



SHAPING A BETTER WORLD SINCE 1845



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FOREWORD



Professor Ian Greer
President and Vice Chancellor
Queen's University Belfast

It is with great determination and ambition that we launch our Net Zero Plan, which sets out an integrated, whole-university approach to achieving net zero greenhouse gas (GHG) emissions by 2040.

In early 2022, Northern Ireland set a target of net zero carbon emissions by 2050 in the Climate Change Bill. As an anchor institution, we want to help lead the way, with our partners, in meeting this challenge – demonstrating what is possible.

This is not a simple journey, but it is necessary and urgent.

Our climate is changing. The effects of this are being felt now as a day-to-day reality. The science could not be clearer: we have before us just a short window in which to act decisively and play our part in tackling the climate crisis.

As part of Strategy 2030, we committed to embracing the Sustainable Development Goals across all our activities and to transition to a carbon neutral society. As a signatory to the UN Accord, we are committed to embedding The SDGs in every aspect of our activity.

This Plan sets out the key principles and a holistic action plan to take us to net zero carbon emissions. We recognise that this journey will involve many challenges, and that the achievement of our targets will be shaped by a number of factors – including developments in technology, infrastructure and government policy; however, the linchpin will undoubtedly be our people.

Achieving net zero will require all of us – staff, students, suppliers, and wider stakeholders – to work together to achieve our ambitions. And they are, indeed, just that – ours. This is a plan which has been developed through extensive consultation with staff, students, suppliers and partners. I am tremendously grateful to all within our community who took the time to help inform and challenge us with fresh perspectives, ideas and the latest thinking.

As we implement the new Plan, we build on the successes of our Carbon Management Plan 2010 and the good progress the University has already made in reducing our carbon emissions, with over £10 million invested in over 80 energy efficiency projects over the past 12 years and a wide range of impactful projects already implemented. To date, we have achieved a 21% reduction in carbon emissions at an institutional level. However, there is much more action that we can and will take to address our emissions.

With a rich heritage of innovation and a proud history of conducting innovative, impactful and world-leading research that is focused on the needs of society locally and globally, and a culture supported by our core values of Excellence, Connectivity, Ambition, Respect and Integrity, we are well placed to deliver on this plan.

We look forward to working together with you to achieve its ambitions.



EXECUTIVE SUMMARY

Queen's University Belfast is committing to achieving net zero greenhouse gas (GHG) emissions by 2040. This ambitious target reflects not just critical contribution that the University makes through world-leading research and education provision on sustainability, but also through its role as a social and civic leader in the transition to net zero in Northern Ireland and more widely, on the island of Ireland.

This document sets out the key principles through which the University will deliver net zero by 2040. This will be achieved by:

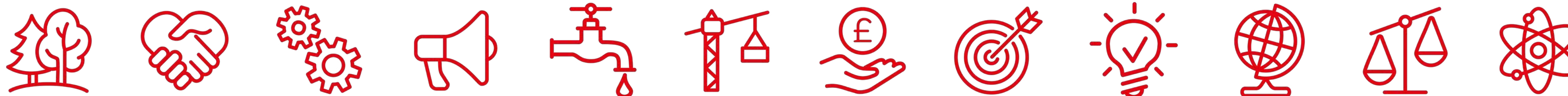
- taking a holistic approach to emission reductions across the institution
- aligning this work with our university values
- improving our resilience and response to the impacts of climate change
- implementing carbon offsetting where necessary
- Working collaboratively with our civic, regional and national partners

Reaching net zero emissions will require collective effort and support from all our staff, students, and external stakeholders. To achieve this, we must ensure that we integrate climate action into all that we do, including the management and care of our staff and students, the oversight of our research and teaching, and our infrastructure, assets and operations, as well through as our engagement with internal and external stakeholders. This approach will deliver a quicker, fairer and more just transition to net zero, and at the same time, improve our working practices, enhance the experience of our staff and students and support our regional, national and international engagement and reputation.

Our emissions and Net Zero Target

Our original Carbon Management Plan was launched in 2010 and set out a strategic commitment to reduce carbon emissions by 21% by 2021. That target was surpassed within seven years with a 23% reduction in emissions achieved by 2017-2018. Whilst significant work on carbon reduction has already begun, it must be accelerated, shaped and adapted in response to regional and national climate policies and in line with best practice within the sector.

In developing our new plan, we have used our 2018-19 emissions of 105,430 tonnes of carbon dioxide equivalent (tCO₂e) as the baseline for future planning. From this baseline we have modelled a comprehensive series of actions which will drive the required reductions in carbon production to reduce our emissions and achieve a target of net zero by 2040. Key high-level actions to achieve this will focus on Scope 1 (direct emissions from owned or controlled sources), Scope 2 (indirect emissions from the generation of purchased energy) and Scope 3 (indirect emissions from our university activities –such as procurement, travel, waste, and water).



EXECUTIVE SUMMARY

The actions we will take include:

- improving the energy efficiency of our buildings
- decarbonising our heating systems
- managing the use of our buildings more efficiently
- building and retrofitting to the highest sustainability standards
- implementing renewable energy technologies across our estate
- collaborating with the organisations in our supply chain to reduce the impact of what we buy
- avoiding unnecessary business-related travel and increasing uptake of sustainable travel
- reducing our waste and increasing recycling
- using our University campus as a Living Lab
- engaging the whole University community
- working in partnership with local industry, regional and national government, and NGOs.
- ensuring we meet our targets with oversight from university leadership and transparent reporting.

The climate crisis will have a significant impact on younger members of society in years to come. As a higher education institution, we have a responsibility to limit our impact on the climate crisis and to prepare students for a changing and challenging future.

As outlined in the following sections of this document, we will achieve this through a comprehensive programme focused on:

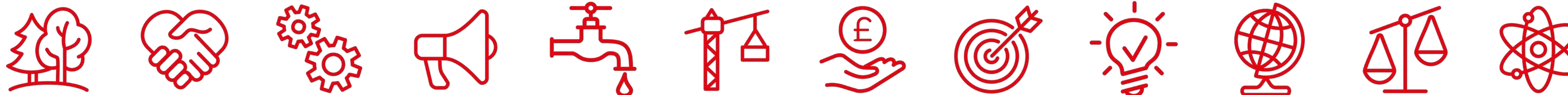
- Reducing our energy consumption (Chapter 4)
- Reducing our Scope 3 emissions – procurement, travel, waste and water (Chapter 5)
- Offsetting our remaining carbon emissions (Chapter 6)
- Developing plans for climate adaptation and resilience (Chapter 7)

A Just Transition and sustainable approach to net zero

One of the most significant challenges facing society is climate change. With that challenge comes a broad range of socio-economic issues which must be addressed in the process of securing a sustainable future.

As detailed in our Strategy 2030, we will work with all our stakeholders to support the transition to a zero-carbon society. Such an approach not only commits us to carbon reduction strategies but also to working in ways that are fair and that leave no one behind. Our transition must be managed both holistically and proactively and in partnership with our stakeholders and communities.

As we plan ahead and take action, ending our contribution to climate change presents a unique opportunity to improve the wellbeing of our staff, students, and the communities that we serve. Our journey must be fair and supportive of better futures for our staff, students, and wider Queen's community.



GLOSSARY OF TERMS

Abbreviation	Definition
ASHP	Air source heat pumps
BMS	Building Management System
CCC	UK's independent Committee on Climate Change
CE	Circular Economy
CF	Carbon factor
EAUC	Environmental Association for Universities and Colleges
EfW	Energy from Waste
EMS	Environmental Management System
FTE	Full-time equivalent
GIA	Gross internal area
HE	Higher Education
HESA	Higher Education Statistics Agency

Abbreviation	Definition
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt hour
LCA	Life-cycle analysis
LED	Light-emitting diode
LPG	Liquid Petroleum Gas
PV	Photovoltaic
Queen's	Queen's University Belfast
REGO	Renewable Energy Guarantees of Origin
RIBA	Royal Institute of British Architects
SDG's	UN Sustainable Development Goals
tCO2e	Tonnes of carbon dioxide equivalents
UNFCCC	United Nations Framework Convention on Climate Change



Chapter 1

Introduction

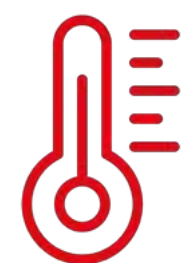


1.1 THE CLIMATE CRISIS

The climate crisis has reached breaking point. We are already experiencing extreme climate-related events on a national and international scale, the consequences of which are frequently unevenly and disproportionately felt by disadvantaged and marginalised communities. Rising global temperatures, melting ice caps, and a rise in the frequency of extreme weather events are all having noticeable and significant consequences for communities and the environment in the UK and throughout the world. So, the climate crisis is an environmental and social justice issue, which must be resolved through reducing inequality.

In the ‘State of the UK Climate 2021’ report¹, the Met Office confirms that since 1884, the 10 warmest years recorded have occurred in this century. In recent decades the climate has also been warmer, wetter, and sunnier than the 20th century, with our most recent decade (2012–2021) being on average 0.1 degrees warmer than the 1991–2020 average and 0.7 degrees warmer than 1961–1990.

Climate change projections for the Northern Ireland are similarly concerning and predict that we will have:



an increased chance of warmer, wetter winters and hotter, drier summers.



hotter summers are expected to become more common- by 2050 every other summer may be as hot as the record-breaking summer of 2018.



a trend for drier summers in the future, with increased likelihood of heavy summer rainfall.



rising sea levels in the 21st century, even if greenhouse gas emissions are reduced rapidly.

The impacts of climate change have also been experienced recently in Northern Ireland. On July 21, 2021, a temperature of 31.3 degrees was recorded at Castleterg, County Tyrone, setting a new all-time temperature record for Northern Ireland (Figure 1). This can negatively impact national infrastructure, people’s health and wellbeing, and further disturbing natural habitats and species.

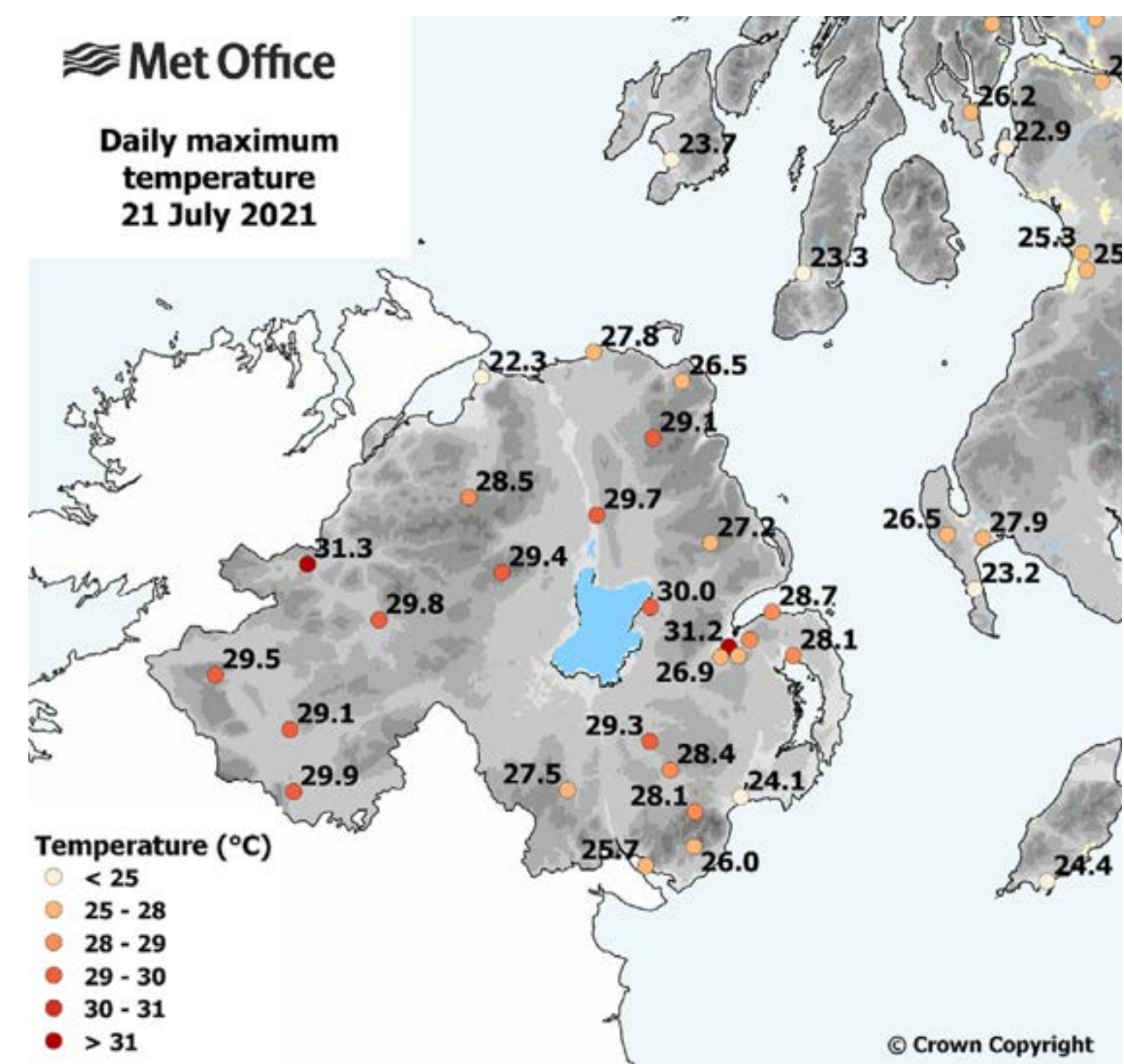


Figure 1
Daily maximum temperatures at stations across Northern Ireland on July 21, 2021.²

¹ <https://rmets.onlinelibrary.wiley.com/doi/10.1002/JOC.7787>

² P.54 - <https://rmets.onlinelibrary.wiley.com/doi/epdf/10.1002/joc.7787>

1.1 THE CLIMATE CRISIS

This record temperature is just one of many future projected climate change impacts due to the annual rise of average recorded temperature in Northern Ireland since 1884 (Figure 2).

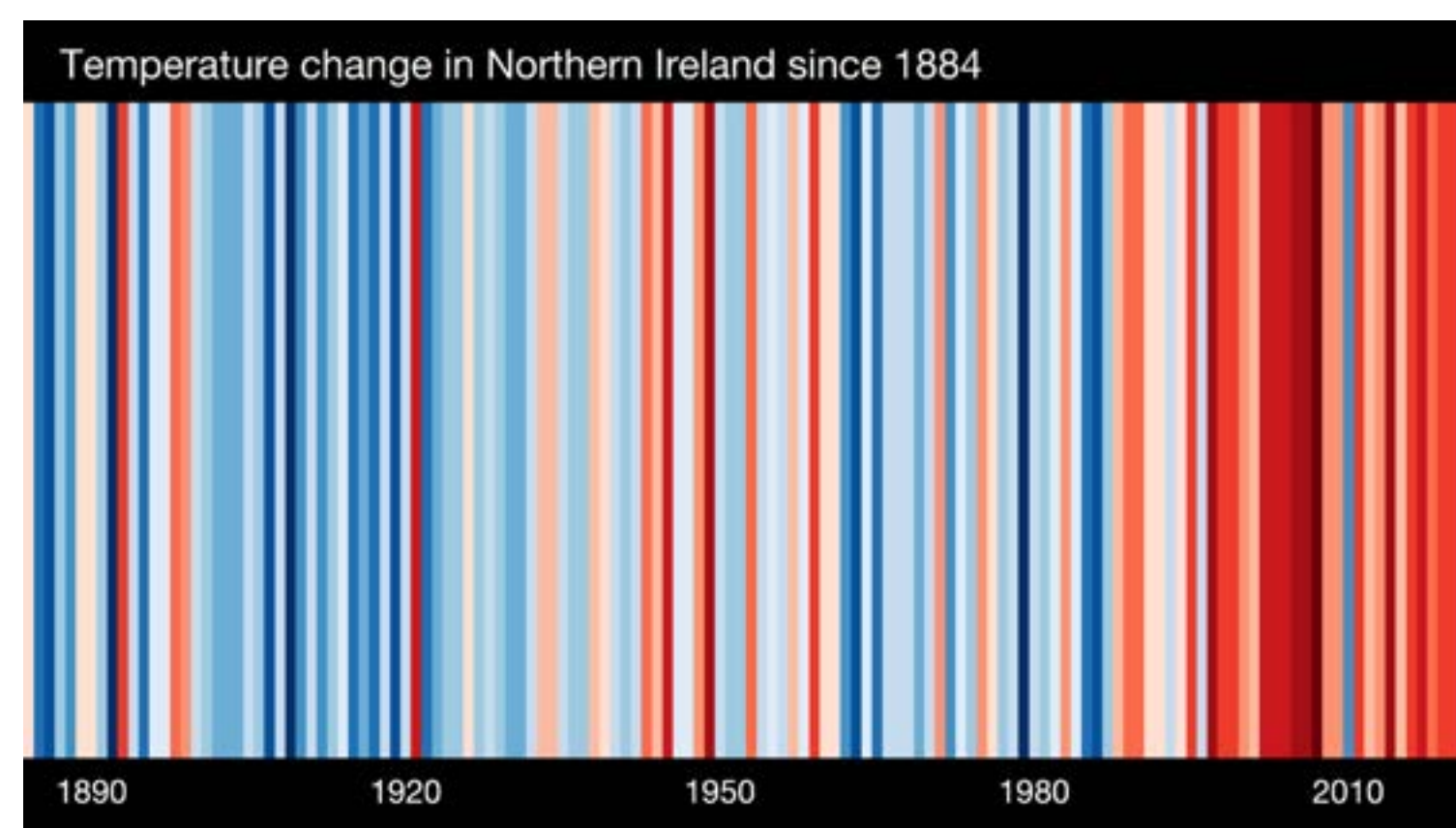


Figure 2
A visual representation of the change in Northern Ireland's temperatures as measured over the past 100+ years. Each stripe represents one year, starting in the late 19th century (left) up until 2021 (right). The 'warmer' the stripe the higher the average recorded temperature was that year. (Data: HadUK-Grid; Concept: Ed Hawkins).³

³ <https://showyourstripes.info//europe/unitedkingdom/northernireland>



1.2 GLOBAL DRIVERS FOR CHANGE

1.2.1 The Paris Agreement

In December 2015 The United Nations Framework Convention on Climate Change (UNFCCC) COP 21 summit approved 'The Paris Agreement,' committing all member states to give their best efforts to keep global temperature rise below 2 degrees above pre-industrial levels by the end of the century in 2100. Furthermore, the agreement pledged to promote measures to limit warming to 1.5 degrees or less.

1.2.2 IPCC Special Report

In 2018, the Inter-Governmental Panel on Climate Change (IPCC) produced a special report on the impacts of global warming of 1.5 degrees above pre-industrial levels and related global greenhouse gas emission pathways. The IPCC report found that whilst limiting warming to 1.5 degrees or less was possible, doing so would require 'unprecedented transitions in all aspects of society', especially given that that human activity has already caused an estimated 1 degree rise in global temperatures. The report also stresses that the effects of sea-level rise, drought, and flooding will not be felt equally, and the risk level presented by these threats is determined by factors such as socioeconomic development, political stability, geographical position, and ability to mitigate and adapt.

The most recent IPCC report published in 2023 emphasizes the need for urgency and ambitious action in tackling climate change if the 1.5 degree limit is to be met.

1.2.3 Public call for action

Aligned with change in global policies there has been a growing public call for immediate action on the climate crisis. There has been an emergence of activist groups such as 'Extinction Rebellion' and the international 'School Strike for Climate' or 'Fridays for Future' campaign, led by Greta Thunberg.

As part of this public call for action, it is the University's responsibility to contribute to global efforts for reducing the impacts of climate change on future generations – particularly because younger members of our society will feel the impact of climate change the most in the coming years (Figure 3).

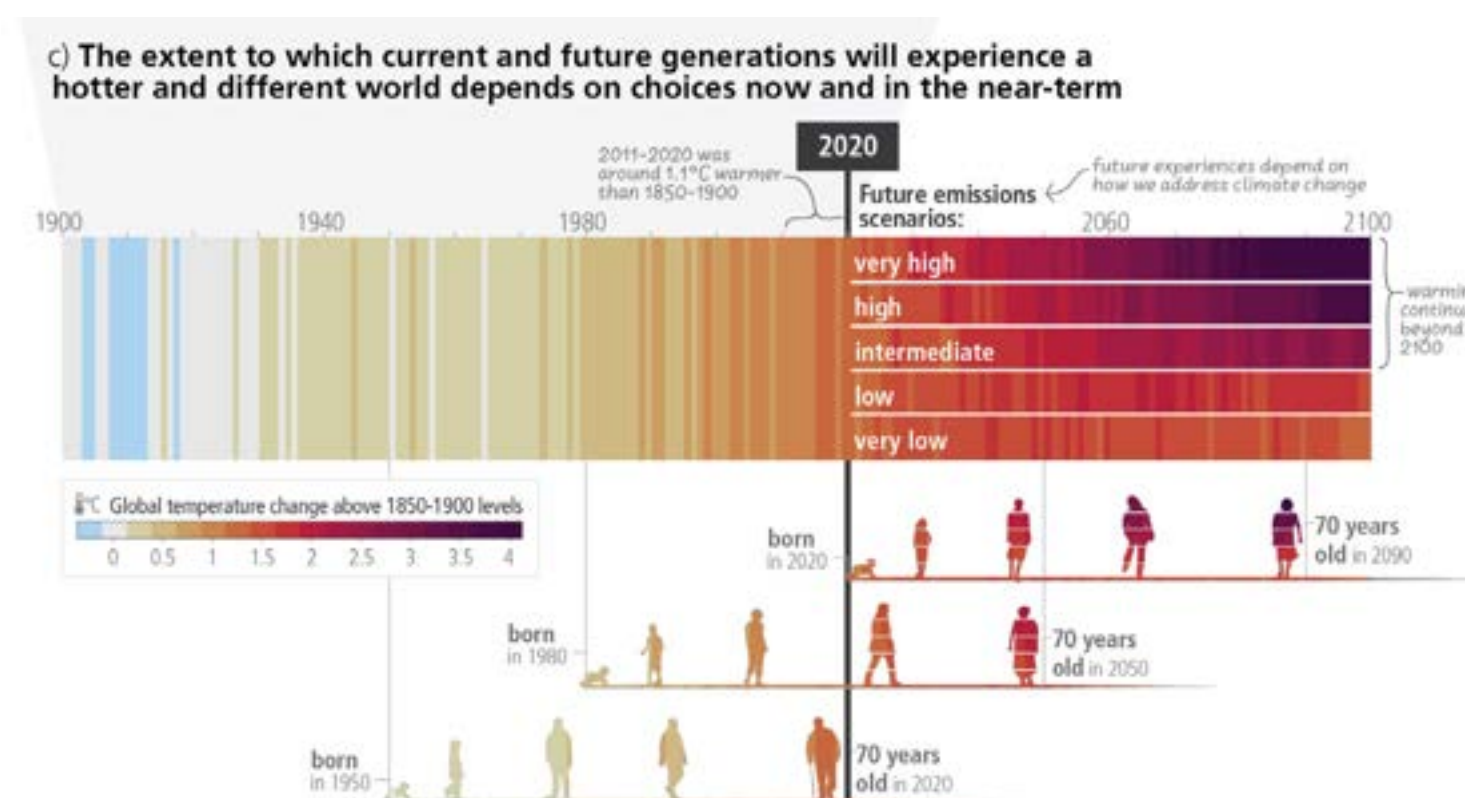


Figure 3: Future Emissions Scenarios

Detail taken from Figure SPM.1 in the AR6 Synthesis Report by the Intergovernmental Panel on Climate Change, shows the observed and possible future average global temperature changes. (United Nations Intergovernmental Panel on Climate Change)

1.2.4 UN global goals for Sustainability

The 17 Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere. These were adopted by all UN Member States in 2015, as part of the 2030 Agenda for Sustainable Development, and each goal has targets and indicators that UN member states are expected to use in setting their agendas over the next 15 years. Climate Change is at the core of how many of these goals can be delivered and as such, tackling climate change is essential for achieving sustainable development for all.

Queen's University is a signatory to the UN SDG Accord. The Accord recognises the key role that global universities play in nurturing a culture of sustainability and delivering on the SDGs by 2030 through research, education, and operations. We are committed to embracing them across all our University activities.



Figure 4: UN Global Goals for Sustainability

Illustration of all 17 Sustainable Development Goals (SDGs)

1.3 POLICIES AND DRIVERS

Our Net Zero Plan aligns with national and local legislation, policies, and drivers for reaching net zero carbon targets outlined below.

1.3.1 UK carbon targets

The overarching policy framework for carbon management in the UK is informed by the Climate Change Act 2008⁴, which has been updated to commit the UK to achieving Net Zero by 2050. The UK has also adopted a series of interim carbon targets to support progress towards this overall target – the UK is targeting to cut emissions by 78% by 2035, compared to 1990 levels⁵.

1.3.2 Northern Ireland carbon targets

Within Northern Ireland, the recent Climate Change Act (Northern Ireland) 2022⁶ similarly establishes a net zero target for 2050 against a 1990 baseline. Aligned with this, the Northern Ireland Green Growth Strategy sets out the long-term vision for tackling the climate crisis, including a commitment to develop Northern Ireland's first Climate Action Plan.

1.3.3 Belfast Carbon Targets

Belfast has developed a net zero carbon roadmap⁷, adopting city-wide targets to achieve net zero emissions by 2050, with interim targets of a 66% reduction from the 2000 baseline by 2025 and 80% reduction by 2030⁸. Progress against these targets is overseen and monitored by the Belfast Climate Commission which is co-chaired by the University and Belfast City Council. The Commission has been established to translate climate policy into action 'on the ground' to bring about transformative change.

1.3.4 Higher education specific guidance

Within the Higher Education sector a range of specific guidance documents have been developed to support institutions in delivering their net zero targets.

In February 2023 The Royal Anniversary Trust released "Accelerating towards Net Zero" an ambitious roadmap for carbon reduction in the tertiary education sector. The report provides a detailed carbon footprint of the tertiary education sector, using detailed modelling which highlights target areas for emissions reporting and reduction.

The EAUC (The Alliance for Sustainability Leadership in Education) have developed a number of specific HE guidance documents including the Standardised Carbon Emissions Framework for Further and Higher Education (SCEF)⁹. The methodology sets out a standardised reporting structure for Further and Higher Education against which we will align our carbon emissions reporting.

⁴ <https://www.legislation.gov.uk/ukpga/2008/27/contents>

⁵ [https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035#:~:text=The%20UK%20government%20will%20set,today%20\(Tuesday%2020%20April\).&text=Today's%20world%20leading%20announc](https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035#:~:text=The%20UK%20government%20will%20set,today%20(Tuesday%2020%20April).&text=Today's%20world%20leading%20announc)

⁶ <https://www.legislation.gov.uk/nia/2022/31/contents/enacted>

⁷ <https://pcancities.org.uk/sites/default/files/Belfast%20Net-Zero%20Carbon%20Roadmap.pdf>

⁸ <https://www.belfastcity.gov.uk/climate-change>

⁹ The SCEF was developed by EAUC. The Framework brings good practice and guidance and will develop a fuller understanding of how institutions contribute to the climate emergency and enable them to act.: <https://www.eauc.org.uk/scef>



1.3 POLICIES AND DRIVERS

1.3.5 Queen's University Strategy 2030

Strategy 2030 sets out our ambition to shape a better world through life-changing education and research across our disciplines and by investing in our people, both students and staff, to ensure excellence and impact.

Our Net Zero Plan aligns with our wider strategic vision, priorities, and commitments for Queen's as set out in our Strategy 2030:

The vision:

- to conduct leading-edge education and research, focused on the needs of our society

Strategic priority:

- Social and civic responsibility and economic prosperity

A commitment to:

- embrace the Sustainable Development Goals across all our activities
- transition to a carbon neutral society

Under the “Social & civic responsibility, and economic prosperity” pillar we plan to achieve a better and more sustainable future for all by 2030 by embedding the United Nations Sustainable Development Goals (SDGs) across all our activities, from research and education to adopting a leadership role in the promotion of the SDGs, and leading by example in areas such as climate action, equality, diversity and inclusion, sustainable procurement, and a commitment to disinvestment from fossil fuels.

SDGs that will be considered as part of the delivery of this plan are:



The University's role in supporting the net zero transition in the region is already well defined and includes:

- research collaborations with industry in areas like renewable energy, energy security, and carbon cooperatives
- work in shaping policy and practice in areas such as city climate action, active travel, urban green space in collaboration with the Belfast City Council,
- and in working with local communities through initiatives such Queen's Community and Place to support social innovation.

The impact of this work will not only benefit the wider region in its journey to net zero, but will also help solve future critical challenges (like energy security) for the institution.



1.3 POLICIES AND DRIVERS

1.3.6 The Just Transition

To tackle environmental challenges like climate change, nations and businesses need to transition towards greener, resilient, and climate-neutral economies and societies.

A Just Transition means greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating work opportunities, and leaving no one behind. This involves maximizing the social and economic opportunities of climate action, while minimising any challenges – including through effective social dialogue among all those impacted.¹⁰

In taking this approach, including additional capital expenditure, we can better deliver a quicker, fairer and just transition to net zero, that improves our work practices, enhances the student experience, supports the community, and improves our international reputation.

Therefore, we will look to develop an approach that considers the Just Transition across our plans and actions to ensure that we are supporting those most vulnerable within our sphere of influence.



¹⁰ International Labour Organisation (ILO) - https://www.ilo.org/global/topics/green-jobs/WCMS_824102/lang--en/index.htm

1.4 WHAT WE HAVE ACHIEVED ALREADY

Our net zero journey commenced back in 2010 with the publication of the original Carbon Management Plan (CMP). Since then, the combination of an active carbon management programme, building refurbishments, waste reduction, active travel initiatives and low carbon technologies have helped to reduce our emissions by 21%. These reductions have been further supported by a drop in the carbon intensity of the grid electricity because of an increased use of renewables.

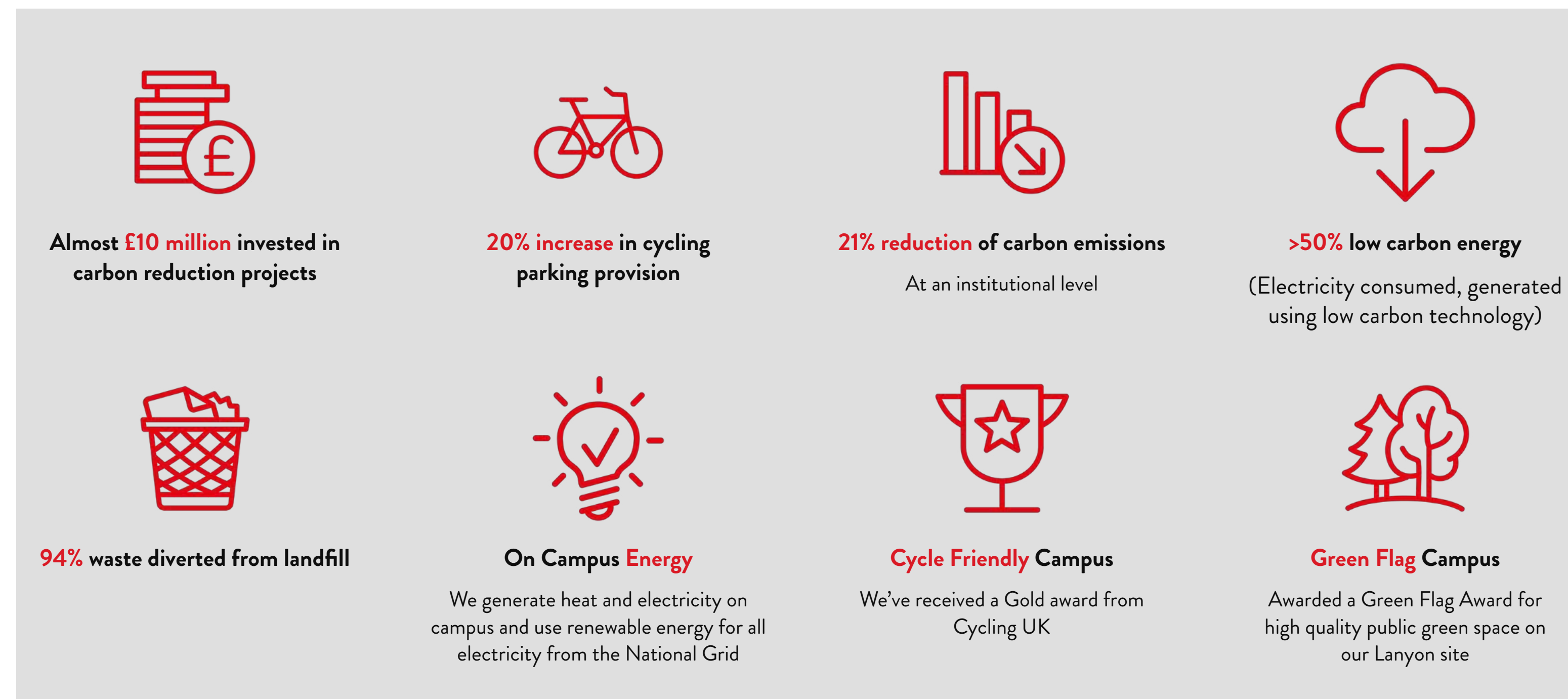


Figure 5: Operational sustainability highlights to date
www.qub.ac.uk/about/sustainability/campus-activities

1.5 APPROACH TO DEVELOPING THE NET ZERO PLAN

Our process for developing this Net Zero Plan has involved:

- establishing a new emissions baseline (2018-19)
- calculating the steps necessary to achieve net zero by a target of 2040
- reviewing our buildings for potential energy efficiency improvements and technologies
- analysing our scope 3 emissions
- developing a climate adaptation plan
- engaging with the Queen's community to ensure their aspirations are reflected in the Net Zero Plan



1.6 WITH WHOM HAVE WE ENGAGED?

Our comprehensive engagement with the University community was fundamental to the development and subsequent design of this plan and the proposed interventions identified below.

Stakeholder engagement included students, staff (academic and professional services), suppliers and the wider community (Figure 6). This was particularly important as it provided a better understanding of how the various stakeholders feel the university should respond to the climate crisis and allied net zero mitigations.

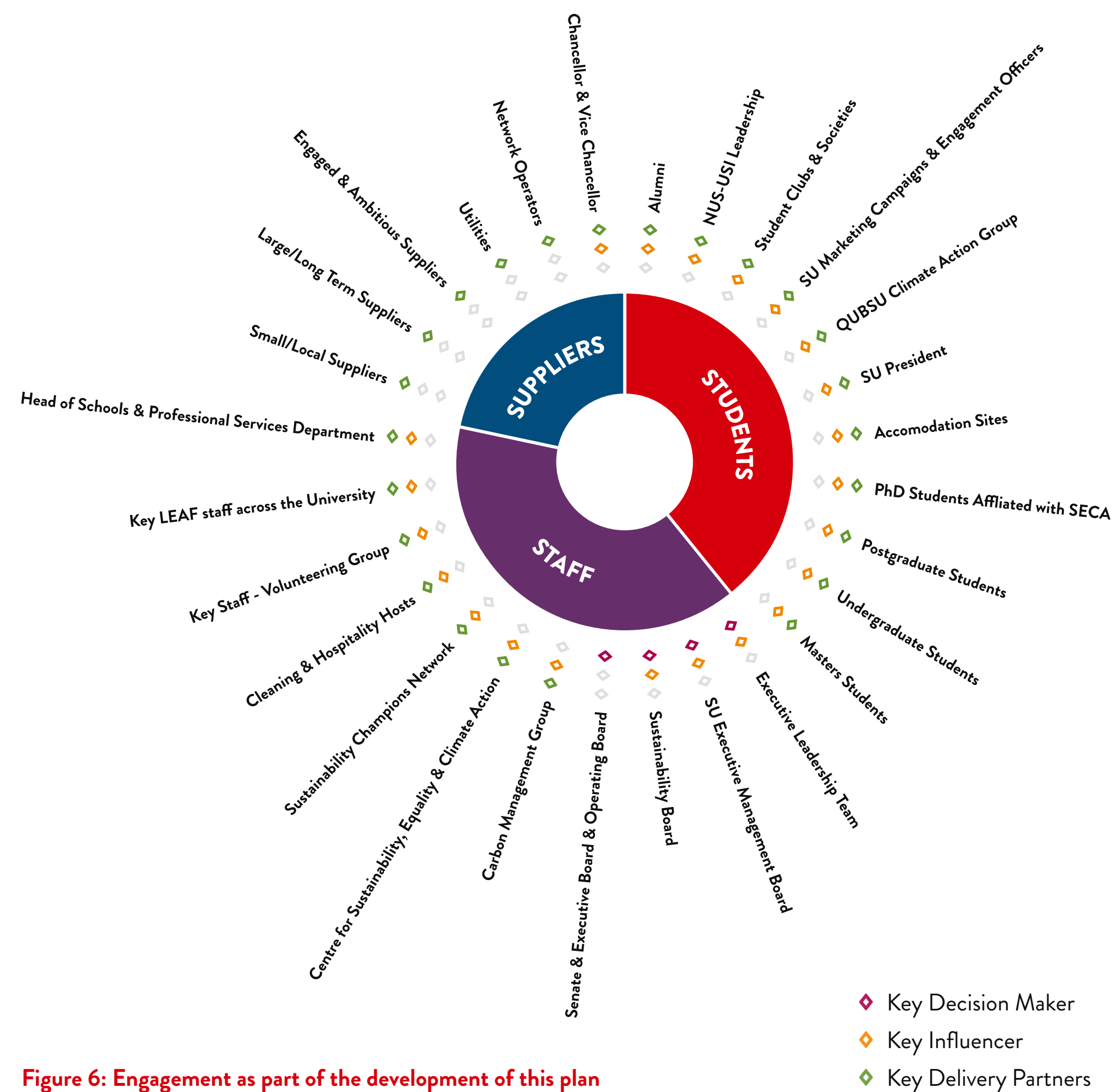


Figure 6: Engagement as part of the development of this plan

1.6 WITH WHOM HAVE WE ENGAGED?

1.6.1 Types of participant engagement

To ensure that the engagement was as inclusive as possible, we created a range of events over the time period November 2022 to January 2023 providing university-wide online surveys and online and in-person workshops, for staff and for students. These events were developed and promoted in partnership with our University communications teams.

The University-wide online survey sought to gauge the opinions of the campus community and beyond on areas such as the need for a Net Zero Plan, how carbon reduction may occur and the ways in which participants would like to be involved with the process in the future. Over 2,100 staff and students responded to the survey.

Other engagement activities were specifically developed to gain insight into key aspects of our net zero journey. Over 280 staff and students participated in range of online and face to face workshops. These included a workshop for procurement staff, an operations & adaptations workshop, a supplier's workshop and a travel workshop. Alongside these there was also a Senior Management workshop, a staff workshop and a student summit.

1.6.2 Aims of participant engagement

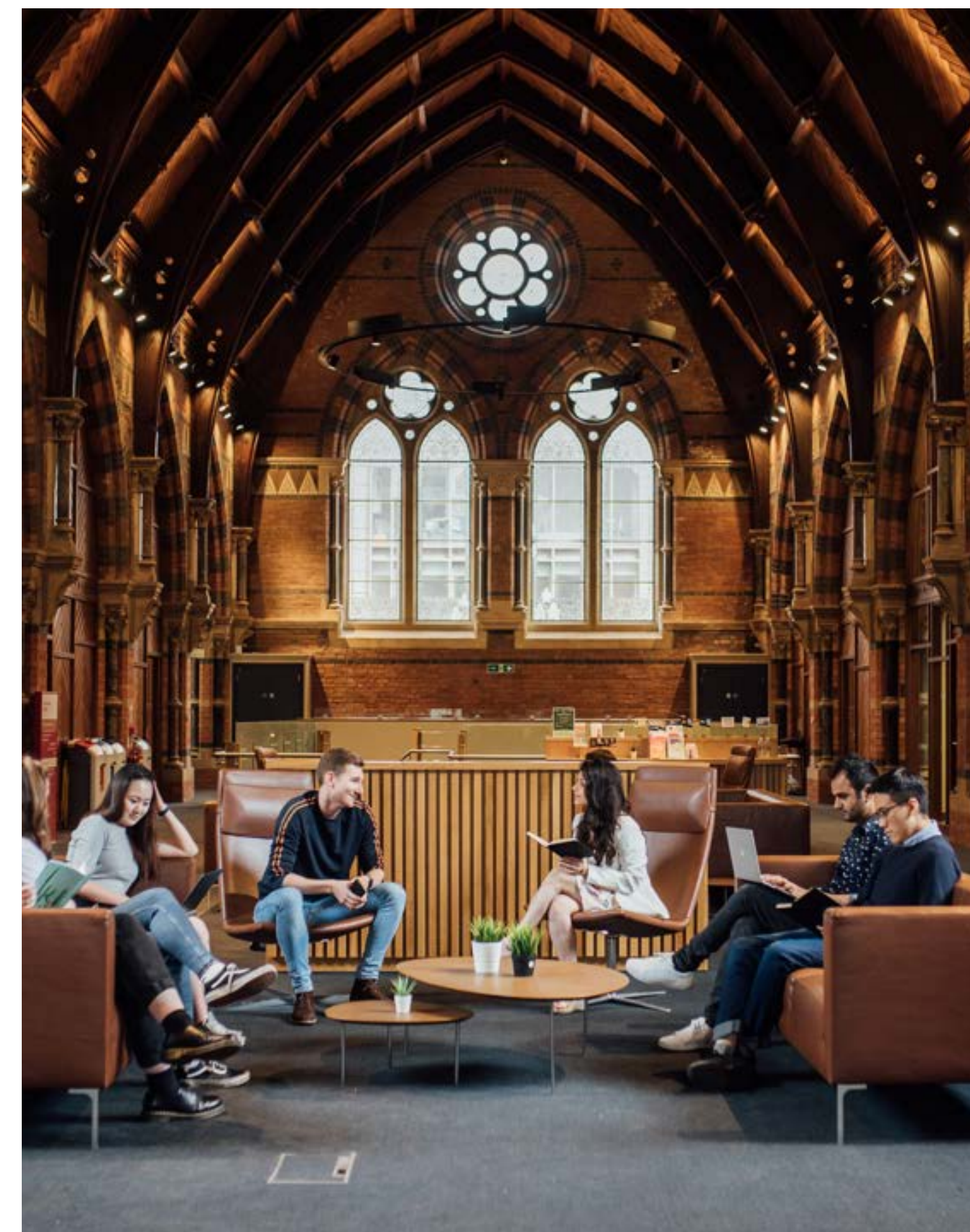
The aims of our engagement with participants were:

- to raise awareness and inform the development of a Net Zero Plan within the University
- to facilitate conversations across the University community regarding a net zero campus
- to embed collective responsibility for the delivery of a Net Zero Plan

Overall, our engagement activities highlighted that the biggest motivators for people supportive of the transition to net zero are:

- reducing the impacts of climate change on our children and future generations
- ensuring that what we do is fair and supports a Just Transition
- a response to climate change as a moral imperative

Our engagement also highlighted a campus-wide enthusiasm for increased collaboration in driving forward the work on a net zero transition.



Chapter 2

Reducing our carbon footprint



2.1 EMISSIONS SOURCES

The baseline for this plan includes all Scope 1, 2 and 3 emissions in our core carbon footprint. Such emissions will be the focus of actions to remove, reduce or offset the resulting carbon to achieve net zero by 2040. These are detailed in the following tables.

At an organisation level, Greenhouse Gas (GHG) emissions are typically accounted for using the Scopes in the following sections.¹¹

2.1.1 Scope 1 emissions

These are ‘direct’ emissions from sources owned or controlled by the reporting organisation. Such sources are facilities such as boilers or fleet vehicles.

Our emissions in this category are:

GHG protocol category	Description	Relevant to Queen’s
1.1 Natural gas	Combustion of natural gas in on-site boilers, CHP etc.	✓
1.2 Fleet (owned/operated)	Fuel (e.g., diesel, petrol) combusted in vehicles owned or leased by the organisation. This captures where the organisation purchases the fuel itself	✓
1.3 Fugitive emissions from reffridgerants	Emissions from leakage of refrigerants where these have a Global Warming Potential (GWP) in their own (e.g., R134a has a GWP (CO2e) 1430 times CO2).	✓
1.4 Other fuels	Combustion of fuels (e.g., diesel, fuel oil) in on-site boilers, generators etc.	✓
1.5 Land-related emissions & Livestock	Direct emissions associated with the use of land. These vary depending on the exact use, but can include conversion of nitrogen in fertilizers to N O, methane emissions from waste or manure, and conversion of land to other uses	✗

¹¹ <https://ghgprotocol.org/corporate-standard>

2.1 EMISSIONS SOURCES

2.1.2 Scope 2 emissions

These are indirect emissions from the generation of purchased electricity.

Our emissions in this category are:

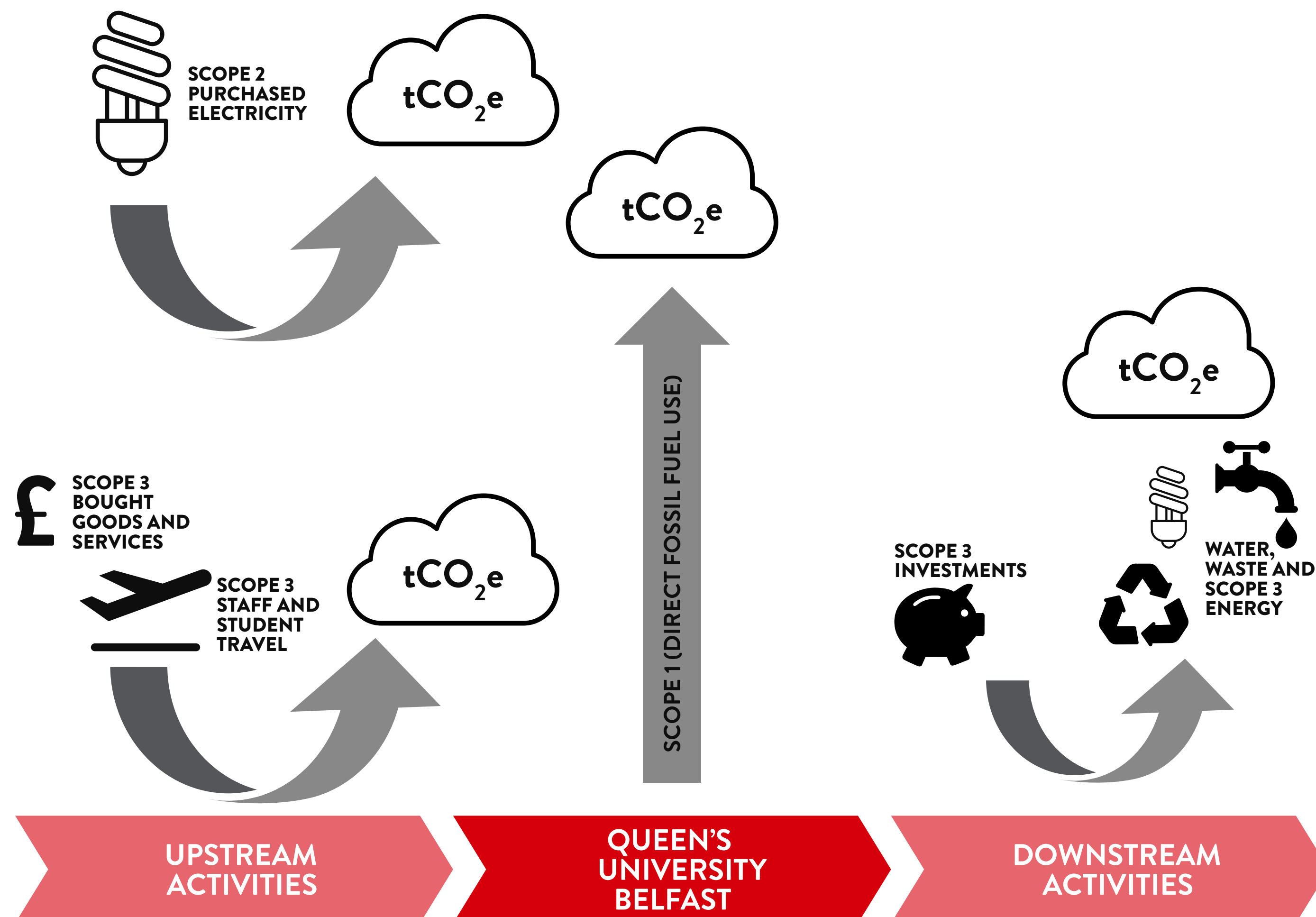
GHG protocol category	Description	Relevant to Queen's
2.1 Purchased Electricity & REGO (see glossary of terms for definition)	Purchased electricity and district heating. I.e., fuel is combusted by another organisation, but the energy created is purchased by the reporting organisation.	✓
	Electrical recharge	✓
	REGOs describe credits created by renewable electricity generators, they can be used to lower an organization's gross market-based Scope 2 emissions from purchased electricity	Not purchased in baseline year
2.2 Purchased heat or steam	Defined as district heating or steam that is purchased or otherwise brought into the organizational boundary of the reporting Institution.	✓



2.1 EMISSIONS SOURCES

2.1.3 Scope 3 (other indirect emissions)

These are indirect emissions (i.e., those owned, controlled, and generated by others) which result from the reporting organisation's activities. Examples include procurement, travel, investments, waste and water.



2.1 EMISSIONS SOURCES

Scope 3 emissions are typically the largest component of any organisation's carbon footprint, particularly in the Higher Education sector. Within the GHG Protocol, Scope 3 emissions are an optional reporting category. They also have more complicated boundaries than Scope 1 and 2 emissions (due to the range and complexity of activities that impact on Scope 3 emissions).

The Greenhouse Gas Protocol Corporate Value Chain (Scope 3) guidance divides Scope 3 emissions into 15 different subcategories, with guidance on which of these emission sources an organisation should quantify and report.

Our carbon baseline assessment includes Scope 3 emissions relating to staff commuting, student commuting, business-related travel, student travel from out of term address to university, capital projects, purchased goods and services and electricity network losses. Most of the carbon footprint for 2018/19 comes from Scope 3 emissions.

Additional scope 3 emissions relate to the transport of goods and services to and from the university, lease of assets by the university, processing of sold products, use of sold products, end of life treatment of sold products, downstream leased assets, franchises, and investments. These are not covered as part of our baseline emissions at this stage.

Our emissions in this category are:

GHG protocol category	Description	Relevant to Queen's
3.1 Purchased goods and services	Materials and services purchased/procured by the university – Classified	✓
	Materials and services purchased/procured by the university – Unclassified	✓
	Water purchased by the university from the utility provider	✓
3.2 Capital goods	Construction or refurbishment of university buildings	✓
3.3 Fuel- and energy-related activities	Transmission and distribution losses in electricity distribution systems and emissions associated with extraction and processing of fuels (well-to-tank).	✓
3.4 Upstream transportation and distribution	Emissions associated with transporting and distributing goods and services, such as delivery vehicle emissions (e.g., DPD, Evri)	✓
3.5 Waste generated in operations	Wastewater treatment	✓
	Waste and recycling	✓
3.6 Business travel	Staff travelling for business reasons	✓
3.7 Employee commuting	Staff travelling to and from the university	✓
3.8 Upstream leased assets	Emissions associated with producing assets (embodied emissions) that the university leases from another entity, such as the embodied emissions of buildings or vehicles.	✗
3.9 Downstream transportation and distribution	Students travelling to and from the university – daily commuting to/from campus	✓
	Students travelling to and from the university – travel between term address and home address.	✓

2.1 EMISSIONS SOURCES

GHG protocol category	Description	Relevant to Queen's
3.10 Processing of sold products	Emissions associated with processing products make by the university, such as manufacturing operations	✗
3.11 Use of sold products	Emissions associated with consumer use of products that consume fuels or electricity, directly or indirectly.	✗
3.12 End of life treatment of sold products	Emissions associated with disposal of products, such as demolition, incineration, landfill	✗
3.13 Downstream leased assets	Emissions associated with operating or producing assets that the university owns and has leased to another entity such as commercial unites, student residential buildings and land.	No data currently available
3.14 Franchises	Emissions associated with operating franchise that are not included in Scope 1 or Scope 2.	No data currently available
3.15 Investments	Emissions associated with spending of investments made by the university, including pensions, project finance, and equity and debt.	No data currently available

2.2 CURRENT EMISSIONS BASELINE

The academic year of 2018-19 has been used as a baseline for our 2040 net zero target. This is the most recent year that has complete and accurate data before the impact of the COVID-19 pandemic in 2019-20 and 2021-22.

The carbon baseline emissions for 2018/19 were estimated to be 105,000 tonnes of carbon dioxide equivalents (tCO₂e). Note that emissions relating to franchises and investments, are not currently calculated, and therefore excluded in this footprint.

A breakdown of the carbon emissions data for our 2018/19 baseline year has been included in [Table 1](#), with further detail available in Appendix A. A visual breakdown of this can be found in [Figure 7](#). Emissions associated with waste and water are included in our baseline, but since they are so small in comparison to others they are not included in our visual breakdown.

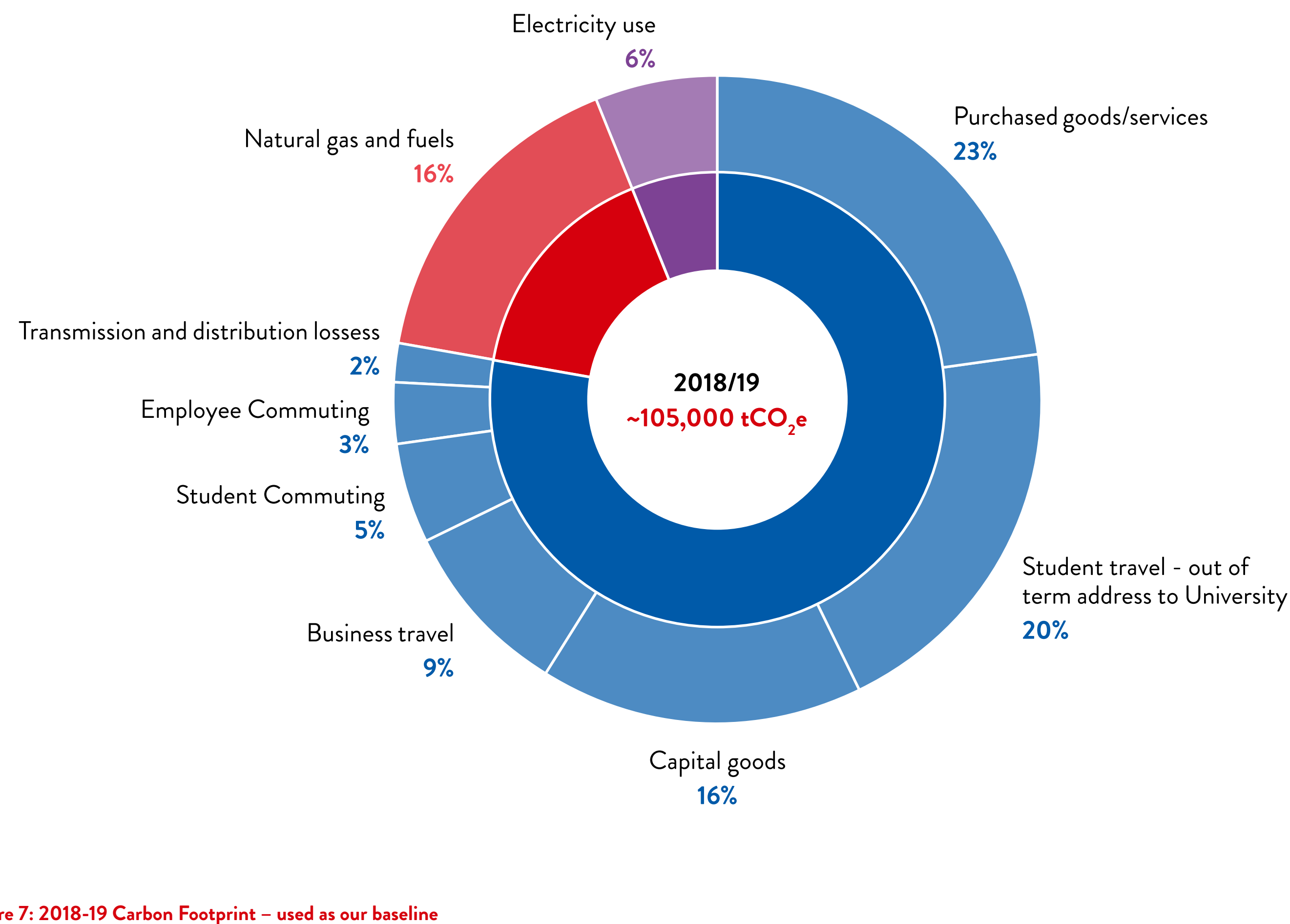


Figure 7: 2018-19 Carbon Footprint – used as our baseline

2.2 CURRENT EMISSIONS BASELINE

GHG protocol category	Description	Relevant to Queen's
Procurement of goods and services	3	23%
Student travel to and from home address	3	20%
Natural Gas and fuels	1	16%
Capital Goods (Building works)	3	16%
Business-related Travel	3	9%
Purchased Electricity	2	6%
Student commuting	3	5%
Employee Commuting	3	3%
Transmissions and distribution losses	3	2%
Water	3	Less than 0.001%
Fleet	1	0.05%
Waste	3	0.10%

Table 1: Scope of the University's Carbon Emissions



Chapter 3

Our approach to net zero



3.1 WHAT IS NET ZERO?

Net zero means achieving an overall balance between greenhouse gases produced and those taken out of the atmosphere.

This should be achieved through a rapid reduction in carbon emissions. However, where zero carbon is not possible, offsetting through carbon credits or sequestration through nature-based or technological solutions may need to be used. The Institution's approach to achieving net zero is illustrated in [Figure 8](#).

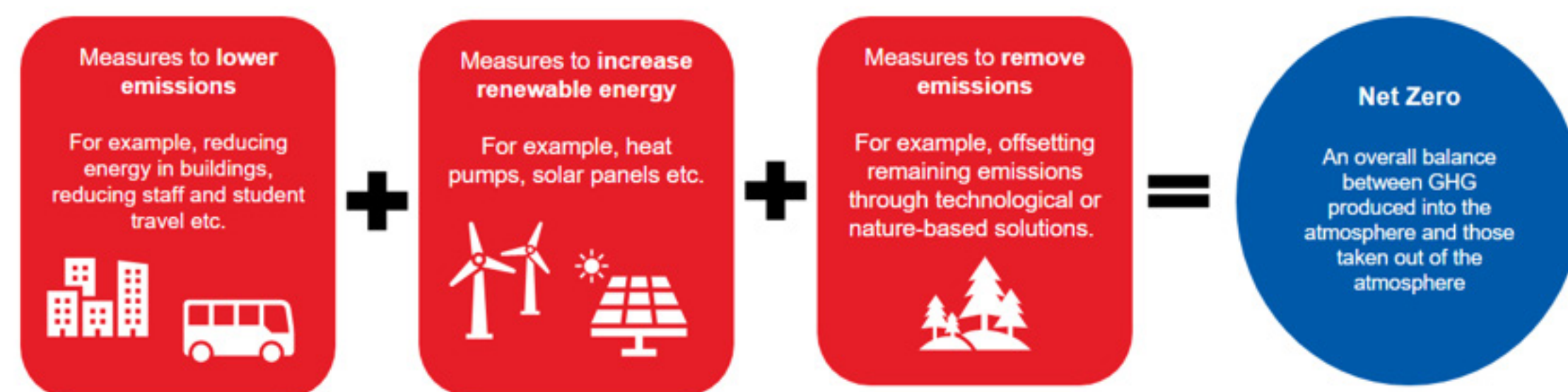


Figure 8: Flowchart detailing our approach to net zero

A visual representation of how we plan to firstly lower emissions; then implement measures to increase renewable energy; and finally, implement measures to offset emissions when the other measures have been carried out.



3.2 OUR PRINCIPLES FOR REACHING NET ZERO

To achieve net zero carbon, we have adopted the following hierarchical principles (Figure 9) based on 4 key steps:

- **avoiding** activities that may increase emissions without considering ways that will have less of an impact on carbon emissions
- undertaking projects/actions/interventions that will **reduce** carbon emissions from our assets and activities
- making use of low-carbon alternatives such as renewable heating and energy technologies, electrified vehicles, and purchasing of **lower carbon** goods and services, etc.
- When all feasible measures have been implemented, consider using carbon **offsets** for our remaining carbon emissions.

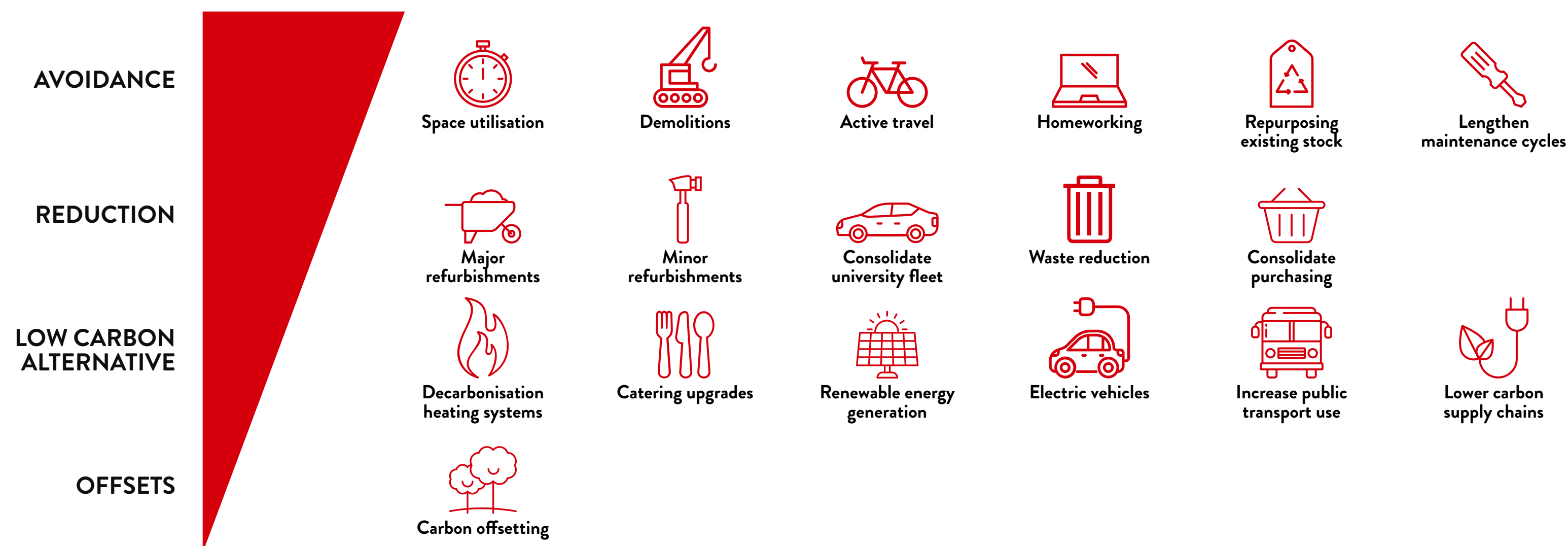


Figure 9: Hierarchy of net zero principles

3.2 OUR PRINCIPLES FOR REACHING NET ZERO

Each of the above principles has a range of associated interventions that must be addressed in order to achieve net zero emissions. These principles and interventions are detailed below:

Principle	Interventions
Avoidance	<ul style="list-style-type: none"> – Increasing space utilisation along with an efficient zoning and controls strategy can help to avoid energy use if buildings when areas are not in use. – We need to look at ways to avoid transport emissions through encouraging active travel (e.g., walking, cycling), homeworking and virtual meeting. – We need to prioritise retrofit and reuse of existing buildings instead of demolition. – We need to encourage more flexible hybrid working patterns such as working from home or working remotely to reduce emissions from travel and increased energy use in our buildings. – We will need to find better ways of extending the life cycle of products and services, etc. by reusing and/or repurposing what we already have. Can we avoid purchasing certain products or services altogether? – We must lengthen maintenance cycles to increase the life cycle of university assets, etc.
Reduction	<ul style="list-style-type: none"> – Refurbishments of existing buildings will be needed to reduce the energy consumptions associated with heating, ventilation, cooling, and lighting. This will need to take a holistic and site-specific approach to ensure all factors are considered when making energy efficiency improvements. – Order consolidation on purchased goods and services will help to reduce demand and consumption. – Water consumption will need to be reduced using efficient sanitaryware and water saving technologies. – Waste generation will need to be reduced through measures that encourage a Circular Economy, such as through reduction, reuse, repair, and recycling.

Principle	Interventions
Low Carbon Alternatives	<ul style="list-style-type: none"> – We must completely decarbonise our activities and will therefore require us to step away from fossil fuel-based sources of emissions. – Gas based heating systems used for space heating and hot water will need to be replaced with fossil fuel free alternatives. – The technology recommendations to get to net zero carbon rely on zero carbon electricity. However, as the grid electricity may not be zero carbon by 2040, renewable energy generation will be required to mitigate this. Onsite renewable energy generation should be prioritised over offsite renewables. The purchase of renewable energy generated off-site can also support the net zero carbon target. – Low carbon alternatives will need to be sought for purchased goods and services and lower carbon materials should be used for capital construction projects. – Rainwater and greywater harvesting should be utilised where feasible as an alternative where fresh water is currently being used for activities where it is not required (e.g., landscaping). – Transportation will need to be decarbonised through electrification of vehicles and the adoption of other lower carbon modes of transport.
Offsets & Green Energy Procurement	<ul style="list-style-type: none"> – Even when all the feasible measures to reduce carbon reductions have been exhausted, it is unlikely that we will achieve net zero emissions by 2040 without additional carbon offsets to cover the remaining carbon emissions that are left over. – Green energy should be purchased where feasible and required, such as renewably sourced electricity purchased through our energy supplier.

3.3 OUR NET ZERO CARBON TARGET

We are committed to achieving a target of net zero GHG emissions by 2040 across Scope 1, 2 and 3 emissions, as identified within our current carbon footprint. In addition and along with all local public sector organisations, we are committing to supporting the NI Government target of 48% reduction in emissions by 2030 for our Scope 1 and 2 emissions. Interim targets specific to each key area will be set for our Scope 3 emissions in the first 12 months of the Net Zero Plan. Across all strands of our carbon reduction work, we will have to continuously review and amend our plan and associated activities to address unplanned impacts in the future.



3.4 FACTORS IMPACTING DELIVERY OF OUR NET ZERO TARGET

Achieving net zero carbon is ambitious and challenging, particularly so given the climate crisis faced by the planet and its people.

Setting 2040 as a target, in advance of the NI 2050 target creates a sense of urgency, particularly for driving change across the university and in demonstrating regional and civic leadership in tackling the greatest long-term threat to the planetary ecosystem. The target aligns with the commitments Set out in our Strategy 2030 and with the expectations of our university community. In setting this ambitious target we will lead by example aligning our practices and operations with the knowledge and expertise of our research on climate change.

A number of factors will impact the delivery of the 2040 target including:



Scope 3 emissions which account for 80% of our emissions are not in the organisation's direct control – e.g. reliance on suppliers decarbonising, external infrastructural changes to public transport and cycling networks and reducing these will be challenging.



Policy development and capacity around alternatives to natural gas e.g. green gas.



The campus infrastructure, which includes a significant proportion of buildings located within a designated conservation area. This currently places limitations on building refurbishment which impact on decarbonisation.



Technological developments and advancements in energy generation, supply and consumption.



The rate at which the Northern Ireland electricity grid will decarbonise and at the same time meet the additional capacity required for technologies such as heat pumps.



Evolution of the off-setting markets.



Energy security risks associated with a decarbonized energy sources e.g. dependence on intermittent sources such as solar and wind and need for flexibility of other sources



Strategy 2030 ambitions and targets for growth in the campus infrastructure, staff and students.



Evolving international, national, and local government policy and legislative requirements including taxation and incentives.

Chapter 4

Reducing our energy consumption



4.1 INTRODUCTION

This section provides an overview of the approach to reducing Scope 1 and 2 carbon emissions from energy and an overview of the interventions that are required to reach net zero by 2040.

The approach we will take to reducing these carbon emissions is illustrated in **Figure 10**, which highlights the following hierarchical approaches:

- **Be lean** – use less energy through behaviour change measures across the university and its operations; controls measures; systems efficiency improvements; fabric measures; and lighting improvements.
- **Be clean** – decarbonising heat sources and technologies for our buildings and other assets.
- **Be green** – powering our buildings and other assets using renewable energy.
- **Offset** – offsetting our remaining carbon emissions through offsetting and/or carbon sequestration regimes.

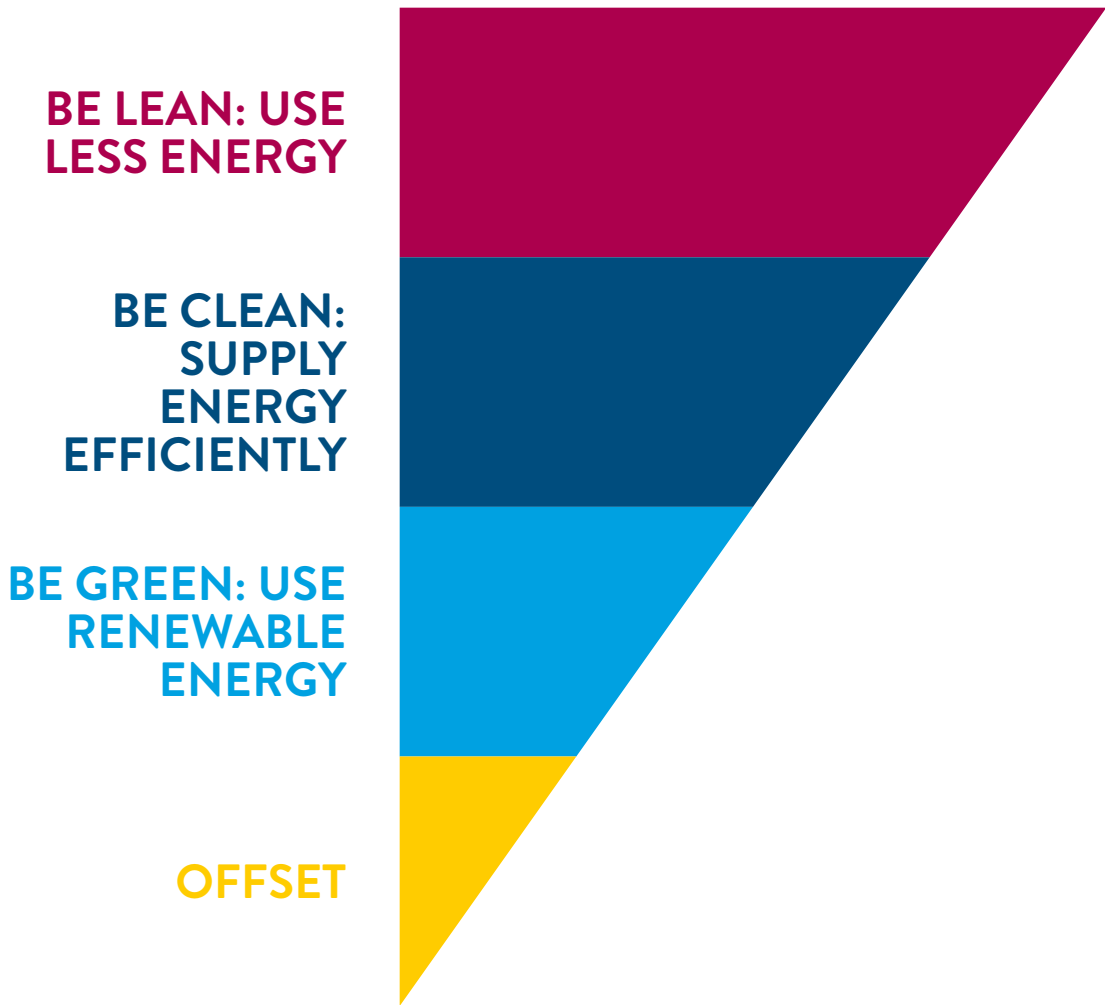


Figure 10: Scope 1 and 2 carbon reduction hierarchy

An approach that looks to first use less energy, decarbonise heat and using renewable energy before then using carbon offsetting regimes.

Key intervention
– Upgrade of Building Controls for heating, cooling, and lighting etc.
– Replacement of florescent lighting with energy efficient LED fittings
– Building fabric, glazing and insulation upgrades
– Review and where feasible upgrade heating systems with low to zero carbon alternatives
– Where feasible install photovoltaic panels across the estate
– Improve metering and data management systems
– Where possible purchase renewable energy (Green electricity & Green gas) in place of fossil fuel-based supplies

Table 2: High-level interventions required to reduce our Scope 1 and 2 carbon emissions to 2040.

4.2 ENERGY CONSERVATION

Energy conservation opportunities can be split into three broad categories: fabric measures, controls measures and system efficiency improvements. The measures proposed within each of these categories can be undertaken in isolation, however the impacts of each will be considered on a building-by-building basis as our works are carried out. Notably, taking a more holistic whole-building approach will maximise the benefits in reducing our energy use across our estate.

4.2.1 Building retrofit - insulation and lighting improvements

A building fabric first approach is the best route for saving energy and reducing carbon emissions from energy. Reducing demand initially with building retrofit will allow us to better understand our minimum energy usage for heating.

This will include (but not limited to) a range of measures such as: double and triple glazing, insulation (for roofs; under floors; in wall cavities; and on external walls); draught-proofing and building maintenance and repairs.

Older energy inefficient lighting will be replaced with more efficient technologies such as LED lighting, but only where required, and where they can support already well-lit areas served by good natural light from nearby windows.

The approach to energy efficiency improvements are dependent on the type and age of the building. Examples of building types and potential energy efficiency interventions across our estate are:

- **Pre 1910:** Administration and teaching (seminar and lecture spaces) buildings
 - installation of additional roof insulation and floor insulation to reduce heat loss and replacing existing windows with heritage-style double-glazed sash windows (in line with regulations because of their historic listed status).
- **Pre 1970:** Residential buildings- installation of roof insulation and floor insulation to reduce heat loss and replacing existing windows with heritage-style double-glazed sash windows (in line with regulations because of their historic listed status). Existing fluorescent lighting could be replaced with LEDs to reduce electricity usage, combined with better electricity control measures.

- **Pre 1990:** Teaching (lab and research spaces) buildings– roof spaces fitted with mineral wool insulation panels. Cavity and external wall insulation using foam insulation in cavities and mineral wool insulation with cladding panels. Floor insulation and replacing old windows with modern double-glazing replacements throughout. LEDs to reduce electricity usage, combined with better electricity control measures. double-glazing replacements throughout.

Approaches to energy efficiency and building retrofit will differ for each building type, there is not one-size-fits-all solution for all buildings.

4.2.2 Improving Building Control Measures

We will optimise building controls to help reduce energy wastage during the operation of buildings and other assets. This includes a wide range of features (such as building management systems, temperature, and occupancy sensors, etc.) which should all be reviewed for applicability within each building.

We will also manage spaces in buildings more efficiently, altering monitoring and controls and amending offices and workspaces to better align with staff and student working and study patterns. This will include (but not limited to):

- Improving heating and lighting monitoring and controls to better align with changes in building occupancy and out-of-hours usage;
- Consolidating and managing workspaces and ICT to reflect hybrid/remote working and study patterns; and
- Ensuring buildings and spaces that are not being used have lighting and heating switched-off to avoid wastage.

4.2.3 Boilers, services and system efficiency improvements

Improving the efficiency of systems within buildings is an additional way of reducing the energy demand in buildings. Once the building fabric has been optimised there may be further savings achievable by improving the efficiency of the systems within it.

A number of University buildings would benefit from system efficiency upgrades (focussing on heat exchangers and pumps). This would be in addition to a range of building fabric, lighting and controls improvements – depending on the building age, type and uses.



Photo by Arthur Lambillotte on Unsplash

4.3 MOVING AWAY FROM FOSSIL FUEL HEATING SYSTEMS

We will reduce our reliance on natural gas, used mainly to heat buildings, by replacing gas heat sources with electric ones or renewable alternatives, where feasible. In addition, the forecast reduction in carbon from the National Grid makes electricity a lower carbon heat source than gas in the longer term.

Planned actions include but are not limited to:

- **Installation of heat pump technologies** - (such as Air-Source or Ground-Source heat pumps) both at building level and linked within a District Heating Network (DHN). The types of technology and their efficiency will depend on the type of building and its uses, so they must be considered holistically, and must benefit both the building and its users' comfort.
- **Some of buildings could have air-source heat pumps installed**, providing the building fabric is of a high enough standard. Furthermore, some buildings could benefit from switching to ground source heat pump district heating. Additional feasibility studies will need to be carried out on the installation of heat pumps including use of car parks and green spaces for ground-source heat pumps across the estate.
- **Grid decarbonisation** - as more of Northern Ireland's electricity grid is powered by renewable technologies (with a target of 80% from renewable sources by 2030), having electrified heating such as heat pumps, will reduce carbon emissions from heating and electricity overall.
- **Heat from Sewage (HfS)** - installations are a developing opportunity in the UK. HfS technologies extract latent heat from sewage or waste, and so typically connect to either wastewater treatment works or sewers. Due to the city-centre location of our University there may be an opportunity to consider HfS installations to drive further decarbonisation if support mechanisms are established.

At an institutional level, Queen's have reduced our carbon emissions by **21%**

4.4 GREEN GAS

Renewable (or ‘green’) gases such as biomethane can act as a direct replacement for natural gas. It is produced from biogas derived from the anaerobic digestion (AD) of organic waste. The raw materials, or ‘feedstock’ used to create biomethane could come from a range of sources including agricultural or food wastes, sewage, and crops.

There has been some unified movement towards the introduction of green gas into Northern Ireland’s gas networks. The distribution and transmission network operators in Northern Ireland have collaborated to produce a ‘Northern Ireland Gas Network Pathway to Net Zero’ strategy¹³. The strategy lays out an overarching pathway to decarbonise the gas network by 2050. Its key milestones related to the introduction of green gas are shown in Figure 11.

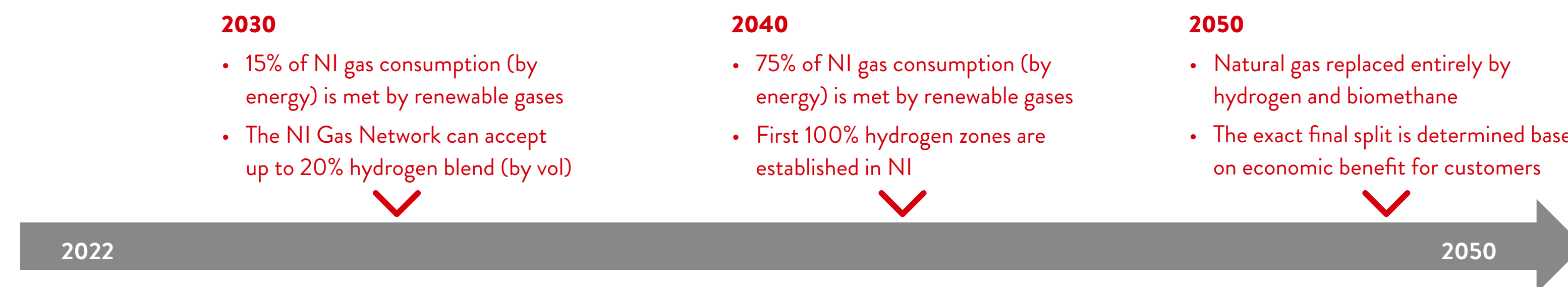


Figure 11: NI Gas Network Pathway to Net Zero Milestones

Our University is leading research on the role of Green Gas in Northern Ireland’s decarbonisation pathway. As a member of the Centre for Advanced Sustainable Energy, the University is one of the authors of ‘Utilising NI’s Agriculture Sector to Decarbonise Heat’¹⁴, a study which significantly underpins the Northern Ireland gas network’s proposed decarbonisation pathway. As a pioneer in this field, the University supports the integration of biomethane into the national gas grid to support efforts in reaching net zero.

We have identified the year 2030 as a the point by which we will have determined the level of green gas we could integrate into our heating systems as part of our net zero ambitions. This decision will inform the degree to which the University will have capacity to reduce emissions from heating systems in areas of the estate, and in particular those which present the significant challenges in moving towards electrified solutions.

¹³ <https://www.firmusenergy.co.uk/images/uploads/documents/13810.001-20pp-Pathway-to-Net-Zero-WEB.pdf>

¹⁴ <https://www.phoenixnaturalgas.com/assets/general/CASE-Summary-Report.pdf>

4.5 RENEWABLE ENERGY GENERATION

As we move towards net zero we will install renewable energy generating technologies on our estate where feasible. This will reduce our reliance on the electricity grid and further reduce carbon emissions from electricity powering our buildings.

- **Installation of solar panels (solar PV) across the estate** – whilst there are challenges with the visual impact of installing Solar PV's across the estate, particularly due to the historical significance of many buildings, there will still be opportunities to generate electricity from solar energy. However, due to highly variable levels of electricity production from PV it may be necessary to combine these with battery storage to maximise the efficiency and useability of this source. The installation of any PV infrastructure on campus would take cognisance of local planning authority regulations to confirm the appropriateness of selected roof spaces. A key factor in this will be the historic listed status of the building.



Photo by Caspar Rae on Unsplash

4.6 MARKET-BASED CARBON REDUCTION OPPORTUNITIES

There are also commercial opportunities available in dealing with any residual carbon emissions after all physical/technological actions and interventions have been carried out.

- **Continued purchase of renewable electricity** – we will continue to purchase green electricity through our energy supplier to encourage the national shift of the energy grid to more renewable technologies.
- **Carbon offsets** – we will invest in accredited and transparent offsetting regimes when we have exhausted all efforts to physically reduce our carbon emissions.

Queen's have
invested almost
£10 million in
carbon reduction
projects since 2010

4.7 FLEET VEHICLES

As we move toward net zero, we will consolidate and reduce the University's fossil fuel fleet, transitioning over time to fully electric vehicles where a viable electric replacement is available and feasible. Schools and Departments will be engaged throughout the process, and we move to lower carbon transport alternatives.



Photo by Jan Kopřiva on Unsplash

Chapter 5

Reducing Scope 3 carbon emissions – Procurement, Travel, Waste and Water



5.1 INTRODUCTION TO SCOPE 3

This section provides an overview of a proposed approach to reducing Scope 3 carbon emissions, illustrating the opportunities and challenges for the University, and providing an overview of the strategic interventions needed to reach net zero.

Scope 3 emissions are typically the largest component of any organisation's carbon footprint. This is particularly true in the Higher Education sector. In the case of Queen's University, Scope 3 emissions currently make up around 80% of the institution's overall carbon footprint.

Scope 3 emissions relate to our 'indirect' carbon outputs. They form a significant challenge in our ambitions to achieve net zero by 2040.

The main challenges are as follows:

- data availability and accuracy
- carbon created through the activities and operations of other, which in some instances are largely outside of our control e.g., supply chain
- policy and infrastructure outside of the University's control e.g., public transport availability
- any activities necessary for the ongoing running of the University activity and potentially delivering on any growth aspirations of Strategy 2030
- Global economic impacts – including travel patterns, buying patterns, and the way both people and organisations operate.

Even with these challenges, it is important that as a leading global university we are understanding the wider environmental impacts of our operations, reducing Scope 3 carbon emissions, and encouraging staff, students, suppliers, and contractors to join the journey to net zero.

There are 4 priority areas for Scope 3 emission reduction:

- Travel of staff and students (commuter and business-related)
- Purchased goods and services
- Capital works projects (building construction)
- Investment strategy

There are a series of initial enabling activities to support future delivery of actions in the target areas:

- Updating all relevant policies to account for Scope 3 impacts
- Improving data collection to calculate Scope 3 emissions
- Setting targets for each priority area
- Collaborating with others to achieve reductions together and encourage sustainable practices
- Implementing principles of circular economy
- Investing in technology, and low carbon products



5.2 TRAVEL

Travel represents the largest aspect of our Scope 3 carbon baseline.

The University has a long running commitment to encouraging and supporting sustainable travel choices for staff and students. To date this has been delivered through the University Travel Plan.



5.2 TRAVEL

5.2.1 Business travel

Business Travel is necessary to facilitate core business and meet the ambitions of wider University strategy. Business travel has significant climate impact and key aspects will be targeted to ensure climate conscious decisions are being made by those travelling on University business.

Key interventions will include:

1. Consulting on and developing a new travel policy which will focus on reducing business travel impact and setting targets for reducing business related travel emissions.
2. Strengthening insights and awareness of pre-trip carbon impact and post-trip reporting data on carbon emissions.
3. Setting annual targets for travel management information reviews and insights against revised policy aims to inform future choices.
4. Collaborating with other travel consortia groups and place carbon reporting and transparency requirements with the appointed travel management supplier to stimulate action in supply chains to reduce carbon emissions.
5. Encouraging sustainable practices by actively engaging with staff on the expectations regarding the UN Sustainable Development Goal on Climate Action, the link to funder requirements, the sectoral expectations on climate conscious travel.
6. Seeking to design out emissions by embedding policies and principles that reduce the number of journeys required.
7. Investigating alternative choices of low-carbon modes of transport that could be presented at point of booking.
8. Investigating how carbon taxes or cap-and-trade systems can create financial incentives for the University to reduce carbon emissions.

5.2 TRAVEL

5.2.2 Staff and Student commuting

The extent to which students need to commute to the university campus is influenced by teaching schedules, personal study preferences, and access to on-campus services. Students are already making decisions on their commuting choices based on their economic situation and their proximity to alternative sources of lower carbon transport. The extent by which staff travel to the University is influenced by their job roles and the ability for them to avail of agile working practices.

Through the Travel Plan a range of interventions will be delivered to support staff and students to transition to low-carbon modes of transport.

Key interventions will include:

1. Promoting and encouraging uptake of sustainable choices for staff and students, aligning with the ambitions set out by our University Travel Plan.
2. Strengthening insights and awareness of carbon impact by disseminating data collected in the annual travel survey on staff and student commuting.
3. Seeking to better understand the barriers to lower carbon commuting choices determine interventions that might be useful in the future including review of university policies which impact on the need to travel e.g. Agile working and timetabling.
4. Setting annual targets and actions to support the promotion of low carbon commuter choices through the University Travel Plan.
5. Collaborating with other anchor institutions/organisations in Belfast, including the Department for Infrastructure and Translink, to reduce carbon emissions through low-carbon modes of active and sustainable transport and to devise better strategies for encouraging greater use of public transport by staff and students.
6. Encouraging sustainable practices by actively engaging with staff, students and the local community on active and sustainable travel alternatives in line with the UN Sustainable Development Goals.
7. Liaising with internal departments (Undergraduate Student Recruitment) to reinforce to students, before they come to the University, that we are a sustainable campus and that students should only use sustainable and active travel means when travelling to the University.

5.2 TRAVEL

5.2.3 Student travel from term address to home

As a global university, Queen's attracts students and staff from around the world. Given our location, travel to and from GB and other countries is unavoidable. This is a core part of the University's business model. Most students will make travel decisions based on what modes of transport are available and their affordability.

However, this element of travel has a significant carbon impact for the University. Regardless of these challenges actions will be targeted to embed as far as possible climate conscious travel for this aspect of our emissions.

Key interventions will include:

1. Liaising with internal departments to reinforce with locally based students, that we are a sustainable campus and to encourage use of sustainable and active travel means when travelling to the University.
2. Strengthening insights and awareness of carbon impact by disseminating data collected in the bi-annual travel survey on student term time commuting.
3. Seeking to avoid some student travel by identifying opportunities for periods of study and placements delivered remotely.
4. Collaborating with accommodation providers (internal and external), Belfast City Council, and the Department for Infrastructure to create an environment that encourages stays between terms.
5. Encouraging sustainable practices by actively engaging with students on the benefits of climate conscious travel.
6. Seeking to design out emissions by supporting students to consider alternative forms of sustainable travel and minimizing national and internal journeys where feasible.

5.3 PURCHASED GOODS AND SERVICES

Purchased goods and services contribute to the Scope 3 carbon baseline. There are key aspects which can be influenced for example by encouraging staff to reduce consumption and consistent supplier messaging to measure and reduce their carbon impact.

Key interventions will include:

1. Further updating procurement policy and processes to champion future-proofed reduced carbon solutions.
2. Continuing to review Scope 3 data and develop methodology to account for a transition to a net zero supply base.
3. Setting annual targets for procurement action on Scope 3 reduction including climate literacy to inform choices on; whether to buy, what to buy, how to buy and how much to buy.
4. Collaborating with other purchasing consortia and suppliers to stimulate action in supply chains to reduce carbon emissions.
5. Encouraging sustainable practices by signposting for staff on the expectations regarding the UN Sustainable Development Goal on Responsible Consumption and Production, the link to funder requirements and the developing sectoral expectations.
6. Seeking to design-out waste by embedding circular economy principles in specifications.
7. Investigating and investing in a transition to net zero supply chains wherever possible.

5.4 CONSTRUCTION AND CAPITAL PROJECTS

Capital projects represent 20% of the University's Scope 3 carbon baseline and will represent a significant proportion of the overall carbon footprint.

In transitioning to a Whole Life Carbon approach within the built environment, embodied and operational carbon emissions will be considered for all future projects.

Key interventions will include:

1. Prioritising the re-use, retrofit and refurbishment of existing buildings over demolition and construction of new buildings.
2. Developing a sustainable design guide for construction projects focusing on design principles, targets, and sustainable and low carbon material sourcing and includes minimum requirements for all construction projects.
3. Setting design stage carbon reduction targets and enhanced sustainability criteria for each project, embedding Passivhaus, embodied carbon, and circular economy principles in specifications.
4. Developing a sustainable construction policy that requires capital works projects to undertake a Life Cycle Analysis (LCA) to achieve lower whole life carbon impact through setting embodied and operational carbon targets, with measures that will endure the value engineering process.
5. Reviewing net zero targets for capital works projects to ensure they have the correct level of ambition.
6. Continuing to review Scope 3 data and develop methodology to account for contractual measures that have been taken to reduce carbon in works contracts.
7. Collaborating with other Estates professionals, procurement consortia and contractors to stimulate action in supply chains to reduce carbon emissions. For example, via all contracts requiring carbon targets on products supplied and transport modes used and best practice sharing.
8. Investigating and investing in a transition to net zero supply chains wherever possible.

5.5 WASTE

Whilst waste represents a small proportion of the Scope 3 carbon baseline, it still requires action and aligns with wider requirements to support the move to a circular economy, both locally and nationally.

Key interventions will include:

1. Updating the waste policy to reflect the University's net zero ambitions.
2. Continuing to review waste streams via formal audits to enable further targeted opportunities to reduce waste, increase recycling and develop the Scope 3 data to reflect when action is taken to reduce the waste.
3. Setting annual targets for action to reduce inbound and outbound waste including enhanced awareness on waste hotspots, recycling provision, and campaigns on the waste hierarchy.
4. Collaborating with other sustainability experts, procurement professionals and suppliers to stimulate action in supply chains to reduce waste.
5. Developing further the LEAF (Laboratory Environmental and Assessment Framework) programme across all qualifying labs at the University.
6. Encouraging sustainable practices by engaging with staff and suppliers on the expectations regarding the UN Sustainable Development Goal on Responsible Consumption and Production which includes tackling waste produced.
7. Seeking to design-out waste by supporting staff and suppliers to embed circular economy principles in specifications and manufacturing, by way of take back schemes and repair options. Reviewing and revitalising the utilisation of equipment sharing schemes
8. Updating the waste policy to reflect the University's net zero ambitions.
9. Continuing to review waste streams via formal audits to enable further targeted opportunities to reduce waste, increase recycling and develop the Scope 3 data to reflect when action is taken to reduce the waste.

5.6 WATER

Whilst water represents a small proportion of the Scope 3 carbon baseline it still requires action.

Key interventions will include:

1. Ensuring that water considerations are included in relevant Estates policies including sustainable construction policy and when refurbishing the existing estate.
2. Continuing to review water usage across the state via formal audits and develop the Scope 3 data to reflect when action is taken to reduce water consumption.
3. Setting annual targets for action to reduce water consumption in hotspots identified, promote wider campaigns on the reduction of water usage e.g. in workplace kitchens and the use of harvested rainwater in the campus gardens.
4. Collaborating with other sustainability experts, procurement professionals and suppliers to stimulate action in supply chains to reduce water consumption through production and manufacturing processes.
5. Encouraging sustainable practices by signposting for staff and suppliers on the expectations regarding the UN Sustainable Development Goal on Clean Water and Sanitation, which includes sustainable management of water resources throughout the campus and supply chains.
6. Seeking to design-out wastewater by supporting staff and students in easy reporting and fast response to water leakage, and reviewing the systems and products bought that require water.
7. Investigating and continuing to invest in water saving techniques and technologies such as water efficient taps, showers, and toilets with flow controllers.

5.7 INVESTMENTS

The carbon impact of our investments is not currently quantified in our carbon baseline. However, this is an emerging area of focus.

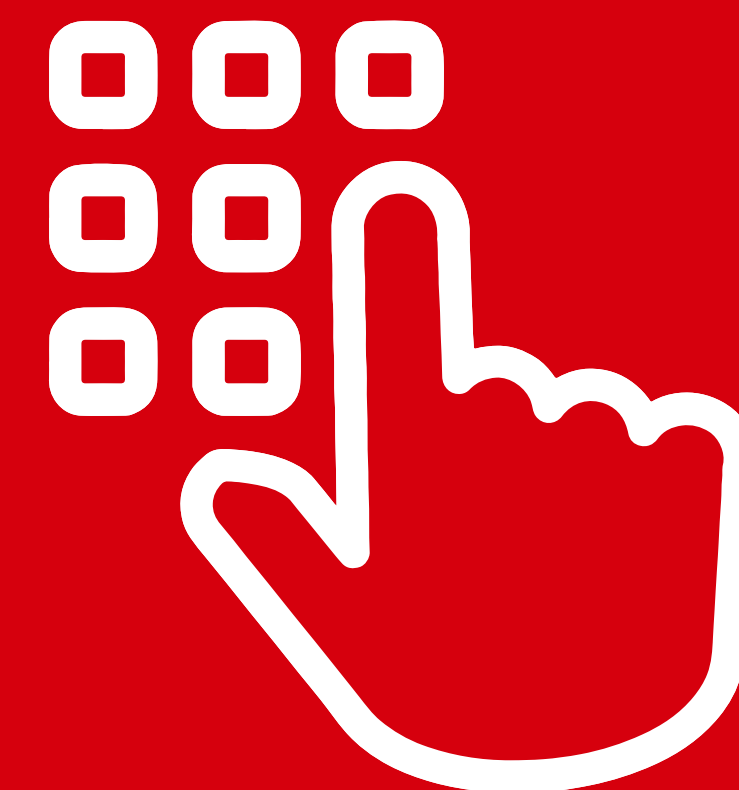
Decisions in respect of investments are made on the recommendation of the Investment Committee guided by the University's Responsible Investment Policy. The policy also outlines our expectations for funds being invested in companies that comply with Environmental, Social and Corporate Governance (ESG) best practice, and act in a way that reduces and, ideally, eliminates, corporate behaviour leading to environmental degradation and climate change.

We will improve our approach to responsible investments by:

- Reviewing and renewing our terms of reference and membership of the investment Committee.
- Working with an independent advisor to improve our approach and inform best practice in this area.
- Reviewing and updating our Responsible Investment Policy.

Chapter 6

Offsetting our remaining carbon emissions



The reduction of emissions through mitigation measures and interventions are the most important means of reducing our environmental impact to achieve the 2040 net zero target. It will not be feasible to reduce emissions to zero solely through reduction activities, and it is therefore likely that we will be left with residual emissions.

However, even when any offsetting regimes are implemented, the University must continue to implement carbon reduction initiatives alongside carbon offsetting to maintain momentum and ensure that remaining offset emissions are continually reduced.

Carbon offsets can provide the mechanism by which the balance of carbon accounting can occur for us to achieve a carbon neutral or net zero position¹⁵. Internationally, and within the UK, the regulatory regime for carbon offsetting is mixed, and is continually evolving. There are some standards in place for different types of offsetting regime, but there is also a voluntary market for carbon offsets that is largely unregulated and not covered by financial or other standards. This means that there are potential challenges for us in the procurement of any offsetting strategies as part of our 2040 net zero ambitions.

¹⁵ Net Zero and Carbon Neutral are effectively the same in terms of net carbon emissions—an organisation reduces emissions and uses offsets or other methods to reduce the net balance of emissions to zero. However, 'Net Zero' as a label implies that the organisation has adopted all reasonable/practicable measures to reduce emissions before relying on offsets to reach a neutral position.



6.1 OUR APPROACH

Taking the previous factors into consideration, we will develop an offsetting strategy that makes use of offsets using appropriate standards to achieve a state of carbon neutrality or Net Zero for our Scope 1, 2 and 3 carbon emissions. It is unlikely that we will reach our 2040 net zero target without making use of best practice good quality offsetting regimes.

To inform our approach, we will liaise with our academic expertise to support the development of this offsetting policy by taking a science-based approach which considers quality over quantity of offsets. We will also collaborate with local stakeholders such as Belfast City Council to consider 'in-setting' through placed based assessments and investments.

We will collaborate with others in the Higher Education sector and engage with sector specific off-setting schemes such as the EAUC Carbon Coalition which provides a vehicle for institutions to work together to offset emissions from their institutions.

Overall, it is our duty as a university to use offsetting responsibly to aid us in our journey towards net zero, not drive it.



Chapter 7

Developing plans for climate adaptation and resilience



7.1 THE NEED FOR A CLIMATE ADAPTATION PLAN

While there is an increasing drive across the UK towards reducing greenhouse gas emissions to limit further damage on our planet, irreversible changes have already taken place. Regardless of the rate of future decarbonisation, the impacts of Climate Change will continue to evolve, and as an organisation we must be prepared to adapt to them.

A plan for climate adaptation provides us with a framework to evaluate and increase our resilience to the impacts of Climate change. Resilience is the capacity of the university and our systems to survive and thrive in the face of potential disruptions. The changing climate has the potential to create new types of disruption, as well as worsening risks that already exist¹⁶.

7.1.1 Impacts of climate change

The UK Government's third Climate Change Risk Assessment (CCRA3) took place in 2018, and the summary for Northern Ireland¹⁷ highlighted 61 risks and opportunities posed by Climate Change.

Much like the projections from the Met Office¹⁸, the CCRA3 confirms that Northern Ireland will face an increased frequency and intensity of warmer and wetter winters, and hotter and drier summers.

The potential impacts to Northern Ireland over the following decades are:

- **Increasing temperatures** - Northern Ireland will experience hotter, drier summers, with greater extremes.
- **Increasing rainfall** - Northern Ireland will experience warmer, wetter, winters. This is projected to lead to an increase in the likelihood of flooding of infrastructure, businesses, and homes.
- **Sea level rise** - Future scenarios for Belfast state that sea level is expected to rise by between approximately 14 and 19cm by the 2050s and by approximately between 27 and 58cm by the 2080s. This will lead to an increase in likelihood of flooding.

7.1.2 Climate risk for Queens University Belfast

The impacts of climate change for Northern Ireland will also influence the city of Belfast and the university overall.

Based on an initial climate risk assessment, we have identified some risks for the university based on the likelihood of these occurring and the impact on institutional assets and operations. These include but are not limited to:

- Disruption to our supply chain (products and services) because of worldwide climate change, impacting suppliers, etc. depending on their location.
- Potential university closure due to impacts on infrastructure from extreme weather events. This could also damage the estate through an increase frequency and intensity of rainfall and storm events.
- Coastal flooding and storm surge impacts on our estate, particularly buildings adjacent to the harbour and within the tidal flood plain.
- Disruption to staff, students, and operations on site due to overheating. Heatwaves can disrupt the comfort and wellbeing of staff and students, and impact events in buildings more vulnerable to increases in heat.

¹⁶ The Alliance for Sustainability Leadership in Education adapting universities and colleges to Climate Change, June 2019.

¹⁷ <https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA-Evidence-Report-Northern-Ireland-Summary-Final.pdf>

¹⁸ <https://rmets.onlinelibrary.wiley.com/doi/10.1002/JOC.7787>

7.1 THE NEED FOR A CLIMATE ADAPTATION PLAN

7.1.3 Assessing and responding to climate risks

The approach we have taken to assessing and responding to the risks and impacts of climate change can be found in [Figure 12](#). This captures current exposure to climate hazards and proposed activities, or 'adaptations' which will reduce that exposure.

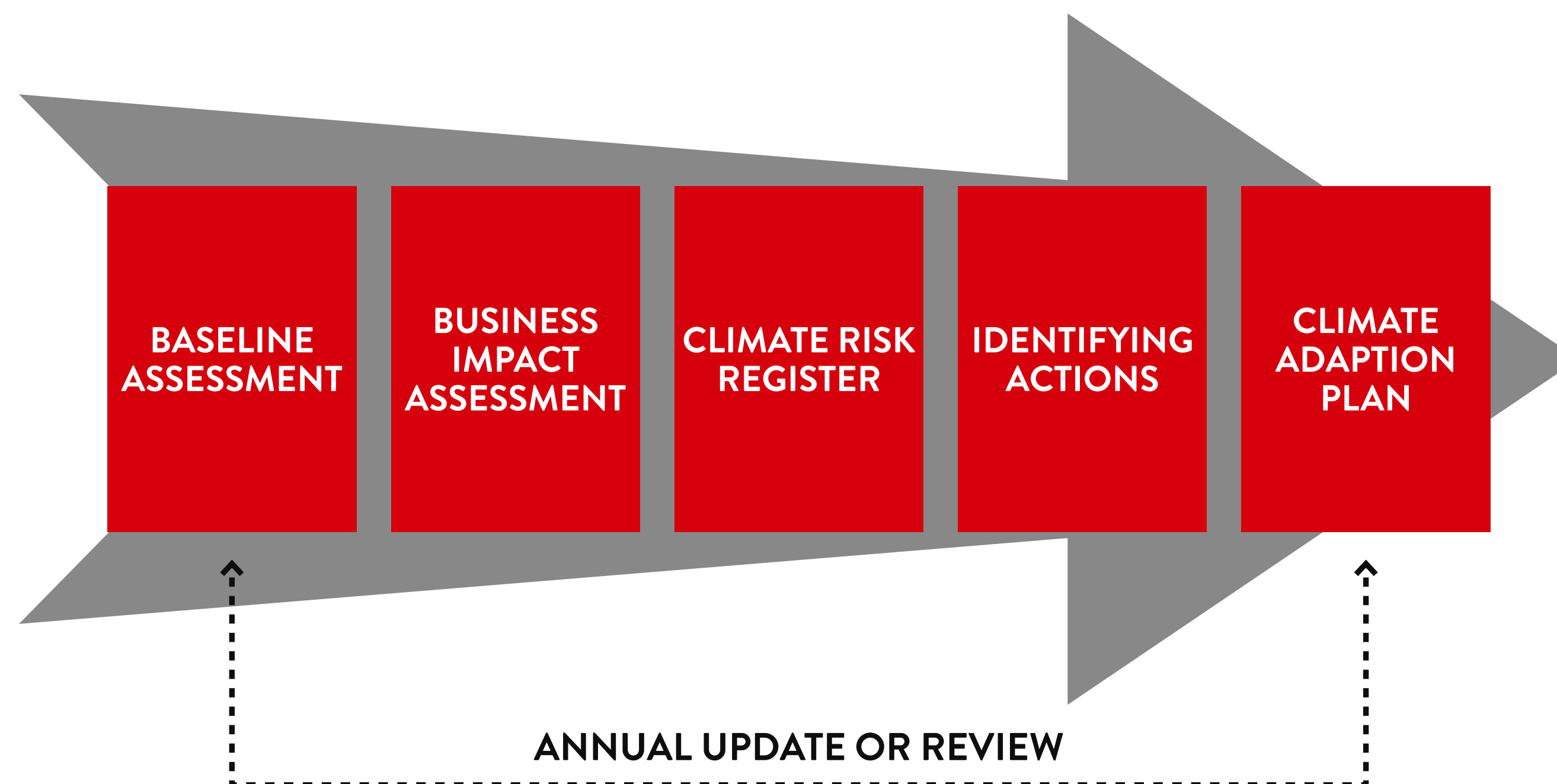


Figure 12: Climate adaptation plan workflow

7.2 PRIORITISED CLIMATE ADAPTATION

Our approach to climate adaptation has been informed by multi-criteria analysis (which follows the EAUC's methodology for prioritising climate risks). This criteria details how we will Investigate; Control; or Mitigate risk across the estate. It also provides suggested and prioritised adaptation measures which we should carry out to reduce further risks to the rapidly changing climate and its impacts.

The following sections provide examples of key adaptation measures which the university will take to build resilience and better prepare and respond to the impacts of climate change:

7.2.1 Integrate adaptation thinking

These are measures which focus on incorporating resilience into existing organisational processes. Incorporating the actions into existing processes will aid the implementation of the plan creating fewer additional processes. Examples include undertaking flood risk assessment and taking account of ventilation strategies in building improvements.

7.2.2 Inform intelligent action

These are investigations which inform focused and efficient mitigations downstream. This will help gather further evidence on the impacts to allow funding and resources to be invested where most needed. Examples include supply chain map to highlight potential vulnerabilities.

7.2.3 Collaboration for resilience

Working with key partners and stakeholders to share information on Climate Risks and work together to find solutions. The impacts from climate change on the university have interdependencies with other organisations and regions, so it is critical that collaborations are formed to tackle these. Examples include liaising with local stakeholders such as Belfast City Council to develop a collaborative approach to resilience.

7.2.4 First steps to resilience

These are quick wins which provide tangible benefits in the short-term. These are key for the initial stages of implementation of the plan, they will provide momentum and examples of what can be done. Examples include implementation of energy efficiency measures across our estate.

7.2.5 Next steps

We have undertaken the first step to building a more climate resilient university and have developed a framework to support future iterations as we work towards integrating climate adaptation into our all our business process.

As we transition from responding to the climate risks to implementing proposed adaptation measures, the following steps will be undertaken to enable the successful delivery of an associated plan.

We will:

- Integrate the Climate Adaptation Plan within the Governance and reporting structure of the Net Zero Plan
- Assign owners to adaptation measures and regularly review progress
- Incorporate climate risks and their management into our existing risk registers
- Agree a proposed date for a review of our Adaptation Plan

The implementation of these next steps will help us better adapt to current and future impacts of climate change already predicted and create a more resilient university for the future.

Chapter 8

Delivering the Net Zero Plan



8.1 REVIEWING PROGRESS

It is essential to have collective effort and support from all our staff, students, and external partners to drive forward this Net Zero Plan. Equally, it is important that the University reviews, develops, and implements new approaches as the climate challenges evolve.

With this in mind, we will amend and evolve the plan to reflect ongoing changes in wider climate change policy and practices and as a result of any social or technological innovations.

The plan will be reviewed annually and progress on delivery may be altered depending on the scale and frequency of influences and impacts of internal and external factors.

Every five years the plan will go through a full progress review and update.



8.2 GOVERNANCE

Successful implementation of the Net Zero Plan will require strong and consistent internal governance at both strategic and operational levels, ensuring longevity in delivering this plan up to 2040 and beyond.

The University Sustainability Board will oversee the University's Net Zero Carbon performance and report to the University Management Board.

The University Sustainability Board meet at least three times a year and include stakeholders from across the University, including Professional Services, Research, Teaching and Learning and the Students' Union.

The Net Zero Programme Carbon Group will oversee the development and project work of the Net Zero Plan workstreams, reviewing progress, monitoring performance, and developing new projects and business cases in support of the Net Zero Plan delivery. The Net Zero Carbon Programme Group will meet at least three times a year and report on progress to University Management Board via the Sustainability Board.

Business cases for capital works will be progressed for approval to Capital Project Group.

Working groups/task and finish groups will progress the delivery of key workstream areas to the Net Zero Programme Group, these will include the establishment of task and finish groups as necessary to evolve and develop particular workstream areas e.g., Business Travel policy, off-setting, as the Net Zero Plan evolves.

The long-term nature of this plan allows time to deliver these actions up to the 2039-40 academic year. Deliverables can be amended or revised periodically as external local, national, or international climate change measures change, with actions being allocated accordingly.

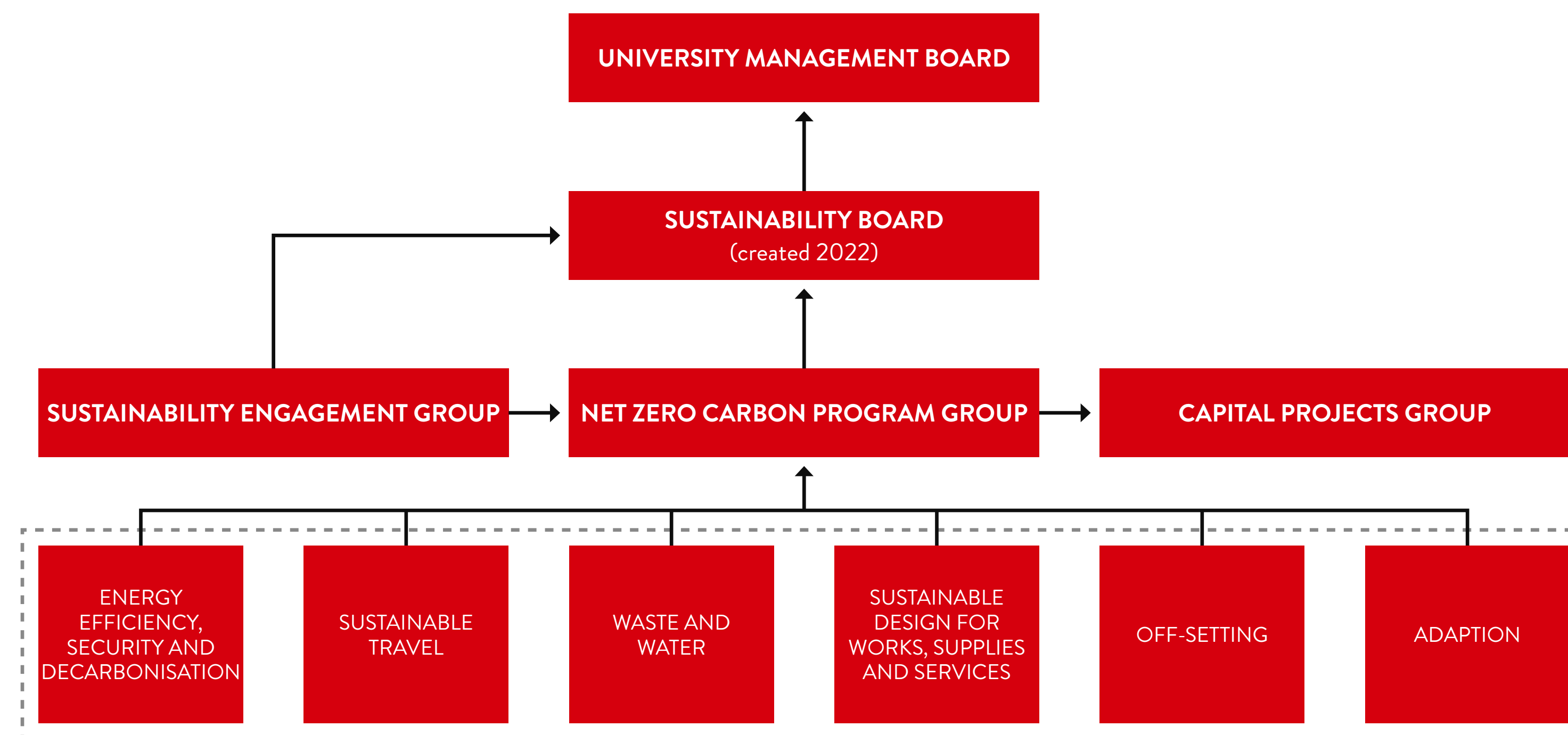
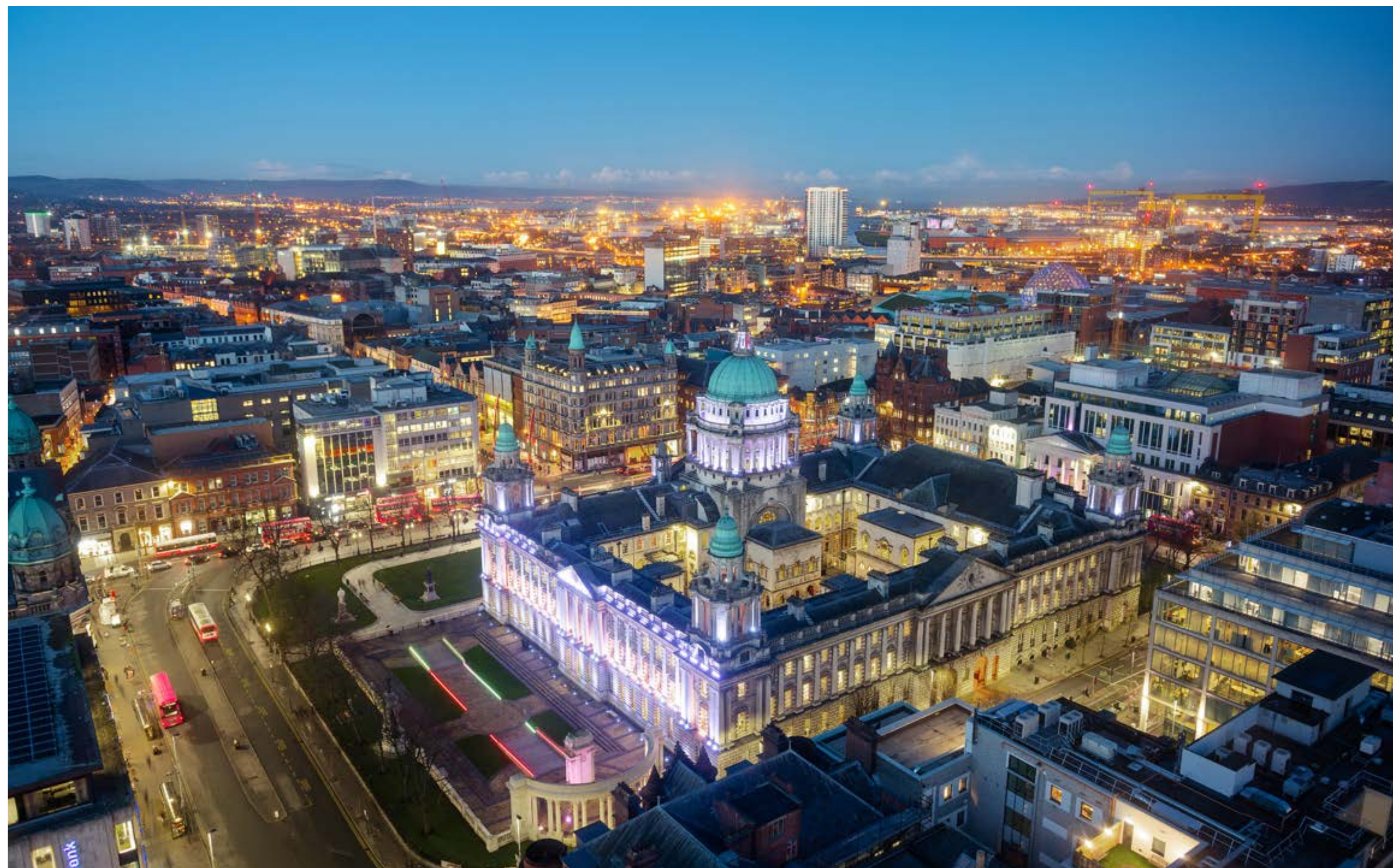


Figure 13: Outline of Governance Structure

8.3 CROSS-CUTTING POLICY

The university will ensure that current and future policies and strategies integrate Climate Change as a key facet of their objectives. Governance of our Net Zero Plan delivery will become more mainstreamed throughout our operations when this plan crosscuts across all other major university policy and operational documents.



8.4 INSPIRING CHANGE AND EMPOWERING OUR QUEEN'S COMMUNITY

We are committed to inspiring change in our staff and students, with an ambition to change behaviours and empower our University community to take responsibility for mitigating against, and adapting to, the impacts of climate change.

8.4.1 Engagement Activities

We will undertake a number of key actions to increase awareness on the need for climate action, embed good practice, and enable our community to play their part in the delivery of our Net Zero Plan.

Key actions will include:

1. Integrating sustainability and climate action within staff induction, training, team meetings etc
2. Widening access to Carbon Literacy training across the University and supporting the development of a university-wide education provision on sustainability
3. Developing and delivering a dedicated communications plan to promote key messages on Net Zero University across the Queen's community
4. Delivering key events across the University calendar year which inspire, support and enable the Queen's community to take Climate Action e.g. Student Summit, tree planting events
5. Scoping out and developing carbon targets for Faculties, Schools and Directorates
6. Tracking progress on the delivery of our Sustainable Lab programme (LEAF) to support environmental activities and facilitate and drive improvements in the efficiency of our research laboratories
7. Providing funding opportunities for staff and students to take climate action on campus through practical initiatives and applied research
8. Developing an online reward and recognition tool to incentivise positive environmental behaviours across the university community.
9. Recognise good sustainability practice across the University within our teaching, research and operations (procurement etc) on a regular basis e.g. showcasing best practice, undertaking an annual celebration event.

8.4 INSPIRING CHANGE AND EMPOWERING OUR QUEEN'S COMMUNITY

8.4.2 Establishing the University as a Living Lab

The University sits as a unique entity in Northern Ireland given the breadth and knowledge of teaching & research capabilities around Net Zero. We will use the University estates to undertake real-life net zero research opportunities for students and researchers that will also provide evidence-based recommendations for the university on the implementation and development of the Net Zero Plan.

These projects will also provide opportunity to collaborate and share knowledge with partners across Northern Ireland to inform the wider transition of NI to Net Zero.

Key actions include:

- Establishment of 'Pathway projects' – On Campus Net Zero construction projects which will test new technologies, low carbon design on new-build and retrofit projects before scaling up to other areas of the estate e.g. heat pump retrofit
- Student/ Academic 'on campus' research projects - focused on key areas of our Net Zero Plan
- Creation of Living Lab fund to support research and learning projects on campus which inform and support the delivery of the Net Zero Plan.

8.5 COLLABORATION

Delivery of this plan will require the support and buy-in of the whole Queen's community. We want to ensure that the university community are closely involved with our actions to reduce our carbon footprint and addressing wider climate change and sustainability issues.

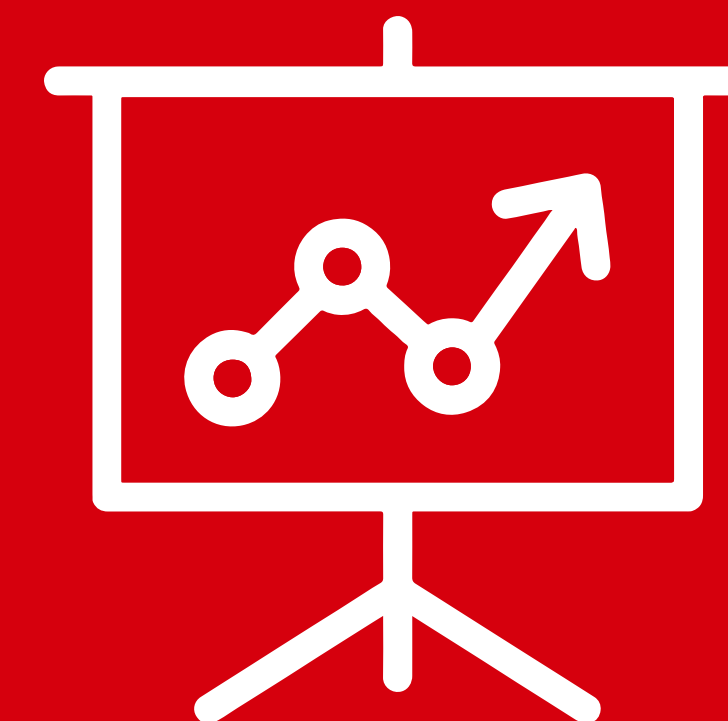
Our engagement highlighted their enthusiasm in collaborating with our efforts going forward.

To build on this we will:

- Continue to engage and bring along the whole university community to ensure that their input informs our actions in achieving our net zero ambitions.
- Ensure that activities to decarbonise the university are fair and just, and that climate action should avoid having a disproportionate negative effect on those on lowered incomes or those who do not have means to engage in more sustainable healthy lifestyles.
- Focus on areas that the university community feel passionate about including:
 - Energy efficiency of buildings and facilities;
 - Enhancing biodiversity;
 - Increased recycling and reduction of waste;
 - Supporting action to reduce carbon emissions through research and innovation in renewable energy technologies;
 - Education on sustainability and the climate emergency across projects and programmes of study;
 - Promotion of more flexible working and teaching through rationalisation of time spent on and off campus,
 - Promoting cycling and EV infrastructure,
 - Working collaboratively with other stakeholders to improve public transport links, and actions around car parking on campus;
 - Provide support for initiatives that allocate funding on activities that have significant impact on carbon footprint

Appendix A1

Carbon baseline data



A.1.1 SCOPE 1

GHG protocol category	Description	Emissions (tCO ₂ e)
1.1 Natural gas	Combustion of natural gas in on-site boilers, CHP etc.	16,476
1.2 Fleet (owned/operated)	Fuel (e.g., diesel, petrol) combusted in vehicles owned or leased by the organisation. This captures where the organisation purchases the fuel itself	54
1.3 Fugitive emissions from refridgerants	Emissions from leakage of refrigerants where these have a Global Warming Potential (GWP) in their own (e.g., R134a has a GWP (CO ₂ e) 1430 times CO ₂).	6
1.4 Other fuels	Combustion of fuels (e.g., diesel, fuel oil) in on-site boilers, generators etc.	200
1.5 Land-related emissions & Livestock	Direct emissions associated with the use of land. These vary depending on the exact use, but can include conversion of nitrogen in fertilizers to N O, methane emissions from waste or manure, and conversion of land to other uses	0
	Total	16,685

A.1.2 SCOPE 2

GHG protocol category	Description	Emissions (tCO ₂ e)
2.1 Purchased Electricity & REGO (see glossary of terms for definition)	Purchased electricity and district heating. I.e., fuel is combusted by another organisation, but the energy created is purchased by the reporting organisation.	7,467
	Electrical recharge	0
	REGOs describe credits created by renewable electricity generators, they can be used to lower an organization's gross market-based Scope 2 emissions from purchased electricity	0
2.2 Purchased heat or steam	Defined as district heating or steam that is purchased or otherwise brought into the organizational boundary of the reporting Institution.	0
	Total	7,467

A.1.3 SCOPE 3

GHG protocol category	Description	Emissions (tCO ₂ e)
3.1 Purchased goods and services	Materials and services purchased/procured by the university – Classified	22,093
	Materials and services purchased/procured by the university – Unclassified	2,223
	Water purchased by the university from the utility provider	0.11
3.2 Capital goods	Construction or refurbishment of university buildings	16,655
3.3 Fuel- and energy-related activities	Transmission and distribution losses in electricity distribution systems and emissions associated with extraction and processing of fuels (well-to-tank).	2,606
3.4 Upstream transportation and distribution	Emissions associated with transporting and distributing goods and services, such as delivery vehicle emissions (e.g., DPD, Evri)	Excluded from assessment
3.5 Waste generated in operations	Wastewater treatment	0.22
	Waste and recycling	106
3.6 Business travel	Staff travelling for business reasons	9,254
3.7 Employee commuting	Staff travelling to and from the university	3,029
3.8 Upstream leased assets	Emissions associated with producing assets (embodied emissions) that the university leases from another entity, such as the embodied emissions of buildings or vehicles.	Excluded from assessment

GHG protocol category	Description	Emissions (tCO ₂ e)
3.9 Downstream transportation and distribution	Students travelling to and from the university – daily commuting to/from campus	4,939
	Students travelling to and from the university – travel between term address and home address.	20,372
3.10 Processing of sold products	Emissions associated with processing products made by the university, such as manufacturing operations	Excluded from assessment
3.11 Use of sold products	Emissions associated with consumer use of products that consume fuels or electricity, directly or indirectly.	Excluded from assessment
3.12 End of life treatment of sold products	Emissions associated with disposal of products, such as demolition, incineration, landfill	Excluded from assessment
3.13 Downstream leased assets	Emissions associated with operating or producing assets that the university owns and has leased to another entity such as commercial units, student residential buildings and land.	No data currently available
3.14 Franchises	Emissions associated with operating franchise that are not included in Scope 1 or Scope 2.	No data currently available
3.15 Investments	Emissions associated with spending of investments made by the university, including pensions, project finance, and equity and debt.	Not currently included within reporting
	Total	81,278



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