St Mary's University Twickenham London

# Carbon Management Plan

# 2021 – 2030

## Contents

## 1. Introduction and purpose

The University has been working hard to improve its environmental and sustainability performance through successive Carbon Management Plans and supporting policies. This is our third Carbon Management Plan and sets out how we will work to enhance our sustainability until 2030.

## 2. Carbon and climate change

Carbon is in carbon dioxide, which is a greenhouse gas (GHG) that works to trap heat close to Earth. It helps Earth hold the energy it receives from the Sun so it doesn't all escape back into space.

Climate change is caused by the emission of greenhouse gases, mostly carbon dioxide (CO2) and methane. Burning fossil fuels for energy use creates most of these emissions. Certain agricultural practices, industrial processes, and deforestation loss are additional sources. Greenhouse gases are transparent to sunlight, allowing it through to heat the Earth's surface. When the Earth emits that heat as infrared radiation the gases absorb it, trapping the heat near the Earth's surface. As the planet heats up it causes changes like the loss of sunlight reflecting snow cover, amplifying global warming.

Climate change threatens people with food and water scarcity, increased flooding, extreme heat, disease and economic loss. The World Health Organization calls climate change the greatest threat to global health in the 21st century.

## 3. Measurement of Carbon

Carbon emissions are defined by "Scopes" derived from an organisation's own operations and its wider supply chain. The concept came from the GHG Protocol of 2001 and Scopes are the basis for mandatory GHG reporting in the UK. Relevant principal items within the Scopes are set out below:

| Scope 1 | Scope 2 | Scope 3 |
|---|---|---|
| Fuel combustion (eg natural gas)<br>Company vehicles (petrol and diesel) | Purchased electricity, heat and steam | Purchased goods and services<br>Business travel<br>Employee commuting<br>Waste disposal<br>Transportation and distribution (up and downstream) |

| | | |
|---|---|---|
| | | Investments<br>Leased assets and franchises |

## 4. Combatting climate change

The excess of GHG in the atmosphere is triggering harmful global warming, so reducing the amount of these gases should help to tackle climate change. This can be done in two ways:

a) **lower the emissions we are sending into the atmosphere**, from activities such as industrial processes, power generation, transport and intensive agriculture
b) **remove GHG emissions from the atmosphere**, for example by capturing carbon created during industrial processes before it's released or planting more trees.

Whilst the University has an interest in both of these approaches, it is the first that is of particular relevance.

## 5. Laudato Si' pillars

As a Catholic University we embrace the Response to the Cry of the Earth and the need to protect our common home for the wellbeing of all, as we equitably address the climate crisis, biodiversity loss, and ecological sustainability. Laudato Si' will be an influence on all our sustainability journey to net zero.

## 6. What is net zero?

The UK government has legislated to achieve net zero emissions on all GHG emissions by 2050 under the 2008 Climate Change Act.

Net zero refers to the balance between the amount of GHG produced and the amount removed from the atmosphere. We reach net zero when the amount we add is no more than the amount taken away.

This Carbon Management Plan is our next step towards achieving the target of next zero by 2050.

## 7. Our estate in context

Our University is a relatively small institution, based in a suburban environment, with constraints imposed by the heritage of our site. To some extent these factors limit both the scale and types of transformational projects that can be undertaken. Our last new freestanding building was completed in 2012 and sustainability has moved on considerably since then. However, there are several sustainability projects we have already undertaken and continue to roll out over the next few years. These will be outlined later in this plan.

## 8. Historic recording

We have been recording carbon emissions since 2005. This has primarily focused on scope 1 (gas and company vehicles), scope 2 (purchased electricity) and scope 3 (water).

We have recorded waste emissions for several years through the HESA Estates Management Record and more recently have started reporting commuting and procurement through our company accounts. We recognise that there is more that we can do in recording our scope 3 emissions.

So far, we have produced two separate CMPs:

- CMP 2011 - covering the period from to 2005 to 2015
- CMP 2015 - covering the period from to 2016 to 2020

These are examined in more detail below.

## 9. Baselines, targets and progress to date

The University has previously been required to provide a Carbon Management Plan that complies with HEFCE requirements. The requirement was to reduce annual $CO^2$ by 2020 by at least 43% against a 2005 baseline.

*CMP 2011*

The CMP 2011 set the carbon reduction baseline at 3,846 tonnes of $CO^2$ emissions effective from 2005 with an interim target to 2015 of a reduction of 19% in $CO^2$ emissions. The previous Director of Estates reported to senior management in 2015 that a reduction of 21% had been achieved against the 2005 baseline.

*CMP 2015*

The CMP 2015 set a reduction target of 28% to 2020. Using the 2014-15 total emissions as the baseline, annual carbon emissions are as shown in the table below (including the year 20/21):

| Year (August to July) | Total electricity and gas $CO^2$ tonnes | Total water $CO^2$ tonnes | Total transport $CO^2$ tonnes | Total $CO^2$ tonnes | Change year to year |
|---|---|---|---|---|---|
| 2015-16 | 2,988 | 40 | 8 | 3,037 | |
| 2016-17 | 2,800 | 41 | 9 | 2,849 | -6.2% |
| 2017-18 | 2,564 | 36 | 9 | 2,609 | -8.5% |
| 2018-19 | 2,304 | 36 | 8 | 2,349 | -9.9% |
| 2019-20 | 2,248 | 40 | 7 | 2,296 | -2.3% |
| Total change | | | | | -26.9% |

The reduction achieved to the end of 2020 is slightly below the CMP 2015 target however when added to the CMP 2011 target, the overall reduction of 47.9% exceeds the initial HEFCE target of 43%.

## 10. Proposals for this plan

### 9.1 Scope 1 and 2 emissions

We must build on the work done previously in reducing our emissions where we have exceeded Scope 1 and 2 reduction targets. Some of this is attributable to infrastructure improvements such as boiler replacements and use of low energy LED lighting. Appendix 1 sets out a summary of identified projects that will help reduce our carbon footprint. These are based on surveys undertaken by an independent energy consultant with base data from 2020/21. The base data derives from meter points. These projects include:

- Improved boiler controls to reduce inefficiencies for instance ensuring heating is only on when it is needed
- Insulation of pipework to reduce heat loss and overheating of spaces
- LED lighting upgrades providing low energy long life lighting
- Insulation of roof spaces to reduce heat loss
- Solar arrays to produce power to heat our plant
- Use of Automatic Monitoring & Targeting Systems to identify energy wastage
- Improved monitoring and awareness of catering equipment usage
- Installation of air source heat pumps
- Provision of new windows and insulation to reduce heat loss
- New windows and insulation
- Regular PPM to ensure equipment is serviced or repaired and working as efficiently as possible

***Reduction target – Scope 1 (mainly natural gas)***

| Baseline (tCO2e) | Baseline year | Reduction (tCO2e) | Target by 2030 (tCO2e) | % Reduction |
|---|---|---|---|---|
| 1,457 | 2020/21 | 350 | 1,107 | 24% |

**Route:**

Reduction in gas consumption through enhanced efficiency and replacement plant. Minor reduction in vehicle emissions due to electrification of fleet. See appendix 1 for specific projects.

| *Reduction target – Scope 2 (electricity)* | | | | |
|---|---|---|---|---|
| **Baseline (tCO2e)** | **Baseline year** | **Reduction (tCO2e)** | **Target by 2030 (tCO2e)** | **% Reduction** |
| 396 | 2020/21 | 100 | 296 | 25% |

**Route:**

Reduction in electricity consumption from a range of sources such as LED lighting, self- generation, switch off awareness. See appendix 1 for specific projects.

## 9.2 Scope 3 emissions

### Waste

This covers a wide range of waste including recyclables. Our waste disposal and recycling has decreased steadily but there is still much more that we can do. Whilst we can move towards using recyclable products and reduce packaging, much of this will be about awareness and engagement.

| *Reduction target – Scope 3 (waste)* | | | | |
|---|---|---|---|---|
| **Baseline (tCO2e)** | **Baseline year** | **Reduction (tCO2e)** | **Target by 2030 (tCO2e)** | **% Reduction** |
| 20 | 2020/21 | 10 | 10 | 50% |

**Route:**

Reduce the amount of waste generated including cutting down food waste, using suppliers with less packaging and more recyclable materials and heightened education and awareness of waste.

Reduce our use of paper with greater focus on soft copy materials for staff and students.

### Water and waste water

We need to improve the monitoring of our water consumption. The first step in doing so is switching our water supplier to ensure we have more accurate and regular billing and monitoring which we will supplement with our own regular meter readings. Whilst we have 21 separate water meters, one of those meters covers about 50% of our buildings including

high use catering facilities. Awareness will also be a big part of our plan to reduce.

| ***Reduction target – Scope 3 (water and wastewater)*** | | | | |
|---|---|---|---|---|
| **Baseline (tCO2e)** | **Baseline year** | **Reduction (tCO2e)** | **Target by 2030 (tCO2e)** | **% Reduction** |
| 28 | 2020/21 | 10 | 18 | 36% |
| **Route:**<br>Implement water saving technologies to include sub-metering to identify leaks and high usage areas, low flow saving taps and shower heads. Sub-metering and monitoring of high use areas. Signposting to water fountains. | | | | |

## Procurement

To date our measure of procurement related GHG emissions covers food and drink, housekeeping and short-term maintenance.

| ***Reduction target – Scope 3 (procurement)*** | | | | |
|---|---|---|---|---|
| **Baseline (tCO2e)** | **Baseline year** | **Reduction (tCO2e)** | **Target by 2030 (tCO2e)** | **% Reduction** |
| 436 | 2020/21 | 200 | 236 | 46% |
| **Route:**<br>Enhanced procurement policy to be implemented in the year 2023-34. | | | | |

## Commuting

The pandemic has changed the way we learn and work and has provided a good springboard to reducing commuting or at least making it more sustainable. We have increased our cycle spaces by 50% and increased our provision of showers to support this. Staff have access to a cycle to work scheme. Our figures include a significant amount of commuting by our teacher training students who travel to placements during the academic year. The way we monitor and record commuting needs enhancement which we aim to complete in the 2023/34 year.

| ***Reduction target – Scope 3 (commuting)*** |
|---|

| Baseline (tCO2e) | Baseline year | Reduction (tCO2e) | Target by 2030 (tCO2e) | % Reduction |
|---|---|---|---|---|
| 396 | 2020/21 | 175 | 221 | 44% |

**Route:**

Continued balanced work from home and remote study. Support and encourage green travel including cycling and walking.

### Business travel

The pandemic has also had an impact on business travel with less reliance on in person meetings and conferences. We will continue to measure levels of business travel through central expenses. Staff will be encouraged to undertake business travel as a last resort and where necessary travel should be undertaken by more sustainable means.

***Reduction target – Scope 3 (business travel)***

| Baseline (tCO2e) | Baseline year | Reduction (tCO2e) | Target by 2030 (tCO2e) | % Reduction |
|---|---|---|---|---|
| 14 | 2020/21 | 6 | 8 | 43% |

**Route:**

Awareness and policy on business travel reflecting green credentials.

### Construction work

The majority of our construction work over the last few years has comprised relatively minor refurbishment projects and as such we have largely been unable to calculate emissions from this work and it is difficult to set a baseline and target. We will however introduce sustainability requirements for projects over £50,000 during 2023/24 and work to set a base line and reduction target by the year 2024/25.

## 11. Financial implications

We will set aside adequate annual investments to support our intentions. Budget costs for a range of projects across our estate covering scopes 1 and 2 are shown in Appendix 1. Projects covering Scope 3 emissions are shown in Appendix 2. Wherever possible, projects will be supported by cost benefit analysis incorporating savings to be achieved and payback

periods. This will give our board confidence that projects not only support our sustainability goals but are affordable.

We will seek external (match) funding wherever this becomes available, for example through OfS and SALIX bids.

## 12. Implementation and engagement

Our sustainability working Group oversees direction on carbon reduction but ultimately many of our targets are down to individuals and their actions. We will plan awareness campaigns and increase our engagement with student and staff groups. In addition, sustainability will become a module in all taught programmes.

## 13. Responsibility, ownership and monitoring

Ownership of this plan ultimately rests with the Chief Operating Officer however actions are spread across the University. To that end the COO will provide an annual update to the Senior Leadership (SLT) team to review implementation and progress. In addition, the COO will provide an annual progress report to our Boards' Finance and Resources Committee. The SLT will monitor progress through a sustainability scorecard. In addition, the Director of Estates and Campus Services will undertake a full review of contents including annual targets within two weeks of the anniversary of this plan.

Jo Blunden

Chief Operating Officer

July 2022

| | |
|---|---|
| Version: | 1.0 |
| Last updated: | 12th July 2022 |
| Next update: | 11th July 2023 |

## Appendix 1 - Carbon reduction projects - Scopes 1 and 2

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| B-F | Boiler controls | The controls for the boilers in D Block Basement are old discrete controls and have obviously failed as all plant on the panel are in hand. This means the boilers will be on 24 x 7.<br>We would recommend the controls for the above panel are upgraded and a BEMS controller is installed to control all the plant. This will allow for Optimised start and stop times, the boilers to be controlled based on outside air temperature and via room reset. | 1,130,847 | 248,786 | 22.0% | 45.7 | £7,200 | 0.83 |
| B-F | Improved plant controls | The HVAC systems controlled in D Block Plantroom are all in Hand due to old discrete controls. This means plant is running 24 x 7. We would recommend the controls for the above panel are upgraded and a BEMS controller is installed to control all the plant. This will | 40,962 | 8,192 | 20.0% | 1.9 | £3,600 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | allow for improved time scheduling, pumps to be turned off based on outside and room temperatures. | | | | | | |
| B-F | LED Lighting Upgrades | There is still a significant amount of 70w Twin T8 and 58w T8 fittings in the blocks associated with this report. We would recommend a programme is created to replace these types of fittings as the Government intends to phase the use of these out by 2025. Typically, 50% savings can be achieved by the replacement of these for LED Equivalents. | 32,519 | 16,259 | 50.0% | 3.8 | £7,200 | 0.83 |
| B-F | Insulation on Pipework | Insulation on pipework throughout the D Block plantroom is missing. We would recommend this is reinstated along with Flange and Valve covers. This will reduce losses on the system and improve gas consumption. | 1,068,844 | 53,442 | 5.0% | 10.4 | £6,000 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| B-F | Automatic Monitoring & Targeting System | The site electrically is fed in the Main from 1 Half Hourly electric meter that only gives a overview of consumption across multiple buildings. We would recommend further electric meters are installed and connected back to a automatic monitoring and targeting system (aM&T) to enable as a minimum a building-by-building breakdown of consumption.<br>The gas meters serve central plants and thus the use of heat meters would help to determine gas usage per building and distribution losses.<br>The Carbon Trust state that an aM&T system can save between 5% and 10% on energy costs. The below savings are only attributed for the blocks included in this report. We have apportioned the cost of an aM&T system across all the reports for this site. | 1,216,910 | 63,863 | 5.2% | 12.1 | £7,200 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| G | Boiler controls | The controls for the boilers in G Block Basement are old discrete controls and have obviously failed as all plant on the panel are in hand. This means the boilers will be on 24 x 7.<br>We would recommend the controls for the above panel are upgraded and a BEMS controller is installed to control all the plant. This will allow for Optimised start and stop times, the boilers to be controlled based on outside air temperature, room reset and from a central PC. | 987,896 | 98,790 | 10.0% | 18.2 | £12,000 | 0.83 |
| G | Improved plant controls | Some of the HVAC systems controlled in G Block Plantroom are in Hand due to old discrete controls. This means plant is running 24 x 7.<br>We would recommend the controls for the above panel are upgraded and a BEMS controller is installed to control all the plant. This will allow for improved time scheduling, pumps to be turned off based | 24,389 | 1,219 | 5.0% | 0.3 | | - |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | on outside and room temperatures. Theproject cost for this work has been covered by the upgrade of the boiler controls. | | | | | | |
| G | LED Lighting Upgrades | There is still a significant amount of 70w Twin T8, 58w T8 and 28w Square D fittings in the blocks associated with this report. We would recommend a programme is created to replace these types of fittings as the Government intends to phase the use of these out by 2025. Typically, 50% savings can be achieved by the replacement of these for LED Equivalents. | 27,557 | 13,779 | 50.0% | 3.2 | £7,200 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| G | Automatic Monitoring & Targeting System | The site electrically is fed in the Main from 1 Half Hourly electric meter that only gives a overview of consumption across multiple buildings. We would recommend further electric meters are installed and connected back to a automatic monitoring and targeting system (aM&T) to enable as a minimum a building-by-building breakdown of consumption.<br>The gas meters serve central plants and thus the use of heat meters would help to determine gas usage per building and distribution losses.<br>The Carbon Trust state that an aM&T system can save between 5% and 10% on energy costs. The below savings are only attributed for the blocks included in this report. We have apportioned the cost of a aM&T system across all the reports for this site. | 1,134,874 | 56,744 | 5.0% | 10.8 | £7,200 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| DeMarillac & GWD | LED Lighting Upgrades | There is still a significant amount of 28w Square D fittings in the blocks associated with this report. Replacing these with 13W LED equivalents would be beneficial. We would recommend a programme is created to replace these types of fittings as the Government intends to phase the use of these out by 2025. Typically, 50% savings can be achieved by the replacement of these for LED Equivalents. | 12,735 | 7,004 | 55.0% | 1.6 | £9,600 | 0.83 |
| DeMarillac & GWD | Boiler controls | The boilers are very old and likely to have reached the end of there life. New Condensing boilers would likely alone bring a 10% improvement through just boiler efficiencies. The controls for these boilers are also old and discrete controls, meaning any changes must be done locally. Installing BEMS controls on this system would generate savings of up to 22% also. | 1,370,880 | 411,264 | 30.0% | 75.6 | £108,000 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| DeMarillac & GWD | Cold water booster pumps | During the visit, it was observed that the cold-water booster pumps, were cycling on and off constantly. This can only be a fault with the units or a leak on the cold-water pipework thereafter. Investigations are needed to resolve this issue. The project cost is for engineer from the manufacturer to attend and check pumps software. | 12,735 | 3,820 | 30.0% | 0.9 | £720 | 0.83 |
| DeMarillac & GWD | Automatic Monitoring & Targeting System | The site electrically is fed in the Main from 1 Half Hourly electric meter that only gives a overview of consumption across multiple buildings. We would recommend further electric meters are installed and connected back to an automatic monitoring and targeting system (aM&T) to enable as a minimum a building-by-building breakdown of consumption.The gas meters serve central plants and thus the use of heat meters would help to determine gas usage per | 1,570,251 | 78,513 | 5.0% | 14.9 | £6,000 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | building and distribution losses.The Carbon Trust state that an aM&T system can save between 5% and 10% on energy costs. The below savings are only attributed for the blocks included in this report. We have apportioned the cost of a aM&T system across all the reports for this site. | | | | | | |
| J | LED Lighting Upgrades | There is still a significant amount of 28w Square D fittings in the blocks associated with this report. Replacing these with 13W LED equivalents would be beneficial. We would recommend a programme is created to replace these types of fittings as the Government intends to phase the use of these out by 2025. Typically, 50% savings can be achieved by the replacement of these for LED Equivalents. | 69,999 | 35,000 | 50.0% | 8.1 | £24,000 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| J | Electrical Catering Equipment Management | Electrical Catering equipment used within the Refectory accounts for 44% of total energy for all the blocks in this report. During our survey we observed potential wasted electricity. A review of all equipment used to see if they can be either removed or managed more effectively would make significant savings.<br>During the survey we observed 2 toasters on permanently during breakfast time. For most of the time they were unused but on. Could toast be made and kept warm under the warming lamps on the main counter.<br>Panini machines were on during breakfast again are they both needed or can they be better managed. All warming lamps were on but not all had food underneath them. Just a 10% reduction in such equipment would save nearly £5,000 annually. | 304,357 | 30,436 | 10.0% | 7.0 | | - |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| J | Gas Catering Equipment Management | Gas Catering equipment used within the Refectory accounts for 13% of total energy for all the blocks in this report. During our survey we observed potential wasted gas. A review of all equipment used to see if they can be either removed or managed more effectively would make significant savings.<br>During the survey we observed both Fryers on during breakfast, could just one be used. The Grill<br>was left on and not sure what it was being used for. | 69,999 | 7,000 | 10.0% | 1.3 | | - |
| J | Sandwich fridge utilisation | The display fridges used to display Sandwiches and Paninis could be combined and one of the<br>fridges removed or turned off. An evaluation of all fridges and utilisation could be conducted and where possible rationalised to maximise stock levels. | 21,195 | 4,239 | 20.0% | 1.0 | | - |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| J | Automatic Monitoring & Targeting System | The site electrically is fed in the Main from 1 Half Hourly electric meter that only gives a overview of consumption across multiple buildings. We would recommend further electric meters are installed and connected back to an automatic monitoring and targeting system (aM&T) to enable as a minimum a building-by-building breakdown of consumption.The gas meters serve central plants and thus the use of heat meters would help to determine gas usage per building and distribution losses. We have apportioned the cost of a aM&T system across all the reports for this site. | 1,283,265 | 64,164 | 5.0% | 13.4 | £14,400 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| KLM | Boiler controls | The boilers are controlled via a Trend IQ controller. During the survey the boilers was fully fired up and all radiators hot. However, due to overheating the staff had opened the windows in the office. Also, huge windows in the stairways were open regardless too. We would recommend adjusting set points and engage students and staff to turn off rads using TRV rather than just open the windows.<br>It was also noted that M block heating pumps are in hand and running 24 x 7.<br>Our cost allows for BEMS engineer to visit reprogramme system to allow for room reset control and high outside air shutdown on heating systems. | 281,252 | 28,125 | 10.0% | 5.2 | £1,200 | 0.83 |
| KLM | LED Lighting Upgrades | There is still a significant amount of 18w four tube T8 fittings in the blocks associated with this report. We would recommend a programme is created to replace these types of fittings as the Government | 47,791 | 23,896 | 50.0% | 5.5 | £15,600 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | intends to phase the use of these out by 2025. Typically, 50% savings can be achieved by the replacement of these for LED Equivalents. | | | | | | |
| KLM | Energy Awareness Campaign | Irrespective of how well energy consumption is managed, the operating efficiency of equipment installed or what level of building controls are available, employee behaviour will always impact the way in which energy is consumed. It was noted during our survey that lighting was left on and PC's & IT equipment still on when rooms were empty. Awareness campaigns can be an effective strategy to focus attention on energy use to help minimise waste. There are often many ways in which student awareness can be improved, but ideally any campaign introduced will introduce ways for students to take an active involvement. | 429,553 | 21,478 | 5.0% | 4.3 | | - |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | Campaigns should also undergo a process of continual renewal, to keep them relevant and maintain higher levels of commitment. | | | | | | |
| KLM | Automatic Monitoring & Targeting System | The site electrically is fed in the Main from 1 Half Hourly electric meter that only gives an overview of consumption across multiple buildings, the same can be said for Gas with no specific gas meter for this building. We would recommend further electric and gas meters are installed and connected back to an automatic monitoring and targeting system (aM&T) to enable as a minimum a building- by-building breakdown of consumption. | 429,553 | 21,478 | 5.0% | 4.3 | £4,800 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | The below project cost should be incorporated into a wider solution for the whole site. The Carbon Trust state that an aM&T system can save between 5% and 10% on energy costs. The below savings are only attributed for the blocks included in this report. We have apportioned the cost of a aM&T system across all the reports for this site. | | | | | | |
| R | Lighting | There is a lot of 51w Single & Twin T5 fittings. We would recommend a programme is created to replace these types of fittings as the Government intends to phase the use of these out by 2025.Typically, 50% savings can be achieved by the replacement of these for LED Equivalents. | 94,481 | 47,240 | 50.0% | 10.9 | £24,000 | 0.83 |
| R | Plant in hand | The heat pumps are in hand on the control panel. The controls need to be assessed so that these systems can be | 67,908 | 20,372 | 30.0% | 4.7 | £720 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | put back under automatic control and not running 24 x 7. | | | | | | |
| R | AC management | The AC controls in the Fitness area are accessible to all and can be easily adjusted. During the survey they were set to 26'C and the reception area was set at 23'C. This would mean that these systems would fight each other.<br>We would recommend the controls are locked down to prevent unauthorised access. This could be achieved via a Perspex cover of by setting a pin code on the controls.<br>Once done we would suggest a common temperature is applied across all units and that a time schedule is also programmed to ensure units only operate during occupancy times. | 41,412 | 8,282 | 20.0% | 1.9 | | - |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| R | Ambirad controls | The Ambirad heaters in the Tennis Centre are controlled via the above panel. On checking the timeclock wasn't set and the time was wrong. It looks like they are operated manually. The daytime temps were set to 23'C and thus when turned on would run constantly.<br>We would suggest the controls are upgraded and controlled via a BEMS where they can be set remotely and prevent inefficient use. | 216,637 | 32,495 | 15.0% | 6.0 | £4,800 | 0.83 |
| R | Tennis Hall lighting | The tennis hall lighting was seen to be on when the building was not in use. This was seen a few times during our survey. The use of microwave sensors for presence control could be incorporated to ensure lights are only on when needed and for the areas in use. | 53,297 | 15,989 | 30.0% | 3.7 | £4,800 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| R | Monitoring & Targeting System | The site electrically is fed in the Main from 1 Half Hourly electric meter that only gives a overview of consumption across multiple buildings. We would recommend further electric meters are installed and connected back to an automatic monitoring and targeting system (aM&T) to enable as a minimum a building-by-building breakdown of consumption.<br>The gas meters serve central plants and thus the use of heat meters would help to determine gas usage per building and distribution losses. | 998,116 | 49,906 | 5.0% | 9.9 | £7,200 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| Naylor | AC controls | The AC controls are accessible to all and can be easily adjusted. During the survey the Café area was set to 25'C and the reception area was set at 21'C. This would mean that these systems would fight each other.<br>We would recommend the controls are locked down to prevent unauthorised access. This could be achieved via a Perspex cover of by setting a pin code on the controls.<br>Once done we would suggest a common temperature is applied across all units and that a time schedule is also programmed to ensure units only operate during occupancy times. | 78,633 | 15,727 | 20.0% | 3.6 | £720 | 0.83 |
| Naylor | Catering equipment left on | Electrical Catering equipment used within the Café was seen to be left on when the area was closed. Staff should be encouraged to check all equipment that is not needed is turned off when the Café is closed. | 10,512 | 3,154 | 30.0% | 0.7 | | - |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| Naylor | Solar Array | The above shows that 269 m2 of roof space could be utilised for solar panels. We will assume a 10% reduction in this due to not all the space being able to be utilised. This then could hold a31.75 KWp system generating approx. 30,714 KWh annually. | 30,714 | 30,714 | 100.0% | 7.1 | £27,432 | 0.83 |
| Teddington Lock | Lighting | The 3G pitch lights are 400w Incandescent lamps. There are also some 70w T12 & T8 fittings in the pavilion and groundsman hut. We would recommend a programme is created to replace these types of fittings as the Government intends to phase the use of these out by 2025. Typically, 50% savings can be achieved by the replacement of these for LED Equivalents. | 17,543 | 8,772 | 50.0% | 2.0 | £6,000 | 0.83 |
| Teddington Lock | Water Heater Timeclock | The water heater in the Shell building kitchen could be left on as its just plugged in. We would suggest a fused spur timeclock is fitted to prevent the unit being left on. | 7,008 | 2,102 | 30.0% | 0.5 | £600 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| The Exchange | Lighting | There is a large number of 32w PLL Downlighters fitted. We would recommend a programme is created to replace these types of fittings as the Government intends to phase the use of these out by 2025. Typically, 50% savings can be achieved by the replacement of these for LED Equivalents. | 6,030 | 3,015 | 50.0% | 0.7 | £3,000 | 0.83 |
| The Exchange | AC management | The AC controls throughout the building are accessible to all and can be easily adjusted. During the survey areas that were unoccupied were seen to be on.<br>We would recommend the controls are locked down to prevent unauthorised access. This could be achieved via a Perspex cover of by setting a pin code on the controls.<br>Once done we would suggest a common temperature is applied across all units and that a time schedule is also programmed to ensure units only operate during occupancy | 57,120 | 11,424 | 20.0% | 2.6 | £720 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | times. Units could be scheduled to turn off 4 or so times a day so that they have to be turned back on and would prevent them running all day. | | | | | | |
| The Exchange | Bar equipment left on | The refrigeration equipment in the cellar was seen to be on. It would be prudent to switch off the Hydrocooler when not in use as this will create a extra heat load for the cellar fridge equipment. It was also noted that the bottle fridges behind the bar were left on. We would encourage a system where they are turned off when empty and if needed timers fitted to ensure they are on and cold when required. | 6,030 | 1,206 | 20.0% | 0.3 | | - |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| The Exchange | Theatre AHU plant | The theatre area AHU and its plant was all seen to be on when the theatre was not in use and wasn't scheduled to be so. Its fair to assume that it probably runs every day. We would recommend the BEMS controls are changed to only bring on the AHU and its plant when the theatre is going to be in use. Holiday scheduling could be used to achieve this. Our project cost allows for a BEMS engineer to visit and set this up so that staff can manage the system better. | 46,553 | 13,966 | 30.0% | 3.2 | £4,800 | 0.83 |
| Waldegrave Park & SHR houses | LED Lighting Upgrades | Most of the lighting is old T8 Fluorescent type lighting. We would recommend a programme is created to replace these types of fittings as the Government intends to phase the use of these out by 2025. Typically, 50% savings can be achieved by the replacement of these for LED Equivalents. | 3,226 | 1,613 | 50.0% | 0.4 | £1,800 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| Waldegrave Park & SHR houses | Boilers and controls | The boilers are located either in the basement or behind the Kitchen and are not accessible by students. Generally, they appear to be left on 24 x 7 to provide hot water and heating with control of heating by individual TRV's in each room. The controls for these boilers are also old and discrete controls, meaning any changes must be done locally. Upgrading the controls so that boilers could be controlled centrally would eliminate energy wastage. There are economic solutions now to deploy systems that could control these boilers centrally without the cost of a full BEMS. LORAWAN is one example. | 134,064 | 26,813 | 20.0% | 4.9 | £3,000 | 0.83 |
| Waldegrave Park & SHR houses | New windows and insulation | The buildings windows are all single glazed. Additionally, insulation levels in the roof space couldn't be checked but would probably need topping up. Although implementation cannot be recommended on energy savings alone, the | 134,064 | 20,110 | 15.0% | 3.7 | £18,000 | 0.83 |

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | Universities aspirations to achieve Net Zero would benefit from this. | | | | | | |
| Waldegrave Park & SHR houses[1] | Energy Awareness Campaign | Irrespective of how well energy consumption is managed, the operating efficiency of equipment installed or what level of building controls are available, employee behaviour will always impact the way in which energy is consumed. It was noted during our survey that lighting was left on, and energy wastage could be observed. Awareness campaigns can be an effective strategy to focus attention on energy use to help minimise waste. There are often many ways in which student awareness can be improved, but ideally any campaign introduced will introduce ways | 143,947 | 7,198 | 5.0% | 1.3 | | - |

[1] There are 10 of these properties so the figures in the table should be multiplied by 10

| Building | Description | Rationale and assumptions (Inspired Energy report extracts) | Annual Running Consumption (kWh) | Guideline energy saving (kWh pa) | Potential savings when implementing | Annual Carbon Savings (tCO2) | Project cost (gross) | Simple payback period (years) |
|---|---|---|---|---|---|---|---|---|
| | | for students to take an active involvement. Campaigns should also undergo a process of continual renewal, to keep them relevant and maintain higher levels of commitment. | | | | | | |

## Appendix 2 - Carbon reduction projects - Scope 3

The projects and initiatives set out below contribute to the carbon reduction targets stated in section 10 above

| Theme | Project | Project cost or Route<br><br>2022/25 |
|---|---|---|
| Business travel | Implement green business and academic travel policy and monitor through travel expenditure and mileage claims | Review and implement business travel policy |
| Commuting | Annual monitoring through staff and student travel surveys. Develop green travel plan. Promote cycling, walking and public transport. | Support Bike purchases, Electric car purchase scheme |
| Commuting | Provision of electric vehicle charging points | £20,000 |
| Commuting | Further enhance cycling friendly facilities and provide electric scooter point on Campus | £10,000 |
| Engagement | Regular staff and student engagement including campaigns and awareness days/weeks | Implement through Sustainability Group |
| Procurement | Develop a "Green IT strategy", reducing carbon emissions through procurement of appropriate IT technology and software. | £30,000 |
| Travel | Estates phased replacement fleet to be electric vehicles including specialist grounds vehicles and grounds equipment as and when available | £120,000 |

| | | |
|---|---|---|
| Waste | Printing - significantly reduce printed materials through responsible practice including academic and professional printing volumes, printing of prospectuses and alumni material | Assess baselines, challenge the need to print and implement policy change and promotion |
| Waste | Food and catering - reduce food waste and packaging through planned and monitored ordering. Excess food to be recycled/donated. | Develop a sustainable catering plan. |
| Water & waste water | Water saving features - eg low flow taps and shower heads, sub-metering. | £50,000 |