UNIVERSITY OF PLYMOUTH

Advancing knowledge, transforming lives

ENERGY AND WATER POLICY AND ACTION PLAN

2021 - 2025

Contents

Introduction

As a leading sustainable University and with our mission to advance knowledge and transform lives it is essential that we take rapid and transformative action to reduce our negative impact on the environment. The University's Strategy 2030 calls upon us to ensure sustainability across the institution, in our finances, reputation, services, partnerships as well as environmental performance and global contribution.

Strategy

As per the Carbon Management Plan, the University declared a target of net zero carbon from scope 1 & 2 emissions by 2025. By 2019–20, the University has reduced emissions from scope 1 & 2 by 62% since the base year of 1990. Our plan can be summarised under five key elements to effecting carbon reduction of which energy and water use is a large part. These consist of:

1. Fuel and power conversion
2. Reducing our resource use
3. Implementing change across our behaviours
4. Institutional change
5. Improving space utilisation

Running alongside the targets for net zero scope 1 & 2 by 2025, is the University's energy reduction targets. The University is targeting to reduce gas usage by 25% and electricity use by 20% by 2030 (based on 2005–06 baseline year). The target is ambitious as it is expected that we will be transitioning through a significant period of change in our base energy usage over the coming years. Likely to start with an initial increase in use of gas to drive an increase in the self-generation of electricity through the onsite Combined Heat and Power (CHP), but longer term moving to reduce gas use and transition to electrically led heating and cooling for buildings.

Furthermore, the universities continual achievement of ISO14001 demonstrates commitment to environmental impact reduction whereby the energy and water plan is a significant factor in achieving this standard and ensuring continual improvement in the future.

Purpose and Objectives

The purpose of this Energy and Water Plan is to contribute towards the United Nations Sustainable Development Goals, specifically:

- Quality Education (4)
- Clean Water and Sanitation (6)
- Affordable and Clean Energy (7)
- Decent Work and Economic Growth (8)
- Sustainable Cities and Communities (11)
- Responsible Consumption and Production (12)
- Climate Action (13)
- Peace, Justice and Strong Institutions (16)
- Partnership for the Goals (17)

The Action Plan follows these objectives:

1. Reduce electricity use by 20% by 2030 based on 2005–06 baseline
2. Reduce Gas use by 25% by 2030 based on 2005–06 baseline
3. Reduce water use to $3m^3$ per student in line with scope 3 local targets
4. Increase proportion of onsite renewables as well as committing to renewable tariff by 2025
5. Raise awareness and build a community of engaged staff and students to improve behavioural change impacts on energy and water consumption across the University

Links to other policies

The action plan directly supports the University's 'Strategy 2030: a future of excellence', particularly in addressing the ambition to achieve resilience, sustainability and effectiveness. Other relevant plans and strategies for sustainability include:

- Carbon Management Plan and Strategy
- Environmental Policy
- Estate and Facilities Campus Strategies
- ISO 14001:2015
- Travel Plan

Governance

The University Executive Group has overall responsibility for the delivery of the Energy and Water Plan. Delegated responsibility for achieving this plan is with the Sustainability Advisory Group (SAG).

This group brings together representatives from across the University including professional services, research and teaching and learning.

The SAG reports to UEG and the Board of Governors. The members of SAG have oversight of the programme to encourage delivery and identify, and remove, the barriers to success.

The Energy and Water Plan is intended to be implemented from 2021 to 2025 (see Action plan) and will be reviewed annually. Energy and water consumption and performance reporting is included in the sustainability report and also used for the Higher Education Statistics Agency (HESA) annual Estate Management Records (EMR).

Monthly reports are produced by the Energy Manager for the attention of the Estates and Facilities Senior Management Team and Director of Estates.

Responsibilities

Staff and students
Ensure activities comply with the requirements of the energy and water management plan and any relevant legislation and departmental codes of practice. To collaborate with the sustainability activity on campus, helping to take forward new initiatives and behaviour change.

Director of Estates and Facilities
Deputy chair of the Sustainability Advisory Group, overall responsibility for ensuring energy and water management is delivered throughout Estates and Facilities.

Head of Building and Engineering
Overall responsibility for the engineering and maintenance function within Estates and Facilities, and ensuring this function incorporates the requirements of the energy and water plan. Delegated responsibility to project managers delivering the low carbon projects.

Head of Capital Developments
Overall responsibility for ensuring ultra-low carbon design incorporated into capital projects. Including that of energy and water conservation.

Head of Sustainability
Has been delegated responsibility for overseeing the management of the energy and water plan. Responsible to ensure that the energy and water plan is implemented and continually developed.

Energy Manager
Delegated responsibility for the day-to-day management of electricity, gas and water use and ensuring that the requirements of the energy and water management plan in respect of utility use is implemented.

Executive Dean, Faculty of Science and Engineering
Chair of the Sustainability Advisory Group and has delegated senior responsibility for the delivery of the energy and water plan and leadership for this strategy across the University.

Director of Sustainable Earth Institute
Overall responsibility for creating a collaborative, interdisciplinary and innovative research environment and culture around energy and water savings and supporting knowledge exchange and research impact with the wider world.

Manager of Sustainable Earth Institute
Delegated responsibility for creating a collaborative, interdisciplinary and innovative research environment and culture around energy and water savings and supporting knowledge exchange and research impact with the wider world.

Centre for Sustainable Futures Lead
Distributed leadership responsibility for encouraging across the Sustainability Education community of practice, the integration of energy and water use change consideration within the curriculum and pedagogy of undergraduate and masters programmes of study.

Heads of School
Cooperate and collaborate with the Sustainability Advisory Group and any responsible persons to enable the energy and water plan to be delivered. Ensure that operational activities comply and deliver against the energy and water plan and to engage with collaboration on process change.

Scope

The scope of this plan is inclusive of all university owned buildings and assets where the university and its subsidiaries are occupying space, in addition to buildings lease. This does exclude consumption associated with tenants of the university where utility data is recharged accordingly.

Performance to date

Electricity, Gas and Water data are collected through various different meters and sub meters, across the estate captured alongside room temperatures, humidity and lighting levels we have over 1000 data points within our Monitoring and Targeting platform. this enables us to analyse and understand consumption trends, deviations and resolve issues promptly.

Gas

Since 2005–06 the University has reduced gas use by 24.4% by 2020–21. A decrease from last year achievement of 42.2% mainly due to covid heating requirements compared to a closed university during the height of the pandemic. Looking at absolute level's gas use has increased over the past couple of years, this is part due to weather implications with colder winters directly impacting gas use.

The below graphs show historic consumption in comparison to the University's floor area. In 2013–14 gas consumption was 84 kWh/m^2 whereas in 2020–21 gas has increase to 108 kWh/m^2. This is mainly resulting from Covid ventilation and heating requirements and increased operation of the CHP to be electrically led. A summary of gas projects can be found in Appendix 1.

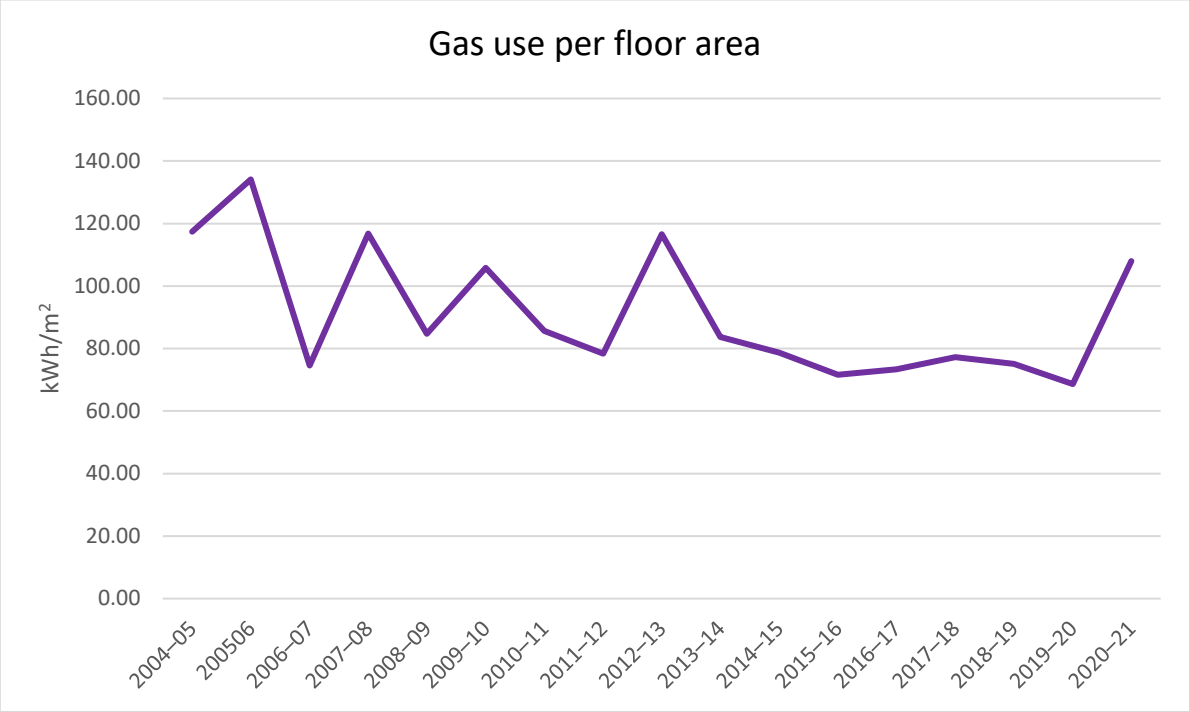


Figure 1: Gas consumption (kWh /m2) since 2013/14

Electricity

Since 2005–06 the University has reduced electricity use by 27%. This equates to 75 kwh/m^2 in 2020-21 compared to 98 kwh/m^2 in 2013-14. Electricity use is expected to increase as we move towards electrically heated buildings, therefore efficiencies need to be found elsewhere. A summary of electric projects can be found in Appendix 2.

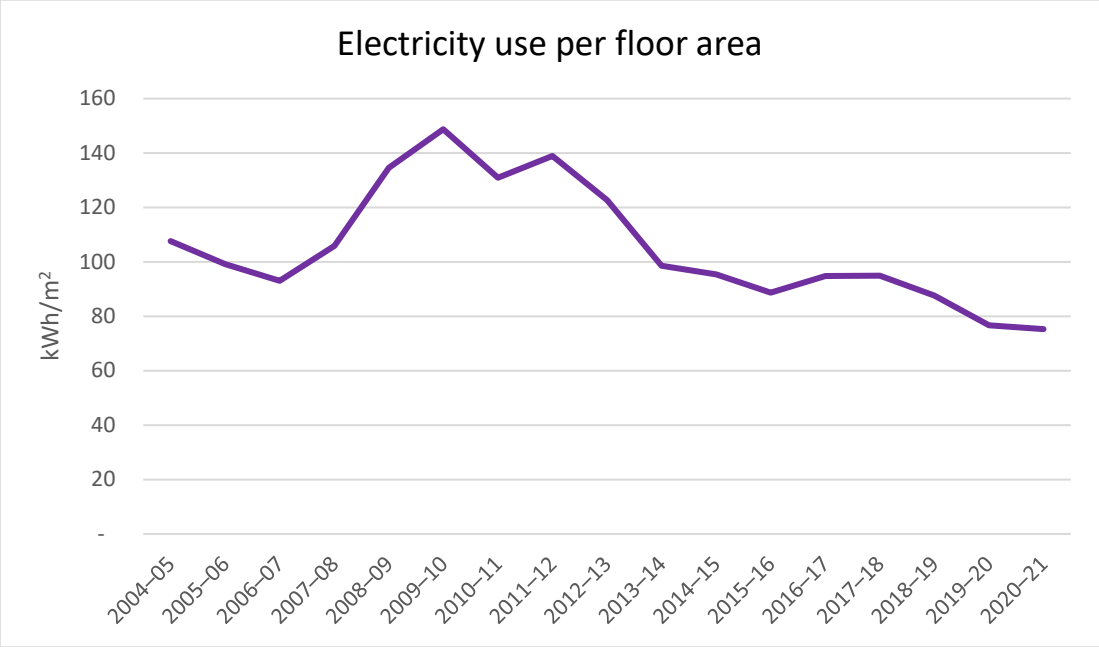


Figure 2: Electricity consumption (kWh /m2) since 2013/14

Water

As global climate changes, water is an increasingly important commodity and as part of our global commitment to marine conservation it's important we reduce our water consumption. We have already made a significant reduction in water use but strive for continual improvement. Since 2005–06 the University has reduced water use by 62%. Looking at Figure 3, since 2005–06 water use has reduced from 0.46m^3/m^2 to 0.28m^3/m^2.

As Shown in figure 4 Since 2007–08 water use has reduced from 7.3m^3 per student to 2.75m^3 per student in 2020–21. We achieved 4.01m^3 per student in 2018–19 which is a more representative year for actual student numbers on campus, due to Covid-19 impacts during the following year as water is heavily dependent on people being on site. A summary of water projects can be found in Appendix 3.

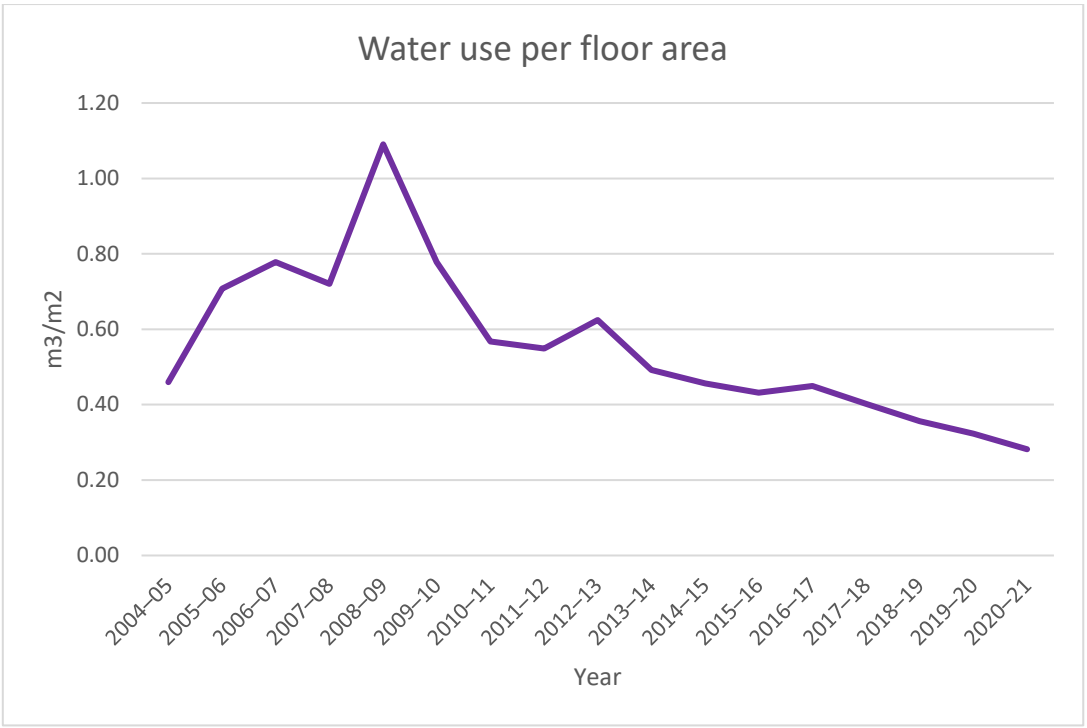


Figure 3: Graph showing historic water consumption in m^3.per floor area

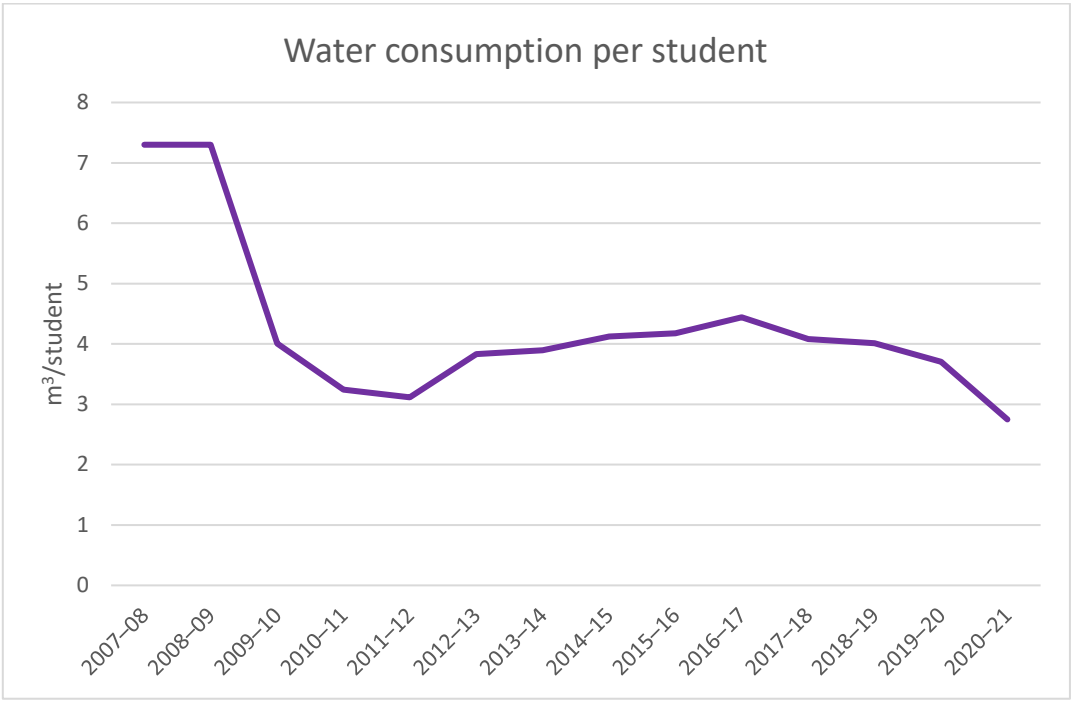


Figure 4: Graph showing historic water consumption as m^3 per student.

Sector Comparison

Looking across the sector to benchmark performance, the University is amongst the lowest for energy consumption per floor area. The following graph shows how the University of Plymouth ranks against other University's by total energy consumption per floor area. Extreme outliers have been removed to not distort the charts. For 2020-21 we are in the top performing 12% universities.

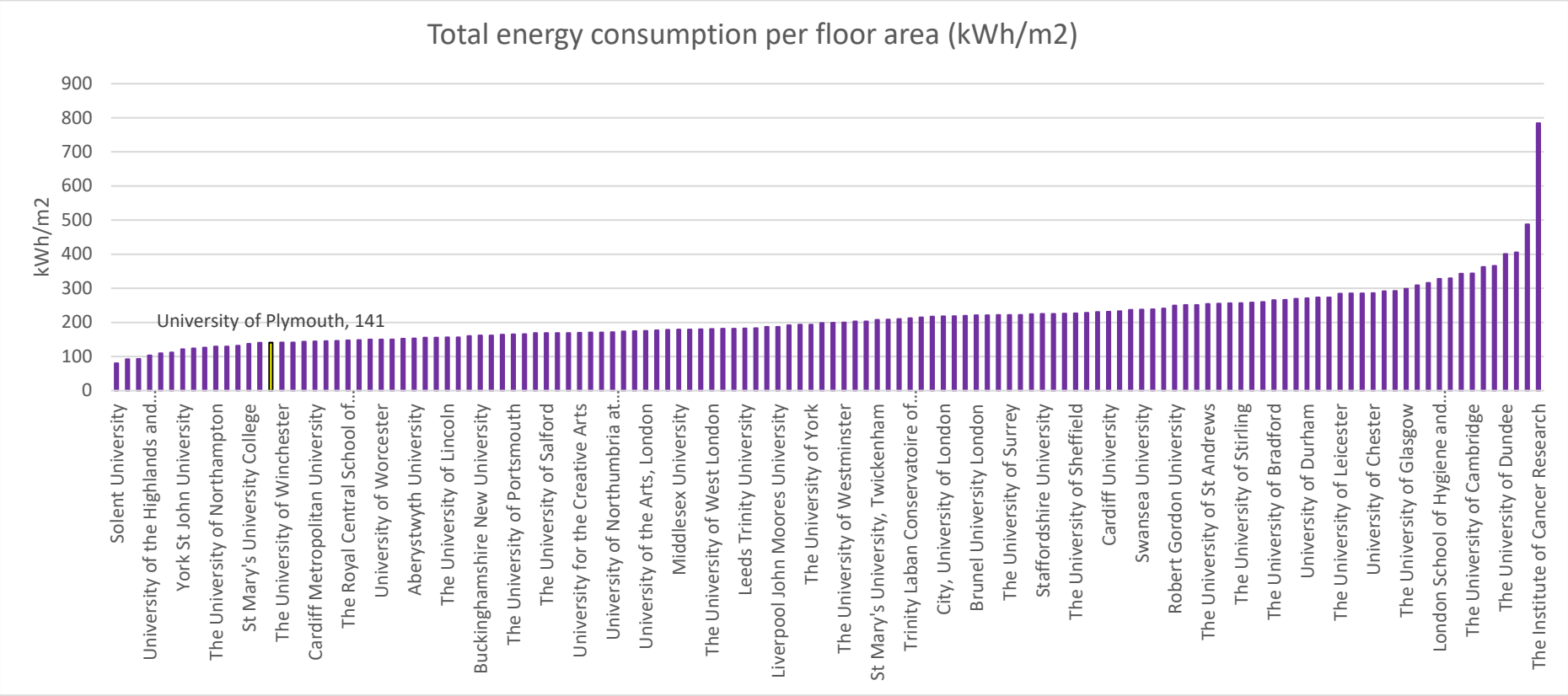


Figure 5: Energy use kWh (combination of electricity and gas) per m^2 for the sector. (Source: HESA).

The following graph also shows that the University is amongst the lowest users of water per student population. This also demonstrates that the target of $3m^3$ of water per student is achievable with significant investment, as universities of a similar nature have achieved this. For 2020-21 we are in the top performing 19% of universities.

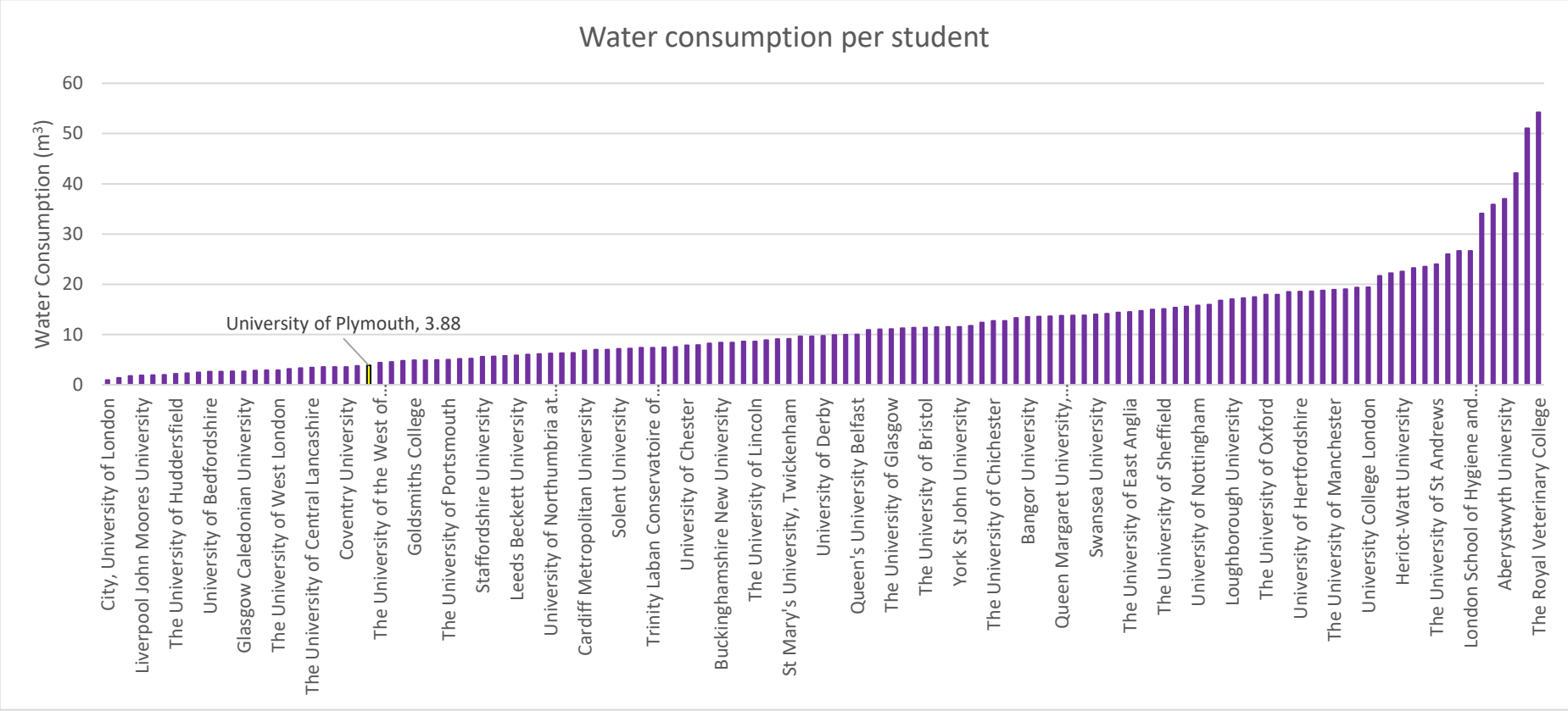


Figure 6: comparison of water consumption per student for other Universities. (Source HSEA).

Energy and Water Action Plan

Objective	Action	Measurement	SDG	Responsibility	Date
Reduce Electricity use by 20% by 2030 based on 2005–06 baseline	Completion of existing LED refurbishment projects	Monitoring and targeting software in kwh	7, 13	E&F	2021–22
	Identification of future LED projects in RLB and Davy buildings	Project plan highlighting buildings for refurbishment and 5 year capital plan	7, 11, 13	E&F	2022–23
	Meter upgrade project to bring remainder meters onto our monitoring and targeting system	Increase in monitoring and targeting software datapoints	7, 12	E&F	2021
	Smart Meter rollout to replace group of non-half hourly meters	Increase in M&T data points	7, 12	E&F	2021
	Portable metering to be used to identify baseloads and high usage. Using this information to inform decisions to reduce consumption. – Data Analyst	Comprehensive reports of building consumption data identifying saving initiatives	7, 12	E&F	2021-23
	Estates and Facilities checklist document for energy, water and environmental considerations for minor works projects to ensure each project is helping achieve our environmental commitments	Project handover to maintenance team to include checklist	7, 16, 17	E&F	2021
	Further detailed investigations into upgrading transformers	Monitoring and targeting software in kwh	7	E&F	2021
	CHP optimisation to maximise electricity generation	Monitoring and targeting software in kwh	7, 12	E&F	2021–22
	Input into design guide for future major refurbishment projects and capital development projects	Completion of design guides for various elements of E&F	7, 17	E&F	2021
	Street Lighting upgrade	Monitoring and targeting software in kwh	7, 11	E&F	2021-22

	Investigation into PC and AV power management to reduce energy use associated with IT equipment	Monitoring and targeting software in kwh	7, 17	E&F,TIS	2021–22

Reduce Gas use by 25% by 2030 based on 2005–06 baseline	BMS optimisation and upgrade project	Monitoring and targeting software in kwh	7, 12	E&F	2022–23
	Lagging investigation / review	Monitoring and targeting software in kwh	7	E&F	2021-22
	DHW Chlorine Dioxide reduce storage temperature	Reduction in energy use associated with DHW identified through monitoring and targeting software in kwh	7	E&F	TBC
	Chiller heat recovery to be carried out	Monitoring and targeting software in kwh	7	E&F	2021–22
	Completion of WSHP for Nancy Astor Domestic Hot Water following approval	Monitoring and targeting software in kwh	7	E&F	2021–22
	Feasibility into district heating network moving from gas led to an electric led system	Reduction in gas usage and increase in electricity in kwh	7, 11	E&F	2021–22
	Sustainable lab work with all research heavy labs, review of existing equipment and more efficient replacements	Signing up to sustainable lab group	7, 17	E&F	2022–23
	Feasibility for Mary Newman and Library boilers	Monitoring and targeting software in kwh	7	E&F	2022
	Feasibility for boiler replacement in Kirkby place for ASHP	Monitoring and targeting software in kwh	7	E&F	2022
	Planned maintenance works incorporated into reducing gas use e.g., boilers	Monitoring and targeting software in kwh	7, 12	E&F	Ongoing

Reduce water use to 3m³ per student in line with scope 3 local targets	Water audit to be completed	Monitoring and targeting software in m³	6	E&F	Ongoing
	Water advice from South West Water to be actioned	Monitoring and targeting software in m³	6, 17	E&F	Ongoing
	Water meter upgrades and replacements. Ensuring all major water consuming buildings are monitored on our M&T platform.	Monitoring and targeting software in m³ including addition of new water sub meters	6	E&F	2021–22
	Review WC flush volume and water wastage. Carry out initial example project and monitor reductions.	Monitoring and targeting software in m³ and report on list of WCs to be actioned	6, 12	E&F	2021–22
	Conduct a review on flow restrictors and carry out an initial example project to be monitored for reductions.	Monitoring and targeting software in m³ and report on flow restrictors to be actioned	6, 12	E&F	2021
	Review urinal replacement or installation of bacterial odour control system to be installed and monitored for reductions.	Monitoring and targeting software in coordination with facilities team to discuss cleaning implication (m³)	6, 12	E&F	Ongoing
	Business case to follow successful studies into taps, flow restrictors, WCs and urinals for wider implementation across campus.	Monitoring and targeting software in m³	6, 12	E&F	Ongoing
	Watering of landscape – water butts	Reduction in water usage associated with landscaping in m³	6, 12	E&F	2021-22
	Mandate increase in rain water harvesting for new buildings and major refurbishments	Increase in grey water usage in m³	12	E&F	Ongoing
	Low water use plant and equipment to be specified in all capital and major refurbishment projects	Reduction in water usage associated with essential plant in m³	6, 12	E&F	Ongoing

Increase proportion of onsite renewables as well as committing to renewable tariff by 2025	Installation of existing solar PV projects	Increase onsite electricity generation in kwh	7, 11, 13	E&F	Ongoing
	Investigation for additional solar PV and solar thermal projects on remaining roof tops.	Increase onsite electricity generation in kwh	7, 11, 13	E&F	202– 23
	Installation of PV for Cornwall innovation centres	Increase onsite electricity generation in kwh	7, 11, 13	Cornwall Council	2022
	Investigation for additional EV charging. For fleet and staff vehicles.	Number of fleet chargers for fleet vehicles.	7, 11,	E&F	2023
	Change to REGO tariff for 100% of University electricity and gas	Energy procurement certificates	11, 13	E&F	2025
	Review current solar thermal capacity and investigate demand for future heating sources.	Creation of review report	11, 13	E&F	2021
	Review into Power Purchase Agreements Offsite renewable generation	Energy procurement certificates	11, 17	E&F	2025
	Feasibility study into battery storage to be completed, looking at individual buildings and PV generation.	If appropriate battery to be installed with solar PV and reducing grid reliance – Reduction seen in monitoring and targeting software	11, 13	E&F	2022– 23

Raise awareness and build a community of engaged staff and students to improve behavioural change impacts on energy and water consumption across the University	Employment of sustainability officer to initiate behavioural change across the University	Engagement events with staff	8, 17	E&F	2021
	Create network of energy and water champions and encourage behavioural change initiatives	Meeting minutes	8	E&F	2021– 22
	Implementation of A-world App	Communication through weekly bulletin	4, 12, 13, 17	E&F	2022
	Student engagement through the SU remaining in contact to ensure the plans meet student expectations	Listed actions and outcomes with SU	16, 17	E&F, SAG, SU	Ongoing
	Annual blackout events to be investigated	Reduction seen in monitoring and targeting software	12, 13	E&F	Annual

	Implement staff training resources and support for carbon management for both professional services and academic staff	Number of app downloads, attendance to meetings	4, 16, 17	E&F, HR, PIoE	Ongoing
	Continue to raise sustainability and carbon awareness across our curriculum, including outside of traditional environmental courses	Engagement events with students following academic involvements	4, 17	PIoE	Annual
	Continue to co-develop curriculum and engagement activities with students and the Students' Union to ensure training is provided and students are able to input into the energy and water reduction projects	Engagement events with students following academic involvements	4, 17	PIoE, UPSU	Ongoing
	Participate in national promotional and campaign weeks on promoting carbon management and sustainability, such as Global Goals Teach In and Green Week	Attendance to events and campaigns.	4, 16, 17	PIoE, UPSU	Ongoing

Future Projects

The University has used both internal sources of funding as well as Salix funding to implement previous projects. However additional funding is required in order to achieve these ambitious targets. We have estimated that approximately £2.7 million is required to achieve the electricity and gas reductions. Further funding will be required to meet the water reduction target; however the amount is currently unknown.

Funding

The University has used both internal sources of funding as well as Salix funding to implement previous projects. However additional funding is required in order to achieve these ambitious targets. We have estimated that approximately £2.7 million is required to achieve the electricity and gas reductions. Further funding will be required to meet the water reduction target; however the amount is currently unknown. All projects are subject to business case approval on an individual basis and will comply with the university procurement guidelines. Alternative funding opportunities will also be explored wherever appropriate.

Energy and water projections

Gas

Mains gas is a significant cause of carbon dioxide and other harmful greenhouse gases. Unlike mains electricity the carbon intensity of mains gas is more difficult to improve, and national infrastructure for green gas is limited. It is therefore of significant importance to migrate away from gas use and look to install other sources of heating and hot water, such as heat pumps and utilising heat recovery, as well as improving thermal efficiency such as the building fabric.

The gas reduction target is forecast to be met after an initial increase over the next few years, although this will only be delivered through significant onsite engineering projects to convert buildings away from the existing gas fed district heat network. Because of this is it expected the gas reduction target of 25% can be met, with significant investment in projects and major infrastructure.

Electricity

Global demand for electricity is increasing, whilst UK electricity market reform is causing increases in non-commodity costs, making electricity use important to manage. The University is expecting an increase in electricity consumption, as a result of migrating away from natural gas used for heating. Therefore, it's important to reduce existing electricity consumption where possible. Looking at figure 7 it is forecasted that the University will experience an initial decline in electricity consumption due to increasing onsite generation through the CHP and expanding photovoltaics and projects to reduce electricity use such as conversion to LED lighting. However, from 2022–23 we are anticipating an increase in electricity consumption as buildings begin to transition from gas led to electrically led heating. Further electricity reduction projects are needed to be identified going forward.

Current reduction identified for electricity is estimated at 19%, meaning further significant projects are needed to be identified over the coming years. This is mainly due to the increasing demand for electricity as buildings are migrated away from gas heating. This also considers limited information available

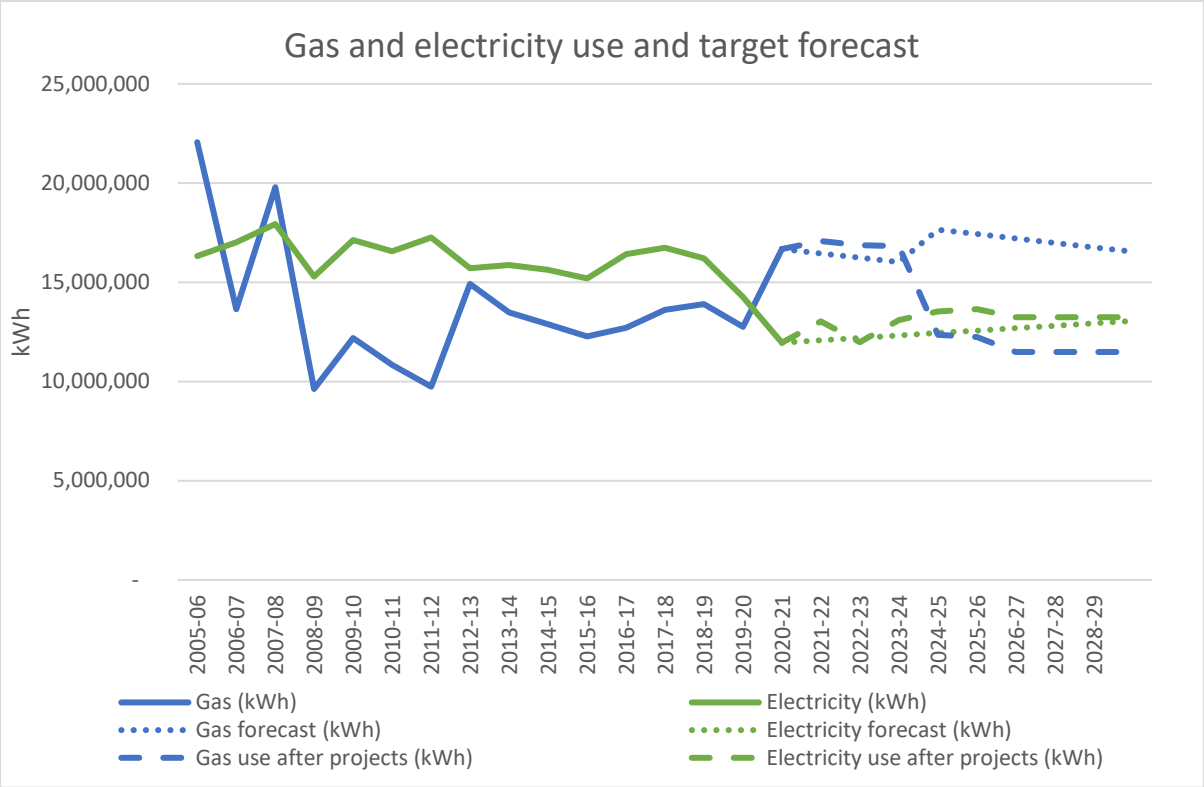


*Figure 7: **Electricity and Gas use and forecast including potential projects and energy infrastructure project.***

Water

Water reduction measures are part of our new construction and building refurbishment projects, ensuring that demand for water can be reduced as our estate develops. The University currently has a number of water saving initiatives including rainwater harvesting technology installed in Roland

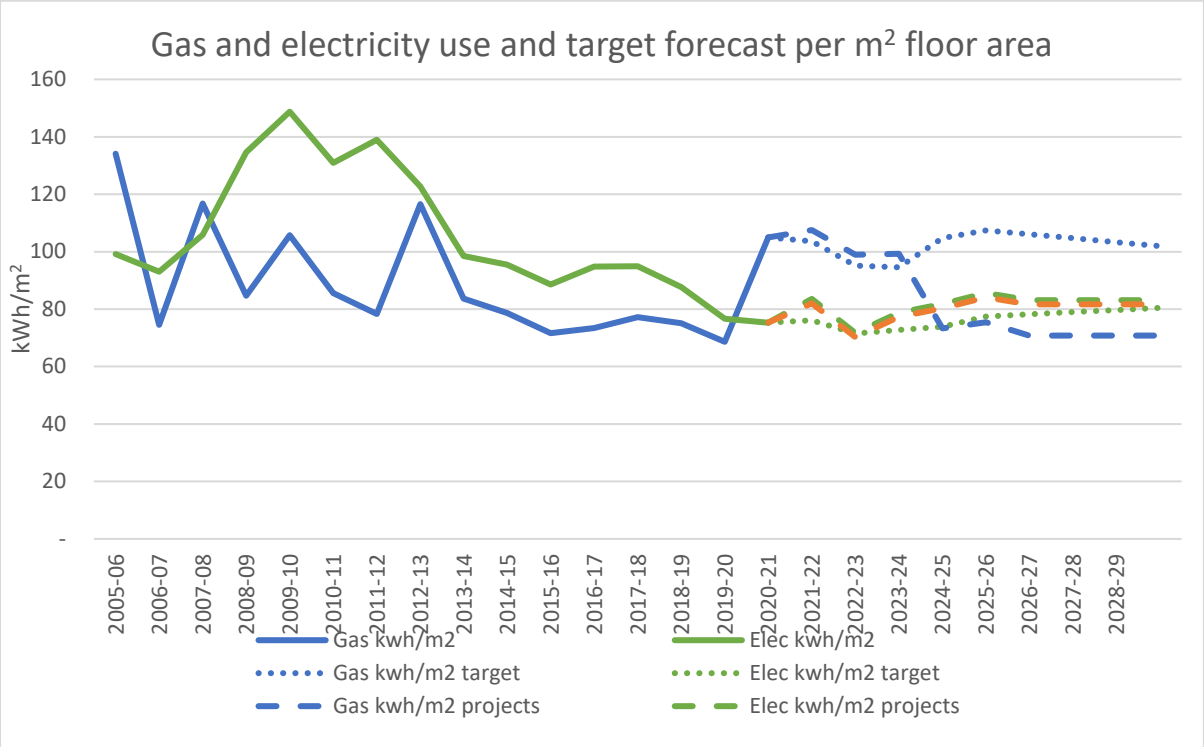
Levinsky Building, Nancy Astor and The House. In addition to this, we have half-hourly water meters throughout campus enabling monitoring and targeting as well as leak detection. We also have water butts to maintain Skardon Gardens, our greenhouse research facility. Going forward further investigation for increased provision of rainwater harvesting and grey water systems is needed.

Based on projected changes in water use, a 53% decrease from 2007–08 levels is identified, which based on current student number expectations would deliver a water use of 3.26m^3/student for 2030. This is inline with our newly identified target of achieving 3m^3 per student inline with scope 3 emissions.

Future impact of building portfolio

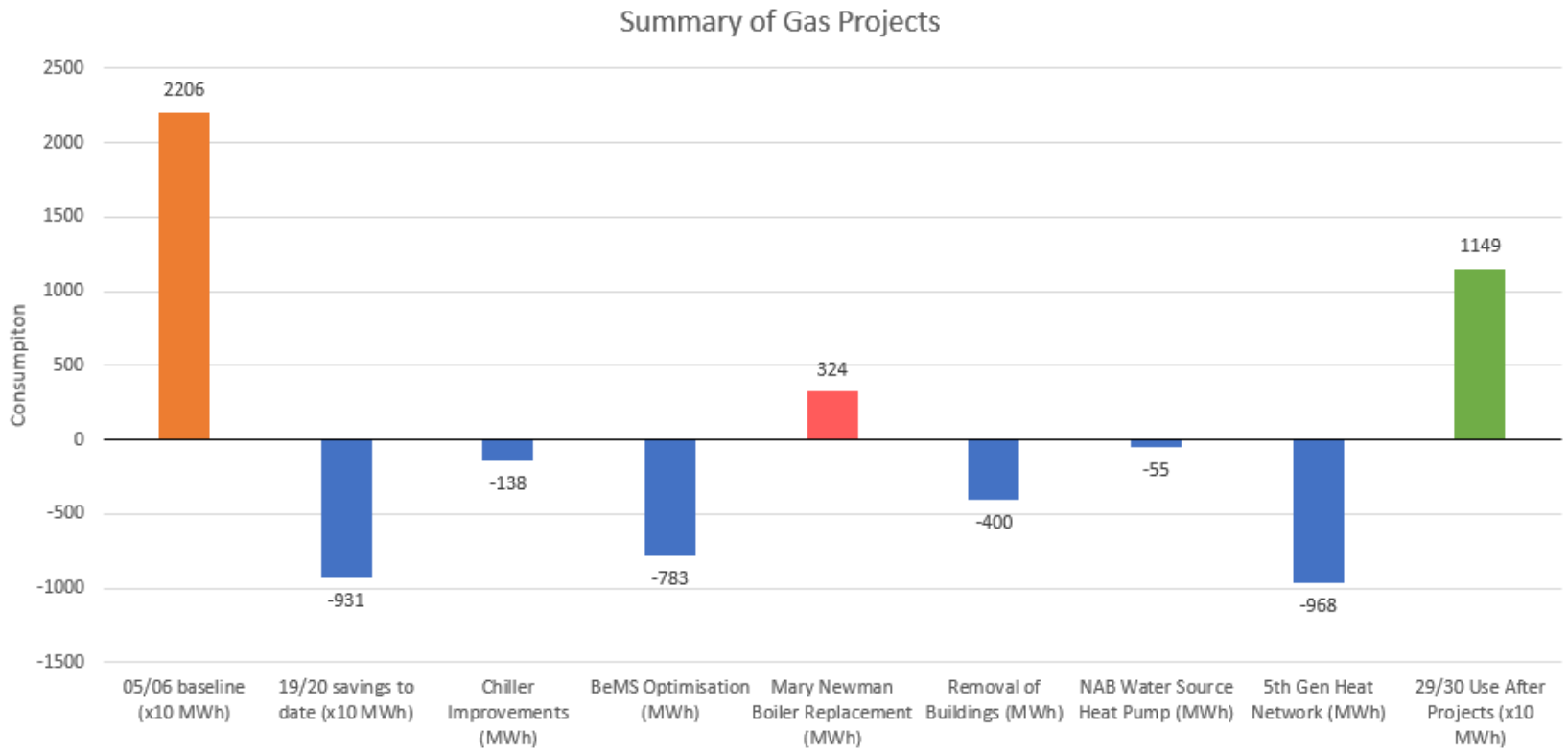
The University's building portfolio is expected to change in size in the future, comprising of new sites including NEDF and Intercity Place, as well as disposing of other buildings for example New Cooperage which is rented and the demolition of Brunel.

The graph below shows historic and future consumption per m^2 of floor area to illustrate the impact of property rationalisation. The graph also includes onsite electricity generation. It is worth noting that water is not included in the below as this is monitored through m3 per student numbers.



Summary of Gas Projects

	2005-06 (baseline)	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Linear forecast based on targeted reduction (MWh)	22,057	16,455	16,235	16,014	17,646	17,425	17,205	16,984	16,763	16,543
Projected annual consumption after projects (MWh)		17,076	16,869	16,818	12,350	12,240	11,486	11,486	11,486	11,486 48% reduction
Total Saving expected from projects (MWh)		- 3,571	- 3,364	- 3,312	1,155	1,266	2,019	2,019	2,019	2,019
Difference between target and projected (MWh)		621	635	804	- 5,295	- 5,185	- 5,718	- 5,498	- 5,277	- 5,057



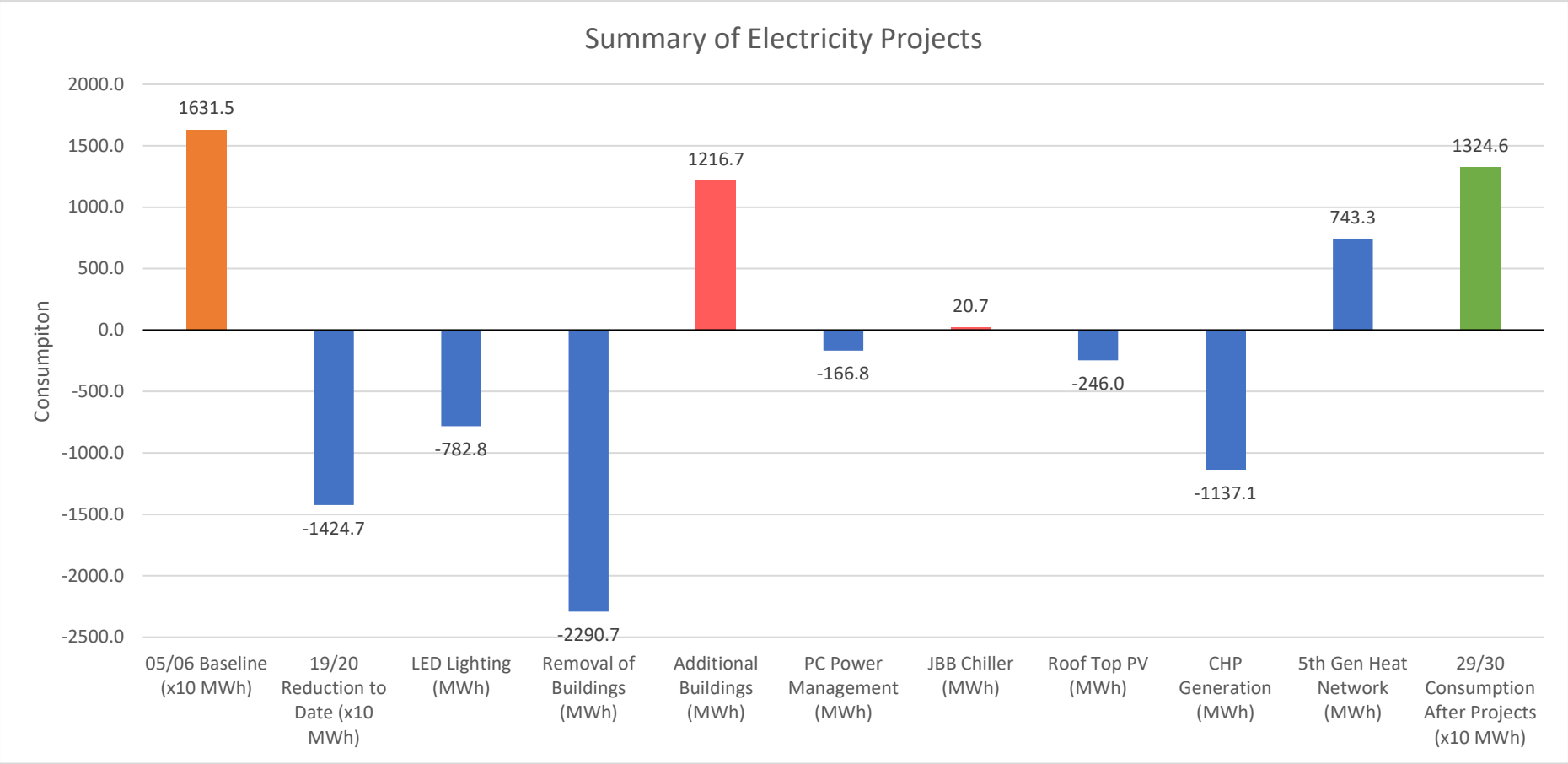
Initial consumption
Saving in use due to a project (project description on x-axis)
Increase in use due to a project (project description on x-axis)
Consumption Targets

Appendix 2

Summary of Electricity Projects

	2005-06 (baseline)	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Linear forecast based on targeted reduction (MWh)	16,315	12,075	12,198	12,320	12,442	12,564	12,686	12,808	12,930	13,052
Projected annual consumption after projects (MWh)		13,029	11,983	13,094	13,535	13,645	13,246	13,246	13,246	13,246 18% reduction
Total Saving expected from projects (MWh)		1,219	2,265	1,154	714	604	1,002	1,002	1,002	1,002
Difference between target and projected (MWh)		954	- 214	775	1,093	1,081	561	439	317	195

Graph of electricity projects forecasted

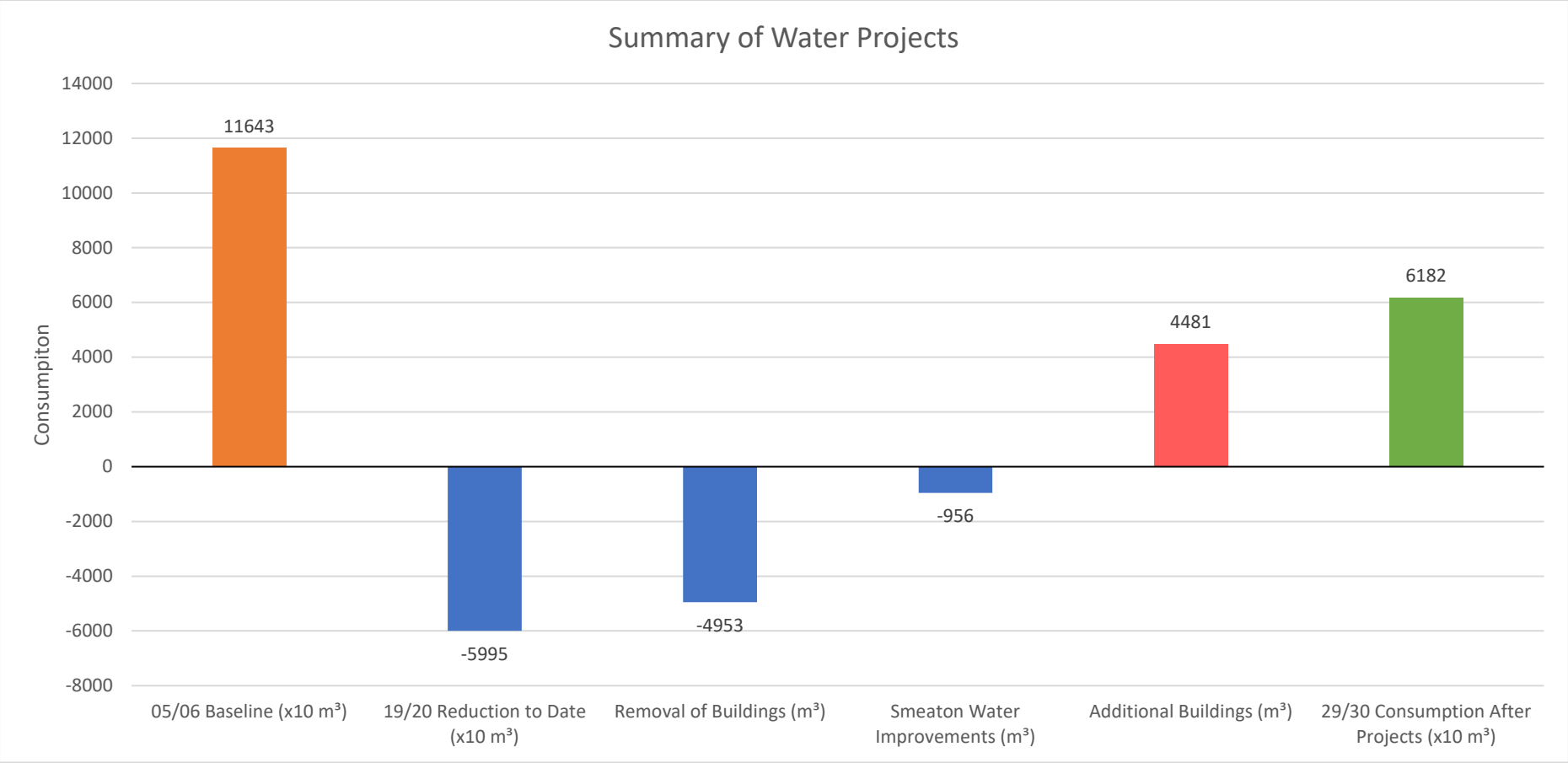


Initial consumption
Saving in use due to a project (project description on x-axis)
Increase in use due to a project (project description on x-axis)
Consumption Targets

Summary of Water Projects

	2005-06 (baseline)	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Linear forecast based on targeted reduction (m^3)	116,433	64,028	62,230	60,433	58,635	56,837	55,039	53,242	51,444	49,646
Projected annual consumption after projects (m^3)		60,583	63,087	63,087	63,325	63,325	61,825	61,825	61,825	61,825 47% reduction
Total Saving expected from projects (m^3)		2,670	166	166	- 72	- 72	1,428	1,428	1,428	1,428
Difference between target and projected (m^3)		- 3,446	856	2,654	4,690	6,487	6,785	8,583	10,381	12,179

Graph of water projects forecasted



Initial consumption
Saving in use due to a project (project description on x-axis)
Increase in use due to a project (project description on x-axis)
Consumption Targets

UNIVERSITY OF PLYMOUTH

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