# Energy & Carbon Plan 2022

## Executive Summary

This energy plan reviews the current performance against the University target to reduce carbon emissions and sets out a plan for energy management and carbon reduction for the current year and up to 2025. This plan is a fundamental part of the University's ISO 50001:2011 certified Energy Management System. A new target for carbon reduction has now been set by the University. This is to achieve net zero carbon emissions by 2030. A KPI to monitor progress on building energy efficiency has also been set. This looks at energy use per m2 of floor area.

The Covid virus outbreak continues to impact on energy consumption with Increased ventilation in lecture rooms and other shared spaces resulting in increased gas consumption. Site activity is returning to pre Covid levels with increasing demand in electricity use.

The University has successfully implemented the £5Million Public Sector Decarbonisation Scheme, installing a large air source heat pump, extending the solar farm, updating the Building Management Systems (BMS) for all buildings on the district heating, adding two more buildings to the district heating, making other improvements to the district heating and installing more LED lights and a large battery.

There are still significant opportunities for further energy efficiency improvements and also for renewable energy investments. A greater emphasis on energy cost saving is required as prices have already risen sharply and are forecast continue to do so over the next 5 to 10 years.

Objectives

1. Seek to continually improve energy management through ISO 50001.
2. Continue to seek energy saving opportunities in buildings and processes and funding for same.
3. Reduce gas usage on site by seeking alternatives to gas boilers and CHP
4. Continue to develop and improve the District Heating system.
5. Continue to develop and improve the campus HV electricity system.
6. Explore the feasibility of more on and off-site generation including renewable energy options.

## Energy Planning

### Buildings and Significant Energy Uses

The majority of energy use on site is associated with buildings in the form of heating, lighting, small and large power use. There are also centralised IT servers (with a mirror on site for backup), a sewage works, an airport, and a street lighting network.

The building energy uses split out into offices, teaching and meeting spaces, research spaces and equipment, workshops, hotels, halls of residence, flats, family houses, aircraft hangars, bus depot, kitchens, restaurants and other eating outlets.

The energy to heat and power the buildings is delivered in a number of ways. Over 50% of the electricity for the campus is generated on site by a 1.4 MW combined heat and power unit and 1 MW solar PV farm. The CHP also provides the base load heat for a district heating system which supplies most of the buildings on the technical site part of the campus. A biomass boiler also provides heat to this district heating system with gas boilers providing back up. Other buildings including all residential buildings are heated with gas boilers. Only two buildings on the technical site are still heated with oil, opportunities are being taken to convert these to district heating when possible.

The new buildings being delivered as part of the Masterplan are beginning to have an impact on energy consumption. This includes the AIRC building, AIRC Test Cells, IMEC building, new Glasshouse and the FAAM buildings. Agri Tech, UKCRIC 1 and 2 buildings and DARTeC building have been added in the last couple years and Baroness Young Halls have been completed u the last few months

There are over 900 electricity meters monitoring demand. When grouping these into major loads and building loads, the top 10 account for 48%.

The table below shows the top 10 electricity users with the year-on-year change.

| Building | Electricity Use 19/20 | | Electricity Use 20/21 | | Electricity Use 20/21 |
|---|---|---|---|---|---|
| | kWh | kWh/Sqm | kWh | kWh/Sqm | |
| C052A | 1,267,094 | 200 | 1,250,547 | 198 | -1.20% |
| C052 | 1,048,670 | 102 | 1,115,796 | 103 | 1.30% |
| IT Servers | 1,030,376 | N/A | 1,036,720 | N/A | 0.62% |
| C083+IMEC+B179 | 828,007 | 83 | 776,993 | 79 | -4.86% |
| C057 | 784,505 | 450 | 1,098,277 | 630 | 40.07% |
| Mitchell Hall | 726,942 | 94 | 660,039 | 86 | -8.97% |
| C085 | 693,927 | 120 | 646,731 | 112 | -6.72% |
| C300 Martell | 554,506 | 103 | 641,602 | 120 | 16.11% |
| C070 | 499,733 | 367 | 537,810 | 395 | 7.74% |
| C239 Conf Hotel | 408,680 | 55 | 197,031 | 27 | -51.46% |
| C055 | 402,428 | 125 | 429,472 | 134 | 6.81% |

The impact of the Covid virus can still be seen with the reduced use of the Conference Hotel. Conversely, there has been a jump in consumption in C057 a research intensive building.

The above electricity sites will be reviewed week on week using data from the University's Half Hourly Automatic Metering System. Graphs showing monthly consumption and annual totals are maintained on an ongoing basis.

There are 186 gas meters monitoring demand. Most (61.4%) of the gas imported is used to fuel the CHP which produced 54% of the electricity consumed in 17/18. Excluding the CHP, the top 10 users of gas account for 35% of natural gas consumption.

The tables below show the top 10 gas users with the year-on-year change.

| Building | Gas Use 19/20 | | Gas Use 20/21 | | Annual change |
|---|---|---|---|---|---|
| | kWh | kWh/Sqm | kWh | kWh/Sqm | |
| Gas for District Heating | 5,072,741 | 62 | 7,776,161 | 89 | 44% |

| | | | | | |
|---|---|---|---|---|---|
| Gas for houses | 2,866,574 | 187 | 2,812,581 | 224 | 20% |
| Lanchester | 2,410,880 | 215 | 2,444,514 | 217 | 1% |
| Mitchell Hall | 2,407,217 | 312 | 2,440,679 | 316 | 1% |
| CMDC | 1,240,545 | 431 | 1,161,334 | 404 | -6% |
| Stringfellow | 1,111,242 | 139 | 1,329,804 | 167 | 20% |
| C300 Martell House | 845,036 | 163 | 1,205,535 | 225 | 38% |
| Test Area | 733,507 | 373 | 1,098,059 | 559 | 50% |
| Fedden | 644,521 | 221 | 581,722 | 200 | -10% |
| Conference Hotel | 399,999 | 54 | 366,610 | 50 | -8% |

Degree days in 20/21 were 1919 compared with 1654 in 19/20 an increase of 16%. This partially explains the increase in gas usage in some areas. The test area experienced problems with the control system failing which explains the large increase there. The gas for District heating does not allow for the other sources of heat including CHP waste heat and biomass heat. However the increase use of gas is concerning and probably due to the increased ventilation of buildings on the Tech site because of Covid requirements.

The top 10 gas sites will also be reviewed week on week using the gas supplier's Half Hourly data. Graphs showing monthly consumption and annual totals are maintained on an ongoing basis.

## Energy Costs

Gas prices have doubled this year so far and Electricity prices increased by a third. Further increases are forecast possibly leading to a further doubling in price for both electricity and gas.

## Energy Infrastructure

The Public Sector Decarbonisation Scheme (PSDS2) application for £4.9 Million for measures to improve an existing district heating system was successful. The current system is dominated by a large CHP unit which is gas fired and which can no longer be considered low carbon . Gas boilers currently top up the heat from the CHP and a Biomass boiler. These boilers are end of life. An Air Source Heat Pump was chosen to replace one of the these gas boiler after considering a Biomass Boiler and a Ground Source Heat Pump. The measures include the installation of the heat pump to replace an existing gas boiler; to undertake other measures to reduce demand on the network (upgrading the building management system; improving heat distribution pipework on the network; and adding two small buildings onto the network which are currently heated with oil and gas). For one of those buildings the existing oil fired warm air heater was over 15 year old and end of life. The other was gas fired and 20 years old. To reduce reliance on the CHP and its generation of cheap electricity, LED lighting has also been included, along with an extension of the existing solar farm and a large scale battery. To improve efficiency of operation a new BMS system was installed in all buildings on the district heating. Replacing Johnson Metasys system with Trend BMS. The overall measures reduce the running of the CHP with the LED lighting savings and the solar farm replacing the CHP electrical output thus keeping ongoing running costs reasonable. All these measures were due to be installed by end of March 2022. Annual Carbon savings are projected to be over 1,500 tonnes of C)2.

A further bid to PSDS3 has also been successful. This secures over £11 Million of grant to insulate the two aircraft hangars (B84 and B85), switch them to being heated by the low temperature district heating where another ASHP will be added replacing a gas boiler, removing the steam network and also installing solar PV on the roofs. These works will be carried by March 2023. A further proposal is planned for later this year to further expand the district heating. Expanding the network onto the residential side of the campus would facilitate a significant reduction in gas use.

The high voltage (HV) electricity network covers the entire campus (including residential as well as technical areas). There are 30 HV transformers on the network which are of varying age and condition. There are opportunities to replace some of these with more efficient versions, review their sizes and improve the way they are controlled to minimise losses.

Energy storage on both the heat and electricity networks would help maximise the use of renewable energy, smooth and reduce maximum demand and help optimise costs. The existing District Heating has a small buffer to deal with morning heating demand peaks. However, this is not sufficient for the expanding network and changes to the boiler house will provide the opportunity to review a more appropriate size of buffer.

There is now energy storage on the electricity network. This the 1 MWh 900 kW battery system installed as part of PSDS2. This should help balance the electricity network to take advantage of changes to time of day charges, and mitigate increasing power demand from new facilities. A requirement for greater resilience (backup) for key research and operations is making the case for a further investments in battery system to be considered. This would also allow the expansion of onsite renewable energy generation whilst respecting the local district network operator’s (DNO) requirement that there is no export of electricity from the site.

## Energy Management

The Energy Management System has now transitioned to version ISO50001:2018. The manual documents how the system works, setting out responsibilities, the policy, the various procedures, tracking legislative changes to maintain compliance and setting a system for monitoring and targeting energy savings.

There are 39 statutory annual DECs (Display Energy Certificates) and 31 ten year DECs (excluding new builds). The annual DECs are updated each September.

The Carbon Reduction Commitment (CRC) reporting has now ceased and replaced by SECR (Streamlined Energy & Carbon Reporting). This new reporting includes business travel by car within its scope.

The internal recharging of costs and charging of tenants has been much improved recently but more work is needed to streamline the processes involved. The charges need to be reviewed on more regular basis. A model needs to be developed to account for all the costs involved.

The Energy Advisor needs to maintain training and CPD requirements to be qualified to undertake DECs. Training is also provided to all staff and students (awareness training and online training). Training needs for FMs and Green Team members should be reviewed.

Monitoring and Targeting is being deployed on the operation of the District Heating and CHP with monthly reviews of performance. The maximum demand of the site is also being closely monitored and targeted during winter to minimise Triad charges. As described above the top 10 electricity and gas users are monitored on a more frequent basis.

### KPIs

The overarching KPI is the absolute target to achieve Net Zero Carbon by 2030/31. This continues the rate of scope 1 and 2 carbon reduction from the previous target to reduce carbon emissions by 50% by 2020/21 from a 2005/6 baseline. This is equivalent to a 6% year on year reduction target since 2010.

A new KPI monitoring kWh per m2 for building energy use is to be introduced. Energy costs as a proportion of turnover is another indicator which is under consideration.

Energy efficiency KPI: "To reduce building energy demand per $m^2$ floor area, with a clear downwards trend on a three-year rolling basis"

| **Building Energy Demand by floor area over last 5 years (kWh/$m^2$)** | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | **2016** | **2017** | **2018** | **2019** | **2020** |
| Electricity consumed* | 116 | 115 | 110 | 96 | 104 |
| Heat consumed** | 218 | 224 | 228 | 201 | 202 |
| | | | | | |
| Change in Elec efficiency | 3% | -1% | -4% | -13% | 8% |
| Change in Heat efficiency | -6% | 3% | 2% | -12% | 0% |

| |
|---|
| *Electricity demand excludes electricity specifically used for heating and also specific research activity |
| ** Heat demand includes electricity for heating, CHP waste heat and assumes a boiler efficiency of 80% where fuel, and not heat, is metered; specific research activity is excluded. Heat demand is adjusted for Degree Days. |
| Energy use associated with Research activity which is not building related is excluded where possible. So, heating and electricity uses in buildings where research takes place is included but large-scale test rig energy use is excluded. |

## Energy and Carbon Saving Opportunities

### Improving energy efficiency of buildings

Lighting is the main electrical load in some buildings. Replacing fluorescent lights with LED lighting and improved control can reduce this consumption by more than 50%. Opportunities to upgrade lighting to LED will continue to be sought. The most recent LED upgrades from PSDS2 included Buildings 3, 61,111,115, 192, Conway House, Conference Centre Car Park and the Library**.** There are still opportunities in the Conference Hotel, other car parks across campus and in Mitchell Hall.

Modern motors with improved control can significantly reduce the electrical loads associated with air handling and heating systems. BAM have been asked to identify opportunities as part of their operation and maintenance of the heating and ventilation on site.

The existing Johnsons BMS system for controlling temperatures is difficult to manage and optimise. As part of PSDS2 it has being upgraded to a Trend system for all buildings on the district heating. The control of the District Heating is being more closely monitored and adjusted to reduce heat consumption and optimise the use of CHP heat and Biomass heat.

## Renewable energy

The new Solar PV array on the far side of the airfield has been increased from 1 MW to 1.434 MW. A further 900 kW is being planned under PSDS3. Discussions are also underway with a local solar farm being planned to look at direct import into the University private wire network. This could see solar providing all of the daytime needs of the campus for most of the year.

The Biomass boiler was repaired over the summer but not operated reliably since. Measures have been taken to rectify this and the boiler is now working. Recent focus on the operation of the District Heating had helped to ensure that it is used more consistently to support the heating coming from the gas CHP unit. The gas CHP unit was fully renovated in August 2018 and is has an O&M contract to operate until 2026 when it is expected to be end of life. Given that it is now no longer low carbon compared with grid electricity plans are being made to reduce its running hours. This has been a key element of the PSDS2 and PSDS3 projects.

The option to install an Air Source Heat Pump was chosen for the PSDS2 and PSDS3 grant applications. A Ground Source Heat pump would be preferable but not possible in the timescales allowed. Modifying heating systems to work with lower return temperatures make it more feasible to have the District Heating network supported by heat pumps. As heat pump technology develops and the grid becomes decarbonised then this becomes a more attractive low carbon option. This feasibility of ground source will be investigated for future PSDS applications. This could include the feasibility of collecting heat from the runway (when it is refurbished) to then store in ground source boreholes. This would increase the performance of any ground source system significantly.

Solar Thermal systems have been added to new buildings to provide hot water and there is some scope to extend this to some existing buildings particularly where there is a significant demand for hot water and where electricity is currently used.

Large scale wind power is still the most cost-effective form of renewable energy for electricity generation. The options for siting a large wind turbine at Cranfield are limited. The main issue is the airport and the potential impact on instrumentation and radar systems. However, this should continue to be reviewed as technology develops which may overcome these issues.

### Behaviour change

Alongside the University of Energy Policy there is an Energy Code of Practice which provides more detail for the interpretation of the energy policy. This helps manage expectations and ensure operations are efficient. This code is reviewed annually.

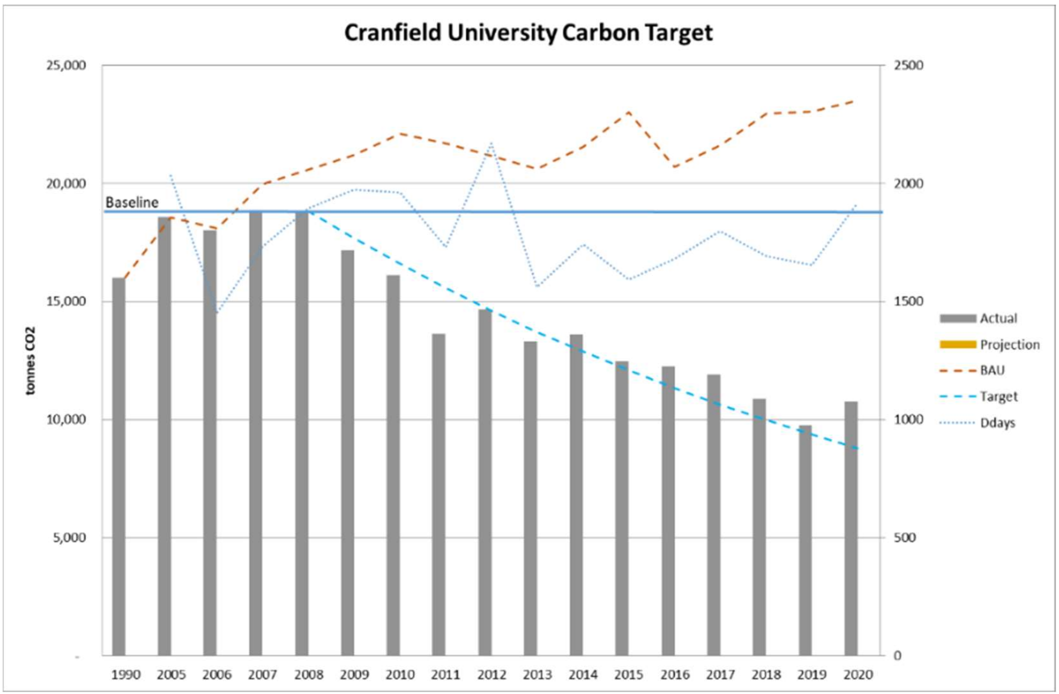
All staff and students are given awareness raising training either through presentation (students) or via online training (staff). Staff and students who are keen to volunteer to help improve the environment at Cranfield are organised in staff and student “Green Teams” and are supported to help with campaigns to save energy.

Promotions and campaigning have been affected by the Covid Virus and lockdowns. Even a simple message to switch of lights conflicting with the counter message to not touch surfaces without cleaning and washing hands. Nevertheless, attempts were made to via social media and intranet to continue to raise awareness to reduce energy use.

## Meeting the 2030 Carbon Target

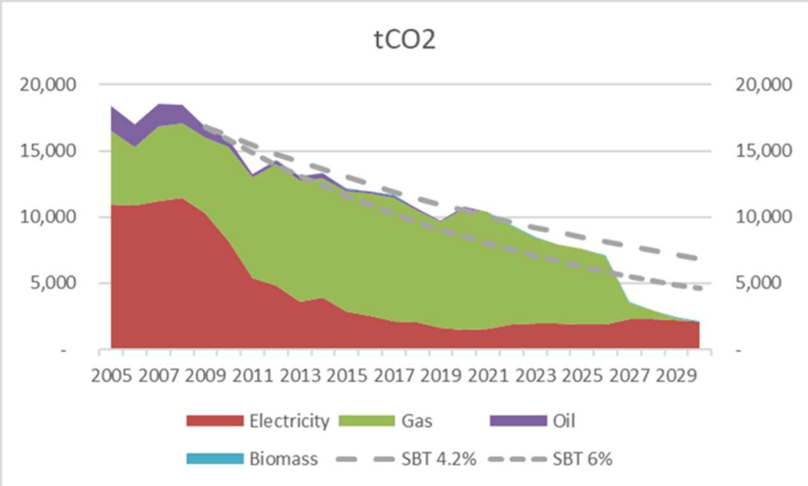
### Review of Carbon Management Plan Progress

At the end of 2020-21 Carbon emissions are 42% lower than the baseline figure for 2005.




Note the years are University years. 2005 runs from August 2005 to July 2006.

The Business As Usual (BAU) line on the graph illustrates what would happen if no energy saving measures had been undertaken and energy use allowed to grow in line with turnover. The degree days line also shows when we had colder years (2012 in particular but also 2020) and the effect on progress can be seen.




This graph shows the progress so far and the current projection to 2030. This illustrates the rate of decarbonisation compared with that required to meet a Science based target.

There has been consistent investment in energy efficiency since 2010 using a Salix Revolving Fund to install more efficient lighting, pipe insulation, new compressors and better controls. This has been supplemented by larger projects to install a CHP (in 2011), improve and expand the district heating network and install a Biomass boiler (2012 to 2014). In 2018 a 1MW Solar PV array was installed, combined with a large project to install LED lighting.

## Salix Projects

Energy efficiency projects Committed so far this Salix Year 2020/21 (Apr-Mar) using Salix loans are summarised below:

| Completed | Title | Annual kWh Savings | Carbon Savings $tCO_2e/y$ | Project Costs | Annual Savings | Payback Time |
|---|---|---|---|---|---|---|
| 22/07/2021 | B300 2nd Fl East Led | 17,795 | 5 | £36,657 | £3,984 | 9.2 |
| 28/08/2021 | B031 Kent House Led | 42,278 | 11 | £88,582 | £9,627 | 9.2 |
| | **Totals** | **60,073** | **16** | **£125,239** | **£13,611** | **9.2** |

The annual summary of the Commissioned Salix Revolving Green Fund Salix is shown below:

| Commissioned (Salix Year) | No of Projects | Annual kWh Savings | Annual Carbon Savings $tCO_2e$ | Project Costs | Annual Savings | Average Payback / Years |
|---|---|---|---|---|---|---|
| 2021/2022 | 2 | 60,073 | 16 | £125,239 | £13,611 | 9.2 |
| 2020/2021 | 2 | 141,960 | 39 | £181,076 | £28,576 | 6.3 |
| 2019/2020 | 6 | 101,282 | 132 | £137,388 | £28,924 | 4.7 |
| 2018/2019 | 5 | 310,380 | 149 | £164,124 | £32,114 | 5.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2017/2018 | 4 | 210,942 | 91 | £187,378 | £37,029 | 5.1 |
| 2016/2017 | 4 | 154,979 | 49 | £62,861 | £12,667 | 5.0 |
| 2015/2016 | 6 | 308,408 | 157 | £173,588 | £36,631 | 4.7 |
| 2014/2015 | 12 | 383,479 | 119 | £124,265 | £40,633 | 3.1 |
| 2013/2014 | 11 | 377,587 | 131 | £136,290 | £45,918 | 3.0 |
| 2012/2013 | 11 | 470,628 | 162 | £194,209 | £48,897 | 4.0 |
| 2011/2012 | 8 | 767,842 | 262 | £208,862 | £67,459 | 3.1 |
| 2010/2011 | 2 | 17,712 | 10 | £6,487 | £3,069 | 2.1 |
| 2009/2010 | 11 | 1,684,911 | 567 | £217,901 | £118,959 | 1.8 |
| **Totals** | **84** | **4,990,183** | **1,884** | **£1,919,668** | **£514,487** | **3.7** |

In addition to the above, the following one-off loan funded projects have been completed.

| Completed | Loan | Project | Carbon Savings $tCO_2e$ | Annual kWh Savings | Project Costs | Annual Savings | Payback / Years |
|---|---|---|---|---|---|---|---|
| Apr 2018 | SEELS | 1 MW PV farm in field | 439 | 1,037,660 | £1,262,609 | £211,683 | 6.0 |
| Jan 2018 | SEELS | B052 LED Lighting Upgrade | 56 | 128,262 | £27,680 | £26,165 | 1.1 |
| Dec 2017 | SEELS | B114 LED Lighting Upgrade | 29 | 64,989 | £43,255 | £13,258 | 3.3 |
| Dec 2017 | SEELS | B083 LED Lighting Upgrade | 25 | 57,976 | £14,077 | £11,827 | 1.2 |
| Dec 2017 | SEELS | B070 LED Lighting Upgrade | 4 | 9,903 | £3,187 | £2,020 | 1.6 |
| Nov 2017 | SEELS | Lanchester LED Lighting | 151 | 345,468 | £208,881 | £70,476 | 3.0 |
| Sep 2017 | SEELS | B052 LED Lighting Upgrade | 4 | 7,981 | £4,896 | £1,628 | 3.0 |
| Jul 2017 | SEELS | B045 LED Lighting Upgrade | 16 | 39,009 | £36,892 | £7,958 | 4.6 |
| Mar 2015 | HEFCE | Biomass Boiler | | 20,767 | £1,000,000 | £154,638 | 6.5 |
| Oct 2014 | SEELS 6 | District Heating Control | 289 | 1,560,000 | £242,520 | £66,898 | 3.6 |
| Mar 2013 | SEELS 5 | Pipe insulation | 59 | 322,348 | £27,075 | £9,348 | 2.9 |
| Mar 2013 | SEELS 5 | Cavity Wall Insulation | 19 | 104,714 | £16,158 | £3,560 | 4.5 |
| Mar 2013 | SEELS 5 | Martell BMS improvements | 107 | 375,337 | £43,354 | £20,977 | 2.1 |
| Mar 2013 | SEELS 5 | Adiabatic coolers | 74 | 141,988 | £127,443 | £29,817 | 3.3 |
| Nov 2012 | SEELS 4 | DH Pipework improvements | 616 | 3,353,755 | £638,772 | £128,449 | 5.0 |
| Jul 2010 | SEELS 3 | UPS Upgrade (IT Servers) | 72 | 133,200 | £71,362 | £20,797 | 3.4 |
| | | **Totals** | **2,488** | **7,703,357** | **£3,768,160** | **£779,499** | **4.8** |

And the following projects grant funded through BEIS/Salix PSDS2 in 2020/21

| Measure | Project Costs | Savings | CO2 savings |
|---|---|---|---|
| DH distribution improvements | £417,881 | £4,111 | 25 |
| Upgrading and installing new BMS | £1,012,616 | £34,012 | 208 |
| LED Lighting | £870,506 | £100,929 | 619 |
| Solar Farm | £465,215 | £36,724 | 225 |

| | | | |
|---|---|---|---|
| Battery | £811,195 | £0 | - |
| Air source heat pump (air to water) | £1,430,433 | -£75,639 | 412 |
| Connect B108 & B045 to existing district heating | £133,968 | £12,505 | 11 |

## Projection 2022 to 2025

The table below has a breakdown of projected carbon savings to 2025. Note over 3,000 tCO2 savings are required by then to keep on track with the target of Net Zero by 2030/31. The PSDS3a funding has been secured for the projects listed below, and there is funding available through the Salix RGF (Revolving Green Fund) for projects but these will need to be further validated and proposals submitted. As the Salix RGF is being phased out it is suggested that an Internal Revolving Fund be set up in its place and some illustrative costs and savings are included below. Finally, more feasibility work is required to firm up on costs and savings and to enable robust and successful applications for PSDS 3b and PSDS3c.

| Year | Measure | Funding | Project Costs | Savings | CO2 savings |
|---|---|---|---|---|---|
| 2022/23 | Hangar insulation | PSDS3a | £ 8,760,332 | £ 175,632 | 646 |
| 2022/23 | BMS | PSDS3a | £ 83,160 | £ 7,943 | 29 |
| 2022/23 | Heating system improvements | PSDS3a | £ 859,320 | £ 17,792 | 65 |
| 2022/23 | Solar PV | PSDS3a | £ 817,085 | £ 106,978 | 393 |
| 2022/23 | ASHP | PSDS3a | £ 871,200 | £ 1,793 | 217 |
| 2023/24 | IT Server heat to B034/B111/DH | Salix RGF | £ 398,000 | £ 52,760 | 243 |
| 2023/24 | Connect B37 to DH | Salix RGF | £ 140,000 | £ 14,300 | 22 |
| 2023/24 | Various LED upgrades & small EE projects | Internal revolving fund | £ 200,000 | £ 135,000 | 90 |
| 2023/24 | Add Hotels and Stringfellow to DH and add Biomass boiler | PSDS3b | £ 5,000,000 | £ 175,484 | 807 |
| 2024/25 | Various LED upgrades & small EE projects | Internal revolving fund | £ 200,000 | £ 135,000 | 90 |
| 2024/25 | Install GSHP and extend DH to Martell | PSDS3c | £ 6,000,000 | £ 28,750 | 771 |
| 2024/25 | Install Heat Pumps in B004. B005, B006 | Salix RGF | £ 270,000 | £ 2,100 | 56 |
| | | Total | £ 23,599,097 | £ 853,531 | 3,429 |

Part of the carbon saving in the PSDS3b and OSDS3c projects will the assumption that the CHP run times will be further reduced and the CHP eventually phased out by 2026. Further savings will be possible through behaviour change measures to ensure there is no wastage, to review and mitigate Covid ventilation strategies in energy terms. The continued decarbonisation of the UK National Grid will also help. As will securing the supply of zero carbon electricity from a solar farm direct. Weather influences will also be a big factor which could go either way.

Specific funding for the electricity infrastructure, such as transformers has yet to be identified the same applies to energy storage although this may be possible through future PSDS bids.

## Action Plan

The following actions were completed by April 2022.

| Task | Description | Who | When |
|---|---|---|---|
| Maintain DECs | Update DECs annually | AM | Annual |
| Revise Tenant Billing | Monthly billing & review rates | AM/GE | Annual |
| Identify funding for de-steaming hangars /DH and new ASHP | PSDS3 Grant Application successful | GE/SS | Dec-21 |
| Identify funding for additional solar PV | PSDS3 Grant Application successful | GE/SS | Dec-21 |

The immediate plan for the current year is set out below:

| Task | Description | Who | By When |
|---|---|---|---|
| Recruit new Energy Advisor | AM is retiring | GE | June 2022 |
| Recruit Building Energy Management System Engineer | Key role to ensure control systems are optimised | GE | July 2022 |
| Maintain DECs | Update DECs annually | Contractor | Annual |
| Revise Tenant Billing | Monthly billing & review rates | GE | Annual |
| Secure funding for Energy improvements detailed above | Undertake detailed feasibility studies | GE/SS | Aug-22 |
| Deliver Salix projects | Maintain Salix RGF fund | GE | Annual |
| Continue to develop strategy for Net Zero Carbon Target | Secure strategic consultancy to review campus energy systems | CF/GE | Apr-22 |

## Conclusions and Recommendations

Progress is being made towards the University's 2030 target. That progress will need to be maintained in the future to achieve the new target of Net Zero Carbon emissions on time. There are still significant opportunities for further energy efficiency improvements and renewable energy investments. Continued investment in these measures will contribute to the target being achieved.

Recommendation to continue to prioritise the following objectives:

1. Seek to continually improve energy management through ISO 50001.
2. Continue to seek energy saving opportunities in buildings and processes and funding for same.
3. Reduce gas usage on site by seeking alternatives to gas boilers and CHP
4. Continue to develop and improve the District Heating system.
5. Continue to develop and improve the campus HV electricity system.
6. Explore the feasibility of more on and off site generation including renewable energy options.

## Document Control

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**Document Review**

| Version | Amendment | By | Date |
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| 1.1 – 2.1 | Initial Draft Versions of original Carbon Management Plan | John Street<br>William Stephens | December 2008 |
| 2.2 | First Approved Issue of original Carbon Management Plan | John Street<br>William Stephens | February 2009 |
| 2.2 | Updated Version of original Carbon Management Plan but kept same Version Number | John Street<br>William Stephens | July 2014 |
| 2017/18 | New format as Energy and Carbon Plan to tie in with ISO 50001 | Gareth Ellis | April 2018 |
| 2017/18 V2 | Verification of Tasks Criteria added to Action Plan | Gareth Ellis | June 2018 |
| 2018/19 | Annual Update | Gareth Ellis | March 2019 |
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