**Energy and Water Action Plan**

**2019/20 to 2021/22**

Version 1

Date May 2021

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**Introduction - Energy and Water Action Plan**

This Energy and Water Action Plan has been developed in line with the Carbon Management Plan to provide the detail on how the University plans to reduce energy and water consumption, improve efficiency, and reduce carbon emissions going forwards.

The Carbon Management Plan includes a target to reduce carbon emissions from a baseline year of 2018/19 to net zero carbon by 2040.

This is a very demanding target and there are a number of ways the University is implementing measures to achieve this. The plan therefore covers a wide range of areas and activities, and is divided in to a number of sections, Planned Energy Saving/Carbon Reduction Projects, Monitoring and Targeting, Energy and Water Awareness Raising, New Builds and Refurbishments, and Reporting.

This phase of the plan covers the years 2019/20 to 2021/22.

**Planned Energy Saving/Carbon Reduction Projects**

There are a number of different programs of work that are undertaken by the University. These fall in to 3 main types of Project:

1. Stand Alone Works

The stand alone works are individual measures like the implementation of presence detection to improve control of lighting, or ventilation plant.

1. Refurbishment Works

An example of recurring works is the refurbishment of the replacement of heating and hot water systems in University accommodation. Here when the refurbishments are carried out the opportunity is taken to include energy saving and water saving measures. These measures can include replacing conventional boilers with condensing boilers to improve energy efficiency, and in time replacing boilers with heat pumps.

1. New Builds

Where the University is constructing new buildings these are generally additions to the building stock. The University needs to reduce energy consumption at the same time as increasing building capacity. As a result, new buildings need to have minimal energy requirements, as the entire new load will add to the University’s existing carbon emissions making it harder to achieve overall reductions.

The Building Regulations give a baseline to work to in terms of energy efficiency, the requirements for BREEAM then add to these requirements. Where new builds are constructed these meet, or exceed the Building Standards for energy efficiency. The University aims to achieve BREEAM excellent for new buildings. New buildings typically have a proportion of their energy supplied from renewable sources and this is usually be solar photovoltaic panels. An Energy Performance Certificate (EPC) is produced for each new building, which gives the Energy performance rating for the building fabric, and services, but does not include process loads. This can result in a significantly lower Display Energy Certificate (DEC) rating than the EPC.

Energy and Water Management Action Plan – Measures

2019/20

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Location | Description | Project Type | Program | Budget Cost, £ | Saving  £ p.a. | Saving, kWh | Saving Carbon, tonnes | Status/Notes |
| Becket | Replacement of Boilers and HWS tanks | Refurbishment | Complete | 22,362 | 2,925 | 97,490 | 18 | Works Complete |
| Eliot College | Replacement of Heating Calorifiers with Plate Heat Exchangers | Stand alone | Complete | 94,506 | 6,549 | 163,730 | 40 | Works Complete |
| Teaching PCs | Adjustment of settings for remote switching of teaching computers to reduce hours of operation | Stand alone | Complete | - | 767 | 5,900 | 2 | Works Complete |
| Kemsdale, Parkwood | Replacement of gas fired water heaters with condensing boilers and hot water cylinders | Refurbishment | Complete | 32,000 | 1,105 | 36,832 | 7 | Works Complete |
| Tyler Court B+C | Replacement of conventional gas fired water heaters with condensing gas fired water heaters | Refurbishment | Complete | 23,000 | 1,747 | 58,230 | 11 | Works Complete |
| Kennedy Building | BREEAM Excellent | New Build | Complete | Included in overall Project Costs | - | - | - | BREEAM New Construction – Final Certificate - BREEAM Excellent |
| Kennedy Building | Roof top PV array installed as part of the Project | New Build | Complete | Included in overall Project Costs | 2,528 | 19,354 | 6 | Roof top Solar PV rated at 17.28 kW peak output |
| Kent Union Building, Parkwood | BREEAM Excellent | New Build | Complete | Included in overall Project Costs | - | - | - | BREEAM New Construction – Design Certificate - BREEAM Excellent |
| Kent Union Building, Parkwood | Roof top PV array installed as part of the Project | New Build | Complete | Included in overall Project Costs | 301 | 2,307 | 1 | Roof top Solar PV rated at 3kW kW peak output |
| University wide | Installation of supplier Automatic Meter Reading (AMR) on gas meters, and re-sizing of oversized gas meters | Stand alone | Complete | 11,749 | - | 5,614 | - | Saving from reduction in standing charges. |
| University wide | Installation of supplier AMR on Non Half Hourly electric meters | Stand alone | Complete | - | - | - | - | Results in improved monitoring of electricity use. |
| University wide | Energy Awareness – Futureproof  Environmental Initiatives Budget | Stand alone | Aug19-Jul20 | - | 14,906 | 250,890 | 53 | Ongoing  Figures based on 2018-19 energy consumptions |

2019/20 - Water

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Location | Description | Project Type | Program | Budget Cost, £ | Saving  £ p.a. | Saving, m3/year | Saving Carbon, tonnes | Status/Notes |
| Becket Court | 3 tanks at similar levels tended to overflow in warm weather. | Stand alone | Complete | £10,000 | 1,651 | 550 | 1 | The tanks were removed and replaced with a direct supply off the mains. |
| Tyler Court B+C | High water usage identified from checking monthly meter readings. Water softener found to be continually overflowing. | Stand alone | Jan20 | 2,000 | 12,960 | 4,320 | 5 |  |

Energy and Water Management Action Plan – Measures

2020/21 - Energy

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Location | Description | Project Type | Program | Budget Cost, £ | Saving  £ p.a. | Saving, kWh | Saving Carbon, tonnes | Status/Notes |
| Boiler House | Replace Primary and Secondary Heating Pumps | Refurbishment | Complete | 90,140 | 15,328 | 117,370 | 32 | Works complete |
| Boiler House | Replacement of Burner Controls | Refurbishment | Complete | 89,478 | 17,918 | 597,271 | 110 | Works Complete |
| Boiler House | Replacement of Boiler House Controls | Refurbishment | Complete | 84,000 | 28,968 | 965,587 | 177 | Works Complete |
| Cornwallis Data Centre | Hot/Cold aisle technology  Total Project Cost £69,976  (All from Salix Budget) | Stand alone | May21-Jul21 | 53,097 | 11,098 | 84,8500 | 24 | Planned |
| Tyler Court A | Replacement of gas fired water heaters with condensing gas fired water heaters | Refurbishment | Complete | 22,000 | 3,079 | 122,177 | 22 | Complete |
| Wigoder | Presence detection control of Moot Room Ventilation | Stand alone | Apr21 | 3,000 | 2,334 | 11,917 | 9 | Final implementation on hold due to Covid19. |
| Pears Medical School Building | BREEAM Excellent | New Build | Complete | Included in overall Project Costs | - | - | - | BREEAM New Construction – Final Certificate - BREEAM Excellent |
| Pears Medical School Building | Roof top PV array installed as part of the Project | New Build | Complete | Included in overall Project Costs | 1,853 | 14,192 | 4 | Roof top Solar PV rated at 13.44 kW peak output |
| University wide | Energy Awareness – Futureproof  Environmental Initiatives Budget | Stand alone | Aug21-Jul22 | - | 14,906 | 250,890 | 53 | Ongoing  Figures based on 2018-19 energy consumptions |

2020/21 - Water

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Location | Description | Project Type | Program | Budget Cost, £ | Saving  £ p.a. | Saving, m3 | Saving Carbon, tonnes | Status/Notes |
| Darwin houses and Colleges | Replacement of shower heads with low volume showerheads. | Stand alone | Apr21-Jul21 |  | 849 | 283 | 1 |  |
| University wide | Installation of supplier AMR on water meters | Stand alone | Jan21 | - | - | - | - | AMR devices installed at no charge by the water supplier. |
| University Road supply | AMR meter confirmed high use off the University Road supply. Issued narrowed down to Turing UPP blocks Hand J. UPP informed | Stand alone | Jan21 | - | - | - | - | Awaiting action from UPP. |

Energy and Water Management Action Plan – Measures

2021/22 - Energy

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Location | Description | Project Type | Program | Budget Cost, £ | Saving  £ p.a. | Saving, kWh | Saving Carbon, tonnes | Status/Notes |
| Rutherford | Replacement of heating calorifiers with plate heat exchangers | Stand alone | Jun21-Sep22 | 41,000 | 5,164 | 204,908 | 38 | Planned |
| Eliot College | Replacement of Low Loss Transformers | Stand alone | Nov21-Jul22 | 57,300 | 7,834 | 59,987 | 15 | Subject to funding from Public Sector Decarbonisation Scheme |
| Cornwallis Data Centre | Computer Room Air-Conditioning (CRAC) units | Stand alone | Aug21-Jul22 | Assessment Cost £2,000  Project Cost TBC | TBA | TBA | TBA | Concept |
| Lecture Theatres | Automatic Ventilation Control | Stand alone | Aug21-Jul22 | Assessment Cost £2,000  Project Cost TBC | TBA | TBA | TBA | Concept |
| University wide | AMR upgrade to University Key submeters.  Total Project Cost £150,000 | Stand alone | Aug21-Jul22 | £150,000 | - | 542,769 | 137 | Ongoing |
| University wide | Energy Awareness – Futureproof  Environmental Initiatives Budget | Stand alone | Aug21-Jul22 | - | 14,906 | 250,890 | 53 | Ongoing  Figures based on 2018-19 energy consumptions |

2021/22 - Water

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Location | Description | Project Type | Program | Budget Cost, £ | Saving  £ p.a. | Saving, kWh | Saving Carbon, tonnes | Status/Notes |
| University Road Water Supply | Follow up on high water usage at Turing College | Stand alone | Aug21-Sep21 | - | - | - | - | Planned |
| Darwin College | Unidentified water use detected during a leak detection survey. Undertake further investigation | Stand alone | Aug21-Sep21 | - | - | - | - | Planned |
| Accommodation Blocks | Check with Commercial Services, and see if there are gaps in occupancy. If there are monitor consumption to see if the buildings are consuming water when not in use. | Stand alone | Aug21-Sep21 | - | - | - | - | Planned |

Energy and Water Management Action Plan – Measures

Major Projects

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Location | Description | Project Type | Program | Budget Cost, £ | Saving  £ p.a. | Saving, kWh | Saving Carbon, tonnes | Status/Notes |
| Boiler House, Canterbury Campus | Replace boilers and equipment in Darwin and Keynes Plant rooms. Change over from HTHW operation to LTHW | Stand alone | Jun21-Sep22 | 4,005,000 | 45,856 | 2,186,562 | 403 | Outlined |
| University wide | Investigate increasing the amount of Solar photovoltaics on the roof tops of University Buildings | Stand alone | Jun21-Sep22 | TBA | TBA | TBA | TBA | Concept |

Notes

The Project to replace the Boilers is planned works, but this may change as the University is considering alternative options for the Boiler House.

Status

Planned – Works are scheduled to be done.

Outlined – Works are scoped and assessed, but not scheduled

Concept – Initial proposal requiring an assessment to scope and evaluate

**Monitoring and Targeting – Automatic Meter Reading (AMR)**

The University of Kent has four main types of utilities meters on site, electricity, gas, heat, and water. These meters are either supplier meters, or University meters. The meters are housed in internal locations e.g., plant rooms, switch rooms etc., or in external locations e.g., meter enclosures, meter pits etc. The way the data from these meters is recorded has been changing. During this phase of the Energy and Water Management Action Plan, the supplier meters for electricity, gas, and water have all been upgraded to AMR metering with the data made available via the supplier websites.

There are distinct advantages to recording the data automatically and these include:

View profile of half-hourly data – Highlights out of hours use, shows times of peak use, shows more detailed use making it easier to see the results of smaller energy saving measures.

View profile of weekly/monthly/yearly data – Allows changes in consumption to be viewed over time, out of term time use can be checked.

Comparison of current data with historic data – Allows evaluation of savings arising from energy saving measures

Data Displays – Allows data to be displayed on screen to demonstrate energy use to staff and students

The above all demonstrate the advantages of being able to see energy use, as opposed to being aware of the effects of energy use. This direct correlation means issues can be identified faster.

The utilities submeters continue to be read manually by Estates, but now this data is starting to be logged on the University’s AMR system making analysis of these manual meter readings easier with graphical displays. The next step is to upgrade these meters to AMR meters and connect them to the AMR software.

**Energy Awareness Raising**

Futureproof

Futureproof is a wide-ranging initiative based around the 17 Sustainable Development Goals. Included within these goals is 13 Climate Action, which directly addresses the issue of the need for carbon reduction through energy efficiency, and the requirement for renewable energy. Further, several of the other goals indirectly reference the need for energy and water efficiency. The Futureproof website can be accessed using the link below.

<https://www.kent.ac.uk/sustainability/futureproof>

The Futureproof program promotes awareness of the issues associated with energy, and water use, and encourages staff and students to reduce use of these resources. This in turn helps to maintain good practice in terms of using energy helping to minimise unnecessary wasting of energy.

The savings identified in year 2021/22 are based on a projection of Future Proof resulting in overall energy savings of 0.5% of the University’s annual energy consumption. The savings are only projected for the one year based on the view that by having Future Proof in place these savings will continued to be maintained going forwards.

Further methods of raising energy awareness

* Responding to Departmental Enquiries, for example, the School of Anthropology abd Conservation (SAC) at Marlow were having a problem with overheating and the issue was identified and addressed, with the information being provided to SAC.
* Providing practical assistance to help with course work by showing how existing heating and hot water services are provided on request. This work is in line with using the University’s operations as a living lab type arrangement.
* Ongoing development of the Carbon and Water webpages to demonstrate what the University is doing to reduce carbon emissions, and how it is progressing against targets.