University of Reading
Net Zero Carbon Plan
2021 - 2030

Author: Dan Fernbank, Energy & Sustainability Director

Date: 16 June 2021 *(updated 27 June 2022, 25 June 2024)*

Contents

1 Executive Summary ... 3
2 Introduction ... 4
3 Defining Net Zero ... 5
4 Zero Carbon Pathway ... 8
5 Heat ... 9
6 Electricity ... 10
7 Travel ... 13
8 Water ... 14
9 Waste ... 14
10 Behaviour Change ... 14
11 Additional scope 3 emissions ... 16
12 Funding and resource ... 16
13 Business Case ... 16
14 Interfaces ... 17
15 Governance ... 18
16 Appendices ... 19

1 Executive Summary

University of Reading has committed to becoming Net Zero Carbon by 2030, demonstrating continued leadership in reducing its environmental impacts. Achieving this goal can set the University apart as one of the leading institutions globally in delivering on climate change mitigation.

The University already has a good track record, having cut its emissions by 44% since 2009. Reaching Net Zero over the next decade will require a whole new level of effort, planning and investment, none of which should be underestimated. Building on its solid energy management foundations will therefore be crucial.

Investment in the region of **£40 million - £50 million** is anticipated to be required. This will involve disruptive work; including replacing almost every heating system in its estate. While some internal funding is expected to be available, a significant amount of this funding will need to be external. This may include grant funding, such as the £3.3 million recently secured grant from Salix Finance's Public Sector Decarbonisation Fund. It may also involve more innovative contractual arrangements, such as energy performance contracting, working in partnership with technology providers to deliver the scale of change required.

Successful delivery will not be easy, but at a high level, the way forward is clear:

A. **All heating systems to be replaced**

B. **Better electrical energy** - reducing waste, improving efficiency, ensuring low carbon supplies

C. **Capping and capturing business travel emissions**, including carbon insetting/offsetting.

Interim 3 year targets will be set and monitored, to ensure the programme remains on track, and to enable early intervention if it is not. The Plan aims to be both ambitious and authentic; including a wide range of emission sources, and committing to investigate more. It strives to meet the principles of science-based target setting, and will form a key part of a package of wider sustainability initiatives being rolled across the University's operations.

The reduction of carbon emissions will consistently be prioritised, with evolving work to also establish a robust carbon insetting and/or offsetting programme, with an offsetting programme potentially presenting some innovative research opportunities for the University.

The ambition and high level pathways are clear. There will be successes, learnings, and no doubt some hurdles and issues along the way, but the sooner we start, the greater the positive impact can be, and the greater the chances of delivering a Net Zero Carbon University. The work starts here.

2 Introduction

Environmental sustainability is at the heart of University of Reading's organisational identity; positioning it as one of its 4 key principles in its latest Strategic Plan, with a commitment to:

> *"…play our part in tackling climate change and are recognised as a University that leads on global environmental sustainability."*
>
> 2020-2026 Strategic Plan

The University is a **recognised leader in reducing its operational carbon emissions**[1]. In 2016, the University met its 35% carbon emissions reduction target (compared to its 2008/09 baseline), winning the EAUC Green Gown Award for Carbon Reduction in the process. By January 2020[2], the University's emissions stood at **44.1% below baseline** (see Section 16.1 for a full breakdown), close to reaching its next target of a 45% reduction by July 2021.

This places the University in the **top 5 higher education institutions** in the country, including the best research-intensive University, for carbon emissions reductions[3]. The resultant **cumulative reductions of 133,517 tCO_2e** are equivalent to taking all of the road traffic off the Borough of Reading for a whole year[4]. In financial terms, cumulative direct savings for the University also amount to **£34 million**.

The **University's climate change research is world-leading**, with the University having the most lead authors in Working Group I for the 6th Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC)[5]. It has therefore long understood the urgent need for sustained and substantial action to mitigate the causes, as well as adapt to the consequences of global climate change. This urgency is now well-understood on a national and international level too and is leading to a heightened profile for the need and urgency for radical action. In May 2019, the Committee on Climate Change advised the UK government to set a net zero carbon emissions target for 2050. On 12 June 2019, a legally binding target for the UK to cut GHG emissions to net zero by 2050 was announced.

The need for robust and ambitious carbon reductions has never been greater. Public and policy pressure are creating new expectations and opportunities for the next decade. The University's track record means it is **strongly placed to lead in the delivery of ambitious carbon reductions**. This Plan sets out the University's proposals and high-level **pathway to achieving net zero carbon emissions**, including how to ensure the proposed approach is authentic. It sets out the scope and timescales for delivering net zero carbon ambitions, and the potential costs and benefits involved.

The understanding and approaches to delivering net zero emissions are evolving quickly, and it may be expected that some potential solutions will materialise in the coming years which have not currently been anticipated. Developing a flexible approach to an evolving programme of work is therefore essential, with regular checkpoints to ensure the programme remains relevant and on track to deliver ambitious carbon emission reductions.

---

[1] *'Carbon emissions' and CO_2 are commonly used to mean 'carbon dioxide equivalent', encapsulating all greenhouse gases, and are used throughout this paper in this context*

[2] *i.e. prior to the COVID-19 pandemic shutdowns causing a large additional, temporary drop in emissions*

[3] *Analysis of 2017/18 HESA EMR data, available at https://www.hesa.ac.uk/data-and-analysis/estates, using AUDE institution classifications*

[4] *To July 2020. Analysis of UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018*

[5] https://www.reading.ac.uk/news-and-events/releases/PR762869.aspx

3 Defining Net Zero

The term 'net zero carbon' can be defined as '*cutting greenhouse gas emissions to as little as possible and then balancing the remainder by enhancing carbon sinks which remove carbon dioxide from the atmosphere'.*

In summer 2019, a zero carbon workshop was held with representatives from the University Executive Board, which highlighted that any emissions reduction target should be:

- authentic in their ambition; going beyond simply 'scope 1 and 2' emissions (see 'Scope' below) to align with the latest thinking on setting legitimate zero carbon, science-based targets;
- sector-leading in both the level, and the scope of its ambition;
- aligned with wider sustainability leadership across the University's operations, to ensure that this is seen as part of a package of strong environmental stewardship.

Many organisations, when setting out net zero carbon plans, are only focussing on these scope 1 and 2 emissions; direct emissions from the fuels they use and the electricity which they consume. The University will also seek to further understand and reduce its scope 3 'indirect' emissions in line with best practice thinking.

3.1 Headline Target

The following target has been agreed for the University:

"Reduce its carbon emissions to net zero by 2030"

"To fulfil our long-term ambition to be the greenest university in the UK, we will lead by example and commit to genuine carbon neutrality by 2030. We will not make that goal easier but less meaningful by excluding critical but challenging components such as travel or accommodation in order to achieve it more quickly. In doing so, we understand the full cost and implications of our target."

2020-2026 Strategic Plan

In this context, 2030 is taken to mean the end of the 2029/30 academic year; i.e. 31 July 2030.

3.2 Milestone Targets

In order to maintain a sense of momentum and ensure progress towards its ultimate goal, 3-year milestone targets are proposed as follows against the University's 2008/09 baseline:

- July 2021 – existing 45% carbon reduction target
- July 2024 – 57.5% carbon reduction target
- July 2027 – 70% carbon reduction target
- July 2030 – 100% carbon reduction target

The reduction of carbon emissions will be prioritised, with evolving work to also establish a robust carbon insetting and/or offsetting programme in relation to the University's business travel. This will aim to ensure that local, national and/or international carbon sinks are enhanced to remove the equivalent carbon dioxide emissions from the atmosphere.

These interim targets will be reviewed regularly and in particular, once the long-term implications of the COVID-19 pandemic on the University's future operations outbreak are fully understood.

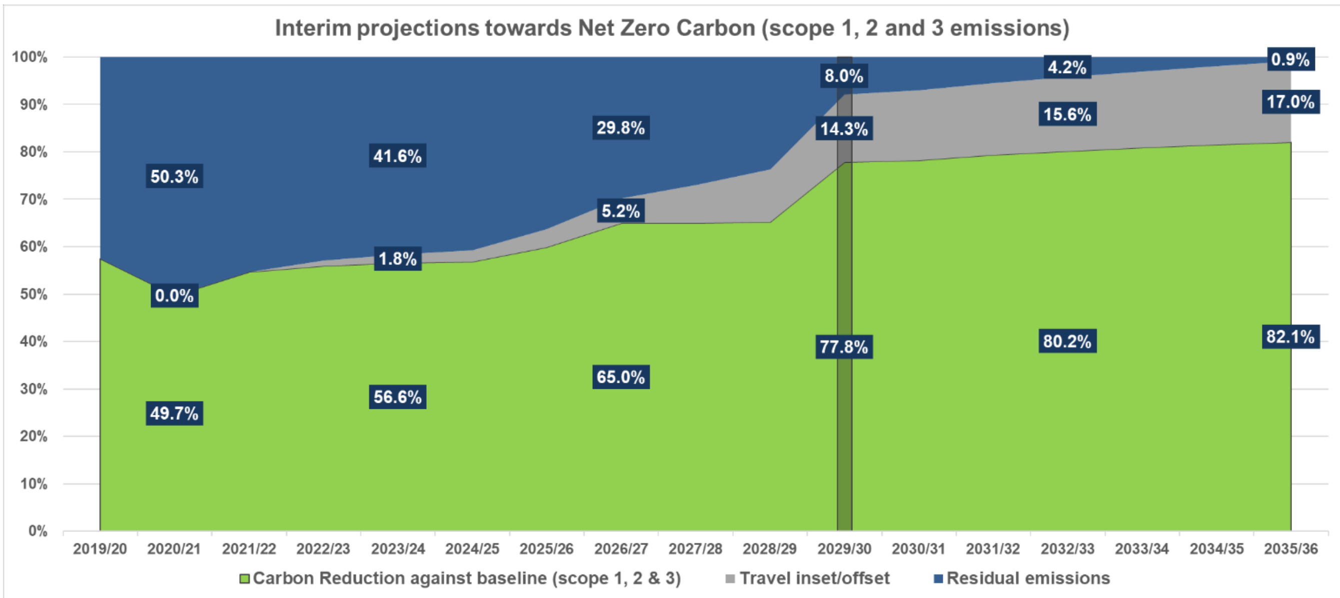

Figure 1 - projected year-on-year scope 1, 2 & 3 carbon emissions 2020 - 2036

Figure 1 shows the projected annual carbon reduction percentages, a developing contribution for carbon insetting/offsetting and the residual emissions for each 3 year period up to 2036. Any residual emissions by 2030, due to some fossil fuels remaining in grid electricity generation, will also require insetting/offsetting to achieve net zero carbon.

It should be noted that 2020/21's emissions are projected on a 'business as usual' scenario, to exclude the temporary additional emission drop that is being experienced due to the ongoing COVID-19 pandemic and associated travel and operational restrictions.

3.3 Scope

The University's current scope for carbon emissions reporting was considered to be reasonably comprehensive in comparison to its peers when it was set in 2011. However, showing continued leadership in carbon reduction requires a review of this scope. Figure 2 therefore sets out the current scope of the emissions reduction target, together with areas for further investigation and potential future action.

For consistency of reporting, it is proposed to continue to report progress against the existing baseline year and headline scope, but increasingly also report progress, both on the narrower scope 1 and 2 emissions, over which the University has the greatest control, and increasingly on a wider emissions scope too.

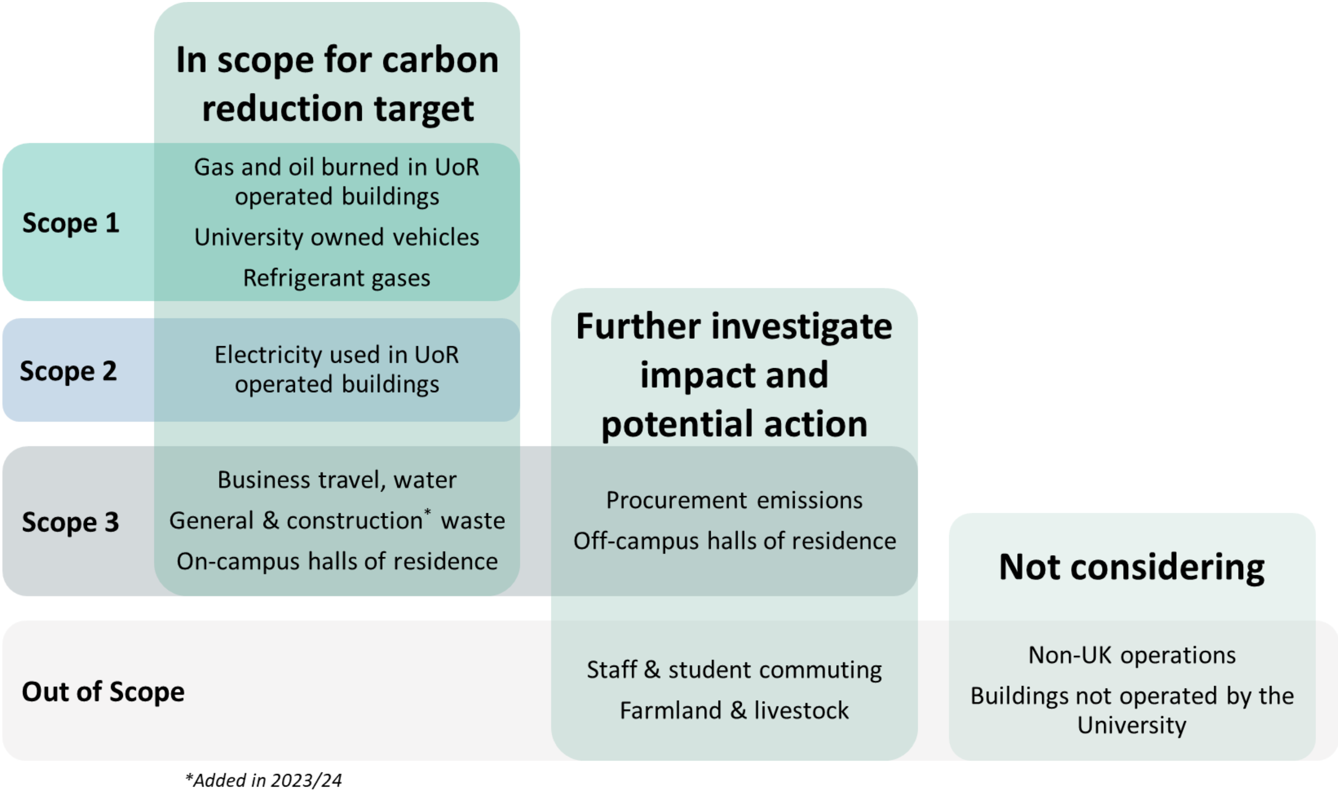

Figure 2 - current and future emissions scopes

A detailed action plan will be developed to improve our understanding and approach to tackling emissions under the 'further investigate' heading. See Section 11 for some initial proposed actions.

Figure 3 below shows the projected carbon reductions against baseline for scope 1 and 2 emissions only, for comparison with Figure 1**.**

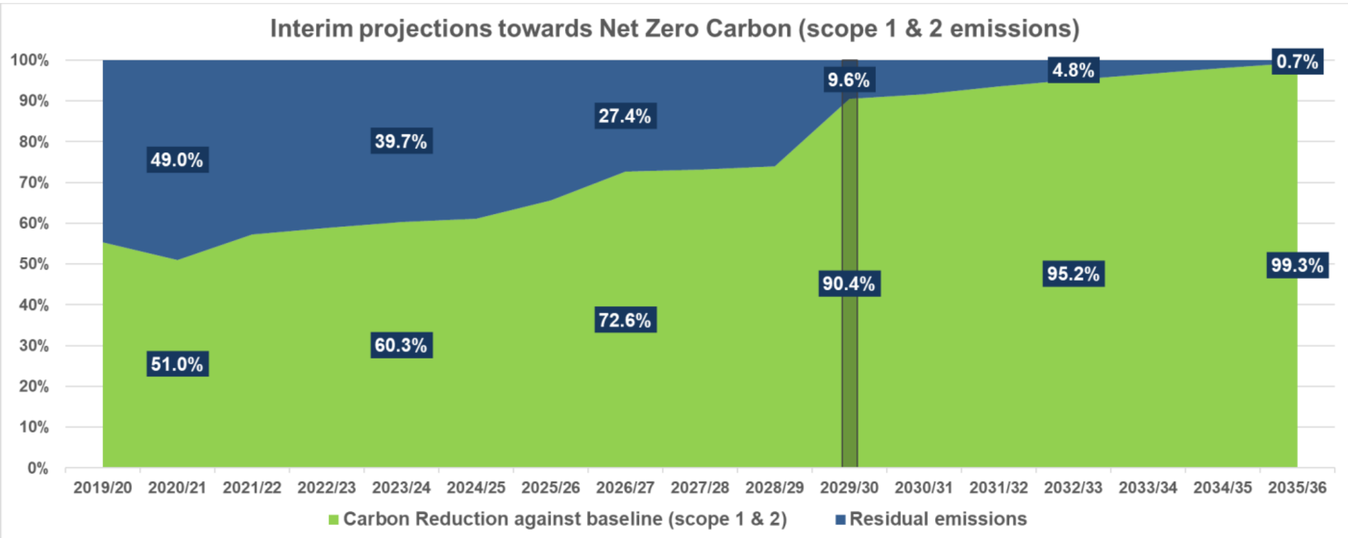

Figure 3 - projected year-on-year scope 1 & 2 carbon emissions 2020 - 2036

4 Zero Carbon Pathway

An A, B, C approach is proposed to deliver the University's net zero carbon ambitions:

A. **All heating systems to be replaced** with low/zero carbon alternatives;

B. **Better electrical energy** - reducing waste, improving efficiency and ensuring electrical supplies are as low carbon as possible, and;

C. **Capping and capturing business travel emissions**, including through policy and technology alternatives and carbon insetting/offsetting.

The University has always advocated an 'efficiency-first' approach to carbon reduction, aiming to reduce wasted/lost energy before considering lower carbon energy supply alternatives. In the condensed time available to deliver ambitious carbon reductions, this is no longer felt to be appropriate, and **the primary focus will need to switch to decarbonising energy supplies**. Where at all possible, energy efficiency opportunities should continue to be considered at the same time, not least because they are most likely to save money; helping to support wider carbon reduction initiatives.

Each of these high-level areas are considered in more detail in sections 5, 6 and 7.

4.1 Business as usual

The impacts of the COVID-19 pandemic have been anything but 'business as usual', with year-end emissions for 2019/20 temporarily dropping to 57% below baseline. The analysis in this Plan assumes that emissions largely rebound once normality returns, with the exception that travel emissions are anticipated to be at least 30% below usual levels for at least the next 3 years, in light of recently introduced internal policies.

Business as usual emissions are assumed to grow at 1% per annum from 2021/22, with travel emissions growing at 4% per annum from 2023/24 without further intervention.

4.2 Reduced Emissions Scenario

Figure 4 illustrates the potential high-level pathway to net zero carbon for 2030.

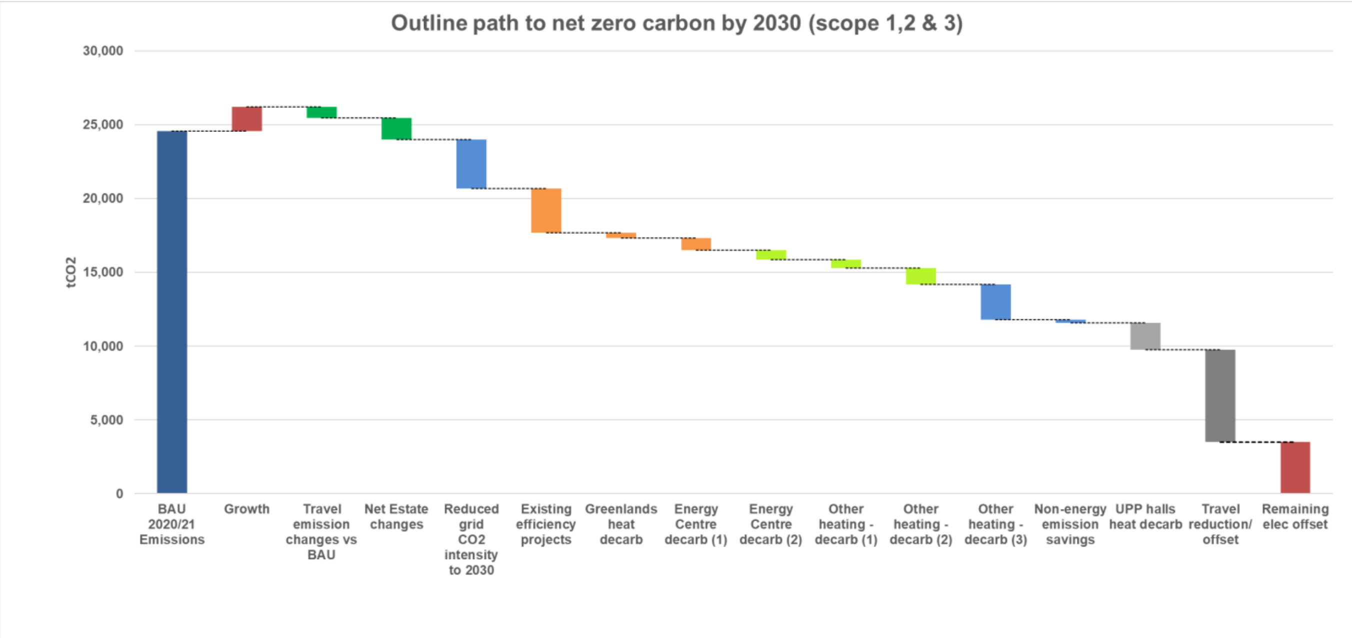

Figure 4 - steps to achieving net zero carbon by 2030

4.3 Legitimacy and strength of ambition

In summer 2019, the University engaged the services of Carbon Credentials to help develop its thinking on delivering a Net Zero Carbon target. Carbon Credentials set out the following tests to ensure the University's plans are rigorous and legitimate:

- **Emissions boundary**: as a minimum, 100% of scope 1 and 2 emissions should be covered by the target. Best practice is to also include at least 66% of scope 3 emissions, and leaders will include 100% of scope 3 emissions. A commitment to further investigate the additional scope 3 emissions sources should be included.

- **Ambition and timescales:** as a minimum, scope 1 and 2 reduction targets should be in line with a science-based trajectory. This means the University's milestone and final targets should be consistent with using a well-below 2°C global warming scenario. Inclusion of scope 3 emissions will show leadership in the sector.

- **Reduction strategy**: The assumptions and calculations used in the net zero pathway and the associated projected annual reductions should be robust and realistic, assuming that sufficient funding is made available.

- **Removals strategy**: To achieve a net zero position by 2030, emissions removals (offsets or insets) will be required. It is best practice to take the time to develop a detailed removals strategy so that the selected projects align with the values of the University and maximise overall impact to society and the environment. The approach, quality and cost of removals will therefore be key factors in the University's removals strategy. The University should prioritise the reduction of emissions on an absolute basis and slowly build up a portfolio of high-quality removals projects.

The proposed scope and targets for the University aim to satisfy each of these tests, including through striving to meet the principles of science-based target setting[6].

The University may wish to consider employing a third party to verify the strength of their ambitions, and the validity of subsequently reported progress.

5 Heat

5.1 Low carbon heating

Almost all of the University's buildings are currently heated through the combustion of fossil fuels. Electrically-powered heat pumps are currently the most developed alternative heating solution available, and the University already has 5 buildings heated by heat pumps; 1 with a ground source heat pump and 4 with air source heat pumps.

The only other established low carbon heating alternatives are biomass or direct electric heating. The University have long been opposed to considering biomass from a maintenance and operational perspective, and the environmental credentials of such schemes can be questionable. Direct electric heating may be relevant in some specific circumstances, however such systems are costly to run and will not be a main focus.

Whilst there is some talk of a future hydrogen network being developed nationally, there are no clear plans or timescales for this and this is likely to come far too late for a 2030 delivery target. Trials to inject up to 20% hydrogen into the existing gas network are underway, but this is still likely to be significantly more carbon intensive than using increasingly low carbon grid electricity to power heat pumps.

---

[6] *The Science Based Target initiative (SBTi) does not currently produce higher education sector-specific emissions. However, the University is part of an EAUC Task and Finish Group to establish such principles.*

A mass rollout and retrofit of heat pumps is therefore required. This may include ground source, water source and air source heat pumps, with the right technologies needing to be identified for each building or group of buildings. This has already been investigated in some detail for Greenlands Henley Business School, which will provide useful learning as this moves forward.

Traditionally, heat pumps have only been able to deliver heating flow temperatures of up to 50˚C; too low for most of the University's buildings without undertaking deep retrofits, which are likely to be cost-prohibitive. Increasingly, heat pumps are becoming available that can deliver much higher flow temperatures of 70˚C - 80˚C. However, the technical complexity, relative immaturity and high capital (and potentially maintenance) costs of retrofitting such systems should not be underestimated. Multi-million-pound investment will be required to deliver an estate-wide heating retrofit programme – likely to be in excess of £30 million. Undertaking such a large programme of replacements over 10 years will inevitably also be disruptive and will require careful planning.

Consideration also needs to be given to how to provide process steam in science buildings, which will most likely need to be electrified (perhaps pre-heated by heat pumps).

Further work will be required to understand whether suitable technologies exist in all instances; a picture which will no doubt evolve over the coming decade. If suitable technology alternatives cannot be identified, heating emissions in the affected buildings will need to be inset/offset until such time as they do.

Figure 4 breaks down the carbon reductions from heating into a number of headline groupings:

- Greenlands heat decarbonisation
- Whiteknights Energy Centre decarbonisation (2 phases)
- All 'Other' heating (3 phases)

A more detailed heat decarbonisation plan will be developed in the coming months, alongside some studies and pilot schemes already in discussion.

5.2 Energy efficiency

Energy efficiency opportunities continue to be widespread, particularly around the control of heating systems. Where time and funds allow, the opportunity to incorporate improved zoning, controls and monitoring of heating systems should be incorporated into any projects to retrofit heat pumps, which can reduce the heat pumps' size and therefore capital costs, as well as reducing ongoing energy costs.

6 Electricity

6.1 Electricity Supplies

The University has purchased electricity which is Renewable Energy Guarantee of Origin (REGO) certified for its entire estate for many years and will continue to do so. Arguably, this has not really driven change in the electricity market however, as suppliers often 'package up' their mandatory renewable supply obligations to sell to willing customers.

It is proposed that the University will investigate the potential for Power Purchase Agreements (PPA), which could see the University committing to buy electricity directly from a renewable energy generator. Such an arrangement is much more likely to deliver real change than green tariff electricity alone, by funding additional renewable generation capacity. This would not replace existing supply arrangements, but would complement them. If one or more local renewable energy source can be identified (e.g. a solar farm/wind turbine), it would be possible for the University to commit to buy all of this electricity and make a significant positive impact on the generation of renewable energy locally. The University could even consider developing such facilities on its own land, which could deliver significant financial benefits too, though this would undoubtedly come at significant financial cost.

6.2 Onsite Generation and Storage

6.2.1 Renewables

In 2020, the University generated approximately 1.5% of its estate's total annual electricity demand from 425 kWp solar panels on its own buildings. Expanding this significantly across Whiteknights could see 6% - 8% of the University's electricity delivered directly from solar panels (see Figure 6), and installations have accelerated significantly in recent years. Expansion beyond these levels will require a significant amount of energy storage to be available. Battery storage continues to be expensive, though costs have fallen significantly in recent years. Thermal storage is a more cost-effective energy storage option and could complement the move to low carbon heating solutions. Storage technologies should therefore be given further consideration.

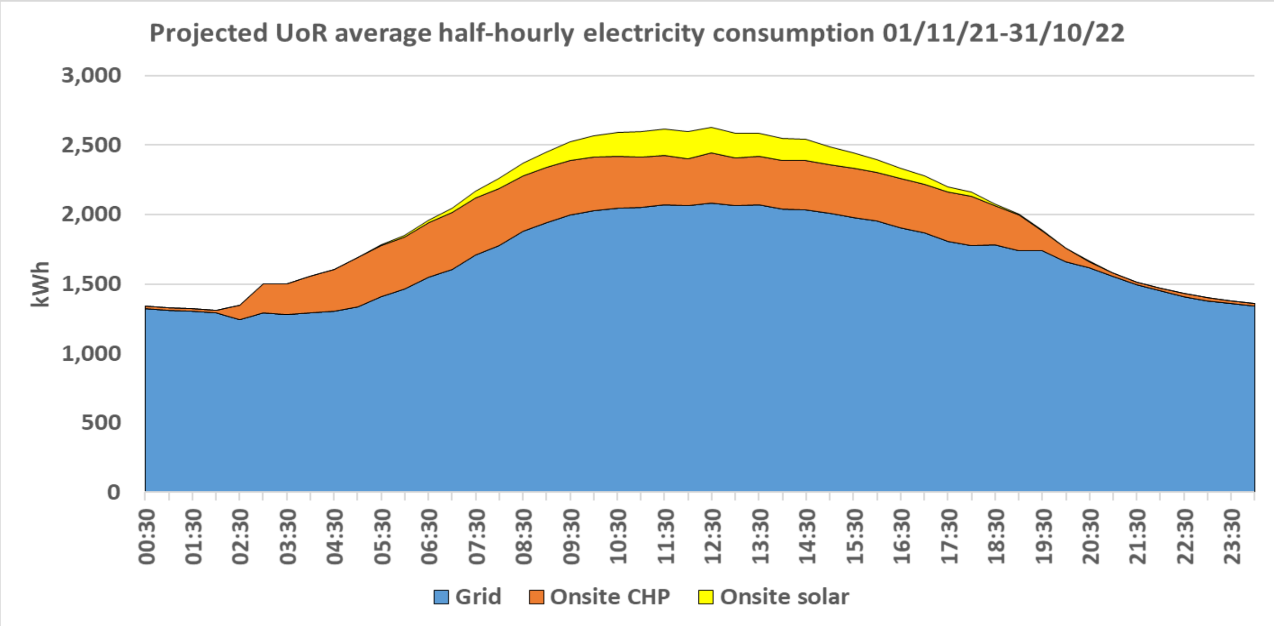

Figure 5 - Current split of electricity supply sources (under BAU conditions)

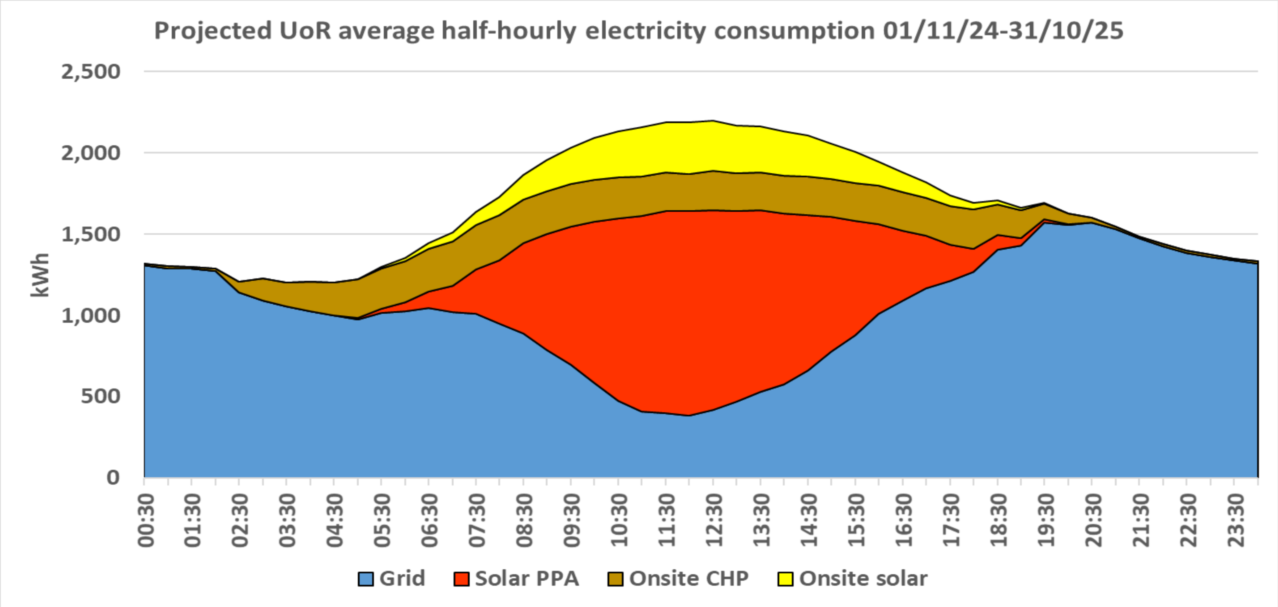

Figure 6 - Projected future split of electricity supply sources - inc solar PPA, 6% renewables and 33% reduction in CHP generation

6.2.2 Combined Heat and Power (CHP)

The University's Energy Centre has delivered significant value since it opened in 2015, feeding efficiently produced heat to a brand new, well-insulated 3.3 km district heating network, as well as generating a significant proportion of electricity for the Whiteknights campus.

When first installed, the CHP engine was viewed as a low carbon solution; combining onsite electricity generation with waste heat captured for use in the new district heating network. This has saved significant carbon emissions compared to the old, inefficient steam boilers and steam network. The national electricity grid has decarbonised significantly in recent years though, and at certain times of the year (particularly in summer), it is now less carbon intensive to be taking electricity directly from the grid than to be generating through the CHP.

In the future, CHP is expected to look increasingly unattractive from a carbon reduction perspective, and the University therefore needs to begin planning for a future beyond its CHP engine. This will inevitably come at a financial cost, as the engine generates 15% of Whiteknights' annual electricity demand. The University should also be careful to consider what would replace the CHP generation, as generating less electricity onsite will most likely mean additional gas being burned in a distant power station. However, by 2030, the University will need to have moved away from gas CHP.

The 2-phase approach to decarbonising heating from the Energy Centre mentioned in section 5.1 could feasibly see heat pump technology initially introduced to complement the CHP engine, and ultimately expanded to take over from it.

6.3 Energy Efficiency

Energy efficiency opportunities are again very widespread and should continue to be sought wherever possible. This can potentially help to mitigate some of the cost increases from running heat pumps and reducing the use of the onsite CHP engine. Headline areas for electrical efficiency improvements (and their associated controls) include:

- Lighting
- Ventilation
- Air Conditioning
- IT

6.4 Grid electricity

The UK electricity grid has decarbonised significantly in the last 10 years and is projected to continue to do so. Current projections are for electricity to be 127 $kgCO_2$/kWh by 2030 and 41 $kgCO_2$/kWh by 2036, compared to 269 currently[7]. Whilst these are significant drops, the 2030 figure in particular should be treated with caution, given the underlying assumptions about the timing of opening Hinkley Point C nuclear power station. Nuclear power stations are typically delivered years behind schedule, and there is therefore a risk that Hinkley Point C is not fully operational by 2030.

Notwithstanding Hinkley, there will inevitably be some relatively significant carbon emissions still associated with grid electricity by 2030. Opportunities for more localised low carbon supply solutions have already been discussed above. Whilst national renewable generation capacity continues to expand rapidly and energy storage is becoming more cost-effective, there is still likely to be some need to inset/offset remaining electricity-related emissions by 2030 to deliver on an authentic net zero carbon target. The need for offsetting these emissions should reduce further over time as grid decarbonisation continues.

7 Travel

7.1 Flights

The University's business travel emissions have grown significantly in recent years, accounting for 33% of its carbon footprint in 2018/19, compared with 20% in its baseline year. In 2018/19, 89% of this was from flying, and any initiatives to reduce business travel emissions therefore needs to focus on this area.

The University has a global reach, and some international travel is essential to be able to maintain this position. However, ensuring viable alternatives to travel are available, when practical, will be increasingly important. Developments in technologies for video, phone and conferencing can significantly facilitate alternatives to travel, and should be a key focus.

Considering viable lower carbon travel alternatives is also key where practical – such as train over plane travel, as well as travelling in lower classes of travel, which have less emissions associated with them.

The combination of COVID-19 travel restrictions, and an associated cap on business travel for the next 3 years, provide a good opportunity to fully explore alternative solutions, their practicalities and limitations.

One important point to recognise is that travel is often funded through an external research grant, and any approaches to reducing travel must therefore seek to work with our external funding partners.

Many universities have opted to exclude business travel from their net zero carbon plans. Including these emissions can therefore help show leadership and tackle the tricky question of what to do about these significant emissions. This is discussed further under offsetting and insetting below.

7.2 Fleet vehicles

Emissions from the University's fleet vehicles account for significantly less than 1% of its carbon footprint. Moving its fleet to electric vehicles can be a good visible statement of its sustainability intentions and is to be encouraged, however it should be recognised that the overall impact of this is small. Maintenance Services took delivery of their first fully electric vehicle in spring 2020.

---

[7] *University of Reading analysis of BEIS 2018 Updated Energy & Emissions Projections, as applied to BEIS published carbon conversion factors*

7.3 Offsetting and Insetting

For the University to reach net zero carbon by 2030, some level of carbon capture will be essential. This can be achieved through the use of offsetting (purchasing international carbon credits) or insetting (investment in emission reduction projects that are sited within the organisation's supply chain or sphere of influence and generate carbon credits). Projects that remove emissions should be credible, worthwhile and wherever possible relevant to the University.

7.3.1 Insetting

One reasonably new approach to the concept of carbon capture is the idea of carbon insetting; looking to improve land management practices, including but not limited to tree planting, within the University's own estate to capture significant levels of carbon emissions each year.

The carbon capture benefits of such an approach will require much further exploration, to understand the level of positive impact this can deliver, and ensure it is in line with best practice guidance. This may present innovative research opportunities for the University.

7.3.2 Offsetting

Once it is understood what level of impact an insetting programme can have on reducing flight-based emissions, it may be necessary to consider some wider offsetting too. Time should be spent to build a portfolio of credible projects that are linked to the University's research interests, are visible to stakeholders and maximise environmental and social impacts.

7.4 Commuter travel

Commuter travel is outside the boundaries of what are ordinarily considered scope 1 – 3 emissions categories, and they are not currently included in the University's reported carbon footprint. A Travel Plan will nevertheless be maintained to continue to promote the uptake of sustainable travel solutions, with appropriate targets being set. In the future, the University may want to consider specific carbon reductions targets in this area.

8 Water

The emissions associated with the supply and disposal of water account for approximately 1.5% of the University's 2018/19 emissions. Further water saving initiatives are therefore likely to only have a small impact on carbon emissions. Nevertheless, from an environmental impact perspective, reducing water usage remains a priority, and a water efficiency programme with appropriate SMART targets should therefore be maintained.

A precursor to this is seeking to improve the University's water metering, which currently limits its ability to accurately monitor consumption and target saving opportunities.

9 Waste

The emissions associated with waste and recycling only account for a fraction of a percent of the University's 2018/19 emissions. The carbon emissions benefit of further improvements in waste management are therefore likely to be very small. As with water though, from an environmental impact perspective, reducing waste and improving recycling remains a priority, and a new Waste & Resource Use Strategy with appropriate SMART targets has now been developed.

10 Behaviour Change

10.1 Schools/functions ownership

Schools, functions and individuals need to, and are increasingly keen to, take greater responsibility for their environmental footprints. In part, this is about being able to provide access to good quality data and resources to enable this to happen, and a priority needs to be to help facilitate this at a local level.

For the first time, each School and Function has been tasked with considering in their Five Year Plans what actions they can take locally to improve environmental sustainability. Some excellent initiatives are already emerging and it will be important to build on and support this, and ensure that best practice can be learned from and promoted more widely.

Work will be undertaken to develop environmental footprints for each School, Function and Department; enabling each area to understand their environmental impacts and embed action locally. This will form the basis of a new behaviour and communication strategy to be developed.

Whilst behaviour change can be very cost-effective, it is also important to recognise that it has its limitations; perhaps offering 5% - 10% savings in energy-related emissions at best.

11 Additional scope 3 emissions

Figure 2 identified a number of areas where the University should look to expand the scope of its carbon reduction targets in the future:

- Procurement – supply chain emissions (including the University's 'digital footprint')
- Off-campus halls of residence (see 'halls' above)

NB: In 2023/24, construction waste, originally identified as out of scope, was added to the carbon baseline and net zero target.

In addition, the following areas were identified for future consideration:

- Staff and student commuting
- Farmland and livestock

Exploratory work will be undertaken to understand the potential approaches to, and impacts of these different emission sources, with the subsequent consideration of appropriate SMART targets to limit their environmental impact.

12 Funding and resource

Previous high-level analysis carried out in summer 2019 considered a target of achieving a net zero carbon ambition by 2036. The University has now decided to pursue a more ambitious target of 2030 and recognises that one consequence of this is that the costs of delivery are likely to be higher. The University may be investing in more cutting-edge heating technologies which are not yet cost competitive with their fossil fuel alternatives, and **£40 million - £50 million should be considered a guide to the potential capital costs involved**. There are many unknowns with these costs currently, not least of which, what the estate may look like in the decade ahead. Costs will therefore need to be further refined as plans become clearer, and as the lessons from pilot projects are learned. As currently calculated, heating replacement costs are likely to account for around 75% of the total required investment. Section 16.3 provides a high-level breakdown of projected expenditure.

It may well be possible to externally fund some of this work, and the University has recently secured a £3.3 million grant from Salix Finance's Public Sector Decarbonisation Fund. Such grant funding is rare however, and is often quite restrictive, with limited funding available. The Government may also decide to introduce other financial mechanisms in the future, such as with the escalation of the Climate Change Levy on fossil-fuel energy supplies.

It is likely to be necessary to consider energy performance contracts (or similar) to attract large-scale investments in the University's estate. Such arrangements are complex and will require careful consideration to ensure they can deliver benefits for all parties and are suitable for the long term.

It is important to recognise that this is the cost to decarbonise the University's *existing* operations. Any new development must also be zero carbon – see 'Estates Strategy' below.

Delivering a zero carbon target in the timescales proposed will have capacity implications for the delivery teams involved, both directly and for those support functions which are key to its success. Resource implications will therefore need to be considered.

13 Business Case

13.1 Financial Benefits

As discussed above, the capital costs for delivering a net zero carbon target will be substantial. Continuing to deliver energy efficiency improvements alongside decarbonisation can help deliver further revenue savings, however these will not be of the scale seen in the early days of the

University carbon management programme. Operational revenue costs (both energy and maintenance) may actually increase for low carbon heating solutions in comparison to the current costs for fossil fuel solutions.

This however takes no account of the potential added value that the University's sustainability credentials can bring in attracting new student intake and research income – which may be viewed both as a financial and a non-financial benefit.

13.2 Non-financial Benefits

Setting out a clear, ambitious and authentic net zero carbon plan for the University can become a unique selling point, setting it apart as a leader in delivering sustainability in its operations alongside its leading environmental teaching and research. This presents opportunities for good publicity and links back to the potential to increase student intake and research grants.

With a stated ambition to *"…lead on global environmental sustainability"*, delivering an authentic net zero carbon target for 2030 can set the University apart.

Both Reading and Wokingham Borough Councils have set their own net zero carbon targets for 2030 and aligning with these targets therefore also positions the University as a key partner locally.

14 Interfaces

14.1 Estates Strategy

14.1.1 New buildings

Currently, the University does not have any major plans for new construction. However, when these do arise, they will need to be built to be zero carbon. A 2018 report[8] from assessments in the UK found that achieving net zero carbon emissions for a new non-residential building is likely to result in a capital cost uplift in the order of 5%-7%. In many buildings this additional cost could be under 1%. A 2015 report[9] from assessments in Canada put the figure at between 5%-19%, but this is likely to be influenced by a colder climate and the earlier date of the report when low-carbon technology would have been more expensive. The Canadian report found that a return on investment of approximately 30% was achievable.

It should be recognised that in Reading Borough Council, buildings will need to achieve BREEAM Excellent certification, and while delivering a zero carbon should go a long way towards that certification, BREEAM has additional sustainability requirements which will also still need to be met.

14.1.2 Refurbishment/Repurposing

Where major refurbishments are undertaken, they will also need to consider their contribution towards delivering a net zero carbon target. For whole building refurbishments, this will be essential, whilst for partial refurbishments, or repurposing existing spaces, this will need to be considered on a case-by-case basis. It will be important to ensure that any works completed complement the University's net zero carbon ambitions where practical, and at the very least, do not undermine the ability to make the building zero carbon in future years.

14.1.3 Space utilisation

There is a significant opportunity for energy and therefore revenue savings in reviewing the way that the University manages space in its buildings. This could be wide ranging, from looking at the way space is allocated, to the use of individual versus shared offices, as well as the utilisation of teaching

---

[8] *https://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/Planning-Policy/LP20162036/cost_of_carbon_reduction_in_new_buildings_report_publication_version.pdf*

[9] *https://newbuildings.org/wp-content/uploads/2015/11/ZNECostComparisonBuildingsDC1.pdf*

and meeting room space. Improving space utilisation rates could be one of the most cost-effective ways to reduce energy costs and therefore carbon emissions, if this can reduce heating and lighting demand in unoccupied spaces and potentially reduce the total floor area owned by the University.

Analysis of rationalisation plans currently under consideration suggest they could achieve a 14% reduction in current building-related carbon emissions, and a 6% reduction against baseline emissions overall. This is reflected in the reduction pathway set out in Figure 4.

14.1.4 Maintenance - heating and hot water boiler replacements

Planned Maintenance priorities will need to consider that gas boilers are likely to be phased out over the next 10 years, and that where possible, it should be planned to avoid further expenditure on replacement boilers or replacement gas mains. Of course, this will not always be practical, and there are likely to be instances where an immediate fix is required which necessitates expenditure.

What will be important is to seek to identify priority areas from a Maintenance perspective for heating replacements, to aim to identify and prioritise alternative solutions there first. This may in some instances mean that Maintenance funding earmarked for boiler replacements can contribute to the costs of low carbon alternatives. However, it should be recognised that the Maintenance budget is already stretched, there will be many competing priorities for this funding and any Maintenance contribution is likely to only represent a fraction of the overall capital costs.

There could also be significant implications for the training needs of staff, to ensure suitably skilled staff are employed who understand and are able to operate and maintain these new systems.

14.2 Travel Policies

14.2.1 Business Travel

It will be important to ensure that the University's Travel and Expenses Policy aligns with plans for reducing carbon emissions from travel, and that the University's contracted travel suppliers are also bought in to this.

14.2.2 Fleet Vehicles

Low/zero carbon standards could be considered for new fleet vehicles to ensure they are consistent with the University's sustainability goals, though as previously identified, these account for a fraction of a percent of total carbon emissions.

14.3 Halls of Residence

On-site halls of residence, operated by UPP form part of the University's reported carbon reduction target. Off-site halls, while not included in these targets, are still branded as the University of Reading's and therefore both affect its sustainability reputation. Conversations have begun with UPP to understand how we can work together to achieve common sustainability goals. This will need much more in depth conversations, and may have contractual implications, such as if UPP wanted to explore ground source heat pump technologies, which would require access to suitable land.

15 Governance

The Net Zero Carbon Plan has been signed off by the University Executive Board and will be managed on a day-to-day basis by Sustainability Services, overseen, monitored and directed by the Environmental Sustainability Committee. Its progress will be underpinned by the University's ISO50001:2018 certified energy management system. In the future, alternative or complimentary standards may also be considered, such as those which focus on carbon rather than energy.

16 Appendices

16.1 Emissions breakdown compared with baseline and last year (tCO_2)

Emissions Source	2008-09	2018-19	2019-20	% change since last year	% change since baseline
Electricity (generation)	17,764	7,185	5,630	22 % ⇩	68 % ⇩
Electricity (transmission)	1,381	612	478	22 % ⇩	65 % ⇩
Natural gas*	12,937	8,791	8,415	4 % ⇩	35 % ⇩
Burning Oil*	1,544	486	405	17 % ⇩	74 % ⇩
Business travel[+]	5,174	4,982	2,038	59 % ⇩	61 % ⇩
Radiative forcing	4,045	3,597	1,126	69 % ⇩	72 % ⇩
Refrigerants [∞]	207	106	280	164 % ⇧	35 % ⇧
General Waste	220	21	14	30 % ⇩	93 % ⇩
Construction Waste[#]	6	9	2	79 % ⇩	70 % ⇩
Water	711	398	311	22 % ⇩	56 % ⇩
Total	**43,990**	**26,187**	**18,699**	**27 %** ⇩	**57 %** ⇩

* Emissions for gas and oil have been degree day adjusted to enable comparison across different financial years

[+] Business travel includes vehicle fleet

[∞] Emission level similar to the 3 years prior to 2018-19. 43% of 2019-20 emissions due to one event

[#] Emissions from construction waste were originally excluded, due to their wide annual variability and small impact, however have been added in 2023/24 for completeness.

16.2 *Additional out of scope emissions for future consideration*

Emissions (tCO_2)	2008-09	2018-19	2019-20	% change since last year	% change since baseline
Employee Commuting[1]	2,139	2,368	2,166	9% ⇩	1% ⇧
Student Commuting[1]	2,202	1,966	2,848	45%⇧	29% ⇧
Procurement[2]	26,682	46,835	38,712	17% ⇩	45% ⇧
Off-site Halls of residence[3]	3,006	2,010	2,082	4% ⇧	31% ⇩
Other buildings not UoR operated[4]	n/a	1,176	682	42% ⇩	n/a
Student Home to University Travel[5]	n/a	n/a	16,582	n/a	n/a

[1] Employee / student commuting figures are based on Travel Survey data completed every 2 years. Baseline values are from 2011-12 as no data was recorded as far back as 2008/09.

[2] Procurement emissions compiled by Higher Education Purchasing Association (HEPA) Baseline values are from 2011-12 as no data was recorded as far back as 2008/09.

[3] Utilities supplies for offsite halls of residence are not under the University's supply arrangements, and the University therefore has no direct oversight of these emissions. However, in the interests of transparency, from 2018/19, we will publish this data provided by the halls operator, UPP.

[4] Under the previous scope (before 2016) emissions for buildings not operated by the University were included, therefore only those since 2015/16 are split out here for comparison. When adjusting the scope of emissions, a full re-baselining exercise was completed to ensure accurate reporting.

[5] Student Home to University Travel at start & end of terms. Using student numbers (UK, Oversees Europe & Overseas Other), assumptions about average distance travelled, with car journeys doubled for parents travelling to University with the student and returning home each time; number of journeys per year; proportion travelling by car, coach, rail, bus or air. Greenhouse gas emission factors are those published by Department for Business, Energy & Industrial Strategy. Air travel includes radiative forcing impact. This is based on student data for 2020/21 and has been added as an addendum to the report after it was first published.

16.3 Projected headline expenditure

Project	Approx. expenditure	Funding source
2020/21 energy efficiency works	£451,000	Revenue funding
2020/21 energy efficiency works	£2,584,000	Salix Finance PSDF grant
2020/21 low carbon heat enabling work	£145,000	Salix Finance PSDF grant
2020/21 solar PV expansion	£544,000	Salix Finance PSDF grant
Total current funding	**£3,724,000**	

Project	Approx. expenditure	Funding source
2021 – 2030 energy efficiency works	£3,000,000	TBC
2021 – 2030 renewables expansion	£600,000	TBC
2021 – 2030 energy storage technology	£500,000	TBC
Greenlands heat decarbonisation	£2,000,000	TBC
Energy Centre decarbonisation (ph. 1)	£3,500,000	TBC
Energy Centre decarbonisation (ph. 2)	£5,200,000	TBC
Remaining heat decarbonisation (ph.1)	£3,500,000	TBC
Remaining heat decarbonisation (ph.2)	£5,500,000	TBC
Remaining heat decarbonisation (ph.3)	£12,000,000	TBC
Non-energy emission reductions	£250,000	TBC
High quality video conferencing facilities	£250,000	TBC
Insetting/offsetting programme	£2,000,000	TBC (assumed over 15 years)
Total current funding	**£38,300,000**	

Summary financials:

Project	Approx. expenditure
2020/21 projects	£3,724,000
2021-30 projects	£38,300,000
15% contingency	6,303,600
Total required funding estimate	**£48,327,600**

16.4 Record of document updates

The following minor amendments have been made to the Plan with the agreement of the Environmental Sustainability Committee:

27 June 2022	Addition of start/end of term travel emissions in reported out of scope emissions
25 June 2024	Addition of construction waste to scope