track 2018/19: 189 kWh/m2
OBJ00011	To reduce water consumption across the University Estate by 20% by 2022/23. Interim Targets (cumulative): Year 1 - 2018/19: 4.0% Year 2 - 2019/20: 8.0% Year 3 - 2020/21: 12.0% Year 4 - 2021/22: 16.0% Year 5 - 2022/23: 20.0%	31st July 2023 (with annual interim reviews by end of September each year).	Total Absolute m^3 Total Relative water use m^3/FTE	Academic year 2016/17	Director of Estates	ACHIEVED Year 2 – 2019/20: 37% Currently under review
OBJ0009	To reduce electricity use across the University Estate by 28% against business as usual (i.e. with no new additional all-electric buildings) by 2022/23. Interim Targets (cumulative): Year 1 – 2018/19: 5.5% Year 2 – 2019/20: 11% Year 3 – 2020/21: 16.5% Year 4 – 2021/22: 22% Year 5 – 2022/23: 28%	31st July 2023 (with annual interim reviews by end of September each year).	Total Electricity Use Absolute kWh Total Relative Electricity Use kWh/m^2 Electricity Use by SEU Absolute kWh Relative Electricity Use by SEU kWh/m^2	Academic year 2016/17	Director of Estates	CLOSED (Super-seded 2019 by OBJ0017)

OBJ00010	To reduce gas use across the University Estate by 15% against business as usual (i.e. with no new additional all-electric buildings) by 2022/23. Interim Targets (cumulative): Year 1 - 2018/19: 3.0% Year 2 - 2019/20: 6.0% Year 3 - 2020/21: 9.0% Year 4 - 2021/22: 12.0% Year 5 - 2022/23: 15.0%	31st July 2023 (with annual interim reviews by end of September each year).	Total Absolute Gas Use kWh (normalised against 2016/17 HDD) Total Relative Gas Use kWh/m^2 (normalised to 2016/17 HDD) Gas Use by SEU Absolute kWh 2016/17 Relative Gas Use by SEU kWh/m^2 (normalised to 2016/17 HDD)	Academic year 2016/17	Director of Estates	CLOSED (Super-seded 2019 by OBJ0017)
OBJ0012	To ensure that all new buildings and major refurbishments are designed to a low energy/water/carbon brief commensurate with the aims of the EWCMP and the 2030/31 emissions target.	Annual Review by end of September each year.	N/A	N/A	Director of Estates	CLOSED (included in Sustainable Construction Policy & actions)
OBJ0013	To deploy principle of all-electric buildings using heat pump technology where appropriate as and when buildings are refurbished or heating systems upgraded/ replaced.	Annual Review by end of September each year.	N/A	N/A	Director of Estates	CLOSED (included in Sustainable Construction Policy & actions)
OBJ0014	To deploy solar PV or other appropriate renewable/low carbon energy technologies on new buildings and to retrofit to existing buildings or suitable external areas (e.g. car parks/spare land) where appropriate and financially viable.	Annual Review by end of September each year.	N/A	N/A	Director of Estates	CLOSED (included in Sustainable Construction Policy & actions)

Environmental Sustainability Team

University of Salford MANCHESTER

4.3 Energy, Water and Carbon Action Plan

Action Ref	Objective Reference	Project Title / Description	Key Actions & Milestones	Responsibilities	Monitoring & Evaluation	Progress to date (March 2020)
A1	OBJ0017	Energy and Water Data Accuracy Resolve outstanding energy and water metering and data collection issues.	Metering issues to be resolved by 2018/19.	Energy Management Officer	Success metric: 100% data collection coverage across gas, electricity and water at building level, with aM&T configured and reporting.	Awaiting front end BMS upgrade due 2019/20
A2	OBJ0017	Energy and Water Sub-metering Identify and implement energy and water sub-metering programme by building and significant end use	Install all building-level sub-metering by close of 2019/20 Academic Year. Granular (major service-level) sub-metering by close of 2019/20 Academic Year.	Energy Management Officer	Success metric: energy broken down by major users for top 50% of buildings (responsible for 90% of energy use)	New milestone date of end of 2020/21 awaiting funding and linked to BMS front end upgrade
A3	OBJ0017	Training and Awareness Identify training and awareness needs across the University to enable delivery of the plan and roll out appropriate programmes during 2019/20 Academic Year. General Awareness among staff and students. Specific Technical Training targeted at Building Managers, Surveyors, Maintenance and Engineering teams.	Finalise training needs analysis by end of December 2018. Develop and plan training and awareness programmes in 2018/19 for delivery in 2019/20.	Environmental Sustainability Team	Improvements in energy use as tracked through Active Energy Manager (normalised for external variables such as weather). Training Feedback	Training programmes completed, considered and planned for Estates & Facilities annually through EEMS. Environmental induction for all staff to be launched at start 20/21.
A4	OBJ0017	BMS Optimisation Resolve BMS maintenance and functionality issues, in order to allow for automatic alarms and ensure that there is sufficient resource available to enable pro-active response and management of energy use through BMS.	Issues to be resolved by close of 2018/19 Academic Year.	University Engineer	Success metric: regular checking and action on BMS and savings realised as measured by Active Energy Manager (normalised for external variables such as weather).	Awaiting front end BMS upgrade and user training due 2019/20
A5	OBJ0017	Energy Audits Carry out detailed analysis of all Significant Energy Uses (SEUs) by buildings through energy audit and feasibility studies to identify potential for cost-effective and implementable energy and water efficiency measures.	Detailed audits of the top 50% users by close of 2018/19 Academic Year, with the remainder following in 2019/20.	Energy Management Officer	Success metric: energy audits complete and costed recommendations held in Opportunities Register for implementation.	Four building audits complete. Business case being prepared for major lighting and HVAC controls efficiency projects as a result, currently under review.

A6	OBJ0003/ 17	CHP Plant Review To review the operation of the CHP serving the sports hall and swimming pool and consider its replacement for operational use.	Carry out a feasibility study on the current pool heating arrangements to determine the cost-effectiveness of repair/replacement of the existing CHP system. Complete review in 2018/19 Academic Year.	Energy Management Officer	Business case for repair/replacement. If recommissioned, then monitoring of energy performance of the Sports Centre.	Not feasible to recommission swimming pool CHP, as Sports Centre future unconfirmed and Energy Strategy to move away from gas. Action removed.
A7	OBJ0017	Long-Term Maintenance Programme Integrate potential energy and water efficiency and renewable energy measures into the University Estates Department's Long-Term Maintenance (LTM) programme.	Identify potential projects by close of 2018.	Energy Management Officer with University Estates Facilities Management Team	Projects implemented with measurable improvements in energy performance tracked through Active Energy Manager.	Integrated Energy and Water Technology lists into LTM projects. Action closed.
A8	OBJ0011	Water Leak Survey Carry out a detailed water leak survey of all buildings using building-level water meter data, followed by investigative works at those showing anomalous consumption patterns.	Complete by close of 2019/20 academic year.	University Estates Facilities Management Team	Leaks identified and repaired, resulting in measurable decrease in water use at affected buildings, as measured at building level by Active Energy Manager.	Survey on existing data ongoing. Awaiting sub-metering installation for further surveying (due 2019/20).
A9	OBJ0011	Water Efficient Sanitary Fixtures Roll out deployment of low flow sanitary fixtures (taps, showers, WCs, urinals, hoses) to all existing water outlets (including "waterless" alternatives in suitable applications).	Installed across all buildings by close of 2022/23 Academic Year.	University Estates Facilities Management Team	Projects implemented with measurable improvements in energy performance tracked through Active Energy Manager.	Integrated Water Technology lists into LTM and capital projects. Action closed.
A10	OBJ0011	To ensure that all new sanitary fixtures and fittings are designed to minimise water use by 2022/23.	By close of 2022/23 Academic Year.	University Estates Facilities Management Team	100% deployment of low flow fixtures in new applications.	Embedded into Energy Design Standard. Action closed.
A11	OBJ0011	Greywater Recycling & Rainwater Harvesting To carry out a study to investigate the feasibility of retrofitting greywater recycling and rainwater harvesting across the existing campus.	Feasibility study by close of 2020/21 Academic Year.	Energy Management Officer	Study complete and results available for agreement and implementation where viable.	Not started.
A12	OBJ0003/ 11/ 17	Energy Design Standard To develop and roll out energy and water-efficient design principles and guidelines for new build and major refurbishment projects.	Develop and roll out new design standards by close of 2018/19 Academic Year.	Energy Management Officer	New standards available and being used by design teams on new build, refurbishment and retrofit works.	Energy Design Standard approved and in operation.

A13	OBJ0003	Electric Vehicles To investigate the potential for use of electric vehicles for on-campus transport.	Trial a suitable vehicle (e.g. Facilities Maintenance Team van) during the 2019/20 Academic Year. Procure and bring into service an Autonomous Bus for use on Campus.	University Fleet Manager	Suitable electric vehicle purchased, leased or hired and monitored for energy performance and functionality/ practicality for duties.	Business case under review, awaiting funding.
A14	OBJ0017	To ensure that all new lighting installed is LED-based and incorporates automatic controls where practicable and cost-effective.	Ensure all new light fittings installed during new build and refurbishment programmes are LED from 2018/19 onwards. Replace all existing lighting with LED equivalents on a rolling basis by 2022/23.	University Estates Facilities Management Team	100% LED lighting fleet deployed, except in specialist applications, e.g. theatre lights, or where performance is otherwise shown to be inadequate.	Embedded into Energy Design Standard. Action closed.
A15	OBJ0017	To ensure that energy efficiency is considered in all maintenance contracts.	Incorporate energy efficiency requirements into all external maintenance contracts let by the University.	University Estates Facilities Management Team	Energy efficiency clauses in place in all maintenance contracts let. Measurable improvements in energy performance tracked through Active Energy Manager. Spot checks of installations before and after maintenance activities.	Sustainable Purchasing Policy approved. Action closed.
A16	OBJ0017	Green IT To review energy use in IT and Data Centre provision and roll out Green IT programme.	Put in place Green IT Strategy in 2019/20.	University IT Department	Reduction in IT Energy Use in line with target	Shutdown script rolled out across campus where possible and data centre set point agreed. Further work required.
A17	OBJ0017	Heating and Cooling Code of Practice To introduce a formal temperature control policy for all University buildings and facilities including teaching space, offices, labs and IT facilities.	Formulate and implement/communicate policy by close of December 2018	University Estates Facilities Management Team	Improvements in energy use as tracked through Active Energy Manager (normalised for external variables such as weather). Spot checks to ensure that policy is being adhered to.	Heating and Cooling Code of Practice approved. Action closed.

Environmental Sustainability Team

University of Salford MANCHESTER

A. Appendix – Energy and Water Market Context and Risk Assessment

Utility	Market Context	Risks	Opportunities
Electricity	The UK operates a liberalised electricity market, enabling consumers to change suppliers and tariffs at will (within normal contractual obligations), in order to take advantage of a competitive market. The market is dominated by a handful of larger players, with smaller operators at the margins. Competition has resulted in historically low electricity prices over the last 15 or 20 years, however, these are starting to increase, mainly as a result of investment costs needed to meet the challenges of decarbonisation of the supply, renewal of infrastructure and security of supply. Costs are made up of commodity costs (the cost of the electricity supplied itself), and various non-commodity costs which cover the cost of delivering electricity, balancing the grid and all network costs. This also includes various Government taxes and levies to support the development of renewable energy and reduce carbon emissions. These were once a relatively small component of pricing, but now can make up almost 50% of total electricity costs. The main non-commodity costs include charges such as: Transmission Network Use of System (TNUoS), Distribution Use of System (DUoS), Renewable Obligation (RO), Contract for Difference (CfD), Feed in Tariff (FiT), Capacity Market (CM) and Climate Change Levy (CCL). In addition, VAT is also charged on top of all electricity charges.	Rising prices as result of increased investment required to upgrade electricity generation and distribution networks and decarbonisation through the Government's "New Nuclear" build programme and subsidies towards renewable energy investment projects. Reform of non-commodity charges to move away from time-of-day charging. Potential increases in tariffs on imported electricity (a proportion of the UK's electricity demand is imported from mainland Europe through sub-sea interconnectors) as a result of Brexit. Market instability as a result of geopolitical forces, terrorism or malicious disruption. Increases to CCL to offset loss of revenue to treasury resulting from closure of CRC scheme.	Take advantage of the competitive market to purchase electricity at lower prices. Shift demand to avoid high tariff costs where there are time-of-day or penalty tariffs (e.g. triads). Implementation of on-site generation (e.g. PV, CHP, wind, hydro) to avoid non-commodity charges levied on grid electricity supply. Reduce consumption through behavioural change and investment in energy efficient technologies. Renegotiate available capacity to reduce standing charges.

Gas	The UK operates a liberalised gas market, enabling consumers to change suppliers and tariffs at will (within normal contractual obligations), in order to take advantage of a competitive market. The market is dominated by a handful of larger players, with smaller operators at the margins. Competition and the availability of imported gas via transcontinental and subsea pipelines bringing gas from Russia and Central Asia, together with shipped imports of LNG from the Middle East and North Africa has resulted in historically low gas prices over the last 15 or 20 years, however, these are starting to increase. The main factor driving the increase is competition for gas as the developing World both industrialises and decarbonises. Overall, according to BEIS forecasts, gas prices are expected to double between 2018 and 2030. Costs are made up of commodity costs (the cost of the gas supplied itself), plus non-commodity costs which cover the cost of gas storage and distribution, plus Government taxes/levies to support the development of renewable energy and reduce carbon emissions. The main tax is the Climate Change Levy, which is expected to increase dramatically in the coming few years as Government balance it up to meet that of electricity, in order to reflect the lower carbon impact of electricity now. In addition, VAT is charged on top of gas charges and levies.	Rising prices as a result of increased demand. Potential increases in tariffs on imported gas (up to 50% of the UK's gas demand is imported through sub-sea interconnectors and shipping) as a result of Brexit. Geopolitical events causing market instability and rising prices Potential supply interruptions as a result of local, regional, national or international demand, geopolitical events or malicious disruption. Increases to CCL to offset closure of CRC scheme. Gas will increase at a greater rate than electricity to level up the disparity between the two.	Purchase gas at lower prices Move to all-electric campus to avoid gas costs and associated CCL. Reduce consumption through behavioural change and investment in energy efficient technologies.

Water	Water has traditionally been supplied on a regional basis, with consumers tied to regional water supply companies. The water market in England has been opened up to competition from April 2017, however, with businesses able to purchase water and waste water services from other providers on a national basis, or even elect to become a water supplier themselves ("self-supply", generally suited to organisations with large numbers of premises spread over a wide geographical area). The ultimate aim is to introduce competition between water service providers and reduce costs to consumers, although it is unclear how successful this has been to date.	Rising prices caused by the water companies' need to invest to replace aging infrastructure. Potential supply interruption or restrictions as a result of water stress resulting from climate change.	Reduce consumption through behavioural change and investment in water efficient technologies. Invest in rainwater harvesting or greywater recycling systems to reduce mains water demand. Investigate the viability of on-site abstraction from boreholes with on-site treatment. Use water metering to identify and eliminate water leaks. Reduce meter sizes to match actual demand to avoid meter size-related standing charges. Look at on-site primary wastewater treatment to reduce tariff charges. Check water tariffs to ensure that these are fair and reasonable, particularly with respect to meter standing charges, surface water drainage, water not otherwise returned to sewer (e.g. evaporation), etc. Investigate options for purchasing water and waste water services from other providers on the open market.