

CARBON MANAGEMENT STRATEGY 2020 - 2030

***TOWARDS
NET ZERO CARBON 2040***

JULY 2021



**Northumbria
University
NEWCASTLE**



Northumbria
University
NEWCASTLE

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1. SUMMARY

Climate change was recently described at the United Nations as the 'biggest threat modern humans have ever faced', and has profound implications for food production, access to fresh water, peace, security and prosperity. Climate change is caused by the build-up of greenhouse gases — primarily carbon dioxide — in the atmosphere. The atmospheric lifetime of carbon dioxide is sufficiently long (hundreds of years) that reducing emissions is not enough to curtail climate change; hence the recent emphasis on the Climate Emergency and the need to achieve Net Zero Carbon.

To avoid dangerous climate change, governments, organisations and individuals across the globe need to fundamentally change how they think about and use energy. This Carbon Management Strategy is Northumbria University's response to the climate crisis. Our aim for 2030 is to have a highly efficient and low carbon University that leads the way in delivering real reductions in energy consumption and carbon emissions, and which puts the University on a trajectory to achieve Net Zero Carbon by no later than 2040.

We may not yet know the technologies that will ultimately allow Net Zero Carbon to be achieved, or what the Government's strategy will be for the country, but the basic priorities will remain the same:

- 1 Design for Net Zero – New builds to aim for net zero carbon in operation
- 2 Eliminate energy waste and improve efficiency – Smart and efficient buildings to minimise energy use; utilise opportunities during all refurbishments to make significant improvements in building efficiency
- 3 Utilise onsite renewable generation – Onsite electricity generation and buildings that can operate with renewable heat technologies such as heat pumps
- 4 Purchase energy responsibly – Continue to purchase green tariff electricity to support the move away from fossil fuels
- 5 Encourage others – Work with staff, student, suppliers and stakeholders to reduce their own emissions

Our target for 2030 is an 80% reduction in emissions, compared to the 2014/15 baseline which includes Scope 1, Scope 2 and Scope 3 emissions. This represents a 9% year-on-year reduction in emissions from 2019, as shown in Fig. 1.

It is estimated that the targets can be met with the following major actions, the timescales for which will be linked to the Estate Strategy and Masterplan:

Project	Estimate Tonnes of CO2e reduction
CCE Heat Pumps and LED	313
CLC East Heat Pumps	135
Move Coach Lane West to City	228
Low Carbon Heat Network Phase 1 including Squires cladding	646
Ellison Cladding	265
Heat Network Phase 2	600

¹<https://www.un.org/press/en/2021/sc14445.doc.htm>

²Scope 1 and 2 emissions cover the main emissions from our buildings, including managed student accommodation, and fleet vehicles. Scope 1 (direct): gas, fleet fuel, refrigerants. Scope 2 (indirect energy): electricity, and heat purchased from the Trinity Square heat network. Scope 3 (indirect): business travel, waste, water, and electricity transmissions losses.

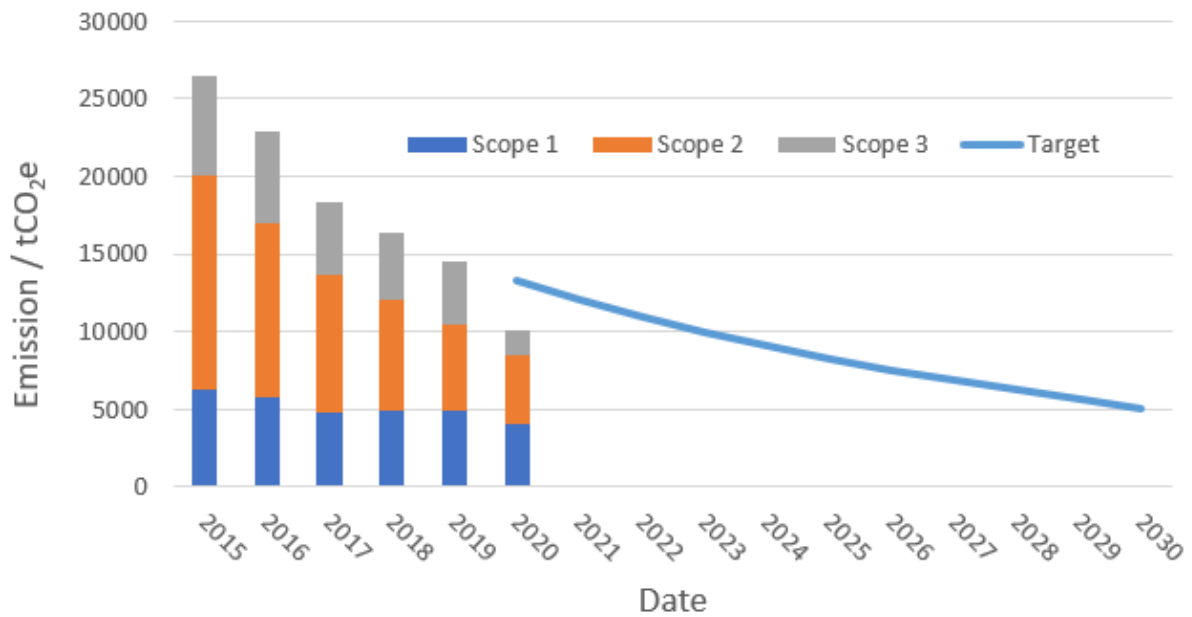


Figure 1. Target Carbon Emissions to 2030

In addition, we will continue with numerous ongoing efficiency projects such as:

- LED Lighting (50% completed up to 2020)
- IT and Data Centre efficiencies
- Building fabric improvements
- Building Management System Improvements
- Reduced air travel for business
- Improved infrastructure for sustainable travel, including electric vehicles
- Solar PV arrays
- Awareness and Behavioural Change

Since 2015 the Carbon Management Plan has helped the University avoid costs of £6m through reduced energy use. It is estimated that this Strategy to 2030 will avoid further costs of £11m, through additional expenditure, on top of maintenance, refurbishment and improvement spending, of £10m on energy reduction measures.

Clearly, we will only achieve our carbon aims if we have a low-energy campus. The Carbon Management Strategy will, therefore, be aligned with the Estate Masterplan to ensure all opportunities for carbon reduction and energy efficiency can be realised, and best value can be achieved. Given the energy-intensity of IT activity, an important element of controlling emissions will be to integrate the Carbon Management Strategy with the IT Strategy. As we emerge from the Covid-19 pandemic, it will be important to understand how different ways of working impact upon carbon emissions, both on and off campus. How we work in the future has implications for the campus and is further reason to link this document with the Estate Masterplan.

2. BACKGROUND

Climate Change is widely recognised as one of the greatest threats facing the planet today, and it is something that we all contribute to through our use of fossil fuels. The scientific consensus is that, in order to avoid serious economic, social and environmental consequences, global warming must be kept below 2°C and ideally below 1.5°C above pre-industrial levels. In December 2015, 196 countries adopted the United Nations Framework Convention on Climate Change (UNFCCC) "Paris Agreement". The Paris Agreement is a legally binding international treaty on climate change. Its goal is to limit global warming to well below 2°C, preferably to 1.5°C, compared to pre-industrial levels.

In 2008 the Department of Energy and Climate Change (DECC) published The Climate Change Act which committed the UK to achieve an 80% reduction in CO₂ emissions by 2050, based on a 1990 baseline, with an interim target of 34% reduction by 2020. In 2019 the UK Government declared an Environmental and Climate Emergency and pledged to reach zero carbon by 2050, and in 2021 set in law the world's most ambitious climate change target, to cut emissions by 78% by 2035 compared to 1990 levels.

In January 2010 Higher Education Funding Council for England (HEFCE) issued a statement of policy "Carbon reduction target and strategy for higher education in England". The policy required universities to develop a carbon reduction plan and set reduction targets for scope 1 and 2 emissions for 2020, based on a 2005 baseline.

Northumbria University consequently produced a Carbon Management Plan for 2010-2020, which set a reduction target of 32.5% by 2020 against a 2005 baseline for scope 1 and 2 emissions. This target was exceeded in 2019, despite a significant growth in the University Estate since the 2005 baseline, and by 2020 a 50% reduction had been achieved. In 2015 an update to the Carbon Management Plan added Scope 3 emissions to the monitoring and targeting.

Actions over the next decade will determine whether or not the world will achieve the sort of reductions in carbon emissions necessary to avoid serious consequences. A report by the Intergovernmental Panel on Climate Change (IPCC) in October 2018 stated that current reduction strategies were unlikely to limit climate change to 2°C of warming, and 3°C was more likely. It stated that keeping to the preferred target of 1.5°C above pre-industrial levels will mean "rapid, far-reaching and unprecedented changes in all aspects of society", with net zero emissions by 2050.

Northumbria University recognises this challenge, embedding Organisational Sustainability, Efficiency and Effectiveness as a Strategic Outcome of the University's 2018-23 Strategy.



³<https://www.legislation.gov.uk/ukpga/2008/27/contents>

3. WHAT WE HAVE ACHIEVED TO DATE

- 50% reduction in Scope 1 and 2 emissions by 2020 compared to 2005/6 baseline
- Reduction in annual gas use of 7 million kWh
- Reduction in annual electricity use of 8.9 million kWh
- 32% reduction in water use, saving 72 million litres per year
- Almost £6m costs avoided due to reduced energy use compared to Business as Usual

SCOPE 1 AND 2 EMISSIONS

At the end of 2019/20 scope 1 and 2 carbon emissions had been reduced by 50% compared to the 2005/6 baseline, far exceeding the 32.5% target. While this achievement was partly due to the COVID lockdown, it is estimated that reductions would have been 41.5% without the lockdown. In the five years to 2020, emissions were slashed by an amazing 58%.

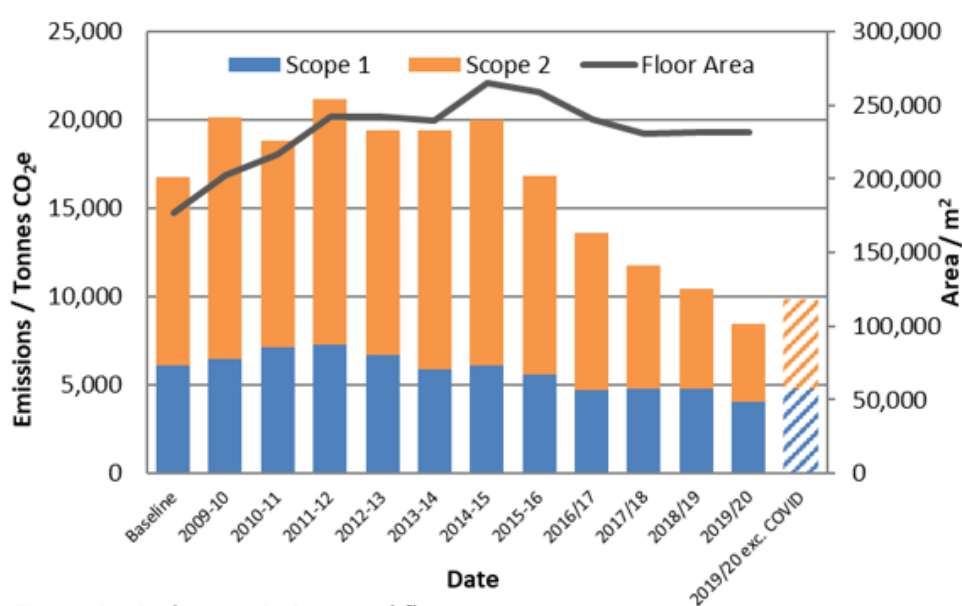


Figure 2. Carbon emissions and floor area



⁴Water contributes to climate change through the energy required for transport and treatment.

Since 2015 we have reduced gas use by 7 million kWh per year, and electricity use by 8.9 million kWh per year, excluding the energy avoided due to the COVID lockdown. By August 2020 the reduced energy use had avoided costs of £5.9 million compared to business as usual (see Fig. 3). The dip in the Business as Usual line for 2020 shows the impact of the reduced energy use during COVID lockdown.

These savings were achieved through a wide range of projects including:

- LED Lighting and controls
- Building Management System upgrades
- Boiler replacement to condensing gas boilers
- Installation of low energy ventilation and cooling
- Installation of 300kWp of solar PV
- Reduced building opening hours during holiday periods
- Occupancy controls on ventilation systems

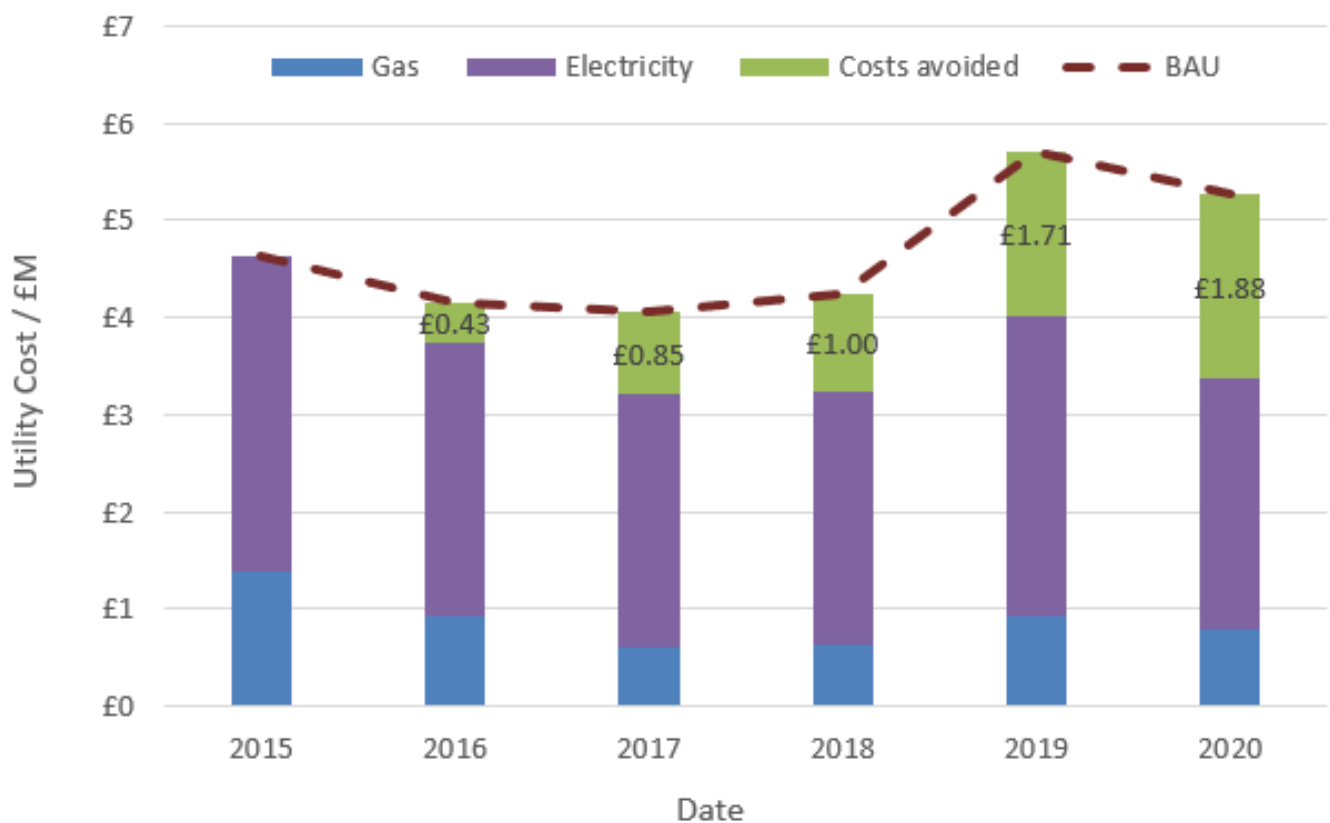


Figure 3. Utility Costs

SCOPE 3 EMISSIONS

The original baseline and target within the 2010-2020 Carbon Management Plan were based on Scope 1 (gas and fleet fuel) and Scope 2 (electricity and heat) emissions. In 2015 we updated the Carbon Management Plan and added reporting on Scope 3 emissions, including business travel, water, waste disposal, electricity transmission and refrigerant gases. Together these Scope 3 emissions accounted for 29% of our total emissions in 2018/19, with business travel flights being the most significant contributor.

By 2019 there had been a reduction in Scope 3 emissions of 36%, mainly due to a reduction in emissions from flights, electricity transmission and water (water transport and treatment emissions). By 2020 Scope 3 emissions had reduced by 74%, but this was significantly influenced by the reduction in business flights during the COVID restrictions.

Water use has reduced by over 32% since 2014/15, saving 72 million litres of water per year, which is the equivalent to 900,000 baths, or the annual water use of 550 homes.

The table below shows Scope 1, 2 and included Scope 3 emissions from 2014/15 to 2019/20. The final column shows the estimated emissions had operations not been affected by the COVID restrictions from March 2020.

		Emissions 2014/15	Emissions 2015/16	Emissions 2016/17	Emissions 2017/18	Emissions 2018/19	Emissions 2019/20	2019/20 exc. Covid	Units
Scope 1	Gaseous fuels	6,059	5,570	4,725	4,725	4,791	4,029	4,756	tCO ₂ e
	Vehicle fleet	65	19	18	27	26	19	19	tCO ₂ e
	Refrigerant Gases	107	153	106	225	72	19	19	tCO ₂ e
	Total	6,231	5,742	4,849	4,978	4,889	4,067	4,794	tCO₂e
Scope 2	Purchased electricity (Grid)	13,189	10,670	8,278	6,507	5,118	3,943	4,570	tCO ₂ e
	Purchased electricity (Other)	0	0	0	0	0	0		tCO ₂ e
	Heat purchased	686	579	569	540	507	498	498	tCO ₂ e
	Total	13,875	11,248	8,847	7,047	5,625	4,441	5,068	tCO₂e
Scope 3	Business Travel	5,014	4,616	3,603	3,560	3,420	1,134	3,420	tCO ₂ e
	Water	213	238	243	231	160	126	160	tCO ₂ e
	Waste	26	26	34	32	30	23	30	tCO ₂ e
	Other	1,087	965	774	554	434	339	393	tCO ₂ e
	Total	6,340	5,845	4,654	4,377	4,044	1,622	4,003	tCO₂e
Total emissions		26,446	22,835	18,349	16,402	14,558	10,130	13,865	tCO₂e

The University purchases electricity from 100% renewable sources via a Green tariff. However, as this electricity is supplied through the national grid, for reporting purposes emissions are shown as Grid average.

The breakdown of emissions by type is illustrate in Fig. 4 based on 2018/19 data (emissions in 2019/20 were heavily skewed by the COVID lockdown).

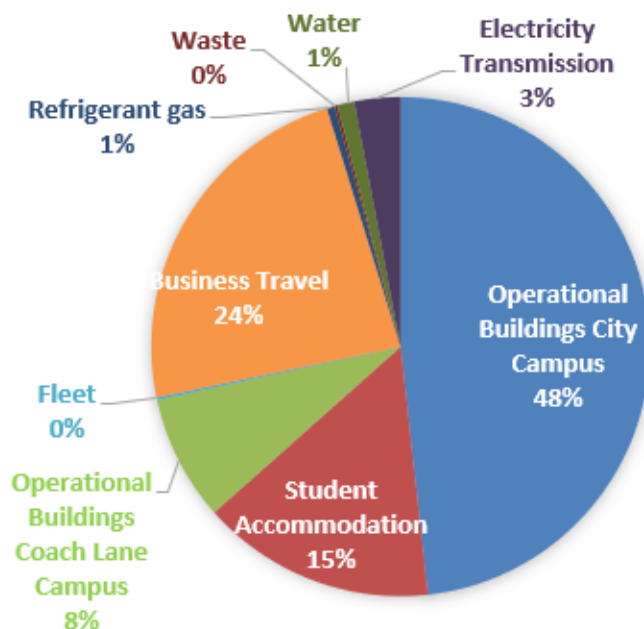


Figure 4: Breakdown of reported emissions



4. SCOPE OF EMISSIONS REPORTING FOR 2020 to 2030

EMISSIONS INCLUDED IN ANNUAL REPORTING:

Scope 1 Emissions

Gas, petrol, diesel and refrigerant gases

Scope 2 emissions

Grid electricity and heat purchased from the Trinity Square heat network

Scope 3 emissions

Business travel, waste disposal, water (emissions associated supply of mains water and treatment of sewerage) and electricity transmissions losses.

OTHER EMISSIONS:

Scope 3 Emissions from Staff and Student Commuting will be reported every other year, in line with the Staff and Student Travel surveys, with a 2020 baseline year

Scope 3 Emissions that are currently excluded from annual reporting include:

- Student travel at beginning and end of terms
- Construction
- Supply Chain
- Rented space and student accommodation managed by third parties
- Home working
- Cloud based IT compute, traffic and storage

These emissions are excluded as there are currently no accurate means of measuring them each year. However, we will be working to improve the accuracy of reporting with a view to include in the future, and we will continue to carry out actions to reduce emissions from these sources where possible.

We do not report against emissions from buildings and space that we use but do not own. The London and Amsterdam campuses, and student accommodation operated by third parties but where allocation of rooms is through the University's booking system fall under this category. We are not directly responsible for energy use and expenditure, and it has not been possible to obtain accurate energy and carbon data. We will continue to work with our partners and hope to quantify these emissions by 2025 at the latest.

5. BASELINE

SCOPE 1, 2 AND ANNUALLY REPORTED SCOPE 3 EMISSIONS

Emissions include those from: gas, electricity, petrol, diesel and heat purchased from the Trinity Square heat network, refrigerant gases, business travel, waste, water and electricity transmission losses.

The baseline year for these emissions, which will be reported against annually, is 2014/15.

		Emissions 2014/15
Scope 1	Gaseous fuels	6,059
	Vehicle fleet	65
	Refrigerant Gases	107
	Total	6,213
Scope 2	Purchased electricity (Grid)	13,189
	Purchased electricity (Other)	0
	Heat purchased	686
	Total	13,875
Scope 3	Business Travel	5,014
	Water	213
	Waste	26
	Other	1,087
	Total	6,340
Total emissions		26,446

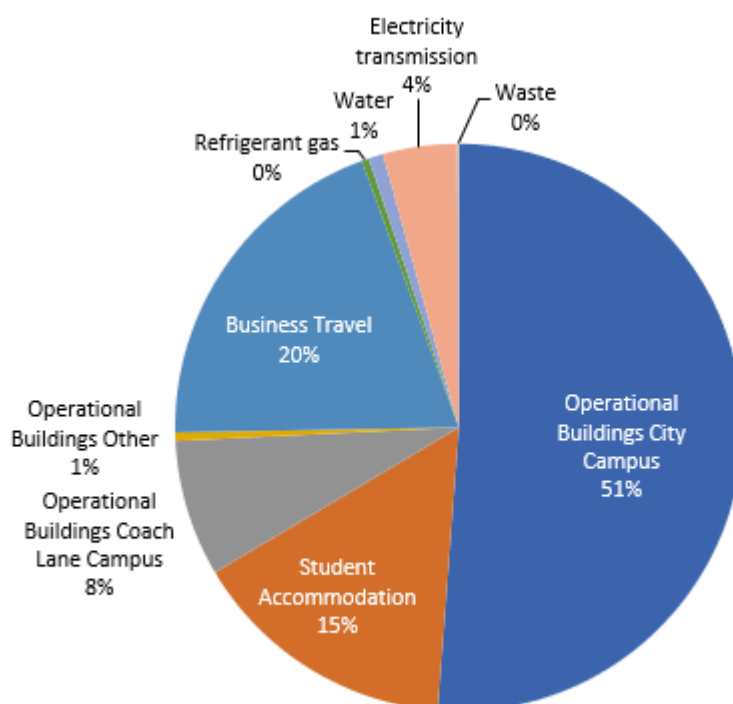


Figure 5. Baseline emissions

COMMUTING

The baseline for Commuting emissions is based on the pre Covid-19 Staff and Student Travel Survey results from March 2020:

- Students produced 4,801 tonnes of CO₂e
- Staff produced 1,230 tonnes of CO₂e

These emissions will be reported against every two years, in line with the Staff and Student Travel Surveys.

The methodology adopted to calculate the commuting emissions baseline reflects that previously recommended by HEFCE and now under the responsibility of UK Research and Innovation and Office for Students, adopting the most recent Carbon conversion factors provided by Defra (2019). The data collated from the survey that feeds into the carbon assessment includes;

- Transport mode split for staff and students;
- Distance travelled for commuting; and
- Engine size and fuel type.

6. OUR GOALS FOR 2030

AIM

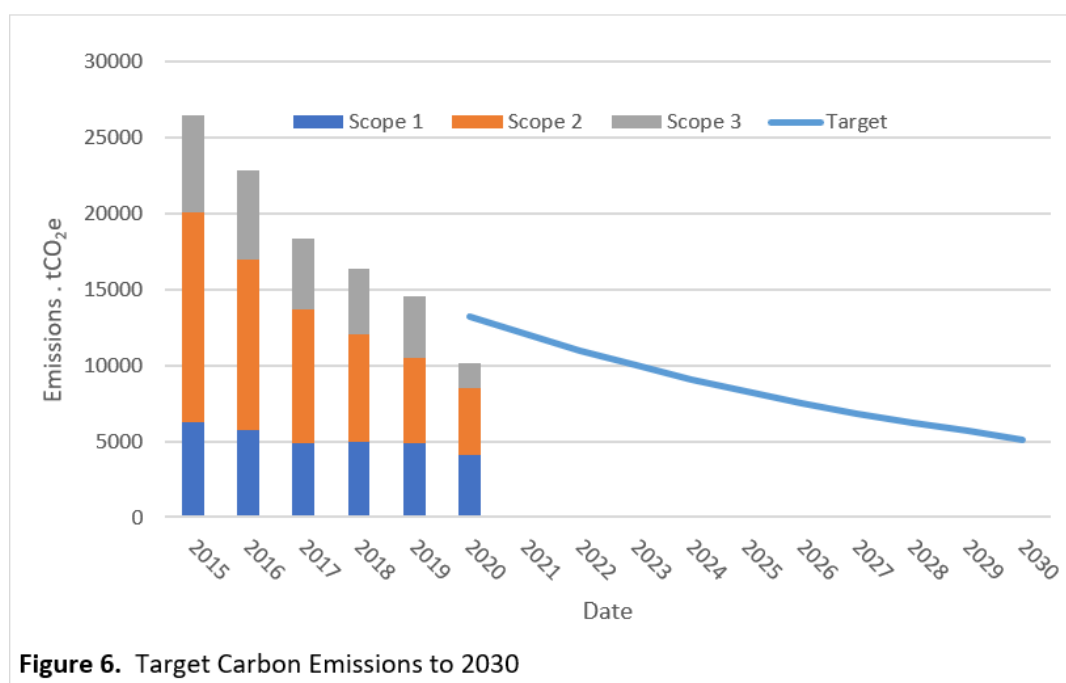
Our aim for 2030 is to have a highly efficient and low carbon University, that leads the way in delivering real reductions in energy and carbon emissions, and which puts the University on a trajectory to achieve Net Zero Carbon by no later than 2040.

THEMES

Towards Net Zero Carbon buildings	Smarter more engaging Campus	Reducing Supply Chain emissions
Actions	Actions	Actions
- Reduce energy demand through improvements to building fabric and plant - New buildings to aim for Net Zero Carbon - Refurbishments to utilise SKA ratings and make significant contributions to reduce energy use - Increase onsite renewable electricity generation and enable a reduction in fossil fuel reliance - Future proof buildings for low carbon technologies, such as heat pumps	- Improved space utilisation with improved controls so spaces and IT equipment respond to occupancy - Improved collection and sharing of data between systems - Living Labs philosophy embraced to share knowledge and encourage student engagement, innovation and research - Develop schemes to encourage and enable sustainable forms of travel - New ways of working to reduce travel	- Working with suppliers and partners to encourage use of more sustainable and lower carbon products - Reduce waste and the environmental impacts of our consumption through a Circular Economy Approach to products

TARGETS

Key Performance Indicators



-
1. By 2030 reduce Scope 1, 2 and 3 Emissions by a minimum of 80% compared to 2014/15 baseline, to 5,100 tonnes CO₂e. This represents a 9% year on year reduction to 2030.
 - a. Interim target of
 - i. 2025 8,270 tonnes 69% reduction from baseline
 2. Improvement in building efficiency (Scope 1 and 2 CO₂ emissions per m²) of at least 3% per year
 3. 30% reduction in emission from staff and student commuting by 2030, from 2020 baseline
 - a. 6% reduction in emissions every two years at each Travel Survey
 4. Water consumption decreased by 10% by 2030, compared to 2019.
 - a. 1% decrease per year

Towards Zero Carbon Buildings Targets

1. All new buildings aim for Net Zero Carbon for operational emissions
 - a. Minimum of A rated EPC and A rated DEC from 2022
2. All refurbishment projects utilise SKA ratings to improve sustainability and energy reduction
 - a. Minimum of Bronze level for all projects by 2023
3. Additional 200 kW of renewable electricity generation installed by 2030 – a 60% increase on current installations
4. 50% of buildings upgraded to enable lower temperature renewable heating systems by 2030
 - a. Heat demand reduced by 20% by 2030
5. Existing heat network replaced with Heat Pump technology by 2026
 - a. Heat Network expanded to include Sport Central, Student Union, and Northumberland Building by 2030
6. 100% of lighting to be LED by 2030
7. 100% of electricity to be purchased from “Green” tariffs utilising renewable energy.

Smarter More Engaging Campus Targets

1. All buildings utilise automatic lighting controls by 2030
2. 100% of air handling units and cooling adjust to occupancy by 2030
 - a. All lecture theatres by 2025
3. Action plan to encourage and enable sustainable forms of travel by 2025
4. Integrate the Carbon Management Strategy with the IT Strategy to develop Action Plan to reduce IT energy use by 2022

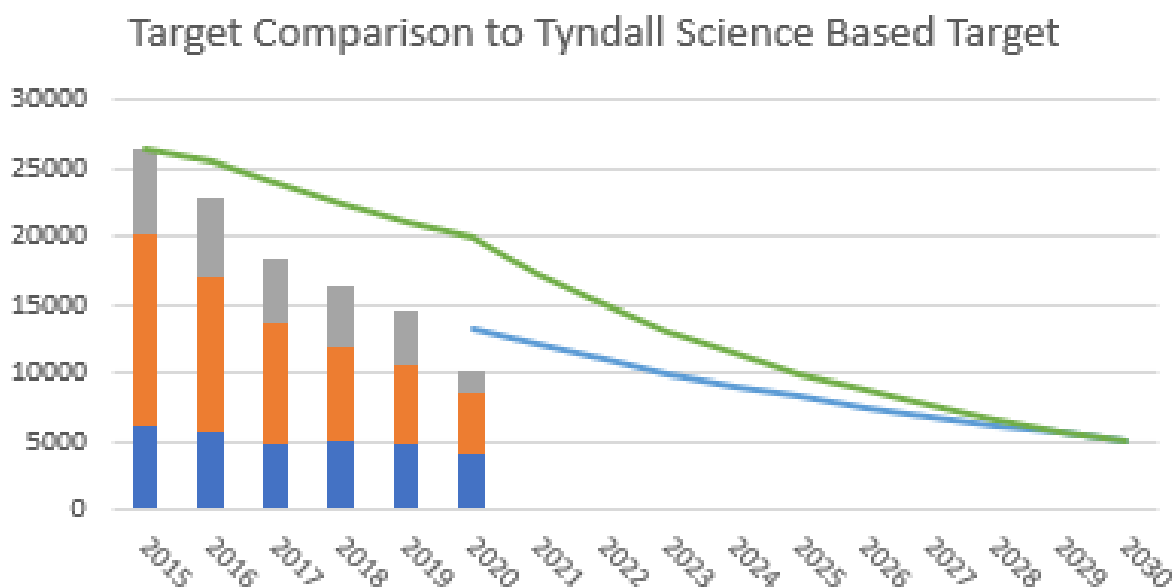
Supply Chain Emissions Targets

1. All construction projects to calculate embedded carbon footprint of construction materials and demonstrate reductions in embedded carbon through Carbon Efficiency Plans by 2022
2. Supply Chain Emissions to be quantified by 2022
 - a. Five Contracts with largest carbon footprint to be identified and plans in place to reduce emissions by 2024

COMPARISON WITH SCIENCE BASED TARGET FOR NEWCASTLE UPON TYNE

As part of the Setting City Area Targets and Trajectories for Emissions Reduction (SCATTER) project, the Tyndall Carbon Budget Tool was developed to provide science-based carbon emissions targets for each local authority area in the UK. The targets are consistent with the United Nations Paris Climate Agreement and are based on a total additional global emission of CO₂ that limits global warming to “well below 2°C and with an outside chance of stabilising at 1.5°C”. The tool recognises a distinction between developed and developing countries in line with the equity requirements of the Paris Agreement.

By normalising to emissions at our baseline year (2015), we can roughly compare our emission trajectory with the Science Based Target for Newcastle upon Tyne provided by the Tyndall Carbon Budget Tool. If our strategy is successful, the total emitted carbon dioxide between 2015 and 2030 will be ca. 190 000 tonnes, some 50 000 tonnes less than that determined by the Science Based Target. However, we should note that success so far has been achieved by taking easy wins; to sustain our trajectory will become increasingly more difficult. It is also worth noting that the projection for Newcastle upon Tyne envisages that Net Zero Carbon will effectively be achieved by 2042, aligned with our ambition to reach Net Zero by 2040.



⁵ <https://carbonbudget.manchester.ac.uk/reports/>

⁶ <https://carbonbudget.manchester.ac.uk/reports/E08000021/>

7. STRATEGY 2020 to 2030 - LAYING THE FOUNDATION FOR A NET ZERO CARBON CAMPUS

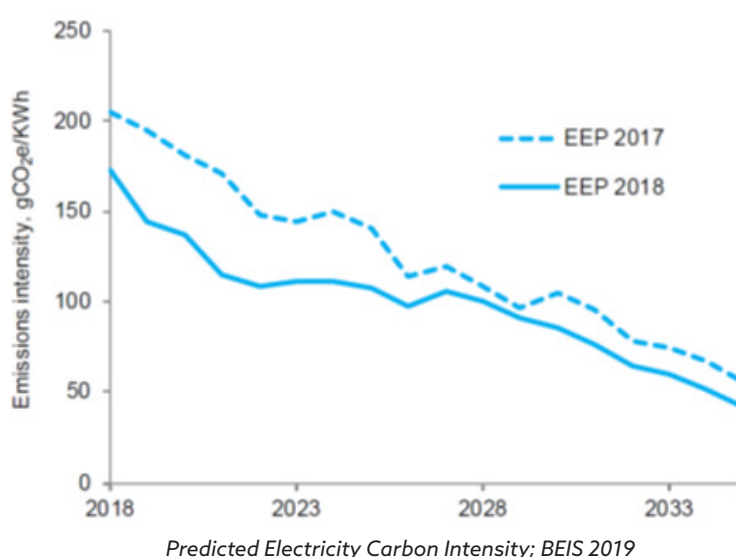
As set out in Section 4, the University has made impressive reductions in carbon emissions and energy use in recent years. However, if we are to meet our stretching targets for carbon emission reduction by 2030, it will be necessary to make fundamental changes to the way that we use energy. The University will see increased demand for energy use as a result of a number of factors:

- Increasing use of ICT equipment every year
- Higher summer temperatures will require more ventilation and cooling
- Plant and infrastructure age and become less efficient
- Increase in research will require more energy-intensive equipment
- Changing teaching patterns

The underlying trend is for energy use to increase by approximately 2% per year if we do not actively work to reduce it, and business as usual “do nothing scenarios” predict that electricity consumption would increase from the current consumption of 22 GWh to 29 GWh by 2030.

At the same time, many of the quick-win actions that can reduce carbon emissions have already been taken. Changing to low carbon heat will be a particular challenge, requiring changes to building heating systems and fabric, to reduce heat loss and enable use of lower heating flow temperatures.

It is not certain which technologies will be available by 2030 to steer the country towards a Zero Carbon Economy. It is expected that by 2030 the carbon intensity of grid electricity will be half what it is now (see the plot below from the Government’s Energy and Emissions Projection 2018 document). But it is still unclear whether heating supplied by electricity will be the best option, whether large scale Carbon Capture and Storage will enable a hydrogen network or if another technology will emerge.



Regardless of these unknowns, the strategy for the next ten years to 2030 is to continue to focus on reducing energy use, reducing costs and making the University as energy efficient as possible, whilst preparing for a range of potential future technologies which will move us away from fossil fuels and towards Net Zero Carbon by 2040.

5. BASELINE

Actions will include improving building fabric to enable lower heating flow temperatures, smart buildings which can better adapt to occupancy and exploit the Internet of Things to ensure optimal efficiency, reducing the need for cooling in a warming climate, maximising space utilisation and utilising waste energy, such as waste heat, rather than allowing it to dissipate. It also includes adapting to new ways of working, such as ensuring that if more staff are working from home, office space can be reduced to avoid heating or cooling empty spaces, and considering the potential impact of carbon emissions of staff working from home.

It is envisaged that as gas boilers come to end of life over the next ten years, they will need to be replaced with lower carbon alternatives and that the existing heat network on City Campus, which is at end of life, will be replaced with a low carbon solution. At present, the only viable option is the use of heat pumps. As buildings are not currently able to operate on low flow temperatures these may initially need to be hybrid systems, with a small gas boiler providing additional heat during the coldest weather.

It is estimated that the targets can be met with the following major actions, the timescales for which will be linked to the Estate Strategy and Masterplan:

Project	Estimate Tonnes of CO2e reduction
CCE Heat Pumps and LED	313
CLC East Heat Pumps	135
Move Coach Lane West to City	228
Low Carbon Heat Network Phase 1: upgrading heating to Lipman, Squires, Squires Annex, Squires Workshop	646
Ellison Cladding	265
Heat Network Phase 2: bring Sandyford, Students' Union and Sport Central into the network	600



In addition, we will continue with numerous ongoing efficiency projects such as:

- LED Lighting (50% completed up to 2020)
- IT and Data Centre efficiencies
- Building fabric improvements
- Building Management System Improvements
- Reduced air travel for business
- Increased electric car charging infrastructure
- Solar PV arrays
- Awareness and Behavioural Change

The Scope 3 emissions that we report are dominated by business travel, and these will be controlled through the University's travel management policy: Virtual First. As described in Section 4, we will continue our work to understand and reduce the impact of other Scope 3 emissions – such those arising from products, services and embedded carbon – that are beyond our direct control.

Fig.7 illustrates the predicted reduction in emissions from 2019 to 2030 based on this strategy. It shows a move away from gas for heating and an increase in electricity consumption for heating and assumes that the existing heat network will move to a heat pump solution.

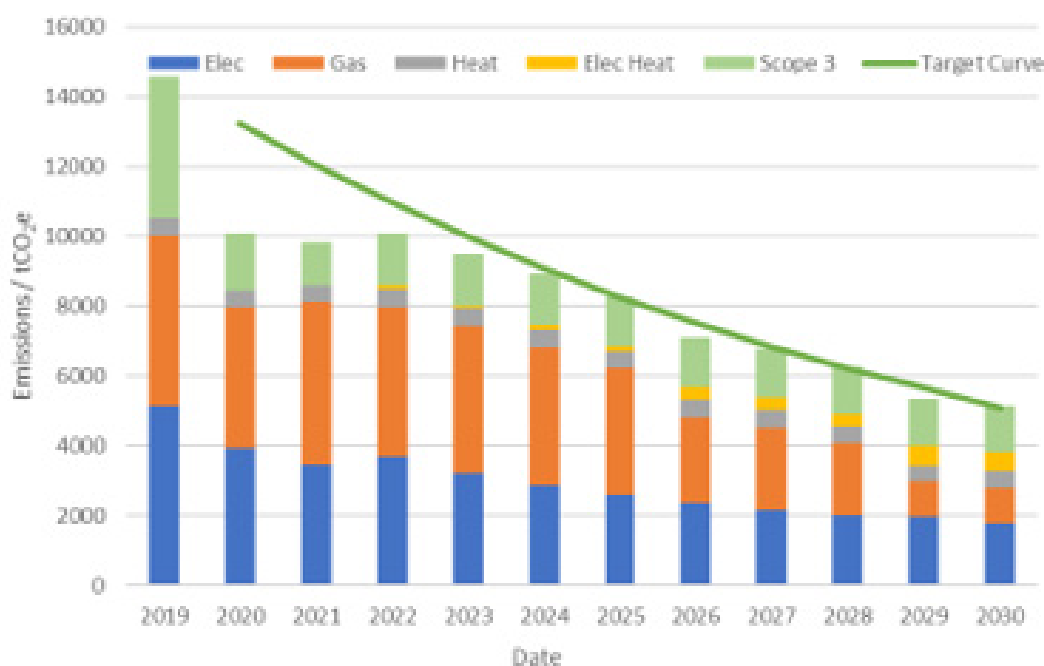


Figure 7. Planned CO₂ Emissions Trajectory

The most cost-effective time to carry out energy improvements to buildings is at the time of refurbishment, or when other works are being carried out. Therefore, we must ensure that these works are properly funded so that all renovations and refurbishments actively improve the efficiency of buildings. New buildings can also have a significant impact upon our emissions, and to meet our objectives, we must also ensure that any new buildings do not increase our carbon emissions and aim to be net zero carbon in operation. For these reasons, the Carbon Management Strategy will be aligned with the Estate Masterplan to ensure all opportunities for carbon reduction and energy efficiency can be realised, and best value can be achieved.

The transition towards Net Zero Carbon is not one that we can achieve alone. We will therefore continue to work with Newcastle City Council and other local organisations as part of the Newcastle Net Zero Taskforce (including the development of district heating networks) other Universities and organisations through collaborative groups such as Environmental Association for Universities and Colleges (EAUC) and with internal stakeholders to engage staff and students.

5. COST 2020 to 2030

Most of the easy wins for energy reduction have been achieved. For the next ten years the strategy of prioritising carbon reduction projects with the fastest return on investment will continue. However, there will also need to be investment in larger projects that do not give a fast payback themselves, but which enable further savings to be realised in the future. For example, external cladding and double-glazed windows give a payback of around 15 to 25 years as stand-alone measures, but will enable heating to operate at lower flow temperatures so new low carbon technologies, such as heat pumps, can be utilised at maximum efficiency in the future. The lowered heat demand will also reduce the size of the plant and equipment required and therefore capital cost required, leading to further savings.

It is estimated that additional capital funding of £10m over the ten-year plan will be required for Carbon Reduction projects. This funding would supplement and be in addition to ongoing maintenance, repairs and capital improvement and refurbishment spending, to help deliver additional energy savings. But it is estimated that this could deliver financial savings of up to £11m compared to Business as Usual (BAU) predictions.

The graph and table below show the effect on energy costs from different investment scenarios at current cost rates:

Capital Investment Scenarios	Total Energy cost to 2030
Business as Usual with no investment	£52.9 M
£100 k per year	£51.7 M
£500 k per year	£47.7 M
£1 M per year	£42.5 M

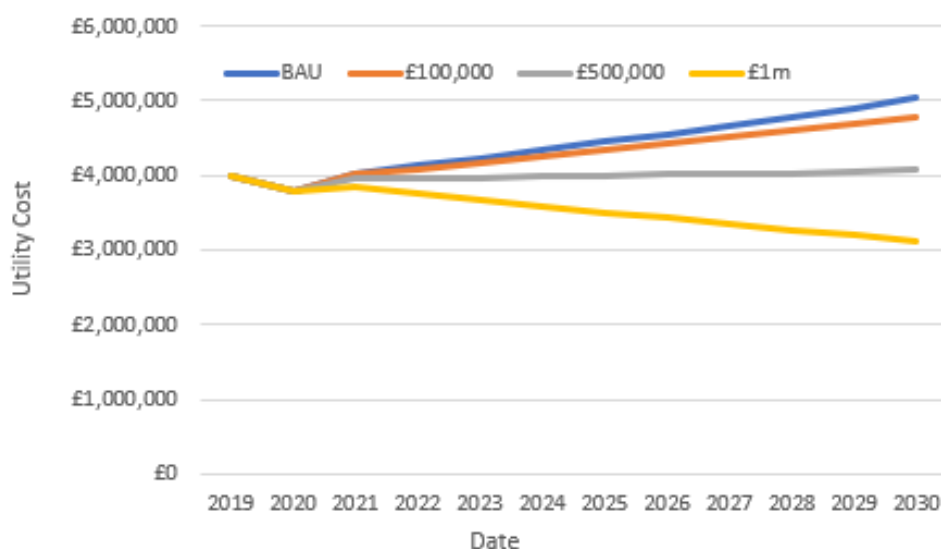


Figure 8. Utility Costs for annual capital investment scenarios

These show that investing £1m per year could result in annual energy costs being approx. £1.7m p.a. lower than BAU by 2030, and the total revenue costs avoided over the ten years would be £10.5m.

The table below shows a breakdown of what the £10m investment could be spent on.

Lighting	HVAC	Fabric	Heating plant	Renewables	BMS	Total
£1,550,000	£795,000	£4,750,000	£2,150,000	£500,000	£255,000	£10,000,000
Change to LED lighting and upgrade controls	Improvements to ventilation and cooling, including data centre	Windows and building insulation and air tightness improvements	Moving away from gas boilers to low carbon heat pumps	Increasing solar PV arrays	Upgrades to building management systems to ensure most efficient operation	

Funding Options

Different funding options will be considered for the carbon reduction projects to ensure best value for the University. These could be:

- Grants (e.g. Public Sector Decarbonisation Scheme)
- Self financing,
- Interest free loans through SALIX
- Energy Performance Contracts with third party finance and leasing options



9. NET ZERO CARBON 2040

- Aim to achieve Net Zero Carbon by no later than 2040
 - Scope to include Scope 1 and 2 emissions, and a selection of Scope 3 emissions the University has direct influence of (flights, business travel, waste and water)
- Reduce energy consumption and eliminate energy waste
- Fossil Fuel Heating to be replaced by low carbon alternatives (mainly heat pumps)
- Electricity to be purchased via Power Purchase Agreements to guarantee zero carbon credentials
- Residual emissions, such as flights, to be offset

As the world slowly wakes up to the Climate Emergency that is upon us, it is evident that we must accelerate our route to Net Zero Carbon.

This Carbon Management Strategy 2020 - 2030 will continue our excellent progress and achieve further significant reductions of at least 80% compared to 2014/15 baseline by 2030 and will put us in an excellent position to become Net Zero Carbon by no later than 2040.

In line with Newcastle City Council and other institutions within the City, our aim is to achieve Net Zero Carbon by reducing carbon emissions as much as possible and then offsetting any unavoidable emissions. As we approach 2040, we will continue to be reliant upon grid electricity and potentially a small amount of gas. Emissions from scope 3 sources, such as flights, may also be significant need to be offset.

ACHIEVING NET ZERO CARBON

Energy Efficiency

The main priorities between now and 2040 are to change the way in which we heat buildings and reduce energy consumption by continuing to eliminate waste and improve efficiency. It is envisaged that the University will need to continue to invest roughly £1million per year to reducing energy use and increase renewable energy generation up to 2040.

Scope 1 and 2 Emissions

Figure 9 illustrates a potential trajectory of emissions towards 2040. It shows emissions from gas almost eliminated as we improve the thermal efficiency of our buildings to avoid wasting heat, and move to alternative forms of heating, mainly through electric heat pumps. Electricity use will have reduced considerably through grid decarbonisation but will still create some 2,000 tonnes of carbon dioxide, because of the need to drive heat pumps. We currently purchase electricity using Green Tariffs that source electricity from hydro and wind sources, but report emissions as the average for the National Grid. In future, we will purchase electricity through Power Purchase Agreements directly from renewable sources, which will guarantee the electricity is zero carbon and will not be calculated at grid emissions factors.

Scope 3 Emissions

Most of our Scope 3 emissions arise from travel, particularly air travel. Although there will be some reductions in emissions from flights by 2040, it is likely that they will be the University's most significant emissions source by 2040 and will need to be offset.

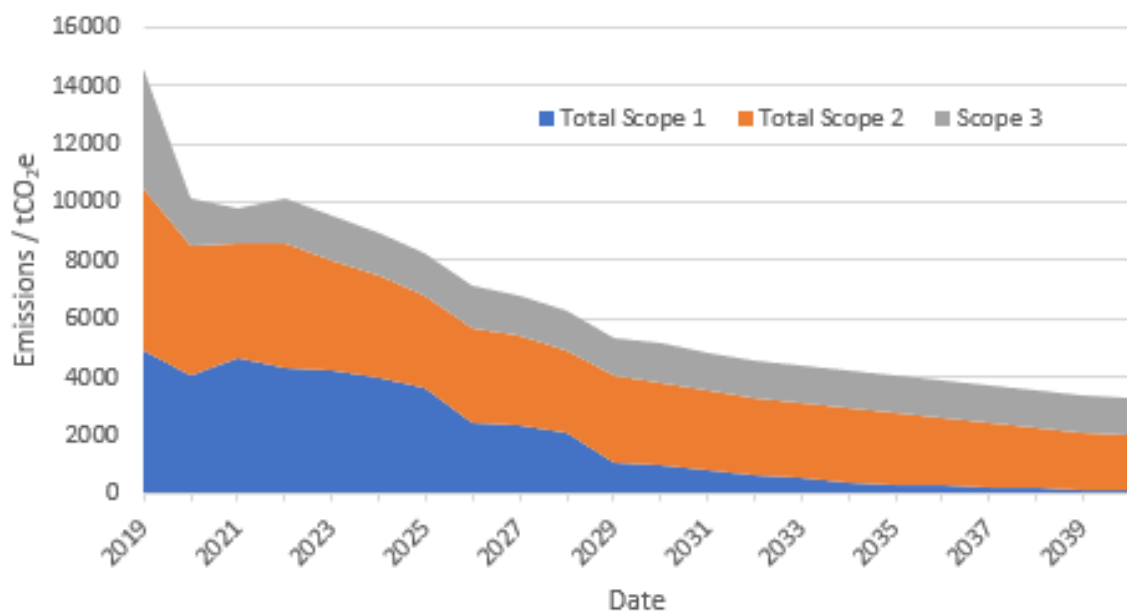


Figure 9. Emissions Projection to 2040

Offsetting

Based on the assumptions above it is estimated that the University will need to offset emissions of approximately 2,000 tonnes per year for gas and transport to be Net Zero Carbon, at a current cost of approximately £30,000 for a verified carbon offsetting scheme, such as UK tree planting.



10. GOVERNANCE

CARBON MANAGEMENT PROGRAMME BOARD

University Executive will strategic responsibility for the implementation of the Carbon Management Strategy, working through the University Sustainability Management Group, and the Carbon Management Programme Board. This Board was constituted in 2015, and will operationalise the Strategy through a range of actions:

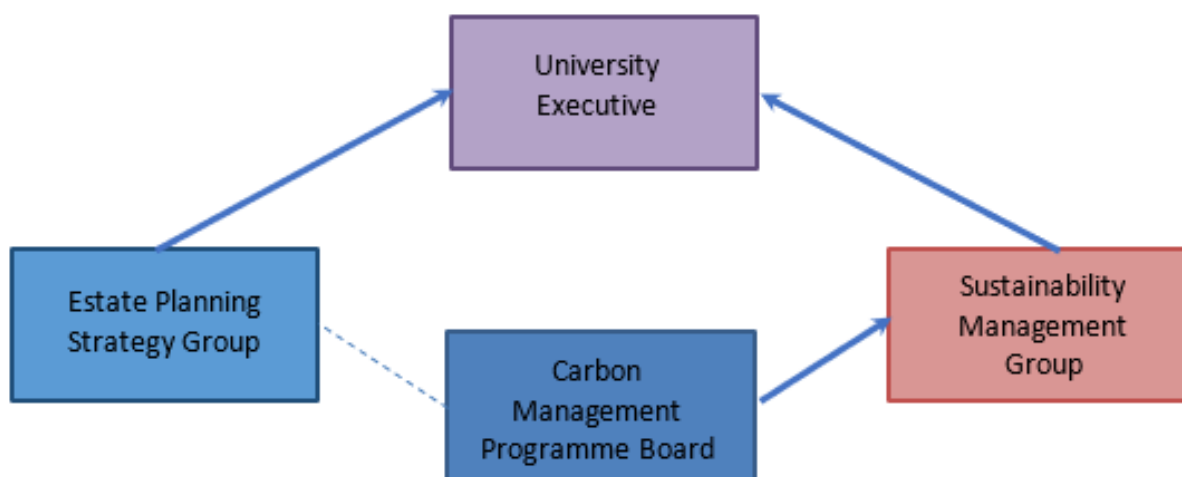
- Deliver the Carbon Management Strategy objectives and targets
- Champion and provide leadership on Carbon Reduction
- Embed a Carbon Reduction ethos at every level across the university
- Monitor and report on progress towards objectives and targets
- Review and champion plans for the financial provision of Carbon Reduction projects
- Agree spend on Carbon Reduction projects within the allocated budgets
- Programme and prioritise Carbon Reduction projects
- Review highlight reports for projects and remove obstacles to successful completion
- Ensure that there is a framework in place to coordinate projects in the Carbon Reduction Programme
- Approve the annual emissions report and publicise performance
- Oversee compliance of Carbon emissions legislation (including Display Energy Certificates, Energy Saving Opportunity Schemes)

Reporting

The Programme Board reports quarterly to the University Sustainability Management Group (Carbon Manager).

Annual reports on performance will be sent to the University Sustainability Management Group and included in reports to the University Executive.

The Programme Board will also liaise with the Estate Planning Steering Group to ensure future estate developments contribute to the reduction of CO2 emissions.





**Northumbria
University**
NEWCASTLE

