AUDE

Together, for excellent university estates & facilities

ASSOCIATION OF UNIVERSITY DIRECTORS OF ESTATES

A Guide to Decarbonisation

Intended to help you navigate your way through decarbonising your operations by optimising and specifying a decarbonisation plan that will have real-world impact on emissions.

Image:
George Green Library,
University of Nottingham
©Arup

Contents and layout

Forewords

AUDE

Climate change is, without doubt, the greatest challenge of modern times. Already we are seeing its impact across the globe as well as closer to home. University campuses, buildings and infrastructure, and our students and staff, are already being impacted by it. That is why, in our 2022-25 Strategic Plan, AUDE committed to develop and share best practice that supports universities to achieve their net zero carbon targets and wider sustainability objectives.

This guide will help you develop your decarbonisation plan. With practical advice, specifications and guidance it draws on the experience and expertise of our members and partners in supporting you in this fundamental activity. If you are about to procure consultancy advice for a decarbonisation plan, read this first – it will help ensure you get an output that is bespoke and targeted to what you need and avoid the pitfalls others have faced.

As Chair of AUDE's Sustainability Advisory Group I am delighted we've created this authoritative and practical guide, and I am confident it will be of value to universities across the world.

Thank you to Arup for pulling the guide together on behalf of the association, and to everyone who has contributed to it including those AUDE members who have joined in the collaborative work to develop it. Whether you are developing decarbonisation plans for the first time or refining and developing existing plans there is a wealth of good practice to draw on here. Learn from the pioneers in this field to boost your own university planning.

Andy Nolan

Chair, AUDE Sustainability Advisory Group

Arup

Developing a Decarbonisation Plan takes resources, time, commitment and emotional energy. But a plan is not the end-point – it should fire the starting gun for ever increasing momentum. Only by implementing a plan and creating real-world emissions reductions will we slow climate breakdown.

In our experience, barriers to decarbonisation are very rarely technical. This is reflected in this guide by the constant reference to internal collaboration and the need to reach outside the Estates Department.

A plan that stretches across an institution can uncover or highlight existing wider barriers. Focussing on these barriers in a positive way rather than wishing they didn't exist is the only way create real progress.

We are proud to have been trusted by AUDE to create this guide with them.

Andy Sheppard

Associate Director – Sustainable Buildings and Project Lead

BUFDG

With severe cost-pressures across UK HE, funding decarbonisation in universities is a huge challenge. Yet a sustainable transition provides opportunities for delivering efficiencies and returns, as well as helping to drive the broader institutional strategy.

We're grateful to the teams at Arup and AUDE for highlighting the key elements of effective decarbonisation planning and helping to guide the sector through such a challenging (but essential) exercise.

Even where significant progress seems impossible without external funding, a detailed plan is crucial in identifying the low-hanging fruit, as well as ensuring the institution is able to be aware of, and act quickly to take advantage of any additional funding when it materialises.

Karel Thomas

Executive Director, British Universities' Finance Directors Group

HESPA

Aligning decarbonisation plans with the development and implementation of institutional strategy is vital in ensuring commitment from all stakeholders and that action can be prioritised amongst competing demands, of which there are many.

Given the size and complex nature of higher education institutions, strategic planners add huge value by joining up conversations and multi-function activities and combining their 'big picture' strategic view and technical analytical skills to enable the development and delivery of cross-institution agendas.

Given the nature of the HESPA community and the opportunity for collaboration around this agenda, this is an important guide for HESPA members to continue to leverage strong relationships across organisations.

Lisa Ambler

Membership Development Manager and Sustainability in Strategic Planning Special Interest Group Steering Group, HESPA

GuildHE

Higher Education Institutions are at the forefront of innovation to improve our world and tackle major social and environmental problems and we should not shy away from making a difference where we can and invest in a long-term plan which supports our staff, students, our communities and our planet.

In a period of tight financial pressures, the decarbonisation challenge can often seem overwhelming. It is vital that when our members invest time, money, and energy in developing a decarbonisation plan, those efforts deliver results.

We therefore welcome this guide which contains useful considerations, recommendations, and example specifications that will help ensure that delivered plans are comprehensive, engaging, and appropriate to the needs of different institutions of all shapes and sizes. No matter where you are on the journey to net zero, this guide is a valuable resource.

Steve Edge

Chair, Guild HE Environmental Sustainability Network

EAUC

Decarbonisation is an essential part of a university's pathway to sustainability. This isn't just of environmental benefit but also helps develop organisational resilience, excellence in teaching and learning, community engagement, and a positive staff and student experience.

This guide is a valuable addition to the tools available to universities to help them decarbonise at pace and scale. By providing advice for at various stages of their sustainability journey, it shows that every university can take actionable steps.

The emphasis on long term strategic estates master planning, developing impactful partnerships, stakeholder engagement and customised, context-specific solutions aligns perfectly with our commitment to equipping our members to achieve their ambitious sustainability goals. This resource will undoubtedly support AUDE and EAUC members alike in this critical time for our sector and society more broadly.

Charlotte Bonner

CEO, The Environmental Association for Universities and Colleges

Image:
St George's HeartSpace,
University of Sheffield
© Bond Bryan Architects

Executive summary

As is shown by increasingly concerning weather patterns, the need to decarbonise is here and it is urgent. However, this urgent need has coincided with unprecedented additional pressures on the UK's Higher Education sector, from post-pandemic changes in student expectations and how higher education is viewed amongst the cost-of-living crisis to institution incomes declining in real terms and a complex estate in need of constant refurbishment and renewal.

However, none of these competing pressures eliminates the need for decarbonisation. Action is still essential, and universities hold a special place in society, influencing as they do, thousands of undergraduates at the beginning of their careers every year and having a central role and voice in many towns and cities.

The maturity of institutions' understanding of and levels of progress on decarbonisation varies massively. Some are just starting out whereas others have had a constant focus on the issue for a decade or more. This guide is intended to suit all institutions, irrespective of the place they occupy on this spectrum.

Likewise, no two institutions are the same so it follows that all decarbonisation plans should be unique. With high complexity, individuality and importance, a high-quality plan is essential. The risks (and potential costs) of setting off in the wrong direction are high.

Those at the beginning of their decarbonisation journey will benefit from what are termed 'Foundation Decarbonisation Plans'. They provide the minimum content required to give an institution a route towards targeted emissions reductions.

The parts that make up these Foundation Plans are relatively standard and so the degree of tailoring (and the associated understanding needed to achieve it) is limited.

Many institutions already have plans to this level, but they may benefit from an update or enhancement to enable tangible progress – whether due to a change in circumstances within the institution, the shifting of expectations and the context, or because techniques and methodologies have moved on rapidly.

Moving beyond Foundation Plans with a customised study (termed an 'Enhanced Decarbonisation Plan') affords the opportunity to enhance accuracy, opportunities or implementability. To tailor an enhanced plan, a university will need to examine their drivers and the characteristics of their institution and estate.

Enhancing accuracy means bringing in additional components to the plan to bring more detail, certainty and robustness, taking additional carbon sources into account or considering a greater range of potential solutions.

Enhancing opportunities means having a secondary focus on non-carbon aspects of sustainability that are highly aligned with interventions commonly used to reduce energy consumption and carbon emissions. Considering these will maximise the impact and value of investment directed at carbon.

Enhancing implementability means having a broader view of the institution, reaching far beyond Estates, the traditional home of energy and carbon issues.

It is imperative that future Decarbonisation Plans are co-created with a panel of stakeholders with finance and strategic planning colleagues. Senior Leadership must embrace the development of the plan. To meet this, the plan must be developed keeping in mind the short-term practicalities (e.g. an organisation's structure and culture), the medium-term context (inc. pedagogy change and funding constraints) and the long-term strategic direction of the university.

Decarbonisation Plans are a 10–20-year undertaking and must be aiming towards where the university will be in 10-20 years' time rather than constraining thinking to the current operations, structure and business model.

Finally, to arrive at the Decarbonisation Plan that is perfect for your institution, it is likely that external assistance is needed. The last section of this guide contains example specifications that can be combined into Invitation to Tender documents to provide a sound basis for procuring the right partner for you.

Navigating this document
Terminology

The terminology used throughout this document is explained below:

A Decarbonisation Plan: A piece of work that sets out how an institution can reduce its greenhouse gas emissions in order to contribute to efforts to slow/reduce/reverse global heating. Incorporates ensuring emissions reductions are achieved according to good/best practice methodologies (such as prioritising energy reduction over purchasing low-carbon energy or offsetting).

Foundation Decarbonisation Plan: This covers the minimum steps that should be undertaken for universities to establish their net zero target, identify opportunities and create a plan for targeted emissions reductions so the target can be achieved.

Enhanced Decarbonisation Plan: This outlines how to take a more customised approach to the minimum content within the Foundation Plan, through detailed consideration of internal and external drivers, as well as an institution's unique characteristics. There is also opportunity for a plan to be enhanced by integrating additional scopes of work to the minimum content that aim to enhance the accuracy and wider opportunities of a decarbonisation plan.

Internal Drivers: Drivers from within a university that encourage them to pursue decarbonisation efforts, such as student and staff pressures.

External Drivers: Drivers from outside the university that push them to decarbonise, such as government policies and funding opportunities.

Characteristics: Every university has different characteristics which should drive the scope for decarbonisation and will impact the resources available for successful implementation. These can vary from campus location, size and scale, to the funding available for decarbonisation.

Enhancing Accuracy: Additional components that can be added to a decarbonisation plan to improve confidence in its projections of the real-world impact of its activities on emissions levels. These aim to bring more detail and robustness, account for additional carbon sources and consider wider solutions, such as taking a whole life carbon approach to carbon reduction interventions.

Enhancing Opportunities: Additional components or altered approaches that universities can adopt to increase the value of their investment, both in the decarbonisation plan itself and in the eventual projects needed to achieve the target. These components are generally areas of sustainability that align to carbon/energy-focussed works.

This guide recognises that universities are at different levels of decarbonisation maturity, with some being at the start of their journey and others having already made meaningful progress.

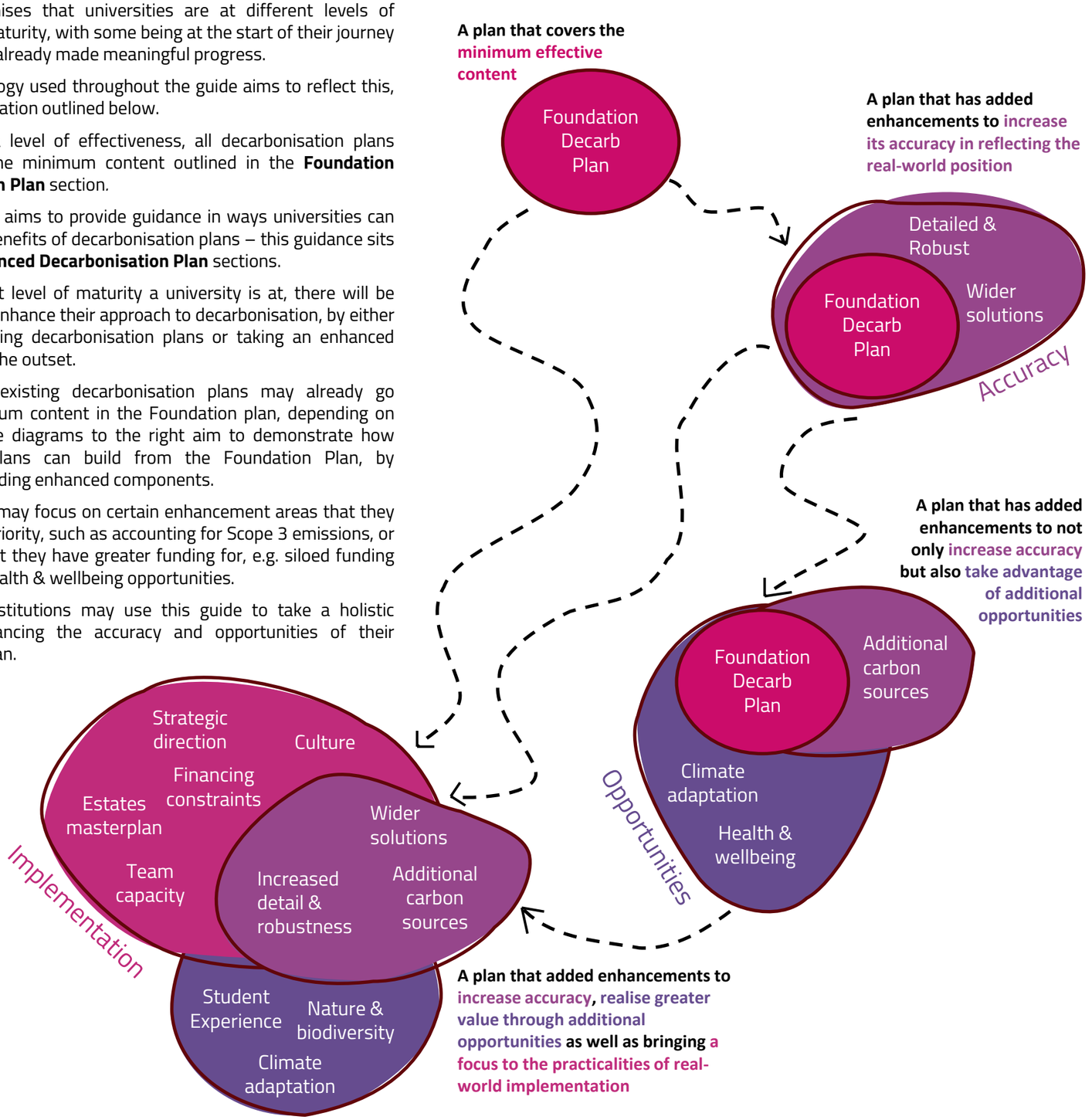
Thus, the terminology used throughout the guide aims to reflect this, with further clarification outlined below.

- To guarantee a level of effectiveness, all decarbonisation plans should cover the minimum content outlined in the **Foundation Decarbonisation Plan** section.
- The report then aims to provide guidance in ways universities can maximise the benefits of decarbonisation plans – this guidance sits within the **Enhanced Decarbonisation Plan** sections.
- No matter what level of maturity a university is at, there will be opportunity to enhance their approach to decarbonisation, by either enhancing existing decarbonisation plans or taking an enhanced approach from the outset.

Institutions with existing decarbonisation plans may already go beyond the minimum content in the Foundation plan, depending on their maturity. The diagrams to the right aim to demonstrate how decarbonisation plans can build from the Foundation Plan, by incorporating or adding enhanced components.

Some Institutions may focus on certain enhancement areas that they see as more of a priority, such as accounting for Scope 3 emissions, or focus on areas that they have greater funding for, e.g. siloed funding pots to enhance health & wellbeing opportunities.

Whereas some institutions may use this guide to take a holistic approach to enhancing the accuracy and opportunities of their decarbonisation plan.



Navigating this document

Where are you currently on your decarbonisation journey and what can you do?

Universities can be at various stages of their decarbonisation journey, depending on their level of awareness, commitment, and action.

It's important to note that universities may not necessarily progress through these stages in a linear fashion, and the boundaries between stages may be blurred.

Some institutions may also be more advanced in certain areas of decarbonisation than others.

However, this framework can help universities assess their current position and identify opportunities for further action and progress.

Here are some actions that universities could take at each of the six stages of the decarbonisation journey.

By taking these actions, universities can progress through the stages of the decarbonisation journey and ultimately become leaders in sustainability and climate action.

Whilst not an exact translation (as every university is different), the following sections will be of most use depending on your maturity level:

1. Unaware or disengaged 2. Awareness & planning	Foundation Plans
3. Early implementation 4. Acceleration & scale-up	Enhanced Plans
5. Leadership & innovation 6. Integration & transformation	Real-world implementation

1. Unaware or disengaged

Little to no awareness of the need for decarbonisation; lack of understanding about the institution's carbon footprint and the potential impacts of climate change.

Potential actions

- Conduct a carbon footprint assessment to understand the institution's environmental impact
- Raise awareness among university leadership, staff, and students about the importance of decarbonisation
- Identify potential champions or advocates for sustainability within the university community

2. Awareness and planning

Recognises the importance of decarbonisation; assesses carbon footprint; develops a decarbonisation plan, sets targets, and identifies potential strategies.

- Set clear decarbonisation targets and develop a comprehensive plan to achieve them
- Engage stakeholders (e.g., students, faculty, staff) in the planning process to build support and gather ideas
- Benchmark against peer institutions to identify best practices and areas for improvement

3. Early implementation

Starts implementing initial decarbonisation measures such as energy efficiency retrofits, behaviour change campaigns, or small-scale renewable energy projects..

- Implement low-cost, high-impact initiatives such as energy-efficient lighting
- Launch behaviour change campaigns to encourage sustainable practices among students and staff
- Pilot small-scale renewable energy projects, such as rooftop solar panels or small wind turbines
- Incorporate sustainability into new construction and renovation projects
- Identify potential funding sources and allocate resources to support decarbonisation initiatives

4. Acceleration and scale-up

Ramps up decarbonisation efforts; invests in larger-scale projects and more ambitious strategies; integrates decarbonisation into core operations, research, and curricula.

- Invest in large-scale renewable energy installations, such as off-site wind or solar farms
- Retrofit existing buildings to improve energy efficiency and reduce carbon emissions
- Implement comprehensive sustainable transportation initiatives, such as electric vehicle charging stations and bike-sharing programs
- Integrate decarbonisation into core university operations, such as procurement, food services, and waste management
- Incorporate sustainability and climate change topics into curricula across disciplines

5. Leadership and innovation

Becomes a leader in decarbonisation; sets ambitious net-zero targets; pioneers innovative solutions; develops cutting-edge research programs, living labs, or large-scale demonstration projects.

- Set ambitious net-zero carbon targets (e.g. scope 3) and develop a roadmap to achieve them
- Establish a dedicated office or team to lead sustainability and decarbonisation efforts
- Develop cutting-edge research programs focused on climate change mitigation and adaptation
- Create living laboratories to test and demonstrate innovative sustainability solutions
- Share knowledge and best practices with other institutions and the wider community
- Advocate for supportive policies and collaborate with government and industry partners

6. Integration and transformation

Fully integrates decarbonisation into the university's mission, values, and decision-making processes; embeds sustainability principles across all aspects of university life; transforms culture and contributes to wider systemic change.

- Embed sustainability principles into the university's mission, values, and strategic planning
- Integrate decarbonisation goals into all aspects of university life, from campus operations to research, education, and community engagement
- Foster a culture of sustainability and encourage everyone to adopt sustainable practices
- Collaborate with local and regional partners to drive systemic change and contribute to the global transition to a low-carbon future
- Continuously monitor, evaluate, and report on progress towards decarbonisation goals, and adjust strategies as needed

Setting the context

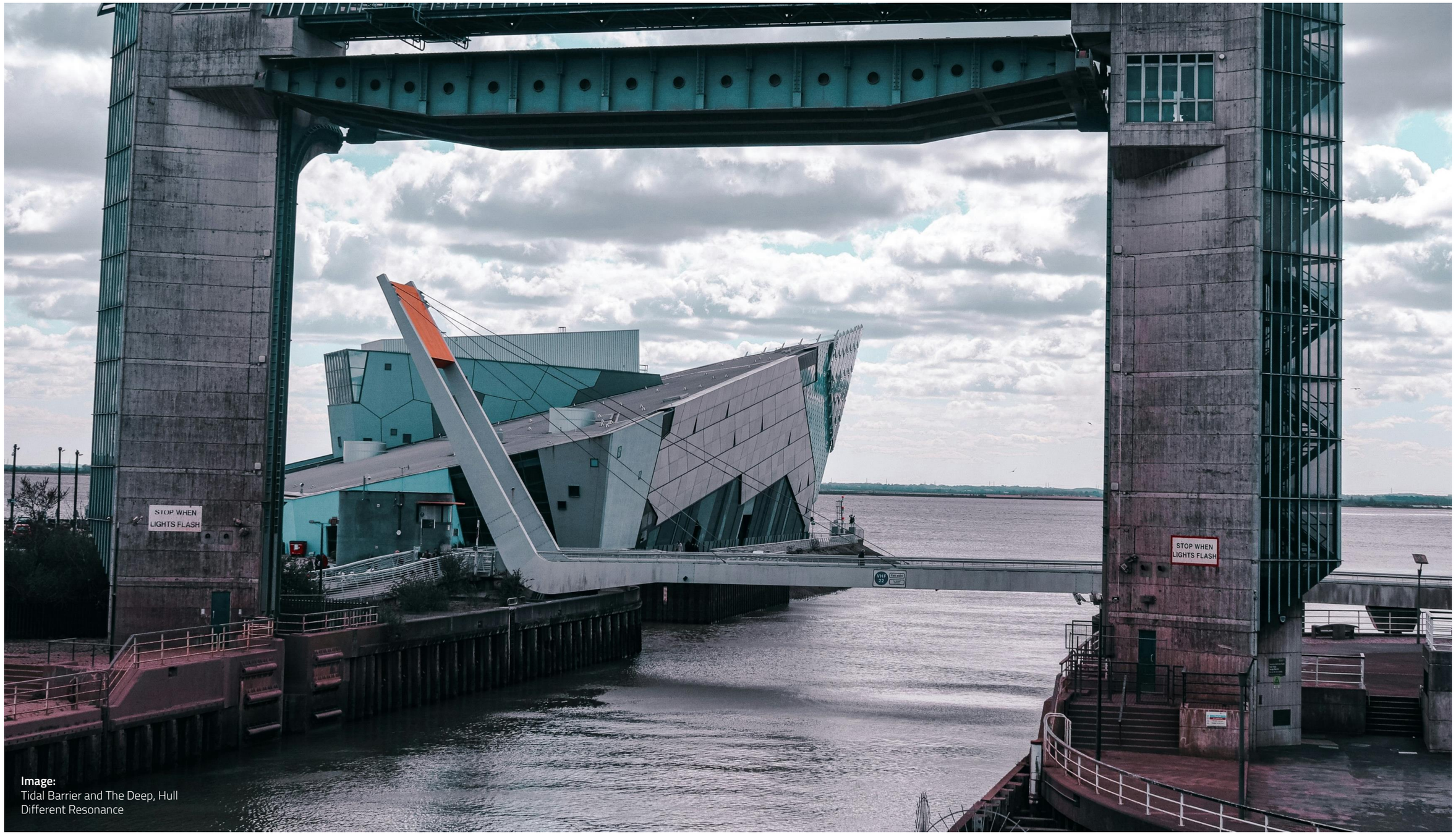


Image:
Tidal Barrier and The Deep, Hull
Different Resonance

Image:
St. Gallen, Switzerland
Eddie Hollywood

Setting the context

Overview

Introduction

Decarbonisation has become a critical priority for universities as they strive to align with global efforts to mitigate climate change. Many institutions have declared a climate emergency and set ambitious net zero emissions targets.

Notably, a robust decarbonisation strategy can enhance a university's brand, thus making it more competitive in attracting environmentally-conscious students and staff, as well as increasing research funding opportunities that prioritise sustainability.

However, the journey from target-setting to affordable implementation requires comprehensive, pragmatic decarbonisation plans that outline concrete steps to achieve net zero while considering broader sustainability and strategic goals.

This section explores the context in which universities must develop and implement their decarbonisation plans, highlighting the internal and external drivers, the importance of collaboration, and the alignment with national and international targets.

Key messages:

- Effective decarbonisation requires collaboration and engagement across the university community.
- Decarbonisation plans should be practical, holistic, and aligned with campus development.
- Decarbonisation actions should be linked with an institution's strategic objectives and consider expected campus developments.
- External drivers include policies, global commitments, reputation, standards, funding, and risk management.
- Universities must align with national and international targets, pioneering local solutions.
- Higher education has a responsibility to contribute to global climate change mitigation efforts.
- Transitioning to net zero requires substantial financial commitment and strategic planning.

Setting the context

Global to local drivers

- Universities must support decarbonisation through sustainable practices and aligning with UK targets.
- They should leverage their position to pilot local initiatives and engage with regional plans.
- The sector must improve carbon reporting, with an estimated £43.8 billion cost to reach net zero.

Aligning with International targets

Higher education (HE) institutions bear a responsibility to support this global effort. Universities can exemplify rapid decarbonisation by embedding sustainability across operations, research, and teaching, thereby preparing students to lead a just transition.

Decarbonisation requires more than discussion and generic plans. Procrastination is no longer an option; it's time to act. As the HE sector embarks on this significant journey, they must also consider the broader picture. They must ensure they're not solely focused on achieving net zero at the expense of other pressing issues. Instead, they should view this as a unique opportunity to leverage investments to enhance wider aspects, ensuring their journey is equitable and focuses on improving conditions for both people and nature.

Paris Climate agreement Limit of 1.5°C already surpassed

UK net zero commitments

Universities need to navigate and comply with national policies and frameworks related to sustainability, ensuring their plans align with the broader national agenda. Through decarbonisation plans, universities can future-proof their estates, not only aligning with the UK's net-zero targets but also helping to progress and accelerate them.

It's essential to define the specific ways in which HE institutions can contribute to national decarbonisation goals, recognising their unique position as knowledge hubs and influencers.

Universities can commit to the Science Based Target initiative (SBTi) as a mechanism to report progress in reducing their emissions. This will support them to align with global and UK net zero ambitions.

net-zero emissions target by 2050

Regional and city-level targets

Universities hold a unique position, bridging international research and on-the-ground realities. Pilot initiatives on campuses can be scaled up, student projects can address hyperlocal issues, community members can provide wisdom and accountability. Forged on trust, these connections cultivate the creative thinking and collective drive essential for meeting the global targets at a local level.

Universities can engage with city-level sustainability plans and contribute to local initiatives, fostering a symbiotic relationship with surrounding communities. This also supports city-level net zero targets, assisting local businesses and communities in reaching net zero goals and ensuring a just transition.

The changes needed to enable decarbonisation can also improve local air quality, health, wellbeing, biodiversity, and climate resilience, positively benefiting the local communities of which UK universities are a part.

Public call to action

As part of the public call for action, universities have a 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.

Building on existing sector knowledge

Higher and further education providers urgently need to get better at measuring and reporting their carbon footprint.

The Standardised Carbon Emissions Framework (SCEF) for universities and colleges has been launched by the Environmental Association for Universities and Colleges (EAUC), enabling institutions to measure, report and manage their carbon emissions.

Launched alongside is a far-reaching report on Accelerating towards Net Zero and for the first time it provides an estimate of the sector's carbon footprint to be 18.1 Mt CO2e, with HE institutions contributing approximately 86% of this, and FE 12%.

AUDE commissioned a Cost of Net Zero Report which was launched in July 2023. It looks at the costs of reaching net zero across scopes 1, 2 and 3 for the UK Higher and Further Education sector. The report says that the estimated total cost for HE&FE sector to transition to net zero is £43.8 billion (comprising £37.1 billion HE and £6.7 billion FE). Whilst this is a significant cost, it also represents a once-in-a-generation opportunity and there is no quantification of the cost of not acting.

"What are we doing now to help us get to net zero carbon? For some, there is enabling work to do, and they initially adopt a 'housekeeping' approach to their estate to ensure there is no throwing good money after bad. They fix draughty windows as an essential precursor to a more significant building fabric intervention planned for later. This approach must be sensible. Energy managers examine issues large and small, working with suppliers to ensure the clearest thinking and the most technologically advanced products, not least when considering scope 3 carbon emissions within the supply chain." -Higher Education Estates Management Report

Image:
Market St San Francisco, CA
Ronan Furuta

Setting the context

Sector approach to decarbonisation

The Intergovernmental Panel on Climate Change's 2023 forecast put global warming at a predicted 3.2°C which can only be mitigated by rapid and unprecedented changes across society, including a substantial reduction in GHG emissions and development of carbon removals.

With the EAUC's estimate of the HE sector's carbon footprint to be 15.6 Mt CO2e, it is essential for all universities to play their part in mitigating global warming by decarbonising their Estate to achieve net zero emissions, as well as investing in and supporting the growth of carbon removals. This will enable universities to eventually go beyond net zero and have climate positive operations, meaning that they are actively removing more carbon dioxide from the atmosphere than they are emitting, resulting in a net positive impact on the climate.

Many universities have already begun the process of decarbonising their estates, have recognised the urgent need to address climate change and demonstrate sustainability leadership. Decarbonisation is not a new concept, and there is a wealth of existing guidance and industry best practice frameworks to support universities on this journey. Thus, it is important to recognise the current best practice approach for Scope 1 and 2 decarbonisation, which is outlined below:

- Reduce the Estate's total energy consumption by rationalisation and improving building utilisation.
- Reduce building energy consumption by improving building fabric and energy efficiency.
- Transition away from fossil fuels to decarbonise heat energy.
- Decarbonise electricity by either renewable energy generation or buying a high quality zero carbon PPA.
- Offset residual emissions by purchasing responsible and robust carbon credits.

Image:
Leeds Metropolitan University Rose Bowl, Faculty of Business & Law (Arup)

Common drivers for pursuing decarbonisation

Internal Drivers

Values and aims

Many universities have a commitment to environmental sustainability embedded in their mission and values. Decarbonisation aligns with these principles and reinforces the institution's dedication to responsible practices.

Leadership and governance

Strong leadership and governance structures within the university can drive the development and implementation of decarbonisation plans. This may involve commitment from senior executives, governing bodies, and sustainability committees.

Research and innovation

Universities are centres for research and innovation. Internal drivers for decarbonisation can arise from research initiatives focused on sustainable technologies, energy efficiency, and climate change mitigation, fostering a culture of innovation within the institution.

Financial considerations

Investing in energy efficiency, renewable energy, and sustainable infrastructure can lead to cost savings over time. Universities may view decarbonisation as a financially responsible strategy that contributes to long-term fiscal sustainability.

Students and Staff

Internal pressure from students, faculty, and staff who are passionate about environmental issues can drive the development of decarbonisation plans. Engaged stakeholders may advocate for sustainable practices and push the university to take meaningful action.

External Drivers

Government policies and regulations

National and regional governments often set policies and regulations to reduce carbon emissions. Compliance with these regulations is a significant external driver for universities to develop decarbonisation plans.

Global commitments

International agreements, such as the Paris Agreement, may influence the development of decarbonisation plans. Universities may align their strategies with global goals to demonstrate their commitment to addressing climate change on a broader scale.

Reputation

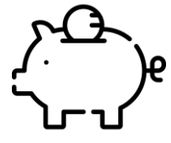
Universities are often held to high standards by the public. Decarbonisation plans can enhance an institution's reputation, attract environmentally conscious students and staff, and contribute to positive public relations.

Industry standards

Universities may be influenced by industry standards and benchmarks related to sustainability. Adopting decarbonisation plans can position the institution as a leader in higher education sustainability efforts.

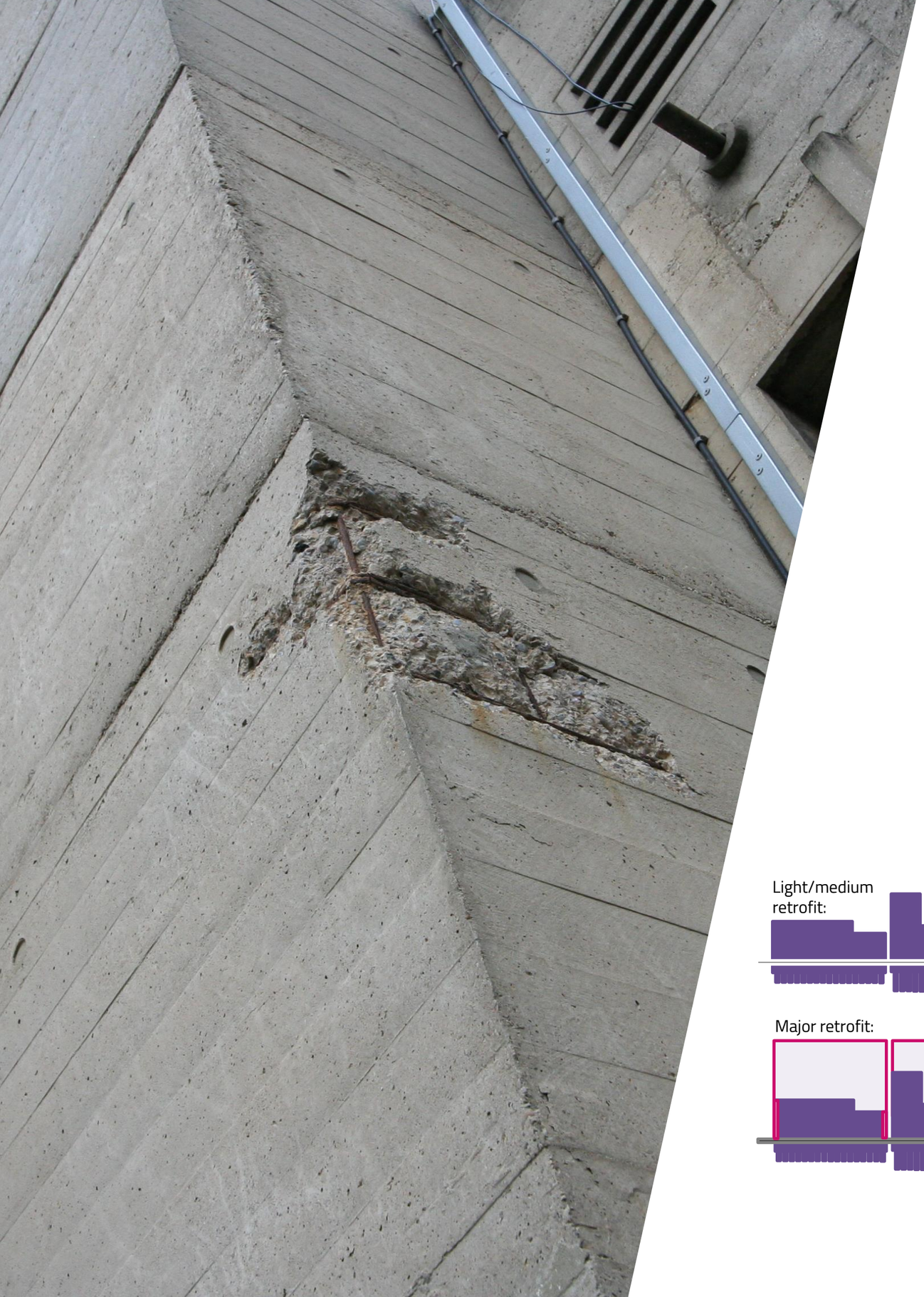
Funding opportunities

External funding sources, including government grants and private initiatives, may be tied to sustainability goals. Universities with clear decarbonisation plans may have better access to such funding opportunities.



Risk management

Climate change poses risks to infrastructure, operations, and long-term planning. Universities may develop decarbonisation plans as a form of risk management to enhance resilience against the potential impacts of climate change.



The Importance of Legacy Buildings

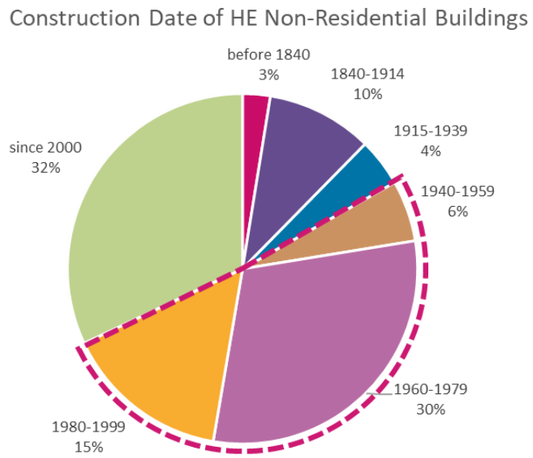
A parallel guide

Any decarbonisation plan needs to sit pragmatically within an existing estate. Many buildings within HE are from the often-problematic period of the second half of the 20th century where standards were variable, materials and design solutions questionable by modern standards and space provision was meeting different needs than today.

However, legacy buildings can be transformed to become modern, inspiring and flexible spaces with charm. There is intrinsic value in the structural bones of these buildings that can return carbon and financial value through there reuse. Retrofitting buildings requires a different approach in terms of brief definition, end user expectations, design and construction . These elements are highlighted in a parallel guide also produced by AUDE.

In survey responses from AUDE members, there were very few who expressed a specific preference for new builds or concerns around the slightly increased risk created when dealing with exiting assets, showing that the appetite for reusing our estate is large.

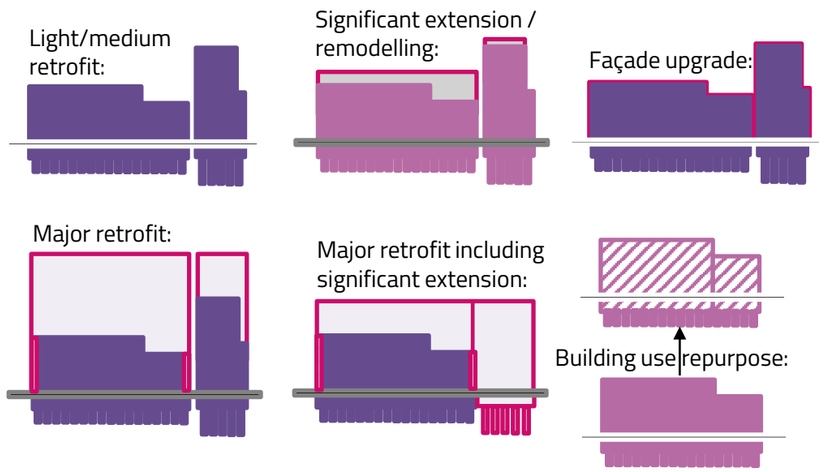
However, it is undeniable that reusing legacy buildings can be more complex. The redevelopment decision-making process needs to consider a wide range of factors, some of which need significant data or studies to enable them to be properly appraised.



The re-use of buildings involves considering the architectural layout, the building envelope and the structural integrity of the building. These factors are explored in depth in the guide, giving the reader a clear understanding of how legacy buildings can be turned into an opportunity.

There are also a number of potential pitfalls from materials and techniques (such as asbestos and RAAC) to challenges in meeting modern standards of inclusive design. None are insurmountable, though, and in many cases can make refurbishment essential, opening the door to other improvements such as student experience and emissions savings.

The guide is interweaved with enlightening and truly inspiring case studies that clearly set out the challenges, lessons learnt and success from a number of example projects from the sector covering the range of refurbishment options from a light retrofit to significant extensions and remodelling with façade upgrades and building use change.



Foundation Decarbonisation Plans

Image:
Wind farm
Dan Meyers

Image:
Wood Model
Christophe Dion

Foundation Decarbonisation Plans
Overview

‘Foundation Plans’ are Decarbonisation Plans which have the minimum content required to give an institution a route towards a targeted emissions reductions. They are a good starting point for institutions setting out on their journey or on which to build more comprehensive plans.

The parts that make up these plans are relatively standard across institutions and so the degree of tailoring (and the associated understanding needed to achieve it) is limited.

Many institutions already have Plans to this level, but they may benefit from an update or enhancement to enable tangible progress – whether due to a change in circumstances within the institution, the shifting of expectations and the context, or because techniques and methodologies have moved on rapidly.

This section will describe the parts of a Foundation Plan to aid understanding of the basics, providing a precursor to sections on more customised and enhanced plans later in the document.

Universities are always changing and progressing. It may be tempting to delay work on decarbonisation until ‘the right time’. But this is inadvisable – the ideal time will likely never appear. Better an imperfect plan at the right time than a perfect plan delivered too late to have impact.

Key message points:

- Foundation Plans are a good starting point and, depending on your institution, may be sufficient.
- They can and should also form the basis for more tailored, integrated plans. Knowledgeable briefing is still needed to ensure the plan meets your needs.
- An update of these Foundation elements should be considered if a more comprehensive plan is being considered.

Foundation Decarbonisation Plans

What is the overarching methodology for producing a decarbonisation plan?

Understand your position

Collate and digest existing relevant data and knowledge

Gather your opportunities

Identifying decarbonisation measures and funding opportunities

Document your options

Produce interim technical notes and key final outputs

Set a target

A carbon emission target is set by the university, and this typically sets the date on which the university will aim to be net zero carbon by. To contribute to the effective mitigation of climate change, these targets should ideally align with Science-Based Targets Institute's guidelines.

The decarbonisation plan is then developed to align with this target date. Notably, some universities prepare to understand the interventions required first before setting the target date.

Determine a baseline

Data analysis is carried out to establish or estimate the current annual energy consumption for each building and calculate the current annual carbon emissions. This typically covers scope 1 and 2 emissions although some choose to include elements scope 3. Previous carbon interventions are often recorded.

Using the EAUC's Standardised Carbon Emissions Framework (SCEF) will aid repeatability and consistency across the sector and is an excellent resource, particularly for those starting out on their journey.

The projected business as usual (BaU) emissions for the university should also be estimated to understand the current emissions trajectory. This should include known plans related to rationalisations and disposals alongside long-term maintenance programmes.

Building information

Foundation Plans rely heavily on existing information relating to buildings rather than additional surveys.

Many institutions will have Condition Reports, Long Term Maintenance Plans and other information that can be invaluable in understanding the viability of individual solutions in individual buildings. Stakeholder engagement can also be useful to gather perceptions and anecdotal views contextualise data.

Building visits to high energy consuming buildings or a selection of typologies is typically required.

Estate infrastructure

Evaluation of the estate's infrastructure should take place, particularly to understand the current electrical capacity and the ability of the local grid to accommodate any proposed increase in electricity consumption (at a building or masterplan level). This is important to understand if infrastructure upgrades will be needed.

Carbon reduction interventions

A low/zero carbon technology appraisal should take place following the review of the building information. A list of all potential carbon reduction interventions should then be developed, including LZC technologies and non-technology focused interventions.

The interventions are then mapped against the buildings.

Decarbonisation plan

The outcomes of the previous activities are summarised in a decarbonisation plan. At this stage, the potential impact of interventions is modelled to arrive at a quantified plan.

A decarbonisation plan can set out the recommended interventions, the carbon emissions saved, energy impact, costs, timeframe, wider considerations and wider benefits.

Decarbonisation Plans are often technical documents, but they are only useful if they are accessible and relatable. Language and formats must be engaging, inclusive and understandable by all.

Programme

Whilst often at a high level, a costed programme is an essential part of the Decarbonisation Plan to set out the immediate priorities. It can develop a timeline covering short-, medium- and long-term actions.

It should consider both the technical aspects of the decarbonisation plan (e.g. install ASHPs) and also the non-technical aspects (e.g. funding routes, governance process etc.)

This should help universities to understand the need for procurement and the potential number of concurrent projects.

Image:
Offingen, Germany
© Andreas Gücklhorn

Foundation Decarbonisation Plans
Step 1- Understand your position

Setting a clear target

- Set a clear carbon emissions target with a specific date for achieving net-zero
- Determine who will be responsible for delivering the commitment and how it will be monitored.
- Interim targets (or cumulative emissions targets), as well as commitment to Science-Based Targets (SBTs) can help keep the university on track towards achieving the overall goal.
- Universities should consider which emissions scopes to include in their target (1, 2 being the common place to start with a Foundation Plan).
- Approximate costs for high quality offsets for to account for residual emissions so funding needs can be embedded into the Plan from the start.

Establishing a baseline

To create an effective decarbonisation plan, it is essential to establish a comprehensive and accurate baseline of the university's current carbon emissions.

Baselining emissions for a decarbonisation plan involves quantifying the current level of greenhouse gas (GHG) emissions from all relevant sources associated with the university's operations.

This process provides a reference point against which future emission reductions can be measured and helps identify areas where emissions are highest, guiding the prioritisation of decarbonisation efforts.

The foundation approach is to:

1. Define the scope and identify the sources of emissions
2. Collect the data on all the relevant emissions sources
3. Use carbon factors to convert data into the equivalent GHG emissions, documenting assumptions
4. Use assumptions to predict the business-as-usual case into future years

What do I need to consider when setting the target?

Resource availability and Estate team capacity

Financial resources and the capacity of the Estates team may limit the ambitions of net-zero targets.

Campus size, structure, location

Physical factors as well as plans for growth can affect the feasibility of carbon reduction measures.

Scope of university operations

Diverse activities and associated emissions influence target-setting.

Strategic ambitions

Institutional commitment to sustainability shapes the level of ambition.

Stakeholder expectations

Aligning targets with the expectations of the university community.

Regulatory environments

Regional policies and incentives impact the feasibility and pace of efforts.

What are the common pitfalls to avoid in baselining?

Incomplete data

Ensure that the data collected covers all relevant emission sources and activities to avoid underestimating the university's carbon footprint. Make estimates for missing data and be clear on basis

Double counting

Be cautious not to double count emissions, particularly when considering Scope 3 emissions, where the boundaries between the university and other entities may overlap.

Inconsistent methodologies

Apply the chosen methodology consistently across all emission sources and activities to ensure comparability.

Not documenting assumptions

Keep a track of all assumptions made during the baselining exercise so they can be reviewed, challenged and updated as necessary.

How can I adopt a comprehensive approach within a Foundation Plan?

Benchmarking

Compare the university's carbon emissions baseline and energy use intensities with peer institutions, industry benchmarks and SBTs to identify areas for improvement and set ambitious yet achievable reduction targets.

Key insights

Evaluate the baseline and business-as-usual data to get insights to inform the decarbonisation strategy, i.e. high consumption buildings etc.

Engage Stakeholders in goal-setting

Involve the university community, seek feedback, and foster a sense of collective responsibility for achieving net-zero targets

Balance direct reduction and offsetting

Combine emission reduction efforts with appropriate and robust offsetting measures

Plan for long-term and phased transitions

Understand wider masterplan strategies and align the business-as-usual emissions plan to ensure that strategic decisions are integrated.

Foundation Decarbonisation Plans
Step 2- Gather your opportunities

Collecting building information

When developing a Decarbonisation Plan, collecting comprehensive building information is crucial to understand the current estate and to be able to identify feasible and effective carbon interventions.

- A desktop study can be undertaken to analyse existing building and infrastructure information, such as floor plans, condition surveys, energy meter data and local electricity grid capacity.
- Building surveys of a sample of buildings could also be undertaken to understand the existing condition of the building fabric, HVAC and usage characteristics.
- Anecdotal and user-perception information can also be invaluable in identifying focus areas.

Identifying carbon and energy reduction interventions

When identifying carbon reduction interventions for a Decarbonisation Plan, it is important to consider both specific buildings and the broader estate to ensure a comprehensive and cohesive approach.

All potential interventions should be assessed against the information collected during the building surveys, to determine which interventions are feasible and appropriate. For example, interventions for a historic office building with gas boilers, compared to an all-electric modern laboratory building, will be very different.

By outlining all potential carbon reduction interventions, further analysis can be undertaken to assess the impact and feasibility, whilst balancing other factors such as cost efficiencies and Estate readiness.

A number of scenarios for different intervention combinations should be modelled, covering energy, carbon and capital cost, to understand their effectiveness. This should highlight the most effective combination of interventions and support intervention prioritisation.

How can I make the most of existing building information?

Multiple data sources

Various types of data can provide different insights into how buildings operate. E.g. user surveys, interviews with the Estates team, maintenance logs and information held by planning teams such as timetabling.

Centralised database

Collect and consolidate all data sources and building information into a centralised database. Whilst doing this, it is a great time to check the consistency of data to increase the accuracy of the Plan.

Improve future ways of working

This work should catalyse organisation in the Estate Team. Going forwards, the database should be updated with new data sources, so it is the place that all stakeholders can access the same information.

Thorough data analysis

When analysing meter data to understand energy consumption, look out for anomalies and trends that indicate opportunities for energy conservation or system optimisation.

Benchmark buildings

Benchmark the energy performance of individual buildings against industry standards or similar buildings within the university's portfolio. This helps to inform prioritising targeted interventions.

What are the key types of interventions?

Fabric Interventions

Improvements to the roof, walls, windows, floors and air tightness, to reduce energy loss. There could be a light or deep approach to fabric interventions.

System Interventions

Improving or replacing current systems, such as HVAC and lighting, to support the transition to low/zero carbon systems, increase system efficiency and reduce consumption.

System Optimisations

Understanding a building's energy demand and requirements can lead to existing systems being optimised. Such as optimising heating and lighting controls.

Renewable Interventions

To support with the production of low/zero carbon energy on-site, renewable technologies can be installed. Feasibility studies for PV, wind turbines, etc. should take place.

Estate Energy Review and Planning Process

Improving the estate wide approach to energy data monitoring, such as upgrading energy metering for more granular consumption or better utilising BMS systems.

What's important in matching interventions to buildings?

Existing plans for the buildings

Planned building works will impact interventions. E.g. if major renovation upgrades are due to take place, it would be cost effective to incorporate energy conservation measures at the same time.

Condition

The condition of the building envelope, and HVAC and electrical systems significantly impacts the energy efficiency of a building. It is key to assess the condition to determine the most appropriate interventions.

The need for decant can increase complexity

If interventions require any spaces to be vacated, the cost and disruption of decant and re-occupation should be factored into the overall costs.

Obviously, appropriate space will also need to be available for use.

Be aware of real-world operational aspects

Understanding when and how individual buildings are used is important to reduce unnecessary energy consumption. E.g. Building controls or BMS should align with usual building occupancy, so HVAC and electric systems are not in use when they not needed.

Consider levels of disruption

Disruption to University operations is important to consider. Such as residential works impacting student living conditions or potential system shutdowns. Phasing and scheduling interventions should take place to align with the academic calendar as best as possible.

Foundation Decarbonisation Plans
Step 3- Document your options

Report Outputs

Decarbonisation Plan reports should demonstrate the comprehensive and data-driven analysis that has been undertaken in their preparation. They should also include clear recommendations and an actionable roadmap for a university to achieve its decarbonisation target. This is communicated in a tailored report which considers factors such as cost, feasibility, and potential disruptions to campus operations.

The foundation content should include:

- Introduction and background context outlining university sustainability aspirations and an overview of how it aligns with wider strategic plans.
- GHG emissions inventory and baseline emissions data for the university
- Building portfolio assessment including building information and energy consumption data
- Carbon reduction intervention analysis and proposed interventions – both building specific and estate-wide
- A trajectory covering project timelines, high-level cost estimates and predicted carbon savings
- High-level financing and funding strategies
- Conclusion and next steps

Programme

To ensure that effective implementation takes place, a short-term programme should be produced. The decarbonisation plan should have identified a portfolio of projects that offer significant emissions reductions and energy savings, which are feasible for implementation within the short-term (1-3 years).

These tend to be the interventions that deliver a favourable return on investment, have relatively low complexity, and provide opportunities for visible, early successes that can build momentum for the broader decarbonisation efforts. External funding can then often be sought for these quick wins.

How can I maximise the insight gained from modelling.

Choose assumptions wisely

Assumptions should be based on comprehensive data collection, reliable methodologies, and credible projections to ensure accuracy. It is important to not over-assume potential energy and carbon savings

Consider using value ranges

Value ranges (such as error bars) often don't significantly increase the complexity of models but are invaluable in communicating the confidence with which data can be read and aid an understanding of risk.

Be wary of double-counting

When proposing more than one intervention on a building, care must be taken that technical overlaps are considered. For example, savings from changing heat sources will be lower with improved insulation.

Be realistic on how your buildings are used

In order to accurately predict savings, the usage patterns of the buildings will need to be assumed (such as 24/7 access, weekend working, office hours etc). Optimistic or pessimistic assumptions can skew outputs.

Monitoring and updating

Undertake monitoring to update modelling outputs as new data becomes available, such as changes in university operations,.

What practicalities should be considered with interventions?

Feasibility

Assessing the technical feasibility, resource requirements and potential constraints of carbon reduction interventions is essential to ensure the most appropriate interventions are chosen.

Simultaneous interventions

Identifying interventions that complement each other and can be implemented at the same time will improve the effectiveness of the Plan and can support cost reduction. For example, if windows are being replaced, additional façade upgrades could take place at the same time.

Complexity

Highly complex interventions are arguably at increased risk of succumbing to difficulties, either increasing programme or increasing cost.

Complications

Anticipating potential complications that may arise during the implementation of the decarbonisation plan, such as financial resource constraints or building specific problems like asbestos, is key to ensure successful delivery of the plan.

How do I prioritise interventions?

Energy Savings

To reach net zero targets it is essential that energy consumption is reduced as much as possible. Interventions that provide large energy savings should be prioritised, where economically appropriate.

Carbon Reduction

Interventions that directly target carbon reduction, such as transitioning to renewable energy sources, electrifying heating systems, and incorporating on-site renewable energy generation, is essential for achieving decarbonisation targets.

Cost and payback

While upfront costs may be higher for certain interventions, evaluating the long-term cost savings and payback periods through reduced operational expenses will be crucial in determining the financial viability of interventions.

Disruption

Interventions with minimal disruption to university operations, such as scheduled upgrades during holidays or phased implementation, should be prioritised to minimise impacts on teaching, research, and campus life.

Alignment to long term management plan

Prioritising interventions that align with the long-term management plan will ensure a coordinated approach. E.g. System upgrades may already be planned, so interventions can build on these plans, such as by maximising control upgrades at the same time.

Foundation Decarbonisation Plans

Deep-dive: Key challenges that smaller institutions are more likely to face (in collaboration with GuildHE)

Key challenges	Explanation	Potential Issues	Actions & Recommendations
Smaller estates and sustainability teams	With reduced numbers of staff at smaller institutions, it is likely that staff will have a variety of roles, resulting in there being few (if any) dedicated sustainability team members. This can impact staff knowledge around the decarbonisation agenda as staff are being asked to prioritise many different workstreams.	Reduced capacity with team members multi-tasking in different role	Engage students and other staff members in sustainability projects or seek external support through partnerships and collaboration.
		Fewer carbon-literate staff	Upskilling staff should be a priority. Reporting outputs should be non-technical and clearly outline the risks and costs of not acting.
Decreased decarbonisation experience	Smaller Institutions may be at the start of their decarbonisation journey, resulting in them having decreased experience. This can impact their ability to be clear what they need of their consultants. Less decarbonisation experience can also bring the potential issue of having lower-quality building data, with the Estates team having been unable to prioritise data collection and analysis.	Less experience contracting decarbonisation consultants	Use this guide and consider partnering with local institutions to understand how they've procured Decarbonisation Plans in the past.
		Lower-quality data on energy and other building characteristics	Be clear with potential consultants on the data you have to allow them to create a methodology that suits your information.
Financial challenges	Compared to large Institutions, smaller institutions typically have fewer revenue streams and less diversified funding sources. This can make them less resilient in times of financial stress and uncertainty, as well as impacting their budget for capital investment and their ability to outsource for consultancy advice.	Reduced resilience to short-term financial stress	Create a flexible Decarbonisation Plan that can change according to circumstances. Align carbon with other actions to meet long-term aims.
		Reduced capital budget	Be realistic from the outset on levels of funding available so a Decarbonisation Plan can be optimised appropriately.
		Reduced budget for consultancy advice	Collaborate with other small Institutions to pool resources or leverage services from local sustainability organisations.
Less comprehensive Estates Masterplan	Smaller Institutions that have limited resources, face budget constraints and have a minimal dedicated planning staff, are more likely to have been unable to invest heavily in comprehensive Estates Masterplans. This can result in a lack of foresight, meaning Institutions may not take the most strategic approach to decarbonisation.	Missed opportunity for multi-functionality, flexibility and utilisation.	Develop a space utilisation study to identify opportunities for consolidation of existing facilities that can inform your Decarb. Plan.
		Higher importance of LTM works in decarbonisation trajectory.	Focus on improving carbon returns in planned projects rather than envisaging stand-alone interventions.
Specialist institutions	Some Universities can specialise in a particular subject area which results in them having unique priorities. Likewise, this may lead to unique approaches being needed in decarbonisation.	Non-typical solutions needed.	Actively engage with a diverse range of stakeholder to promote interdisciplinary collaboration and work closely with carbon consultants.
Likely to aspire to grow significantly	It is more likely that smaller Institutions will have aspirations for economic growth, increased student intake and Estate development. A focus on economic growth can often come as a challenge to sustainability aspirations, including decarbonisation. Development of the Estate will also have a significant impact on carbon emissions, due to the carbon associated with construction.	Competing priorities over decarbonisation efforts	Integrate decarbonisation goals into the strategic direction so growth and decarbonisation goals go hand-in-hand.
		Increased Scope 1, 2 and 3 emissions	Develop a growth plan that incorporates decarbonisation strategies and net zero design principles.

Building on a Foundation Decarbonisation Plan

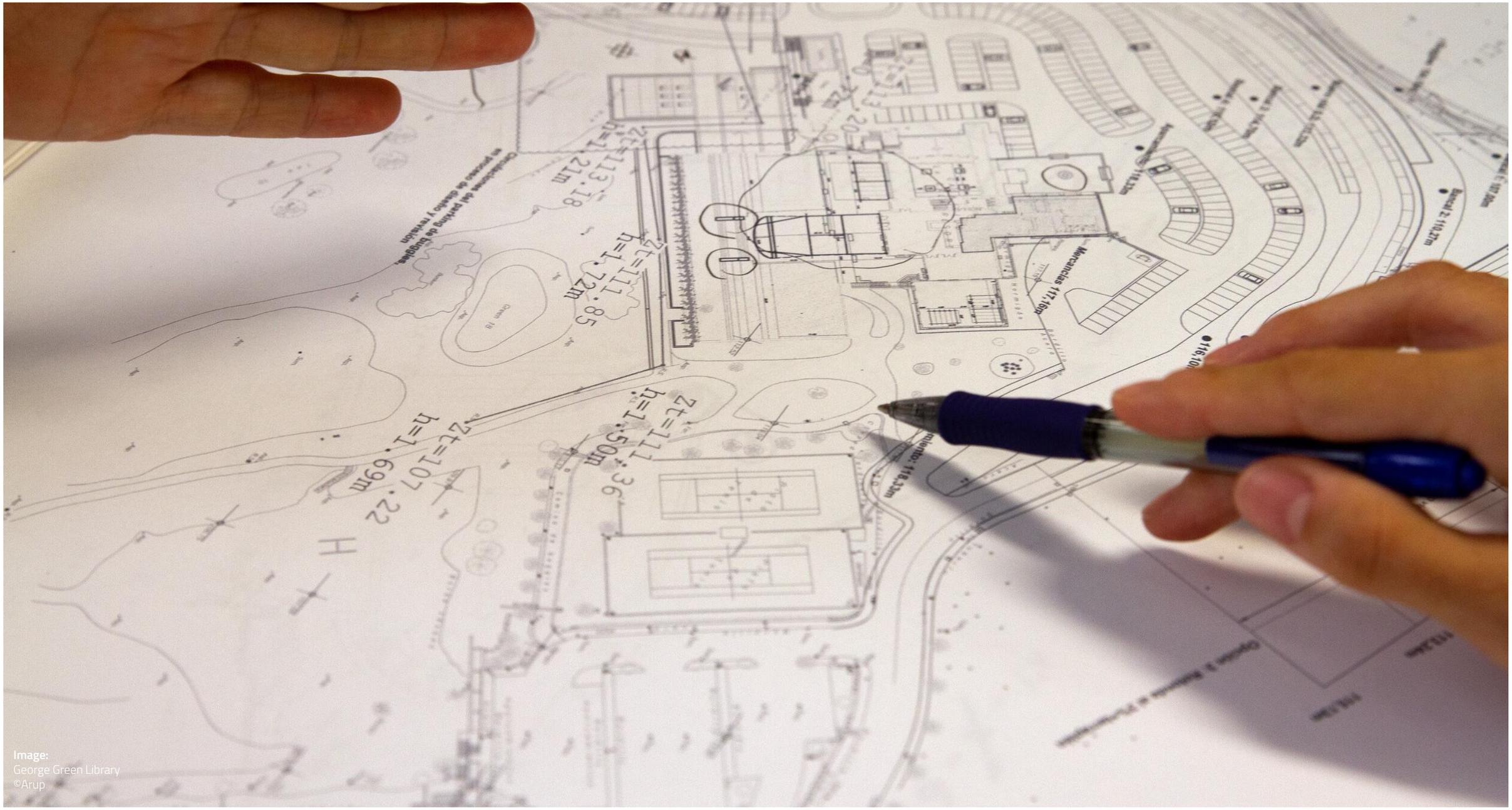


Image:
George Green Library
©Arup

Customising an Enhanced Decarbonisation Plan

Overview

In some cases, Foundation Plans provide an institution with a practical route towards emissions reductions. However, they can sometimes lack detail, miss opportunities for co-benefits and fail to integrate effectively into wider institutional strategies, all of which can reduce the effectiveness of a Foundation Plan.

An institution can build on an existing Foundation plan by examining its drivers for action on emissions and being aware of the characteristics of the institution that will impact on which areas to focus an Enhanced Plan.

Finally, the opportunities an institution has, both externally in terms of funding and internally in terms of the culture of the organisation will impact on the viability of various approaches to decarbonisations.

There are valid actions that can be taken regardless of an institution's maturity level in Decarbonisation Plans. Whether it's building on an existing Foundation Plan or embarking on a new Enhanced Plan from scratch, taking all these characteristics into account will better tailor a Plan. An Enhanced Plan should, therefore, be considered as being more integrated into the institution's internal and external systems.

Key message points:

- Campus features (infrastructure, location, size) and research expertise shape the feasibility, focus areas, and proactivity of decarbonisation strategies.
- Partnerships, funding, culture, and stakeholder engagement determine the resources, ambition, and urgency of the decarbonisation plan.
- Enhanced Plans typically stretch beyond elements that are in direct control of a Director of Estates. Collaboration is essential, as is the consideration of institution-wide factors such as culture change and leadership support.

Image:
Student Centre, University College Cork
©Studioworks

Customising an Enhanced Decarbonisation Plan

Mapping the characteristics of a university against the steps of a decarbonisation plan

The characteristics of universities can have a significant impact on their approach to decarbonisation. These characteristics drive the scope of the decarbonisation plan, priorities, and implementation strategy by:

- Shaping the feasibility and cost-effectiveness of specific decarbonisation measures.
- Influencing the focus areas and priorities based on the university's location, size, and research expertise.
- Determining the available resources and partnerships that can support decarbonisation efforts.
- Affecting the level of ambition and the urgency of implementing the decarbonisation plan based on stakeholder engagement and institutional culture.

The characteristics are typically split between the physical campus features (age, condition, location, size, scale etc.) and more operational features (research, partnership, funding, culture etc.).

The approach and success of university decarbonisation efforts will depend on a combination of these characteristics, as well as the specific goals, strategies, and actions pursued by each institution. However, by leveraging their unique strengths and addressing their particular challenges, universities can play a crucial role in driving the transition to a low-carbon future.

This table highlights how university characteristics can influence the recommended options in enhancing a Foundation Plan.

By considering these characteristics at the outset, universities can develop tailored approaches that account for their unique circumstances, challenges, and opportunities.

This understanding can help ensure that the decarbonisation plan is realistic, effective, and well-suited to the specific context of each university.

	How the characteristic affects the plan	Recommendations for enhancing your foundation plan
Campus infrastructure	Campuses rely on many infrastructure systems. The condition and capacity of these systems can significantly impact the feasibility of intervention options. For example, a move to heat pumps might be relatively low-impact but if the electricity grid needs to be strengthened, it is entirely possible that additional costs may make the intervention infeasibly. Some campuses may also have assets in the form of infrastructure elements (such as district heating networks) that others do not.	• Consider more extensive surveys with aging infrastructure. • Consider infrastructure surveys alongside building surveys. • An increased focus on the resilience of campus infrastructure to shocks and stresses is important. • Because infrastructure elements are often long lead-time aspects, it can be even more important to take account of the long-term strategic direction
Location	Rural or out-of-town university campuses have the potential for being less constrained for space (potentially allowing flexible decant options) or provide opportunity to direct-wire connections to large renewable developments. City-centre campuses are more likely to have the potential for shared infrastructure, multiple transport links. The geographical location will also inform local targets and planning policies (in the case of Local Authorities) and devolved legislation / guidance around aspects such as heat network zoning (in the case of countries).	• Less urban institutions can take a greater focus on off-site renewables. • City-based institutions may benefit greatly from identifying nature and biodiversity co-benefits from decarbonisation actions as they can be harder to identify than in rural areas. • Climate change adaptation can be relevant depending on local conditions. • Urban institutions may see a greater benefit from attention to health and wellbeing as a co-benefit.
Size and scale	Larger universities may have more complex emissions profiles and significant non-core sources such as fugitive emissions. Universities with a greater number of buildings might also find increased benefit from considering ways of combining interventions into a coherent package of works. For more information on the specific challenges affecting smaller institutions, see the previous Deep Dive.	• Larger institutions should potentially consider a greater number of carbon sources and put a greater emphasis on data analysis. • Larger institutions may have to rely on greater attention to student experience as they can be more anonymous and corporate due to their size. • Larger institutions may have more potential for utilisation increases.
Research	Research expertise may exist that can be brought into the potential interventions. However, it can be challenging to align the expectations and timescales of operational and academic staff. A large research portfolio can also lead to more complex and variable building types as well as uncertainty in funding sources.	• Consider more comprehensive building surveys of atypical research facilities. • A lesser research proportion may give a greater potential impact of online teaching and other pedagogical change.
Partnerships	Partnerships with organisations and bodies outside an institution are increasingly common and may provide opportunities. Existing relationships with energy companies or awareness of others' activities in the city/region. Universities are large users of heat, for example, creating opportunities for anchor loads for new networks.	• Institutions with strong community links may be able to develop bespoke offsetting opportunities through these relationships, benefitting from increased attention to this step
Funding	Obviously, the certainty and amount of funding (both currently and the future pipeline) is a significant factor. Plans that are clearly unaffordable are unlikely to progress, but nuances exist behind this. Funding applications need different levels of detail, cover different interventions and have different timescales. For more information on this important factor, see the Deep Dive later in the document.	• Tighter funding constraints could necessitate looking at co-benefits and a more comprehensive approach to monetisation such as Shadow Carbon Pricing. • An increased focus on the cost of not acting can also be enlightening.
Culture	The culture that exists within and between those that will be responsible for implementing a decarbonisation plan can be make-or-break. Using stakeholder engagement and co-design can be instrumental in developing a coherent plan. Leadership and SLT drive and support is also essential. The inter-departmental nature of a decarbonisation plan can be a useful vehicle to examine and improve many elements of culture and co-working.	• A focus on the short-term practicalities of implementation can highlight areas of inefficiency and non-joined-up working. • If your decarbonisation maturity is high, it's likely you've addressed more of the 'technical' barriers, meaning that a focus on culture change and collaboration may be beneficial. • Stakeholder engagement and co-creation techniques can be powerful in instigating change.

Enhanced Plans for Greater Accuracy and Opportunity

Image:
Redwood forest
©Eelco Bantlingk

The most fundamental way to enhance a plan is simply to carry out the same steps but with a more comprehensive scope. Suggestions for this additional scope is set out in the section on specifications.

The following two sections set out two further important ways that an Enhanced Plan can improve the impact of a Decarbonisation Plan.

Enhancing Accuracy

Building on the Foundation approach and adding extra components to a Decarbonisation Plan, in order to improve its robustness and support universities in achieving their net zero targets.

For example, it is becoming increasingly important for universities to not only address Scope 1 and 2 emissions, but also consider Scope 3 emissions and take a whole life carbon approach to development.

Enhancing Opportunities

Decarbonisation Plans can incorporate additional components or take altered approaches to increase the value of their investment, both in the decarbonisation plan itself and in the eventual projects needed to achieve the target.

By considering wider sustainability needs and goals, investment in carbon reduction interventions can align to these to deliver valuable co-benefits, such as integrating nature-based solutions as part of decarbonisation implementation, which supports climate change mitigation, improves student health and wellbeing through cleaner air quality, and can enhance the vibrancy of a campus masterplan.

Whilst these opportunities widen the issues being considered, it is important to keep decarbonisation as the central tenet of a plan to ensure focus.

These enhancements increase the value of the outcomes of the Decarbonisation Plan, but they also inevitably increase its complexity. With this comes an even greater need to focus on practical implementation by focussing on leadership, systems and other non-technical factors (covered in a subsequent section).

Image:
University of Nottingham
©Snehil Jonathan

Enhancing Accuracy

Overview

After the Foundation Plan steps have been improved and tailored, the first way an Enhanced Plan can respond to the characteristics of an institution is to bring in additional components into the Plan. These components can serve a number of purposes:

- Bring more detail, certainty and robustness to a plan (such as building energy surveys or a focus on whole life carbon).
- Take additional carbon sources into account for a more holistic picture (such as Scope 3 emissions or fugitive emissions from refrigerant leakage).
- Consider potential additional solutions (such as large-scale renewables or offsetting).

These additional components should be chosen in light of any particular opportunities for co-benefits an institution is interested in or the wider strategies, challenges and constraints of the institution that it are most important for the Plan to be integrated with.

Key message points:

- As plans expand to consider more factors, they inevitably (and positively) attract more stakeholders. As such, with expanded plans, it becomes even more important to consider the culture of the organisation and the teams involved in order to aid implementation.
- The components can allow easier integration with the institution outside of the traditional audience for a decarbonisation plan, such as strategic planners, finance directors and senior leadership teams.

Enhancing Accuracy

Adding more detail, certainty and robustness

Detailed condition and energy surveys

A Foundation Plan covers the minimum content required to give an institution a route towards an emissions reduction target, carbon reduction, with interventions often chosen following minimal data collection. For example, desk-top studies or basic building surveys can lack detailed consideration towards the unique characteristics of specific buildings and the direction of the Estates Masterplan.

The 'building survey' element of a decarbonisation plan is crucial in understanding the Estate and determining the most appropriate carbon reduction interventions to be able to reach decarbonisation targets. Therefore, to add significant value to Decarbonisation Plans, it is recommended that detailed building condition and energy surveys are undertaken. These should include:

- A qualified engineer or consultant visits the site to undertake the building energy survey
- Building envelope assessment
- Energy audit
- HVAC system evaluation
- Lighting assessment
- Review building operations and controls
- Identify renewable energy opportunities

Going beyond operational carbon

The UK Green Building Council (UKGBC) have outlined in their Net Zero Whole Life Carbon (WLC) Roadmap[1], that as operational carbon emissions decrease, mainly due to building improvements and grid decarbonisation, then embodied carbon will form over half of built environment emissions by 2035. It is therefore crucial to address embodied carbon emissions to mitigate the impacts of climate change.

Foundation Decarbonisation plans typically include Universities Scope 1 and 2 emissions, outlining the interventions needed to reach net zero operational energy targets. This approach does not typically consider the embodied and WLC impacts associated with any development of the Estate, as the embodied emissions fall under Scope 3. Embodied carbon Scope 3 emissions are a particular concern for UK decarbonisation, due to their significant impact on the built environment reaching net zero.

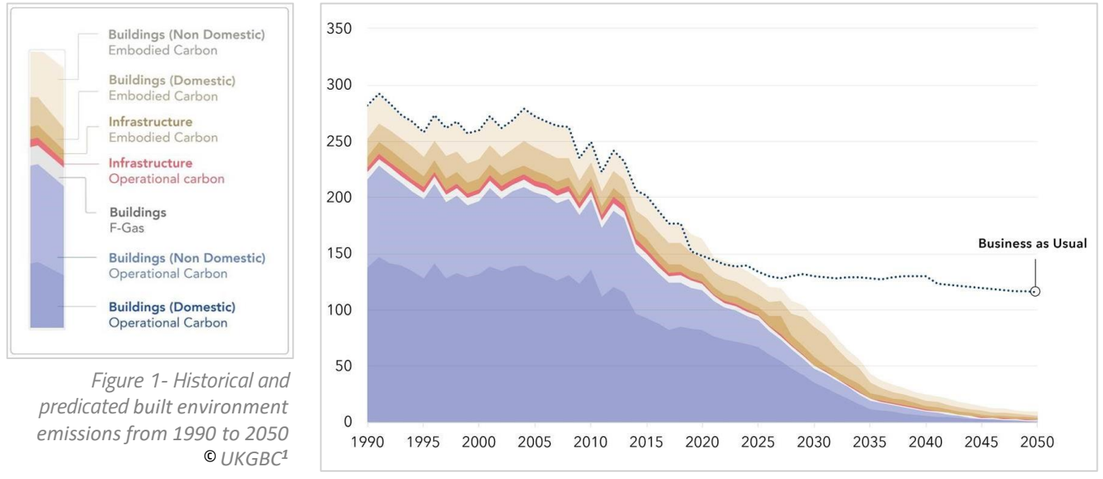


Figure 1- Historical and predicated built environment emissions from 1990 to 2050 © UKGBC[1]

Whole Life Carbon Assessments

When determining which carbon reduction interventions should be implemented, WLCA can be used to assess which interventions have low or high associated embodied carbon emissions. This could range from small-scale WLCA taking place for specific HVAC systems to large-scale WLCA taking place for developments that are planned to take place on the Estate.

Institutions that undertake WLCA should align to the RICS WLCA methodology, as demonstrated by figure 2. This methodology accounts for all the upstream and downstream emissions associated with a built asset, from the raw material extraction and construction processes, to the final disposal and recycling of materials at the end of the asset's life.

When considering carbon reduction interventions, assessing the WLC of interventions may demonstrate that the best intervention in terms of reducing operational carbon, is the worst intervention in terms of embodied carbon. Therefore, undertaking WLCA highlights the bigger picture and adds more detail to Decarbonisation Plans. This enables universities to be more certain when deciding which interventions should be implemented, as they understand the overall carbon impacts of interventions.

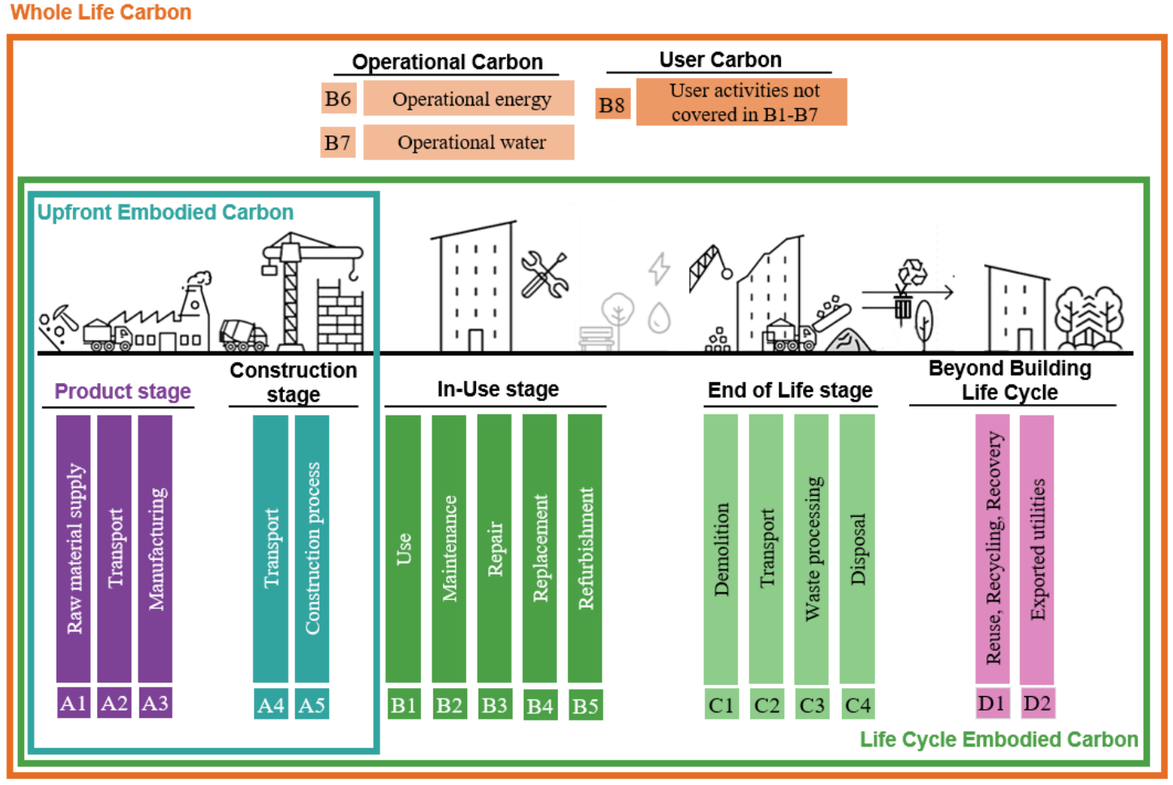


Figure 2- Based on RICS WLCA for the built environment methodology © RICS [2]

Additional Carbon Sources – Scope 3 (indirect) emissions from supply chain, purchasing, travel and other activities

As building decarbonisation plans are implemented and the grid decarbonises, Scope 3 emissions will become an even greater proportion of sector emissions. If we are going to tackle the climate crisis we need to start reducing our Scope 3 impacts now. An institution investing significant amounts in eliminating their Scope 1 and 2 emissions could be leaving 88% of their true emissions completely untouched (right).

For universities, Scope 3 typically includes emissions related to the procurement of goods and services, transport, water and waste. A full list of the emissions sources can be seen in figure 3.

Several key areas of Scope 3 fall under the remit of the Directors of Estates. To support Scope 3 emissions reductions, Directors of Estates can:

- Collaborate with procurement teams to establish sustainable procurement policies which prioritise low-carbon goods and services
- Work with contractors and suppliers to reduce emissions in the value chain.
- Update the Estates masterplan to ensure sustainable transport is a priority deliverable, such as improving walking and cycling infrastructure throughout the campus
- Implement comprehensive waste reduction and recycling policies and water reduction policies.

Even for areas that are outside of the direct control of the Estates Team, a collaborative Decarbonisation Plan with leadership support is an opportunity too good to miss for incorporating wider emissions.

It is worth noting that many solutions to Scope 3 emissions are non-technical, relying more heavily on process and behaviour change. As such a different type of output and recommendations should be expected from the outset.

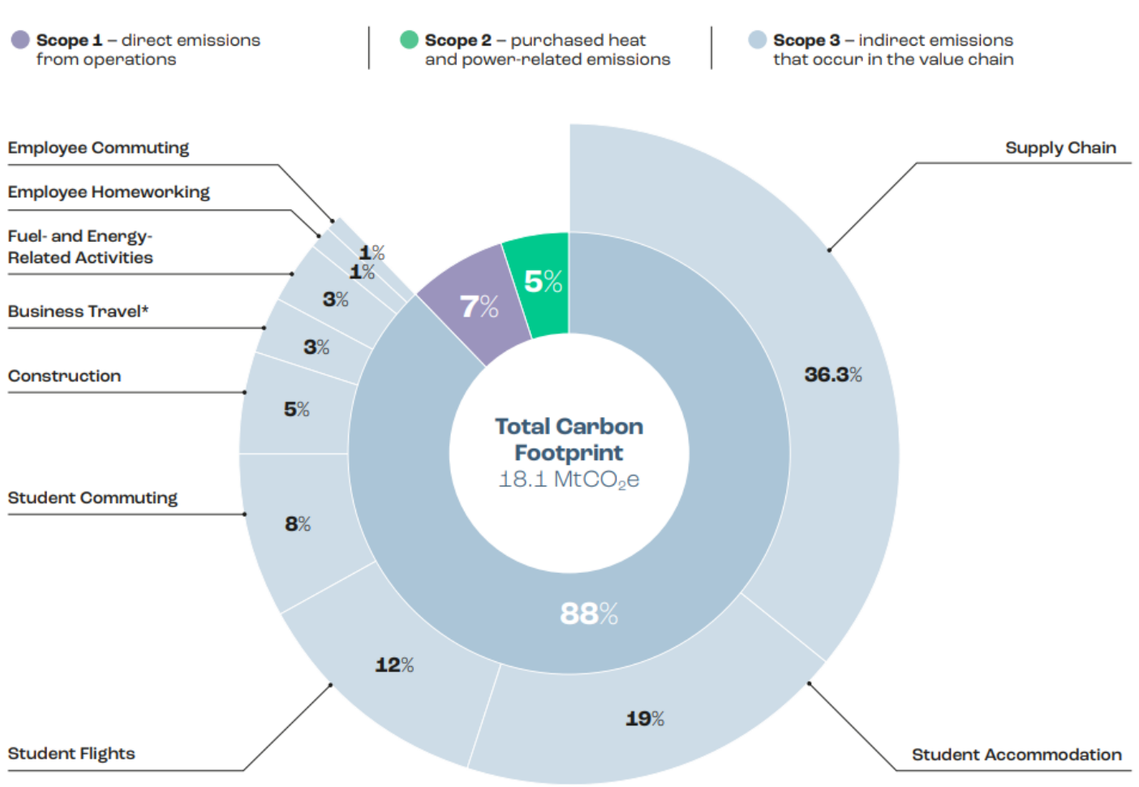


Figure 3- A breakdown of 2020-21 sector-wide emissions across. ©The Royal Anniversary Trust [3]

Additional Carbon Sources – Fugitive emissions

The impact of fugitive emissions (the unintentional release of greenhouse gases such as refrigerant leakage from mechanical systems), has become a critical environmental concern for the built environment. These should be captured within a building's Scope 1 emissions when calculating the baseline carbon in a Decarbonisation Plan but are often missed when a plan focusses on energy.

The Global Warming Potential of a refrigerant can be thousands of times higher than carbon dioxide, meaning that the release of even small amounts of older refrigerants can negate hard-won (and paid for!) gains in improved energy efficiency.

Fugitive emissions should be considered throughout the life cycle of the building as refrigerant leakage will occur annually and be most impactful when building services reach the end of their life or are not well maintained.

They are often overlooked in Foundation Plans, primarily due to challenges with data collection and analysis, as well as there being a more limited understanding around these sources of emissions. In more recent years, the built environment industry's understanding around accounting and reducing the impact of fugitive emissions to support decarbonisation has increased, with guidance released from institutions such as The Chartered Institute of Building Services Engineers (CIBSE).

Universities must incorporate fugitive emissions in their Decarbonisation Plan scopes, to ensure that these emissions are not left unaccounted for, as this may cause risk of greenwashing and credibility issues when claiming net zero.

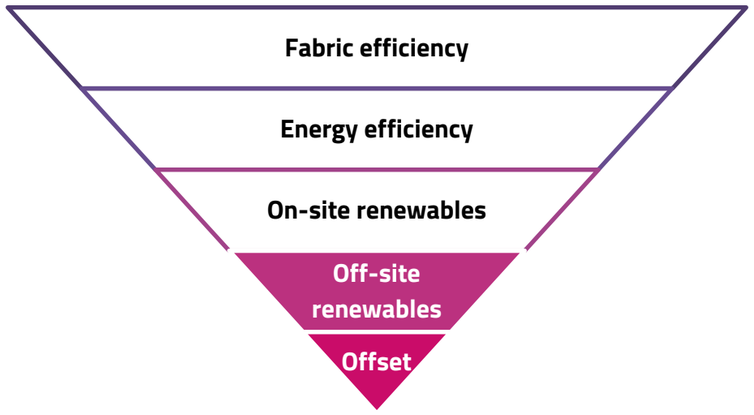
Enhancing Accuracy

Incorporating wider solutions to reach a net-zero target

Why would wider solutions be needed?

Even with universities' best efforts to decarbonise their Estates, primarily by carbon reduction interventions within their own operations, there will still be residual carbon emissions that must be accounted for in order to achieve net zero targets.

Foundation Decarbonisation Plans typically assess and recommend on-site carbon reduction interventions at a small scale, aligned to the energy hierarchy:



However, Decarbonisations Plans have often lacked effective consideration towards the final two components of the energy hierarchy: off-site renewable energy production and carbon offsetting.

Adding these components into Decarbonisation Plans brings significant value, as they play can a crucial part in achieving net zero targets as well as bringing wider co-benefits (such as those relating to biodiversity and discussed in the following 'Enhancing Opportunities' section).

Large-scale renewable energy solutions

The characteristics of a university, particularly the size, scale and available funding, will impact the opportunity to deliver/ support large-scale off-site renewable energy projects. For example, universities could invest in large scale solar or wind farms.

There are then different ways in which the renewable energy generated at large scale projects could be used/purchased by a University. For example, a Private Wire PPA results in the generated power from a renewable energy project being delivered directly to the purchaser. Thus, Universities that use this solution will increase the amount of their operational energy deriving from renewable sources and therefore reduce their operational carbon emissions.

Wider drivers for large-scale renewable energy production:

Lower costs – Over the project's lifetime, you will be paying significantly less for each unit of electricity than if purchased from a supplier.

Predictable prices – Electricity generated on site is not affected by fluctuations in the global energy market.

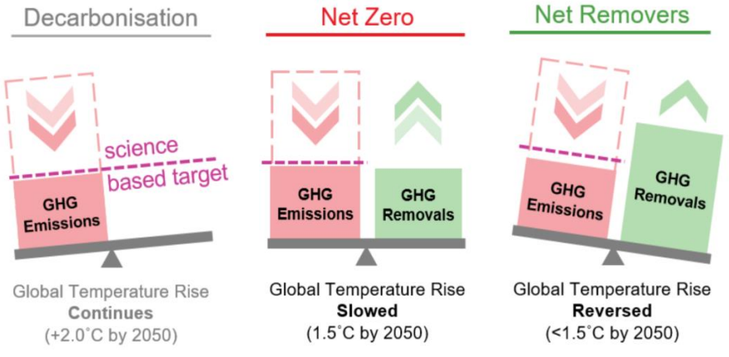
Local Employment– Investing in local renewable energy solutions can support the growth of green energy jobs and provide employment opportunities.

Carbon Offsetting

Carbon offsetting goes hand-in-hand with deep decarbonisation and is essential to mitigate the impacts of human-induced climate change. Offsetting is all about taking responsibility for and addressing any residual emissions. This is a complimentary and critical step in achieving net-zero targets.

"Carbon Offsets" are certifiable and transferable units of emissions, termed credits, that can be purchased by an entity to balance their emission outputs through investment in additionality projects that remove (preferred) or reduce emissions elsewhere.

Arup worked with the UKGBC to produce a Carbon Offsetting and Pricing Report[4] which provides industry leading guidance on this topic.



©Arup Infographic

Universities that choose to not offset will be neglecting their residual carbon emissions and cannot attain net zero.

Foundation Decarbonisation plans may provide an estimate of residual emissions, following the proposed interventions. This can be used to give an indication of the quantity of "carbon offsets" that will be required to meet net-zero targets, but lacks detail regarding offset typologies, internal carbon pricing and procurement.

How might carbon offsetting be integrated into Decarbonisation Plans?

The Voluntary Carbon Market (VCM), where carbon offsets are purchased, has been tarnished with a bad reputation of selling 'poor quality' credits, which can create financial and reputational risks for organisations using the VCM. Also, the typologies and prices of credits within the VCM hugely varies, thus understanding which credits are 'high quality' can be difficult to decipher.

Therefore, in order for Universities to responsibly offset their emissions and reduce the associated risks of offsetting, it is recommended that a tailored offsetting strategy is developed. This strategy can be integrated with the Decarbonisation Plan, as the carbon calculations and Estate emissions trajectory can be used to determine the quantity of carbon offsets required and support decisions regarding internal carbon pricing.

In developing a responsible offsetting strategy, it is important to consider the timing of the offsetting – it will need to be matched to the timing of the emissions and offsetting is based on annual emissions, requiring regular funding.

Wider drivers for carbon offsetting and investing in the VCM:

Drives innovation and scales emerging climate technologies, driving down cost curves and enabling the cost-effective adoption of new technologies.

Delivers wider benefits to people and the planet, supporting healthy soils and water supplies, whilst also strengthening community land and resource rights.

VCMs have the potential to become a very significant driver of mitigation action in developing countries, which supply the majority of voluntary carbon offsets.

Enhancing Opportunities

Overview

Upon implementation, decarbonisation plans can cause significant additional investment whilst influencing the priorities for existing investment for the next 10-20 years. This forms a once-in-a-generation opportunity to maximise other opportunities and benefits.

The most relevant co-benefits of decarbonisation plans are those where the common interventions provide direct parallel opportunities. For example, carbon interventions can involve works to the fabric of a building or the heating/cooling infrastructure. Considering a parallel increase in resilience to a changing climate would be very efficient.

It is important to ensure the additional value of these opportunities is captured, providing increased support for the investment case.

The targeted opportunities and co-benefits should also be integrated into the wider strategies, challenges and constraints of the institution.

However, to avoid a loss of focus, decarbonisation should always be considered the central issue that all others hang off and are secondary to.

Key message points:

- Interventions driven by carbon reductions can realise benefits beyond just emissions reductions.
- Some agendas are particularly linked to the type of work often carried out to implement a decarbonisation plan.
- Integrating the co-benefits into the wider long-term direction and strategy of the institution can focus work in a more coordinated and cohesive way.
- These co-benefits have the potential to influence the prioritisation of carbon-driven interventions.

Image:
Oxford University
©Darya Tryfanava

What are nature and biodiversity specifically?

Nature comprises land, freshwater, oceans and air that together support biodiversity. Biodiversity describes the variety of life on Earth in all its forms and is used as a measure of the health of these ecosystems.

Why is it important?

Nature is our life support system. It provides us with food, water, health, happiness and prosperity. But human activity is causing a devastating decline, predominantly through changes to land and sea use, pollution, over-exploitation of natural resources, and climate change. An estimated 25% of species are threatened with extinction, and the World Economic Forum has identified biodiversity loss and ecosystem collapse as the third most significant threat to humanity this decade.

In an attempt to halt this threat, organisations have started to align themselves with the global goal of becoming nature positive which represents a reversal of nature loss by 2030 with a view of full recovery by 2050. Similar to net zero for carbon, it articulates the level of ambition that is needed at all levels of society to address the nature crisis.

How might this be integrated into a decarbonisation plan?

When considering possible interventions for a decarbonisation plan, opportunities to increase biodiversity on site can be sought. For example, fabric upgrades required to the roof can be used as an opportunity to implement green roofs. As well as considering biodiversity on site, re-use of existing buildings and systems should be prioritised, to reduce biodiversity impacts off-site that can be caused by material extraction and manufacturing processes of new products.

What would a dedicated assessment include?

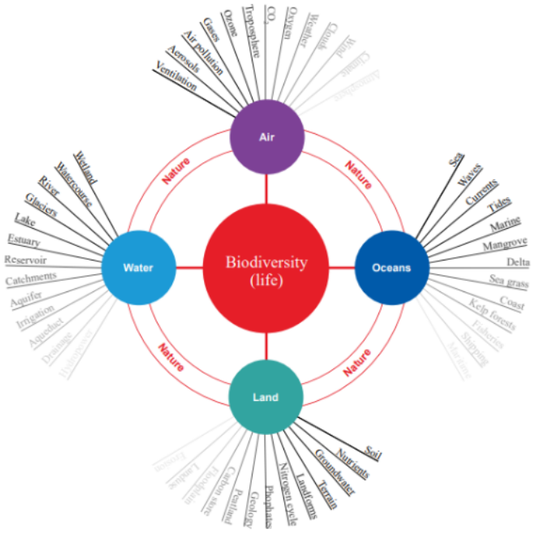
A biodiversity management plan can be developed for a site, including an assessment of the current state of the site and opportunities for improvement.

What interventions could be considered?

Each University environment is unique, so interventions should include design features that are best suited to the site. For example, nature-based solutions for City campuses may prioritise green roofs, whereas campuses in more rural locations may prioritise woodland and watercourse restoration.

Examples of interventions:

- Creating green spaces and wildlife habitats on university grounds
- Restoring existing green and blue infrastructure where damage has occurred
- Incorporating native plant species and promoting diverse ecosystems
- Integrating nature-based solutions to climate risks such as SuDS to reduce stormwater impact
- Prioritising climate-positive materials, such as using timber instead of concrete for new structures
- Implement green roofs and walls

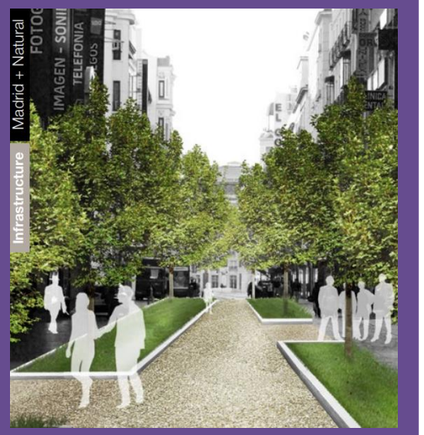


Case study example:

"Madrid & Natural[5]" is a forward-thinking report that provides multiple nature-based solutions to regulate Madrid's urban environment. From designing sustainable roofs and using resilient urban planning to restoring riverbanks and creating urban forests, the report proposes achievable solutions to designing healthier, liveable, and resilient urban areas.

Many of the solutions outlined within this report are applicable to University Estates.

Sustainable Roofs
"Roof space is underutilised in many cities; **combining green roofs and solar technology** can create vital synergies in dense urban areas. Roof vegetation can increase the efficiency of PV panels by reducing ambient temperatures.
Sustainable roofs support water management, improve insulation and air quality, provide cooling, and create habitat for biodiversity."



Street Greening
"Increasing tree cover and green space is a key element of green networks and can have positive effects on the economic and social quality of neighbourhoods. Trees provide shade and filter road pollution. Tree-lined streets **can encourage people to seek alternative modes of transport** and pursue healthier lifestyles."

The neighbourhood benefits are applicable to University campuses. Universities could create tree-planting programmes for students and staff to be able to be involved in.

Temporary Flooding
"Many cities are looking to redesign their water streams to make them more resilient in light of increasing extreme weather events due to climate change. **Recreational green areas with permeable surfaces can be used as buffer zones for temporary flooding** when needed. Spaces for temporary flooding should be included in city planning, especially when designing new developments in flood risk areas. The re-establishment of local riparian vegetation can help mitigate the impact of flood events."

What is climate adaptation and resilience?

Climate resilience is the capacity to recover quickly from acute climate hazards or adapt to chronic or slowly increasing climate hazards. It encompasses the actions taken to mitigate known climate risks, adapt to unknown climate risks, and build adaptive capacity to manage and leverage change.

Why is it important?

Our climate has changed, and continues to do so, if we don't prepare for the impacts of this, it will have a detrimental impact on people and assets. The changes already experienced in the UK over recent decades include:

- An annual average temperature increase by nearly 0.3°C per decade.
- Heatwaves have become more common and intense across the country and cold extremes significantly less likely.
- Sea levels are over 5cm higher than in 1990 and continue to rise.
- Increase in extreme heavy rainfall events, which will become more intense and frequent.

It is essential that institutions invest in adaption and resilience measures now. If action is delayed, it is likely that more will be spent to rectify the situation, following an event, than would be spent on preventative measures.

How might this be integrated into a decarbonisation plan?

Resilience and adaptation requirements can be integrated into proposed decarbonisation interventions. For example, fabric upgrades can include a consideration for reducing overheating (e.g. cool roofs), as well as reducing heat loads. Additionally, heating and cooling systems that are to be replaced to remove the reliance on fossil fuels can be designed to ensure thermal comfort in future climate scenarios.

What would a dedicated assessment include?

A climate change risk assessment can be carried out, considering current and future climate hazards for the site. Hazard, exposure, and vulnerability can be integrated to estimate consequences and risk. Assessments range from rapid hazard and exposure screening, to quantitative in-depth modelling of estimated losses, damages, and impacts. Cost-benefit analysis of specific mitigation and adaptation measures may be included to inform investment decisions and long-term strategy

What interventions could be considered?

Campus infrastructure and location will significantly impact the climate adaptation and resilience interventions that are required. For example, City campuses that have large amounts of hard surfacing with poor drainage system will likely need to prioritise reducing surface water run-off and flood resilience.

Examples of interventions:

- Flood resilience through nature-based solutions-SUDs, rainwater gardens, sponge parks, permeable paving, etc.
- Rainwater harvesting and storage tanks, as well as water-efficient fixtures and systems to increase resilience to droughts and water scarcity.
- Undertake thermal comfort analysis of buildings based off projected increases in temperature
- Passive cooling strategies to mitigate overheating
- Shaded areas incorporated into exterior landscaping, including areas with tree coverage, to provide refuge from the sun and extreme heat

Case study examples:

Mansfield Sustainable Flood Resilience (MSFR)[6]: Arup supported Severn Trent to design and implement an urban flood resilience scheme which was based on biodiversity interventions instead of traditional drainage systems.


The scheme will improve flood resilience and bring new green spaces to the town.

- Through blue and green interventions, 58,000m³ of surface water will be captured, freeing up capacity in sewers.
- The rain gardens, bioswales or basins will bring more greenery to the public spaces, improving the urban realm and creating more aesthetically pleasing places.
- New plants will reduce pollution and sequester carbon from the atmosphere whilst the soil will help filter any stormwater passing through it.
- The scheme will add to the vibrancy of the town, encouraging people to spend more time outdoors and bringing opportunities to interact with others.

Sustainable Urban Drainage, University of Glasgow Western Campus:
A project as part of the enlargement of Gilmorehill Campus to realise the co-benefits of increased climate resilience, biodiversity enhancement and greater rainwater attenuation

- Rain gardens system throughout the urban realm of the western campus
- Management of upstream runoff to attenuate prior to discharge to River Kelvin
- Biodiversity enhancement in this community open space
- Regeneration of 'brownfield site'

What is Health & Wellbeing?

Mental and emotional health, physical health and a healthy lifestyle all contribute to an individual's health and wellbeing.

Mental and emotional health affects how we think, feel and act. Physical health describes the condition of your body, whether you have illness, injury or a health condition. And a healthy lifestyle considers a balanced diet, physical activity, sleep and stress management.

Why is it important?

Health and wellbeing is a fundamental human right for all people. Having good health and wellbeing allows people to live their lives to the fullest, such as being able to participate in activates that they enjoy and being productive in the working environment. This is an essential foundation for positive economies and striving societies.

The built environment has a major impact on human health and wellbeing, due to the quality of indoor and outdoor spaces impacting how people behave and feel, and the susceptibility to health risks.

It is essential for Institutions to consider the positive and negative impacts that existing Campuses and potential developments may have on people's health and wellbeing.

How might this be integrated into a decarbonisation plan?

Striving to decarbonise will involve the re-development of existing buildings and a strategic approach to the regeneration of Campuses to support climate mitigate and adaptation. Carbon reduction interventions come hand-in-hand with some direct co-benefits to physical health, such as cleaner air and improved thermal comfort.

There is great opportunity for Decarbonisation Plans to further integrate positive health and wellbeing outcomes, by striving to do better and go beyond the minimum. Any development that takes place should apply the 'lens of health and wellbeing' to establish how students and staff can have improved experiences with the Campus, thus improving their overall wellbeing. For example, when undertaking external works, Universities can consider improving access to nature or improving sustainable transport networks.

What would a dedicated assessment include?

Universities could undertake a Campus wellbeing review, using the principles of the WELL Building Standard and WELL Communities, to establish their current position and determine focus areas for health and wellbeing improvements.

Universities could also roll out health and wellbeing surveys, to determine existing student and staff priorities and needs.

What interventions could be considered?

Some of the carbon reduction interventions that have direct impacts on health and wellbeing can be evaluated to ensure health and wellbeing is maximised, such as indoor air quality. There are additional interventions which could be implemented alongside decarbonisation interventions to enhance health and wellbeing.

Examples of interventions:

- When upgrading HVAC systems, user's thermal comfort and controls could be improved.
- If façade upgrades are taking place, the façade could be designed to make spaces feel welcoming and inclusive through external lighting and by activating the public realm.
- During periods of building construction, the construction sites could utilise 'meanwhile' design features, such as living scaffolding and viewing windows.
- In areas where external works take place, nature-based solutions should be prioritised, such as wildlife corridors and tree planting.
- Active transport features, such as improvements to pedestrian and cycle networks, as well as additional cycling infrastructure should be incorporated.

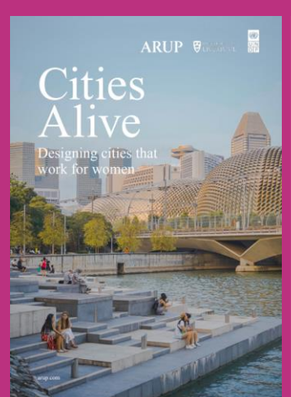
Case study example:

The Jo Cox More in Common Centre, University of Huddersfield[7]: This is a new building that opened in 2023, which provides staff and students with a space for reflection. The building has been designed, built and assessed in line with the WELL certification, resulting in the health and wellbeing of users being prioritised. Some of the features include are outlined below:

- Air Source Heat Pumps generate heat to avoid the direct use of fossil fuels.
- Spaces have been designed to provide individuals with a connection to nature through windows and biophilia.
- Building air quality is monitored using sensors for CO2, VOC's, particulate matter, humidity, temperature and air pressure.
- Employees are encouraged to take regular breaks away from their desks and make use of the restoration spaces provided, such as the social spaces and prayer rooms.
- Staff and students can learn more about nutrition and food growing by joining sessions on the university campus including chef-led cooking demonstrations and gardening and planting workshops.

Cities Alive- Designing Streets for Women[8]: This report considers how cities can be better design for women, which aims to make places safer, healthier, more vibrant and more pleasant spend time in for everybody.

There is a section in the report on how the built environment can impede women's health and wellbeing. This is followed by strategies which can be used to improve the health and wellbeing of women in cities. Most of these strategies and design principles can be applied to University Campuses to improve student health and wellbeing.



Create inclusive, active and restorative public spaces and green areas

What is Student Experience?

Student experience can be described as how students perceive interactions with an Institution, including with the faculty, support functions, access to information and the campus culture.

Why is it important?

It is essential for Institutions to recognise the importance of student experience. Prioritising and fostering an environment that provides for students will enable students to be their best selves and unlock their full potential. This can lead to better learning outcomes and course improvements.

Student experience can also impact upon an Institutions' reputation and in turn influence the ability to attract new students. As well as having impact on boosting alumni engagement.

How might this be integrated into a decarbonisation plan?

A survey undertaken by the Students Organisation for Sustainability in 2023 demonstrated that 77% of students reported being 'very' or 'fairly' worried about climate change and its effects[9]. This highlights that students care about decarbonisation and tackling climate change could have a positive impact on student experience.

By implementing Decarbonisation Plans, Institutions have the opportunity to consider the impacts that carbon reduction interventions and wider Estate upgrades have on the student experience. For example, Institutions that clearly report on their current carbon baseline and provide clear information as to how they will decarbonise, can evoke feelings of trust and respect from students, thus improving their experience.

What would a dedicated assessment include?

A student experience survey or journey mapping could be undertaken to understand how students go through Institution's experiences.

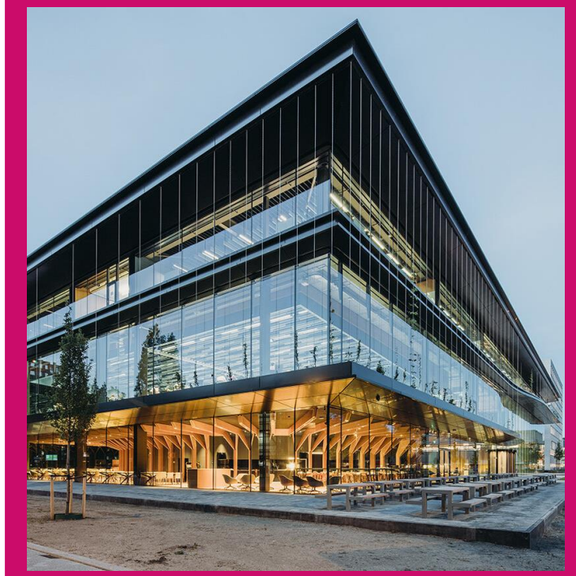
What interventions could be considered?

The built environment plays a crucial role in shaping the overall student experience by providing spaces for learning, living, socialising, and personal growth. Thoughtful design and planning can create a campus that fosters academic success, community, and overall well-being.
With the implementation of decarbonisation plans leading to internal and external works taking place, there is opportunity to improve campus culture and the student experience at the same time.

Examples of interventions:

- Building controls should be maximised to improve indoor air quality, thermal comfort and lighting levels in spaces such as classrooms and libraries, to create comfortable environments for students.
- Maximising adaptability and flexibility of spaces, so that spaces can meet the current and future needs of students and staff.
- Promoting sustainable transport, such as bike-sharing programs and improved public transport connections, can enhance mobility and accessibility for students.
- Incorporate indoor and outdoor recreational spaces that provide spaces for students to relax away from the busy campus environment. These spaces should include biophilia and green infrastructure.
- Enable students to be involved in elements of the design, such as having walls for murals or areas where student art can be displayed.
- Include students in the overall decarbonisation process to enhance educational outcomes, give real-world skills and lead to improved student support for the decarbonisation plan. Can also help to inspire students to drive change post-university.

Case study examples:



Echo, TU Delft[10]: The Echo interfaculty building is a new versatile building at one of the top universities in the Netherlands, which aimed to provide additional flexible teaching space that can be used by all faculties.

- Column-free floor plans and adaptable education spaces have been designed to meet the current and future needs of the university's lecturers and students in mind, enabling flexibility for the constantly changing world of learning.
- The continuous glass façades are interrupted awnings that keep out excess solar heat, while climbing plants form a subtle green façade that filters daylight. This improves user comfort and their overall teaching experience.
- Using advanced simulation and daylight analysis, the design team were able to allow ample daylight into the education spaces and auditorium, while ensuring screens remain visible for all the students.

Concourse, University of Sheffield: The concourse, at the heart of university campus life, became a transient "non-space" until recent revitalisation.

- Lighting scheme offers a bold simplicity to the plaza that accentuates the clean lines and texture of the bridge, giving it a strong identity to the university campus.
- This helps to aid wayfinding and removes areas of deep shadow; contributing to an increased sense of safety and security.
- University staff can select various pre-set scenes or reprogram the lighting to celebrate specific events.
- The multi-use space now encourages students and the public to sit and enjoy the space, as well as special events taking place there with an outdoor music venue and bar.

Real World Implementation

Image:
Jessop West Building, University of Sheffield ©Giles Rocholl Photography

Real World Implementation

Overview

Overview

A decarbonisation plan is only as good as its implementation. Past plans have at times been created in isolation and then struggled to influence an institution's investment. They sometimes did not integrate well with existing aims, constraints and ways of working. This can leave them to be seen as an inconvenience rather than a vehicle to enable progress and success.

- Short-term practicalities: Plans need to be driven, supported and enacted across many (if not all) Corporate Services departments and require significant leadership and vision to deliver. A plan needs to be created to slot into the existing structures, cultures and capacities.
- Medium-term context: Plans created with too little acknowledgement of the financial position and other trends within the sector can reach barriers as soon as they are issued.
- Long-term direction: The timescales of many plans (often 20-30 years) means they need to consider the direction of the institution over a similar timescale and the Estates Masterplan that will support that direction.

  In particular, collaboration with strategic planners in the development and implementation of a plan can increase ownership and recognition of the plan at an institutional level

Key message points:

- The key audience for a decarbonisation plan is not the Director of Estates, it's the Senior Leadership Team. They need to see it recognising and supporting their own pressures, constraints and aims.
- A plan must embrace that every institution does things differently, from its formal governance structure to the informal way teams work together.

Image:
James McCune Smith Learning, University of Glasgow
©Vishnu Prasad

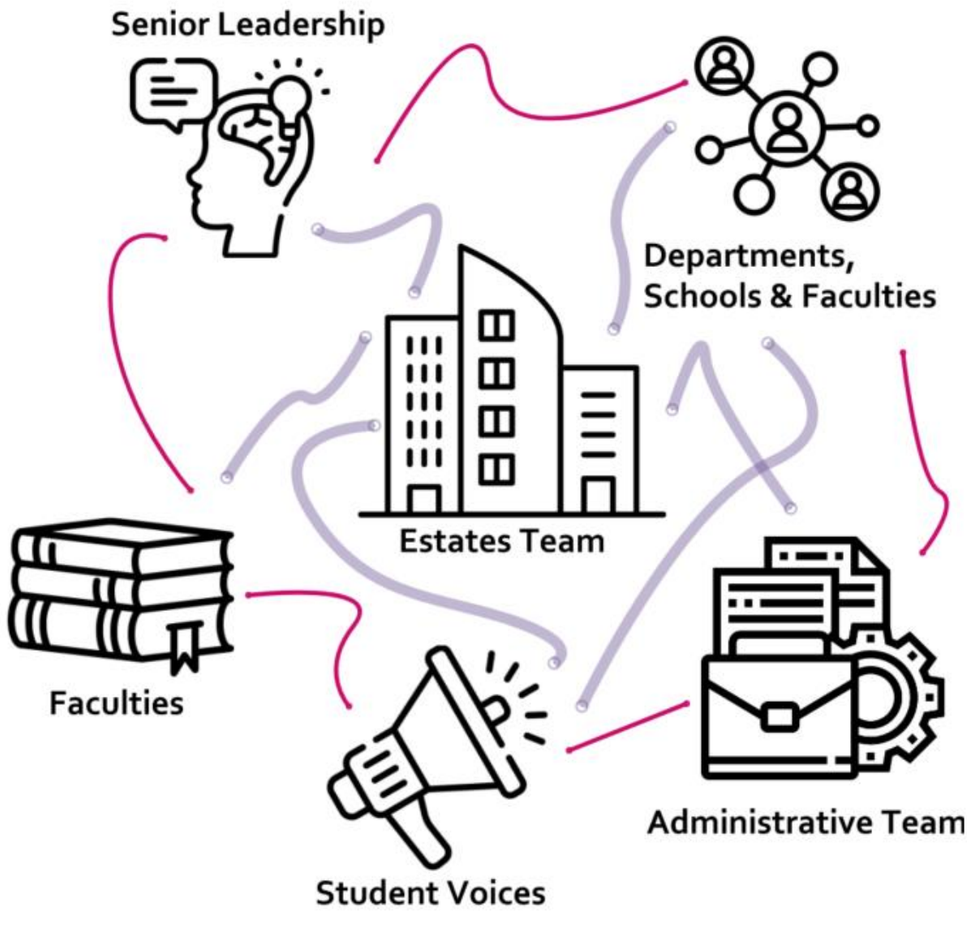
What impacts short-term implementation?

Developing and implementing comprehensive decarbonisation plans is a complex and challenging task. The responsibility often falls on the shoulders of the Estates Department alone.

The capacity of the Estates team and existing institutional structures will have a significant impact on effective implementation and decarbonisation.

Successful implementation requires unprecedented cooperation within institutions and uncompromising commitment at the highest levels of leadership.

Universities need to understand the benefits of transitioning to an agile and collaborative governance structure, by moving away from traditional bureaucratic hierarchies, to be better adapted and resilient to changing circumstances.



Existing ways of working- actions/recommendations to drive decarbonisation

By implementing the actions and recommendations outlined below, universities can create a more collaborative and effective approach to driving decarbonisation.

Potential factors	Actions/ recommendations
Siloed departments and lack of communication	Establish cross-departmental working groups and regular communication channels
Limited engagement from non-estates staff	Create a programme of upskilling staff on the importance of decarbonisation and their role in the process
Lack of student involvement	Create opportunities for students to participate in decarbonisation planning and decision-making, such as through student sustainability committees
Insufficient leadership support	Develop a compelling business case for decarbonisation and engage senior leaders through regular briefings and progress reports
Competing priorities and limited resources	Align decarbonisation efforts with other institutional priorities and explore innovative financing mechanisms.
Resistance to change and new ways of working	Foster a culture of sustainability through awareness campaigns, incentives, and recognition programs for individuals and departments making progress
Difficulty in measuring and reporting progress	Establish clear metrics and reporting frameworks to track progress and communicate successes and challenges to stakeholders
Limited collaboration with external partners	Actively seek partnerships with local authorities, businesses, and other institutions to share knowledge, resources, and best practices
Competing priorities	Adopt the principle of a Shadow Price of Carbon to monetise emissions savings. Choose a sufficiently high value to drive change and represent future costings.

Medium-Term Context

Universities operate in a complex and dynamic environment, requiring them to adapt and respond to various challenges and opportunities whilst balancing academic priorities, financial considerations, and societal expectations.

Any sector-specific or wider societal challenges that universities face will likely impact their ability to deliver short, medium and long-term goals, thus affecting their success. This includes their ability to successfully decarbonise and reach net zero targets.

Decarbonisation plans need to be adaptable in the medium-term to ensure that implementation plans meet the changing needs of the estate.

Below outlines some key challenges universities are facing and how these can impact decarbonisation.

Online Courses

With online learning becoming one of the fastest-growing markets in the education industry, many universities are expanding their online course offerings to cater for this demand. This can have both positive and negative impacts on decarbonisation.

For example, decreased campus use can reduce building's operational energy consumption, as well as lower Scope 3 commuting emissions. However, online courses can result in higher residential energy use and increase the demand for online infrastructure, such as data centres which are often energy intense.

Pedagogy change away from traditional lectures

Universities are increasingly exploring alternative teaching methods to traditional lectures, such as flipped classrooms, active learning, and project-based learning. This can impact space utilisation, such as a decreased demand for large lecture theatres and increased need for flexible teaching spaces.

Thus, new teaching methods can influence building design requirements. If design changes are needed, there is the opportunity to adopt carbon reduction interventions at the same time.

Reduced post-graduates

Many universities are experiencing a decline in postgraduate student enrolment, which can impact residential demand, research activities, and the utilisation of specialised facilities such as laboratories and study spaces.

This can lead to lower occupancy in buildings, which in turn impacts space utilisation and highlights the need for more flexible and adaptable working spaces.

Geopolitics

Shifting international relations can directly impact universities, particularly those with international student bodies, global partnerships, and research collaborations. These factors can impact stability in university funding mechanisms.

Geopolitical factors, such as supply chain disruptions, can also impact the availability and cost of materials that are required for decarbonisation.

Cost of living

The rising costs of living can impact University enrolment and the overall financial stability of the institution. This can impact the funding available for the implementation of carbon reduction initiatives.

Space utilisation

Institutions recognise that poor space utilisation is often associated with a lack of understanding around what makes up their estate and how spaces are used.

As highlighted, some of the wider societal challenges will result in spaces being further underutilised and necessitating downsizing or reshaping of the estate. Thus, addressing space optimisation and improving building utilisation should be a priority to improve estate efficiency and support energy reduction.

Increased competition in the sector

Increased competition can drive a focus on cost-effectiveness and operational efficiency, influencing the prioritisation of carbon reduction interventions based on their financial and reputational benefits and how the co-benefit of student experience is impacted.

Sector impacts and actions/recommendations to drive decarbonisation

Potential factors	Actions/ recommendations
Changing energy patterns in some buildings	Implement effective energy metering to understand current energy consumption levels to feed into the Decarbonisation Plan, influencing the prioritisation interventions.
Changing Scope 3 emissions	Undertake annual Scope 3 emissions analysis to understand any changes and determine the biggest carbon hot spots. Thus, targeted interventions can be implemented.
Increased demand for online infrastructure	Improve efficiency of online infrastructure. Invest in sustainable data centres and servers that incorporate renewable energy sources and efficient cooling systems.
Poor space utilisation	Integrate technology across the estate to understand space usage and improve utilisation through space programming and room and desk booking systems.
The condition of the estate after many years of tight funding.	Consider a Long-Term Maintenance Plan an opportunity for efficiency with decarbonisation actions. Replacement of end-of-life items is significantly more cost effective.
Need for more flexible and adaptable spaces away from traditional teaching spaces.	Encourage cross-disciplinary collaboration and flexible use of space by converting underutilised spaces into collaborative and open-working spaces.
Supply chain problems	Diversify supply sources alongside prioritising local and regional sourcing. Implement material standardisation where possible and develop strategic material banks and reserves.
Stability in funding mechanisms	Utilise whole life costing to determine the long-term practicalities of funding decarbonisation. *See next page for a deep dive into financing decarbonisation.*

Implementing decarbonisation plans

Deep-dive: Financing decarbonisation – key challenges and recommendations (in collaboration with BUFDG)

Key challenges

Competing priorities, constrained budgets

Decarbonisation is just one competing priority in a sector currently facing significant financial pressures, It can be challenging to allocate resources and funding to sustainability initiatives in the face of other pressing demands, regardless of long-term benefits and cost savings.

Long payback periods

Many decarbonisation projects have payback periods of 10 years or more, misaligned with the typical 5-year financial forecasting and budgeting cycles of universities, making it more difficult to secure funding and approval.

Lack of dedicated funding

While there is some limited grant funding available for decarbonisation projects, there is a lack of dedicated, ringfenced funding for these initiatives within university budgets. This can make it difficult to prioritise and protect funding for decarbonisation given competing demands.

Complex options

With a limited balance sheet, decisions need to be made over what types of activity are best funded internally. A funding strategy which considers cash requirements and risk profile etc. that aligns with sider strategies is needed.

Siloed decision-making

Despite decarbonisation plans being often led by Estates, they have institution-wide implications. Siloed decision-making and communication challenges between departments can hinder the development and implementation of plans.

'Business-as-Usual' costs not defined

Decarbonisation Plans are often seen as simply a cost. It is rare that the cost of not acting (the 'counter-factual') is explored in any depth. Doing so can show the true cost/benefit of carbon-focussed interventions, effectively highlighting shorter payback periods and unlocking funding.

Lack of expertise

Decarbonisation is a complex and rapidly evolving field. Many universities lack the internal expertise and capacity to develop and implement effective strategies, leading to a lack of buy-in and ownership and from internal stakeholders.

Borrowing

Institutions cannot just borrow against current commitments without consequence. Plans must not only consider a budget but a spend profile that falls within annual limits.

Many have already borrowed heavily to help navigate the challenges facing the sector and the wider UK economy, and finding additional funding for the transition to net-zero or other environmental targets will be incredibly difficult.

Universities will need to be acutely aware of their own financial capability, and how any funding decisions align with the broader university strategy, and appetite for risk.

Recommendations

Make the business case	Develop clear, concise decarbonisation plan summaries tailored for senior leaders	Capture broader benefits and avoided BaU costs, not just short-term financial returns	Align with strategic priorities and emerging student/stakeholder expectations
Break down silos	Establish cross-functional working groups to embed decarbonisation across the institution	Engage sustainability leads at the executive level as key decarbonisation stakeholders	Improve communication and coordination between estates, finance, IT, planners and academia
Innovate on financing	Explore green bonds, sustainability-linked loans, revolving funds and partnerships	Lobby for dedicated grant funding to support decarbonisation initiatives	Develop phased investment plans that balance quick wins and long-term ambition
Build skills and capacity	Provide training for sustainability and estates teams to stay ahead of the curve	Foster a sector-wide community of practice to share challenges and best practices	Engage students, staff and stakeholders to build bottom-up support for action

Call to action

Financing decarbonisation is a critical challenge that requires strategic vision, collaborative action and innovative thinking.

By making sustainability a top priority, breaking down silos, exploring new funding models and investing in skills and capacity building, universities can mobilise the resources needed to deliver on their climate commitments.

Above all, universities must not restrict themselves to measures that are financially advantageous with short payback periods.

The time to act is now.

Image:
CRANN Building, Trinity College
© Arup

Long-Term Direction

What impacts long-term implementation?

Institutions have varying net zero target dates, ranging from the late 2020's up to the UK's net zero 2050 goal. Hence the long-term direction of universities is key for successful decarbonisation as the Plans will cover a significant period of time.

Strategic Direction

The strategic direction of a university should inform all short- and medium-term activities and support an overarching long-term vision. By serving as a guiding framework, it can drive a transformative student experience, foster research and innovation and positively contribute to society.

Decarbonisation goals must be integrated into all aspects of university operation, teaching, research and engagement, and should result in decarbonisation being a key driving force behind the Institution's strategic priorities and decision-making processes.

A well-integrated Decarbonisation Plan can go further than merely avoiding conflictions with a strategic direction – the Plan should, to some degree, actively set the agenda so that the two long-term strategies support each other.

Estates Masterplan

The Estates Masterplan is a long-term plan, usually covering 10 to 15 years, that acts as a framework for the development and management of a university's built environment. It serves as the blueprint for universities' future growth, thus should be aligned to the strategic direction of an Institution and will ideally respond to some of the challenges facing the sector.

Integrating the Decarbonisation Plan as a leading framework for the Estates Masterplan is crucial to realising the Institution's Net Zero goals. This approach places sustainability and carbon reduction initiatives at the core of decision-making processes within the Estate Team.

An effective decarbonisation plan can be used to shape the Estate Masterplan by dictating the prioritisation of energy-efficient buildings, renewable energy infrastructure, sustainable transport solutions, and green spaces. It should influence decisions regarding the renovation or repurposing of existing facilities, as well as the design and construction of new structures, taking into account a changing climate and the need for increased resilience.

Image:
University of Liverpool
Estates Masterplan ©UoL

Estates masterplan- actions/recommendations to drive decarbonisation

Potential factors	Actions/ recommendations
Changing demand for various faculties and/or facilities	Long-term planning for changing demand can lead to efficiencies in the estate (and therefore in carbon) by informing required space flexibility needs that create buildings that change with the university instead of needing refurbishment.
Temporary works and decant strategy	Prioritise the consideration of decant space to maximise use of existing spaces with early planning and aligning the programmes across all decarbonisation (and other) works.
Changing relationship with wider locality	An aspiration to increase links with the local town or city is common. An additional level of informal assessment can consider a wider urban boundary as opposed to university-centred one to increase real-world impact.
Development of public realm	Decarbonisation should influence wider public realm works to create a climate resilient environment which supports climate change mitigation through nature-based solutions and enhances student experience.
Transport connectivity modal shift	Prioritise sustainable transport solutions to support Scope 3 emissions reduction from commuting. Ensure Estates Masterplan enables sustainable transport network upgrades as transport patterns gradually change.
Increasing emphasis of sustainability in all subjects' curricula	A decarbonisation plan has the potential to form a valuable learning resource and the use of the estate as a Living Lab to allow cutting-edge yet practical research to be carried out.
Adaptation/resilience to a changing climate	Build in the expectations of the impacts of a changing climate over decades into your planning and the specification of upgrades.
Student expectations	Universities are in the business of attracting students. 'Attractiveness' can be a key metric pulling together many disparate elements to ensure trends are towards improvements.

Specifying a Plan to meet your needs

Image:
Granary Square, Kings Cross, London © Paul Carstairs

Image:
George Green Library
©Arup

Specifications
Overview

Summary

These specifications provide a starting point to allow institutions to turn their need for a Decarbonisation Plan into a robust Invitation to Tender document.

They are adaptable, forming a 'shopping list' of items to combine in a way individual to an institution.

Being clear with potential consultants on your preferred way of working will result in an appointment that progresses smoothly towards conclusion.

Introduction

The following sections provide example specifications that can be used to procure a Decarbonisation Plan. The specifications follow the structure of the document to allow direct comparison and easy reference.

The intention is that institutions pick from these elements and use them as a starting point for an Invitation to Tender document. Elements such as institutional background and terms and conditions will need to be added in accordance to organisational procurement guidelines.

The specifications for the Foundation Plan are included followed by options for enhancements. It is intended that an institution that does not have a Foundation Plan would always include the specification for the creation of one. Institutions that already have a Foundation Plan (or similar) can choose to either:

- Build from their existing Plan (in which case including it in the ITT would be advisable) or
- Refresh all or part of their existing Plan.

How to use the specifications

No 'standard' specification will be able to be applied in all circumstances. Many nuances exist and each institution is highly individual. Consultants may also have a preferred way of working and question the rationale behind the specifications. Institutions should be comfortable they are confident in the underlying reasons behind the inclusion or exclusion or particular elements.

Where the specifications include options for an institution to choose from or information that will need to be provided, these are highlighted. These areas are deliberately limited as to include all the potential areas of variation would quickly lead to a very complex structure of specifications, the majority of which would be irrelevant to many institutions.

Establishing an internal team

These specifications cover the appointment of an external team. Equally important, if not more so, is the establishment of an internal team to drive the project.

Whilst not strictly related to specifications and also being covered elsewhere, it is nonetheless worth reiterating on the importance of Senior Leadership visibility, involvement, engagement and sponsorship of a Decarbonisation Plan. To be frank, on-paper theoretical buy-in is worthless – someone of sufficient seniority to influence decisions needs to be personally invested in the success of the endeavour.

Depending on the extent of the Plan being procured, the engagement and close involvement of colleagues involved in Finance and Strategic Planning is invaluable.

Match with other wider linked approaches

Decarbonisation plans sit within a wider set of influences on carbon and broader sustainability. A plan can be used as a catalyst to review good practice in other areas such as the early procurement of sustainability interventions, engagement with expert teams, utilising Soft Landings philosophies and effective commissioning of buildings.

Setting out an approach

These specifications set out the actions a consultant will need to take and the deliverables they should produce. However, just as important in selecting a partner in this exercise is their approach to working.

A university should set out their preferred style of working, whether that is highly collaborative (but often, as a result, harder to control) or very logically with actions clearly evidenced and with formal communication protocols (which can bring reduced flexibility).

Pay as much attention to establishing an internal team from across a number of disciplines to ensure the needs of different departments are understood from the outset.

Neglecting to do this may cause any outputs to be later questioned.

The University requires an engineering consultant-led team to develop a decarbonisation plan, and associated delivery pathway to reach net zero carbon emissions for Scopes 1 and 2 [by 20XX].

The purpose of the Decarbonisation Plan is to demonstrate comprehensive and data-driven analysis of the existing Estate that results in clear recommendations and an actionable roadmap for the University to achieve its decarbonisation target.

This should enable the University to set out a costed plan and programme for the recommended carbon reduction interventions, such as building fabric upgrades and replacing existing, fossil fuel-reliant, systems with low carbon alternatives such as heat pumps, electric heating, or other low-carbon fuel sources.

The scope is as set out below.

Setting a target *(delete if a target already exists)*

- As there currently is no Net Zero Target date for the University, the activities undertaken within the scope of works to produce the Decarbonisation Plan must be used to set the University Net Zero Target date.
- It is important that the target date is ambitious but is realistic in terms of the financial implications and programme delivery time for chosen interventions.

Determining a baseline

- Select a baseline year which future emissions will be compared against, taking into account data availability, how representative the year is (particularly with regard to temporary Covid impacts) and industry best practice.
- Establish the energy consumption for the baseline year (all relevant emission sources) for each building by analysing available data in the form of metering data, latest DEC certificates, etc. that will be provided by the University.
- Select emission factors from a reputable source and apply them to the energy data to quantify the GHG emissions for each source and scope.
- Aggregate the emissions from all sources and scopes to determine the university's total baseline GHG emissions.
- Develop a 'Business as Usual' (BaU) scenario reflecting the University's current expected trajectory if no further additional action is instigated. This should consider, at a high level, internal factors such as known plans related to rationalisations and disposals alongside approved long-term maintenance programmes. It should also consider external factors such as the expected decarbonisation of the UK electricity supply

Collecting and analysing building information

The University will provide access to the following data and information:

- Wider University policies and strategies including standard specifications.
- Metered or annual energy consumption data in addition to that provided for the baseline year,
- Building and site schematics, operating hours.
- Plant and asset lists, Condition reports, Asbestos registers, building construction records, installation and maintenance records, updated Estate Masterplan documents, etc.

The consultant should:

- Analyse all the information provided by the University including existing energy consumption data to understand building energy consumption patterns, highlight any anomalies and gaps in the data.
- Complete [a number of] representative site surveys of a limited number of buildings to become familiar with the estate, all relevant buildings and to understand the existing condition of the building fabric and systems. Also determine whether there are any other significant energy loads, such as IT or laboratory equipment, to better understand how energy is being used within the building.
- Engage with the Estates team [and wider University stakeholders to a lesser extent] to discuss their initial understanding of the Estate, the existing masterplan and facilities management plans to ensure recommended carbon reduction interventions align to plans.
- Request for any additional data or information that they require to determine which carbon reduction interventions will be most impactful, feasible and appropriate.
- Following site surveys and stakeholder engagement, the consultant is required to identify all relevant carbon reduction interventions for each building so that further feasibility and impact analysis can take place within the Decarbonisation Plan.
- Quantitatively model all carbon interventions based on industry best-practice knowledge.
- Clearly track all assumptions and benchmarks used for later approval by the University.

Formulation of Decarbonisation Plan – appraising carbon reduction interventions and chosen project's timeline

- Following site surveys and data analysis, the consultant is required to provide a comprehensive list of potential carbon reduction interventions for the campus [including infrastructure] and for each building, which will achieve the University's net zero goal.

  Examples of key intervention types that should be considered include building fabric upgrades, methods to transition away from fossil fuels, system replacements, system optimisations, energy data monitoring and metering upgrades, behavioural changes and on-site renewable energy methods. Note that this list is not exhaustive and other interventions are expected to be considered.

  Interventions should be supplier-agnostic, meaning that they should, wherever possible, not include technology, services or products that are limited to a single supplier.

- Building on the quantitative modelling, carbon reduction interventions should be appraised in terms of carbon emissions reduction potential, capital cost and payback period, disruption to the University and alignment to long term management plan.
  - The approach taken to determine the most cost-effective solution should be made clear within the plan.
  - Detailed appendices of calculations and assumptions should be included.
- Carbon reduction interventions should be ranked to show potential carbon saved against capital cost and payback period. This should determine the proposed projects to reach the University Net Zero target. The prioritisation of interventions should also follow the Energy Hierarchy of addressing efficiencies and energy reduction over changing energy sources.
- The Plan should include a timeline of when the projects should be delivered, such as in the short-term prioritising projects that have a relatively low complexity and deliver a favourable return on investment. The complexity of the project should include consideration of any listings or other heritage status and the need for decant space.
- At this stage, the Consultant should present the Decarbonisation Plan back to the University's key stakeholders for comments and discussion, to ensure the proposed Plan meets the University's needs and aspirations, before proceeding to the final reporting stage.

Final Reporting

- The Decarbonisation Plan will be a written report that demonstrates the comprehensive and data-driven analysis undertaken by the consultant. The minimum content of the Decarbonisation Plan should include:
  - Introduction and background context outlining university sustainability aspirations.
  - GHG emissions inventory and baseline emissions data for the University
  - Infrastructure assessment and decarbonisation options including consideration of enhancements required to electrical supply capacity in areas where it may be required and its feasibility
  - Building portfolio assessment including general building information, energy consumption, carbon emissions, energy consuming loads.
  - Carbon reduction intervention analysis and proposed intervention projects– building specific and estate-wide.
  - A costed trajectory (based on industry averages) covering project timelines, cost estimates and predicted carbon savings.
  - Long term delivery Plan/ Net Zero Roadmap
  - Recommendations for high-level financing and funding strategies
  - Conclusion and next steps
  - Appendices including any additional information and workings, such as detailed building summaries, carbon and cost assumptions, calculations, etc.
- To ensure that effective implementation takes place, a short-term programme and implementation plan should be produced.
  - The decarbonisation plan should identify a portfolio of projects that offer significant emissions reductions and energy savings, which are feasible for implementation within the short-term (1-3 years).
- The model used to determine the carbon impact of the various interventions should be provided as a deliverable. It is assumed to take the form of an Excel spreadsheet/workbook, set out in a clear manner to as to allow interrogation and adjustment by University staff. The model should not contain any hidden principles/methodologies that are essential to understanding how the tool operates (although the hiding of specific formulae and other background IP is negotiable in individual cases).

Image:
Global Change Institute,
University of Queensland
©Angus Martin Photography

Customising Specifications
Overview

The following pages of specifications are split into sections which align with the key sections discussed earlier in this report. These specifications can be added to or integrated into decarbonisation plans to build on and enhance the Foundation Plan approach.

Enhancing the foundations

The first page covers ways to increase the value of Foundation Plans by adding depth without significantly increasing scope.

Enhancing for accuracy with additional elements

These are specifications that Universities can add to their scope of works for a Decarbonisation Plan with the aim of enhancing accuracy and ensuring Net Zero carbon targets are achieved.

These are primarily carbon-focused covering detailed building condition and energy surveys; whole life carbon assessments; accounting for scope 3 emissions; fugitive emissions; large scale renewable energy solutions and carbon offsetting

Enhancing opportunities

These are specifications that Universities could integrate into their Decarbonisation Plan scope of works, aiming to enhance wider opportunities that can be considered at the same time as decarbonisation initiatives.

The topics cover nature & biodiversity; climate adaptation & resilience; health & wellbeing and student experience.

Enhancing real-world implementation

Finally, and possibly most importantly, we look at ways of increasing the ease with which the decarbonisation plan being specified can be integrated into other institution activities and navigate the inevitable barriers and challenges by taking a change management approach.

Specifications

Decarbonisation Plans – Enhancing Accuracy with more comprehensive foundations

This page contains specifications that can be used to augment / improve Foundation Plans. These inclusions will, in many cases, improve a Foundation Plan without significantly changing the scope to bring in additional elements. It is unlikely that any one institution will want or need all these bullets to be carried out – tailoring is necessary in order to avoid high fees.

Determining a baseline

- The 'Business as Usual' (BaU) element of the Plan should be expanded to consider expected and potential future legislation, taking cues from reputable sources such as the Committee on Climate Change and their pathways. Where external factors are not certain, a sensitivity analysis should be carried out to isolate important factors to increase the University's resilience against assumptions changing.
- The BaU trajectory should also include longer-term expected refurbishment / replacement cycles along with the potential impact of external factors (such as improved industry good practice). Any costs related to this should be communicated as separate to the costs for decarbonising.

Formulation of Decarbonisation Plan

- Agree (and use) specific KPIs and metrics that are most relevant to the University and that align with internal reporting procedures.
- Projects that would require occupant decant or vacant buildings should he highlighted.
- Present a Business-as-Usual trajectory including current and planned projects, expected Long-Term Maintenance cycles and expected trends in industry best practice and legislation. BaU costs should be clarified and presented as separate to additional costs for decarbonisation. Emissions savings should be presented as both a reduction from the baseline year and a reduction from the BaU trajectory at agreed milestones (such as the Zero Carbon Target date).
- The potential for heat networks (whether traditional heat-only, more advanced ambient loops or '5th generation' networks sharing heat and cooling between buildings) should be specifically explored.
- The plan should be structured in a way that allows the University's internal teams to easily update and refresh the plan as well as monitoring progress against it.
- The trajectory should include a consideration of the potential errors including error bars (or similar) in key charts and graphics.

Final reporting

- The report must consider secondary factors that increase complexity, specifically the need for decant space. The programme should show decant space need to avoid associated potential barriers and challenges are foreseen.
- The programme should consider the duration of the decarbonisation process out to the Net Zero Target Date along with providing practical short-term next steps.
- A techno-economic approach should be adopted using a format agreed by the University such as Net Present Value, Marginal Abatement Cost Curves or other technique.
- Where possible, cost estimates should move beyond the use of simple industry benchmarks, with a Quantity Surveyor being employed as part of the team and recognising the value of anecdotal and quantitative information on cost held by the University.
- In collaboration with the University's Finance Department, examine all feasible options of financing and funding options for decarbonisation interventions. To include but not be limited to grants, PSDS, Salix, Green bonds, Sustainability Linked Loans (SLLs), revolving funds, partnerships etc. Recognition should be given to the disconnect between the common 5-year investment cycle and payback periods being longer than this horizon.
- The programme of interventions should be presented in the form of a phased investment plan.
- Outputs should be tailored to a range of audiences. As a minimum, a brief and accessible 'Summary for Decision-Makers'-style document should be created alongside a technical report. The outputs should also be tailored to University structure and reporting lines as well as taking into account our particular drivers.

Approach

- The consultant appointed is expected to work with University staff in a highly collaborative manner. Fundamentally, we do not want a decarbonisation plan developed *for* us – we want a decarbonisation plan developed *with* us.

Detailed Building Condition and Energy Surveys

In order to understand our existing estate and building stock and to determine the most appropriate energy and carbon reduction interventions, detailed building condition and energy surveys must be undertaken.

A qualified engineer or consultant must undertake the building surveys. They should have a thorough understanding of building systems, energy efficiency measures, and relevant regulations and standards.

The surveys should cover the following points:

- A building envelope/ fabric assessment:
  - Evaluate/estimate the thermal performance of all elements of the fabric
  - Determine the potential for improving the thermal resistance and airtightness of the building envelope through measures like insulation upgrades, air sealing, or window replacements.
- HVAC system evaluation:
  - Assess the age and efficiency of heating, ventilation, and air conditioning (HVAC) systems, including boilers, chillers, air handling units, and ductwork.
  - Evaluate the effectiveness of temperature controls, zoning, and scheduling.
  - Identify opportunities for system upgrades, replacements, or the integration of renewable energy sources for heating and cooling. It is essential that interventions supporting the transition away from any existing fossil fuel energy sources, such as gas boilers, are identified.
- Lighting assessment:
  - Conduct a detailed survey of lighting systems, including the type of fixtures, and controls.
  - Identify opportunities for efficient lighting retrofits, occupancy sensors, and daylight controls.
- A Matterport (or similar) scan of plant rooms visited.
- Review building controls:
  - Assess existing building management and controls systems for HVAC, lighting and other energy consuming equipment including evaluating the effectiveness of any scheduling, timeclocks and setpoints.
  - Identify opportunities for improving system integration, controls, energy management strategies as well as Smart systems
- Identify renewable energy opportunities:
  - Evaluate the feasibility of integrating renewable energy sources into the buildings or infrastructure.
- Occupant behaviour and engagement:
  - Evaluate the level of awareness and involvement of building occupants in energy conservation and sustainability practices. E.g. Is there energy conservation signage displayed throughout the building?
- Stakeholder engagement:
  - Engage with building occupants, building/ facility managers, and relevant stakeholders, such as the Estates team, to gather insights and ensure buy-in for proposed interventions.

The required deliverable associated with this element is an individual report/section for each building surveyed covering the above elements. This information should then be used to inform the wider Decarbonisation Plan.

Whole Life Carbon Assessments

In order to successfully decarbonise and reach our net zero targets, we understand that Whole Life Carbon Assessments (WLCA) should be incorporated as early as possible into the design phase of projects.

Our Estate Masterplan includes areas for campus development and our Decarbonisation Plan will outline carbon reduction initiatives that require building works to take place. Thus, we will require a qualified professional to undertake WLCA's to appraise design options for all new construction, retrofit and refurbishment projects. The results from the WLCA should be used to enable informed decision-making, allowing design choices to be determining based on environmental impact and not solely financial cost.

We currently have the following projects that are sufficiently well-progressed through the sign-off or design process to warrant a WLCA to inform the Decarbonisation Plan:

- Building A, c.X,000m^2 of (e.g. teaching space). Currently at (e.g. RIBA WS0)
- Building B, c.Y,000m^2 of (e.g. sports facilities). Currently at (e.g. RIBA WS2)

Approach to undertaking WLCA at concept design

- A qualified, preferably chartered, professional (e.g. sustainability consultant, architect, engineer) must undertake the WLCA. They should have expertise in undertaking whole life carbon assessments and recommending low carbon design solutions.
- During the initial planning and design phases of new construction, retrofit and refurbishment projects, the qualified professional is required to undertake a WLCA to appraise potential design options.
- The qualified professional is required to engage with the University to determine project specific requirements and targets for the WLCA, such as whether the assessment is to facilitate sustainability certification, e.g. BREEAM Mat01 credits, or if the assessment needs to demonstrate project alignment with Net Zero Standards.
- The WLCA is to follow the standard approach to carbon measurement and assessment in the building environment. Thus, the assessment is to be undertaken in accordance with the RICS Professional Statement 'Whole life carbon assessment for the built environment, 2nd edition' and align with BS EN 15978:2011.
- The assessment is to align to any additional requirements determined by the University, following the stakeholder engagement.
- The qualified professional must send out a request for information for material quantities/ estimates and material specifications for all the building-elements, for the alternative design option appraisals.
- The qualified professional must work with the design team to be able make material assumptions where materials are not yet specified.
- The WLCA must be undertaken using an appropriate and well recognised LCA software, such as OneClick LCA.

Approach to WLCA reporting

- The WLCA report output must inform the University and design team of the embodied carbon ($kgCO_2e/m2$) associated with the different design options at practical completion (A1-A5), over life cycle (A, B1-B5, C, 60 years) and report separately on the next product system (D).
- The report should identify which design option has the lowest embodied carbon impact, so that the University and Design team can make informed decisions over the chosen design.
- The report should identify the key building elements with the highest embodied carbon ($kgCO_2e$), outline opportunities for reducing embodied carbon and propose recommendations to ensure low carbon design decisions continue to be embedded into the chosen design.
- The qualified professional should ensure that any additional requirements determined by the University have been accurately reported on, to ensure the WLCA report output is valuable and insightful.
- The qualified professional should use their own judgement to demonstrate any additional key findings and useful information.

Note for consideration/clarification

This section is specifically focussed on providing additional accuracy on existing or defined upcoming projects. A higher-level approach to the embodied carbon of future projects is included within the Scope 3 specifications as an alternative.

Specifications

Decarbonisation Plans – Enhancing Accuracy with additional elements

Scope 3 emissions

Scope 3 emissions (all indirect GHG emissions that occur in the university's value chain, both upstream and downstream) are to be assessed so that recommendations to reduce these emissions can be identified in order to achieve the University's Scope 3 emissions reduction/ net zero target.

Approach to Scope 3 reporting:

- Identify all recognised methods for reporting on Scope 3 carbon emissions and setting carbon targets, including sector specific methodologies e.g. Higher Education Supply Chain Emissions Tool, the Standardised Carbon Emissions Framework or the GHG Methodology for Business Travel and Employee Commuting.
- Determine the most suitable approach to Scope 3 reporting for the University, to enable accurate and transparent reporting on Scope 3 emissions.

Establishing Baseline:

- The consultant is required to request all information and data needed from the University to establish a baseline. The key reporting categories for universities are usually travel, procurement, water and waste, thus relevant data for these categories should be requested. If the chosen approach to Scope 3 reporting has different key categories, this approach should be taken.
- Review and report on the quality of the data provided by the University to be able to baseline Scope 3 emissions.
    - Stakeholder engagement is key to ensure that the most appropriate and best quality data has been collected.
    - Where University data is limited, appropriate assumptions should be made. For example, travel-related emissions based on average emissions from commuting patterns could be used where transport fuel or distance data is not available. All assumptions and benchmarks should be clearly highlighted.
- Select a baseline year which future emissions will be compared against, taking into account data availability, how representative the year is (particularly with regard to temporary Covid impacts) and industry best practice.
- Set out which / if any aspects of Scope 3 emissions do not currently apply and the rationale behind this (a materiality assessment).
- Aggregate the emissions from all applicable sources to determine the university's total baseline Scope 3 emissions, in accordance with the recommended accounting and reporting methodology.

Existing Scope 3 Hotspots and Emissions Reduction Opportunities:

Scope 3 hotspots refer to the activities or sources within the University's value chain that contribute significantly to our overall Scope 3 emissions.

- Clearly report on Scope 3 hotspots to highlight areas where significant emission reductions can be achieved through targeted interventions or strategic collaborations.
- Research opportunities for each hot spot area and actions taking place on Scope 3 emissions by other organisations to reduce emissions to identify best practice recommendations for reducing our scope 3 emissions.
- Review our existing policies that impact Scope 3 emissions and highlight any policy gaps to identify appropriate and impactful Scope 3 emission reduction recommendations.
- Provide recommendations/ interventions for each carbon hotspot area, that we could adopt to reduce our Scope 3 emissions, such as incorporating carbon impact into the procurement process of goods, works and services.

Scope 3 Carbon Reduction Strategy:

- Develop a scope 3 carbon reduction strategy based on prior data analysis, policy appraisal, highlighted carbon hotspots and the identified recommendations/ interventions.
- Include a Business-as-Usual trajectory that takes account of the current best understanding of the likely decarbonisation of relevant sectors due to wider systemic shifts towards low carbon.
- Undertake financial simulations that indicate the cost of achieving our Scope 3 emissions reduction target / net zero target for the identified recommendations / interventions.
- Develop a costed action plan for scope 3 emissions to support the carbon reduction strategy. This should demonstrate carbon reduction potential and capital cost for the recommendations / interventions, enabling us to focus resources on the largest impact areas.
- The strategy should provide guidance on how to engage with suppliers and encourage them to adopt low-carbon practices and technologies.
- Identify how different stakeholders within the University have responsibility and control over different elements of scope 3 and highlight opportunities for collaboration.

Specific area: Scope 3 for embodied carbon within buildings projects.

- For all interventions suggested as part of the Scopes 1 and 2 Decarbonisation Plan, calculate a high-level embodied carbon estimate for each works based on industry benchmarks (or more accurate data if available)

Fugitive emissions

Fugitive emissions refers to the unintentional release of gases or vapours from industrial processes, equipment, or facilities. Fluorinated GHGs contribute to global warming when released into the atmosphere and these are commonly used in various applications across the university estate, including refrigeration and air conditioning, foam blowing agents, fire extinguishers, and electrical equipment insulation. Fugitive emissions should be included within Scope 1 calculations.

Therefore, we believe that assessing fugitive emissions is an important step for us to be able to develop a comprehensive Decarbonisation Plan.

Accounting for fugitive emissions

- The consultant will need to engage with university stakeholders, such as the Estates Team, facility managers and laboratory staff in order to identify all potential sources of fugitive emissions, such as air conditioning units, refrigerators and laboratory equipment.
- The consultant is required to request all the information and data needed from the University, such as equipment details, maintenance history and manuals, so that a comprehensive inventory / database can be developed.
- Fugitive emissions need to be quantified using recognised calculation methodologies and emission factors, such as CIBSE guidance and leakage scenarios, or the GHG Protocol. The Global Warming Potential of each refrigerant should be used to calculate the CO_2 emissions of system leakage.
- Consider variables such as equipment type, age, operating conditions, and leak rates.

Reporting on fugitive emissions:

- The scope and boundaries must be clearly defined at the start of the report, such as:
  - Identify the types of fugitive emissions included.
  - Explain any exclusions or limitations in the data collection process.
- Provide detailed emissions data by GHG type, as well as providing the total amount for carbon dioxide equivalent (CO_2e).
- Explain the chosen calculation methodology used to estimate the fugitive emissions.
  - Appendices should include assumptions made and uncertainties in any estimations undertaken.
- The consultant should identify opportunities and initiatives to reduce fugitive emissions, such as implementing leak detection, repair programs and / or a move to new systems that use refrigerants with a lower GWP.

Large-Scale Renewable Energy Feasibility Study

In order to support estate-wide decarbonisation, we require a Renewable Energy Feasibility Study to identify potential options for supplying our electricity or heat from direct or indirect low carbon sources. A qualified engineer or consultant must undertake the study.

The Renewable Energy Feasibility Study must include:

- Demand, consumption and phasing quantification
- The undertaking of an assessment of energy supply options for wind, solar, hydroelectric, geothermal, biofuels, hydrogen, DHNs, BESS, EVs, waste heat and building level interventions.
  - For each option this should include a description, sizing, high level concept definition and spatial constraints, high level cost benefits and multicriteria analysis to shortlist options recommend those for further consideration.
- Up to five viable scenarios of renewable technology combination.
- Include whether directly connected (private wire) or alternative connection solution.
- Commentary on the additionality of each scenario, based on UKGBC guidance contained within the 'Renewable Energy Procurement Part 2' document[11].
- An economic analysis on each viable scenario must take place include a high-level consideration of ownership and funding opportunities (identifying potential partners if possible) and estimating key financial metrics such as payback period and returns on investment.
- Clarification of Authorised Supply Capacity and consultation with local Electricity Network for connection and /or upgrade quotes (and timescales).
- This report should also consider the potential benefits, contradictions and risk factors of battery storage or other forms of energy storage, both at a building scale and larger.
- In addition to examining the potential for new renewable energy sources, the consultant should also advise on mechanisms such as Power Purchase Agreements (PPAs) and Heat Purchase Agreements (HPAs) as a way to potentially access low/zero carbon energy at a reduced capital investment.

The deliverable for this element is a report that summarises finding, recommendations and next steps. The report should include appendices of calculations and assumptions.

Carbon Offsetting

Carbon offsetting is a natural next step after deep decarbonisation, and it is essential for the University to offset our residual carbon emissions to mitigate the effects of climate change and achieve our Net Zero goals. Therefore, we request that a Responsible Offsetting Strategy is produced to complement and enhance our decarbonisation pathway and efforts.

For the avoidance of doubt, all reasonable efforts in direct and indirect emissions reductions should be made before considering offsetting.

Approach

The consultant should consider the following when developing their methodology and approach.

- Stakeholder engagement and workshops with the University must take place focussing on shaping the University offsetting aspirations and ambition. Workshops should also be used to explain to our different stakeholders how responsible offsetting works in practice and how any associated risks can be mitigated.
- The consultant is required to request all the information and data needed from the University to enable a tailored offsetting strategy to be produced. This should include required emissions data for the estate [and Scope 3 emissions], as well as information on our wider sustainability objectives and ESG (Environmental and Social Governance) documents, so that any suggested carbon credit typologies will deliver co-benefits that best align to our wider aspirations.
- The consultant should identify a number of portfolios for our carbon offsetting approach in order to reach our Net Zero target date.
    - Potential offsetting scenarios should align to best practice offsetting frameworks and guidance, such as the Oxford Offsetting Principles and Core Carbon Principles, in order for 'Net Zero' to be achieved with robustness.
- The consultant is responsible for reviewing current carbon offsetting schemes within the Voluntary Carbon Market (VCM) to be able to provide carbon credit recommendations.
- To enable informed decision making, annual carbon cost projections for each portfolio must be estimated, wider co-benefits that align to our wider sustainability aspirations should be summarised, and any commercial and reputational risks must be outlined. This information is to be presented to the relevant University stakeholders that will determine the chosen approach to offsetting.
- The consultant is to support the University make their final decision for the chosen carbon offsetting portfolio approach.
- The final outcome should enable the University to engage in the VCM to purchase and retire the correct quantity of desired carbon credits.

Carbon Offsetting Strategy

The consultant is required to produce a carbon offsetting strategy report which covers the following content as a minimum:

- Outline the University Net Zero definition and offsetting aspirations.
- Demonstrate that a policy review has been undertaken to understand the University's wider sustainability aspirations, so that the chosen offsetting approach will deliver co-benefits that best align to these.
- Set out the boundary of the offsetting (i.e. the emissions they are intended to offset – whether Scope 1 and 2 or any additional carbon sources).
- Present the quantity of residual emissions that are required to be offset, using available existing data, as well as forecasted residual emissions to reach the University Net Zero target date.
    - If applicable, align the offsetting strategy with the Decarbonisation Plan to allow the evaluation of alternative decarbonisation scenarios with full knowledge of the varying offsetting costs associated with each one.
    - Clarify any exclusions and assumptions that have been made.
- Summarise a number of different offsetting portfolios and describe how they align to industry leading frameworks in order to achieve Net Zero by the University's target date.
- For each offsetting portfolio report on:
    - Annual carbon cost projections
    - Potential delivery of co-benefits and alignment to wider University sustainability aspirations
    - Commercial and reputational risks
- Outline chosen portfolio approach following stakeholder engagement and University decision.

The Enhancing Opportunities section within this report outlined that there are four key areas of wider sustainability opportunities that align well to carbon- and energy-focused works. These are:

- Nature & Biodiversity
- Climate Adaptation & Resilience
- Health & Wellbeing
- Student Experience

Universities can specify additional components which aim to enhance wider opportunities by delivering co-benefits for the key areas mentioned above. Four levels of specifications for enhancing opportunities have been outlined below to allow institutions to reflect their priorities.

By progressively adding these levels of specifications to the scope of decarbonisation and implementation plans, universities can gain a more comprehensive understanding of the wider opportunities and impacts associated with interventions. This tiered approach aims to allow for flexibility in terms of the depth and complexity of analysis, depending on an institution's decarbonisation maturity, available funding and resources, data, and stakeholder needs.

These elements should be integrated into the Decarbonisation Plan in order to create a single picture. Decarbonisation should continue be the central focus of this work – any significant benefits identified in the key sustainability areas can then be progressed separately.

Level 1: Initial impact assessments – Providing a quick, high-level overview of potential impacts.

- In order to better understand the existing Estate, a RAG (Red, Amber Green) impact assessment should take place to quickly identify and prioritise the potential impacts of carbon reduction interventions across the key sustainability areas of [].
- For example, a RAG assessment to understand the impacts of potential decarbonisation interventions upon student Health & Wellbeing could include:
    - Red: Decarbonisation measures have potential negative impacts on the health and wellbeing of students and staff
    - Amber: Mixed impacts, with some health benefits but also potential concerns or trade-offs to consider
    - Green: Strong positive impact on air quality, mental health, physical fitness, and overall wellbeing
- The RAG assessment should be presented as a matrix or dashboard (including a rationale for the rating assigned), allowing decision makers to quickly identify areas for concern and areas of strong positive impacts.

Level 2: Quantitative analysis using standard figures- Offers a more robust, data-driven assessment of potential impacts.

- Incorporate standard quantitative metrics and benchmarks to assess the impact of decarbonisation initiatives and carbon reduction interventions on the key sustainability areas of [].
- For example, use widely accepted methodologies and data sources to estimate the potential benefits, such as reduction in air pollutants compared to WHO guidelines as a result of increased green infrastructure or university sustainability rankings based on student feedback.
- These metrics can be compared against benchmarks derived from industry standards or peer institution performance.

Level 3: Building-Specific Quantitative Assessment- Delivers tailored and estate-specific insights for the unique characteristics and opportunities of each building.

- Conduct building-specific assessments of the quantitative and qualitative impacts of potential or proposed decarbonisation initiatives on the wider key sustainability areas of [].
- For example, biodiversity surveys and ecological assessments can be used to establish the baseline condition of habitats and ecosystem services or undertake occupancy surveys to receive quantitative and qualitative data on the potential impacts of carbon reduction interventions on student and staff satisfaction, productivity, and well-being.
- This level of analysis should allow for more targeted and effective interventions to be implemented.

Level 4: Include Social Value / Monetisation of Benefits- Provides a comprehensive understanding of the broader societal value of decarbonization initiatives.

- This level of analysis should seek to capture the full range of economic, social, and environmental value created by decarbonisation initiatives within the key sustainability areas of [] and report this in monetary terms that can be easily understood and compared by decision-makers and stakeholders.
- Use recognised frameworks and methodologies to identify, quantify, and monetise the wider benefits of potential carbon reduction interventions, and for the implementation of the decarbonisation plan across Estate.
- For example, use Social Return on Investment (SROI) or Ecosystem Services Valuation.

Specifications

Decarbonisation Plans – Enhancing Real-World Implementation

The specifications in this section are intended to encourage a broader approach beyond just the highly technical and aimed squarely at the Estates Team (as is often the case).

The first section sets out how those who commonly carry out Decarbonisation Plans should change their approach and the second envisages having a parallel team and workstream, most likely of organisational psychologists or similar dedicated to organisational and change management.

Integrating with wider university pressures, direction and opportunities

It is essential that the decarbonisation plan takes account of short-term University practicalities, the medium-term context of the Higher Education sector and wider and the long-term direction of the University.

- The consultant should be mindful of the following factors that we consider to be of particular importance :
  - Short-term practicalities of: siloed departments and lack of communication; limited engagement from non-estates staff; lack of student involvement; insufficient leadership support; competing priorities and limited resources; resistance to change and new ways of working; difficulty in measuring and reporting progress; limited collaboration with external partners; competing priorities.
  - Medium-term context of: changing energy patterns in some buildings; changing Scope 3 emissions; increased demand for online infrastructure; poor space utilisation; the condition of the estate; the need for more flexible and adaptable spaces; supply chain interruptions; stability in funding mechanisms.
  - Long-term direction factors of: changing demand for various faculties; temporary works and decant strategy; changing relationship with wider locality; development of public realm; transport connectivity modal shift; increasing emphasis of sustainability in all subjects' curricula; adaptation and resilience to a changing climate; student expectations.
- In creating the decarbonisation plan and implementation plan, the consultant should engage with appropriate stakeholders outside of the commissioning department and incorporate drivers and views.

Increase the practical implementability of the plan using change management principles

- Carry out an organisational assessment of the University within the context of reviewing our readiness to deliver our decarbonisation goals from a culture, organisation and governance perspective.
- Document the governance arrangements and roles and responsibilities for decarbonisation-related activities across the organisation.
- Engage with a representative group of teams and individuals to understand their aspirations, attitudes and opportunities for decarbonisation through interviews, workshops and surveys.
- Identify and analyse key stakeholders and develop an engagement plan for securing their buy in and involvement as required. Engage leaders to understand their ambition for decarbonisation and their appetite to drive change across the organisation.
- Indicate actions needed to fully integrate decarbonisation into our broader strategic objectives, describing what decarbonisation means to the organisation and the impact areas to focus on. Action plans should also cover the implementation of decarbonisation plans in a collaborative manner, allowing key stakeholders to review options from a broad cost/benefit perspective to prioritise efforts and drive forwards intervention projects.
- Create a clear implementation plan based on information and understanding gathered.

Note that these specification items are intended to arrive at an implementation plan. Slightly different actions would be needed if a change management / organisational psychology approach was going to be continued into implementation (such as developing leadership and decarbonisation skills across the organisation).

Enhanced modelling outputs

In order to aid the understanding of options during internal conversations and to allow investigations into the effects of different options and inputs, the University requires enhanced modelling outputs.

The foundation model is assumed to take the form of an Excel spreadsheet/workbook, set out in a clear manner to as to allow interrogation and adjustment by University staff. The model should not contain any hidden principles/methodologies that are essential to understanding how the tool operates (although the hiding of specific formulae and other background IP is negotiable in individual cases).

In enhancing the modelling outputs, the University requires the following:

- A PowerBI 'front end' to display information from the background model in a way that is intuitive. The PowerBI element should include the ability to:
  - Vary the implementation date of particular interventions and the buildings interventions are applied to.
  - Vary a proportion of the key assumptions behind the model
  - Produce graphs, trajectories and programmes for individual buildings or a collection of buildings.
- A 3D model representative of the campus which allows the easy identification of buildings or collections of buildings that user-inputted conditions apply to. Examples could include all buildings with works in a particular year, undergoing a particular intervention type or have current or project emissions above or below a certain level

Case Studies

Image:
People's Pavilion, Eindhoven
© Filip Dujardin

Implementing decarbonisation plans

Case study: Embedding sustainability at University of Liverpool

Introduction

The University of Liverpool's Facilities, Residential and Commercial Services (FRCS) department has embarked on an ambitious journey to embed sustainability across its built environment projects. The Sustainable Built Environment Investment Framework (SBEIF), developed in collaboration with Arup is now in its implementation phase, driving change across sustainable design, governance, performance reporting, and procurement.

Collaborative approach

The SBEIF project, which began in 2022 and has progressed throughout 2023-24, is a testament to the power of collaboration. The framework convenes an extensive set of teams, roles, and stakeholders to drive full-scale change in how the University delivers projects across its campuses. By applying the SBEIF retrospectively on flagship projects and incorporating stronger sustainability measures at later design stages, the University has demonstrated its commitment to decarbonisation.

Impact on decarbonisation

The SBEIF is actively contributing to reducing greenhouse gas emissions by:

- Integrating less carbon-intensive construction design, materials, and practices into estate developments
- Securing ring-fenced investment to mitigate against value engineering
- Applying the framework to brand new projects in 2024 to put the newly developed work methods to the test

Co-creation and diagnostic

Collaboration and engagement are at the heart of this initiative. The SBEIF was co-created through multi-stakeholder workshops, capturing inputs on challenges and necessary changes. Arup conducted a light-touch organisational maturity diagnostic to understand the opportunities and obstacles to implementing the SBEIF.

Addressing capability gaps

To address specific capability gaps, targeted interventions were identified, including:

- Leadership engagement workshops
- Cultural change assistance, resource and capability planning
- Target-setting guidance
- Role clarification through a RACI (Responsible, Accountable, Consulted, Informed) activity

Building a strong foundation

By fostering collaboration, building ownership, and addressing capacity and capability gaps, the aim is to create a strong foundation for the successful implementation of the SBEIF. This collaborative approach ensures that sustainability principles are embedded in the university's built environment projects, driving positive change and contributing to a more sustainable future.

Conclusion

The University of Liverpool's Sustainable Built Environment Investment Framework is a shining example of how collaboration can drive decarbonisation efforts in higher education institutions. By bringing together diverse stakeholders, addressing capability gaps, and embedding sustainability principles across its built environment projects, the University is paving the way for a greener future.

Key Stakeholders

- Syd Cottle, Director of Estates & Infrastructure
- Rachael Hanmer-Dwight, Head of Environmental Sustainability & Energy Services

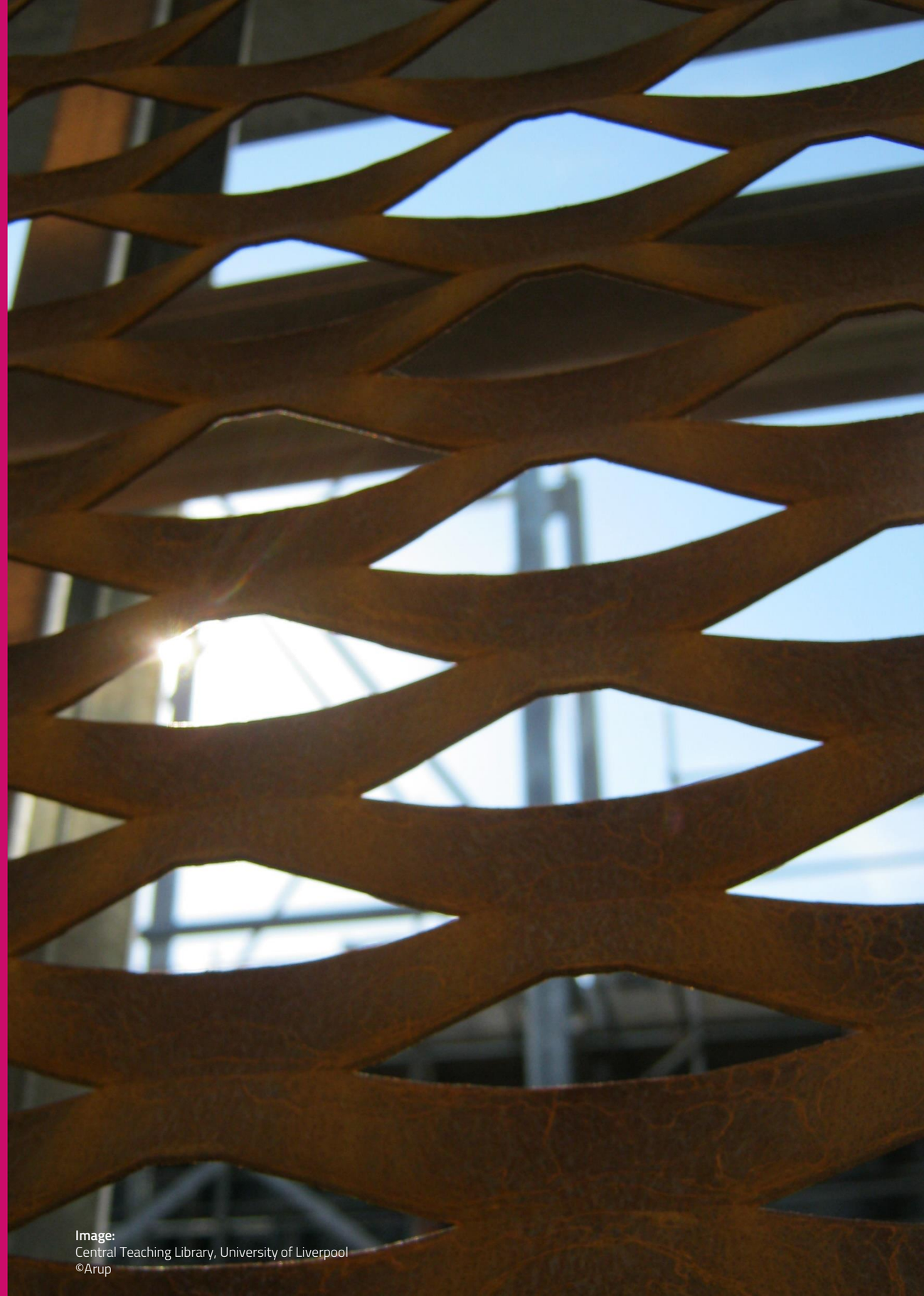


Image:
Central Teaching Library, University of Liverpool
©Arup

Implementing decarbonisation plans

Case study: Financing University of Hull's Decarbonisation Journey

The University of Hull set ambitious carbon-neutral targets but faced challenges in financing decarbonisation plans due to competing priorities, long payback periods, and budget constraints.

To overcome these barriers, the University:

- Aligned decarbonisation with strategic priorities via a 10-year sustainability strategy
- Secured £86 million in dedicated green bond financing
- Developed tailored business cases beyond simple payback and Net Present Value (NPV) metrics.
- Fostered cross-functional collaboration to embed decarbonisation across the institution

Securing dedicated financing was a key enabler, while strategic alignment, tailored business cases, and breaking down silos were critical to success. Ongoing challenges include keeping pace with technology and upskilling.

The case study highlights the importance of strategic alignment, innovative financing, customised business cases, and collaboration in overcoming decarbonisation financing challenges. By sharing best practices, universities can support one another in mobilising resources to achieve sustainability goals.

Image:
College of Physical Education, Hull University
©Sam Lambert/ Architectural Review

Endnotes

1- Net Zero Carbon Roadmap, UKGBC- https://ukgbc.org/wp-content/uploads/2021/11/UKGBC-Whole-Life-Carbon-Roadmap-A-Pathway-to-Net-Zero.pdf

2- WLCA for the built environment, RICS- https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/construction-standards/whole-life-carbon-assessment

3- A breakdown of 2020-21 sector-wide emissions across, The Royal Anniversary Trust - https://www.queensanniversaryprizes.org.uk/wp-content/uploads/2023/01/Accelerating-towards-Net-Zero.pdf

4- Carbon Offsetting and Pricing Report, UKGBC- https://ukgbc.org/wp-content/uploads/2023/07/UKGBC-Carbon-Offsetting-and-Pricing-Report.pdf

5- Madrid + Natural Report, Arup- https://www.arup.com/perspectives/publications/research/section/madrid-and-natural

6- Mansfield SuDS, Arup- https://www.arup.com/projects/mansfield-sustainable-drainage-systems/

7- Jo Cox More in Common Building User Guide- https://www.hud.ac.uk/media/assets/document/estates/resources/JoCoxMoreinCommon-Buildinguserguide.pdf

8- Cities Alive – Designing Streets for Women, Arup- https://www.arup.com/globalassets/downloads/insights/cities-alive-designing-cities-that-work-for-women.pdf

9- Reflections on students' feelings on climate change, Students Organising for Sustainability- https://www.sos-uk.org/post/reflections-on-students-feelings-on-climate-change

10- Echo: Designing Netherlands' most sustainable university building, TU Delft- https://www.arup.com/projects/echo-tu-delft

11- Renewable Energy Procurement Part 2, UKGBC- https://ukgbc.org/resources/renewable-energy-procurement-part-2/

AUDE