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SPOTLIGHT
Savills Research

UK Higher Education Spotlight

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The climate emergency - Behavioural change and estates challenges

> **“Every important social movement of the past half-century has begun on university campuses”**

In this edition of our Higher Education Spotlight we open the can of worms that relates to environmental sustainability and the built environment.

Universities have been at the forefront of the climate debate for many years through their research, but the last 12 months has seen a rise in demands from stakeholders to do more and faster.

In many cases institutions have already embraced the easy wins of behavioural and cultural change, as well as ensuring that new buildings are built to one or other environmental standard. However, the more difficult questions remain to be answered, and many of these relate to estates, buildings and their underlying infrastructure.

The key challenge for estates directors in both the higher education and private sectors is establishing what best practice looks like. Many decisions that might look sensible can raise other questions. For example, wind turbines generate green energy yet there is no sustainable way yet of recycling their blades; there is pressure on universities to limit international travel to events, yet the benefit of the research and information sharing at such events might have a more positive effect on the world than the CO_2 saved by not flying; and at an estate level the concept of embodied carbon might suggest that refurbishing buildings is better than building new ones, but even this debate still lacks evidence and needs further examination.

1 The challenge

The combination of rising activism and high profile climate-related events such as the Australian fires has meant that 2019 reached a new peak of concern about the future of the planet. Increasingly searching questions are being asked of all organisations by their stakeholders about how their behaviour will change to mitigate or diminish environmental impacts, and the built environment is very much at the apex of this debate.

The world is 0.8 °C warmer today than it was one hundred years ago, and the warmest decade in history in the UK has occurred since 1990. In May 2019 the UK was the first country to declare a climate emergency, with the government going on to make a legally binding commitment to become carbon neutral by 2050.

Buildings are the third largest carbon emitter in the UK today, even before you include the carbon and other costs of construction. To put this into context Historic England estimates that the carbon footprint of buildings in England exceeds the total emissions of all uses in Scotland and Northern Ireland combined. According to the UK Green Construction Board, when construction, transport of materials and building's electricity use is combined, the built environment sector creates 42% of the UK's total greenhouse gas emissions.

However, to date, little effective action has been taken to reduce this, and buildings are not on track to meet the 2050 net zero carbon commitment according to the government's independent advisory body, the Committee on Climate Change.

Given that every important social movement of the past half-century or so has begun on university campuses, university estates directors will be under ever-increasing pressure to demonstrably lead on this debate.

While the challenge is significant and the pathways to success are diverse, and often rife with conflicting advice, we believe that there are a number of reasons why universities are better placed to deliver solutions than the private sector.

The first of these reasons, and arguably most important, is the fact that the majority of the best research and thought-leadership in this area is coming out of higher education. Private sector developers, building owners and occupiers are struggling to make evidence-based decisions, and academia can help on that front.

Secondly, higher education estates offer the opportunity to test theses in a relatively controlled environment, and we expect to see more universities using individual parts of their estate to test both behavioural and technical solutions.

Thirdly, universities generally tend to own their own estates, and this removes one of the key barriers to change that is prevalent in the private sector. For example,

UN Sustainable Development Goals: University estates can play their part in achieving at least seven of the 17

Source United Nations with Savills annotations

> **“Many universities have an incredibly diverse portfolio of property and land, and this enables them to explore a wider variety of options to achieve net zero”**

a typical private sector owner of an office building might choose to build a building that is capable of being operated to the highest environmental standards, yet they have no control over whether the eventual tenant of this space operates that building in an efficient and effective manner. University estates directors can to a greater degree ensure that their users use the buildings effectively, and we expect to see more universities building environmentally sustainable behaviour into the contract that exists between the institution and its students.

The final reason why we believe that the higher education sector can and will continue to lead the debate around sustainability and the built environment is the diversity of its holdings. Many universities have an incredibly diverse portfolio of property and land, and this enables them to explore a wider variety of solutions. For example, large agricultural holdings not only offer the opportunity to offset carbon emissions from elsewhere on the estate, but also to experiment with re-wilding, carbon sequestration, public access to the countryside and nitrate neutrality.

Of course being an educational institution also brings its challenges that in some cases are unique to this sector. These include a highly transient population, significant international travel both by students and academics, political pressures on what kind of research is acceptable and fundable, and the sheer cost of the technology that is required to model climatic change. Another theme that we have touched on in previous Higher Education Spotlights is that of the under-occupancy of most educational estates, which while it is not a particular environmental concern if the asset goes completely dark during quiet periods in the academic day, week and year, is still worthy of consideration. For example, is building a property that is only used 50% of the time a sustainable use of materials even if it is not emitting carbon or creating waste when it is not in operation?

While many universities have declared a climate emergency already, there is still a notable tension between achieving climate-related ambitions and maintaining the institution’s more normal strategic goals, and we recognise that universities like private sector businesses face many competing demands. Change will be both voluntary and enforced, though the news that the UK’s Office for Students is planning to make voluntary the current mandatory collecting of universities’ estate management records (which include reporting on their carbon emissions) feels like a backward step for great transparency, data-sharing and benchmarking.

We believe that there is a huge opportunity for the higher education sector to lead the climate agenda, and it is clear that this is already happening in terms of debate, research and actions. For example, our analysis the Ministry of Housing, Communities & Local Government data on Energy Performance Certificates (EPCs) for non-domestic buildings shows that a significantly higher proportion of university properties are rated Net Zero or EPC A to C than the norm. Indeed, as the data below shows the majority of university buildings are capable of being operated at the more energy-efficient end of the spectrum. This is clearly a great start, yet also raises questions about behavioural change and whether building new is the best solution....

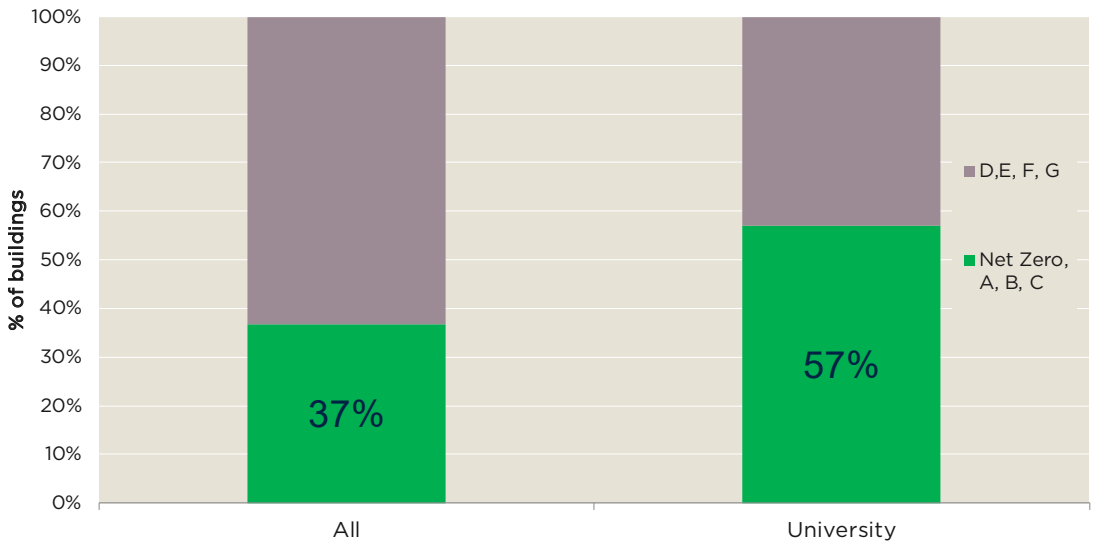
42%

of the UK’s greenhouse gas emissions come from the built environment

57%

of EPC-rated university buildings have a rating of A, B or C

UK non-domestic building EPC ratings: University buildings are clearly ahead of the curve on being capable of being operated in an energy-efficient manner



Source Savills using MHCLG data

> **"The greenest building is one that already exists"**
>
> **Carl Elefante, former president of the American Institute of Architects**

2 Build or refurbish?

When it comes to an estates response to how an organisation goes green or fulfils net zero carbon targets, building a new building is often the easiest route to take. There have been a plethora of badges and rating systems for many years that take into account a wide variety of factors including BREEAM and LEED certifications, and both universities and private sector property developers have generally embraced all of these for marketing and altruistic reasons. However, 80% of the built environment already exists, and the challenge of what to do with the existing stock is a far more complicated question for building owners.

Universities all over the world have been enthusiastic embracers of ensuring that their new buildings are at the pinnacle of sustainable development. As far back as 2015, Harvard University announced that they had built their 100th LEED-certified space, achieving the highest Platinum rating on the renovation of Esteves Hall at the Business School. This is particularly interesting for two reasons, firstly that the 100th project was a renovation rather than a new build, and secondly that Harvard is a highly technical university.

The latter point is a particular challenge for some higher education institutions. A 2016 study by MIT highlighted the fact that small, arts-focused institutions faced lower barriers towards achieving sustainability goals than larger universities with engineering or science laboratories or medical schools. The reasons for this are simple in that laboratories are generally the most energy-intensive space on campus due to both the equipment in use and the ventilation demands. This means that when setting targets for cutting emissions, one size definitely does not fit all and estates directors should ensure that benchmarking is comparing like with like.

The question around rebuild, retrofit or refurbish is one of the least well-researched questions in the climate debate as it relates to the built environment. However, given that the majority of our built environment already exists, answering it not only has the largest potential capital cost but also the largest potential environmental gain.

Furthermore, while building a new building enables the delivery of a property that ticks all the sustainability boxes, the actual construction of that building carries a considerable environmental cost. A recent Historic England report estimated that the construction of new buildings in the UK emits 48 mega-tonnes of CO_2 per annum, which is the same as the total carbon emissions of Scotland. The construction industry is also a huge consumer of often finite resources, with the Building Research Establishment estimating that construction consumes 55% of all the materials produced in the UK. The British Geological Survey estimated that more than 90% of all the minerals extracted in the UK are used by the construction industry. Finally, there is the question of waste, with DEFRA calculating that 61% of the total waste in the UK comes from the construction and demolition of buildings.

However, the problem for those with existing estates remains that the majority of their estate was not built with zero carbon in mind. Furthermore, even when we talk about retrofitting buildings to make them more sustainable we are generally talking about a more significant intervention i.e. ripping out the old and replacing it with the new.

Generally, the path to net zero starts with the question of how to improve energy efficiency e.g. how do we make the heating ventilation systems more efficient? However, a more fundamental question is around the fabric of the building and how it contributes or detracts from its energy efficiency. The moment that the idea of changing the fabric of the building emerges is, however, the moment the question of embodied carbon rises, and this raises the spectre of a massive negative impact, on one hand, to make a positive impact in terms of emissions!

So, if a wholesale refurbishment of an existing building can often be more carbon-intensive than we might want, what are the alternative ways of improving its energy efficiency?

There are actually a lot of relatively small-scale interventions that combined together can make a positive net improvement to the asset's overall environmental impact. These could include upgrades in lighting, just using the building management systems better, and better education of the building's users on how to use it in the most sustainable fashion.

While many of these solutions fall more into the behavioural than operational camp, they can have significant effects on energy usage and CO_2 emissions. As ever in the sustainability debate, one of the barriers to adoption of any change is the ability to measure its impact. While minimum energy efficiency standards and Energy Performance Certificates have gone some way towards achieving this, they remain a relatively blunt tool that measures aspiration rather than reality. Looking ahead we expect to see more voluntary use of Display Energy Certificates (DEC), which are records of the actual energy usage of the building. At the moment DECs are only compulsory for public buildings, but we expect that these or a similar measure will become increasingly common in the future. Indeed, we are seeing increasing numbers of multi-let office buildings displaying this information live in their receptions or via staff intranets, so their tenants and users can compare and contrast how their behaviour is having an impact.

More enforcement is now feeling inevitable, with Manhattan recently bringing in a local law that mandates the reduction in carbon emissions in New York City's largest buildings by 40% by 2030 and 80% by 2050. The potential penalties for not hitting this are significant, up to $1m per annum in some cases.

Improving the existing stock of buildings on our estates is not an option, it is fundamental to the UK's climate change targets. However, without better measurement, and acceptance that one size does not fit all, we will struggle to achieve it. Universities face some unique challenges here with many historic buildings. Heritage buildings are currently outside the MEES regulations, but this does not mean that interventions are not possible.

Embodied Carbon & Life Cycle Assessment

Life Cycle Assessment examines the carbon over a buildings entire life cycle to estimate its carbon footprint over a fixed period. The key stages in a buildings life cycle are as follows:

Construction: including minerals extraction, materials being transported, energy consumption as part of the construction process, and waste creation.

Operation: All the energy usage that relates to the day-to-day running of the building. This will include heating, cooling, lighting, ventilation. Occupant behavioural change is as key in this stage as sourcing of energy and efficiency of plant.

Maintenance: Consumption of materials and greenhouse gas emissions that are related to maintaining the building's current performance. This would generally exclude refurbishment.

Demolition and recycling: All the costs and outputs that are related to the end of the building's life. Impacts will include both the emissions and the environmental impact of the disposal of materials.

The embodied carbon of a building includes all of the above except Operation

> **"The UN's fourth Sustainable Development Goal is Quality Education"**

3 Behavioural change

One would think that with the world's students very much at the forefront of demanding better environmental behaviour they would also be demonstrating it. However, in the same way that the circle has not been squared between consuming fast fashion and its environmental impacts, many university estates are still struggling with wide-open windows in halls of residence while the heating is also on full blast! This slightly glib remark does, however, hint at some unique challenges for higher education institutions that wish to reduce their carbon impact.

As we mentioned earlier in this report, some of the things that universities do, are by nature very large consumers of energy. Laboratories, engineering facilities and the computing power required to create new models all push up energy usage and emissions. However, these are easily measurable and mitigated or offset.

More challenging to measure and value are the positive impacts of research and education. "Quality Education" is the fourth of the UN's Sustainable Development Goals (SDG), and universities positive impact on the world through teaching and researching is probably far in excess of the campus' energy emissions. There undeniably needs to be more outreach from the academic bubble of the journal to the wider world, but therein lies another environmental sustainability challenge for universities.

Discouraging academics from flying around the world to attend or address conferences would have an immediately measurable effect on CO_2 emissions, and thus has received a lot of attention. Sion Pickering, the network manager for the Roundtable of Sustainable Academic travel, based at the University of Edinburgh was recently quoted as saying that business travel was "one of the biggest carbon emitters that we have as a university." The University of Exeter has estimated that travel accounts for 21% of its carbon footprint (and it is worth noting that many organisations do not include travel when calculating their total carbon footprint).

However, international collaboration (particularly in the field of environmental sustainability) generally leads to more impactful research and a higher likelihood of the results being taken seriously, so a blanket ban on business travel might be a short-term win but a long-term loss. Suggestions that virtual events and video conferencing are better for the planet than flying might sound obvious, but they ignore the carbon emissions related to datacentres and traffic, with one recent survey suggesting that the typical office worker's annual email traffic alone emits as much CO_2 as one flight from London to Brussels.

Another issue that is comparatively unique to the higher education sector is that of international students and their travel. Virtually no university includes the carbon emissions from students travelling to and from their home countries in the institution's overall calculation of its carbon footprint. A study in the Journal of Cleaner Production by Robin Shields from the University of Bath indicated that the greenhouse gas emissions associated with international student travel were between 14.01 and 38.54 megatons in 2014, a sharp rise from the 7.24-18.96 range that was present in 1999. The study pointed out that the lower estimate is comparable to the national annual total emissions of Jamaica.

Yet a simple ban on non-domestic students has more than just financial complications for universities. What would be the impact be on international co-operation and knowledge transfer? How damaging would this be in terms of UN SDG 4?

Universities in particular need to think about their own sustainability goals as whole rather than parts such as energy, behaviour, estates. Furthermore, there are clearly some areas where a knee-jerk cut or change may have longer-term negative implications for the institution itself or the wider debate.

The challenge ahead is as much about measuring and comparing costs and benefits as it is about an immediate reduction in CO_2 emissions or being seen to do something.

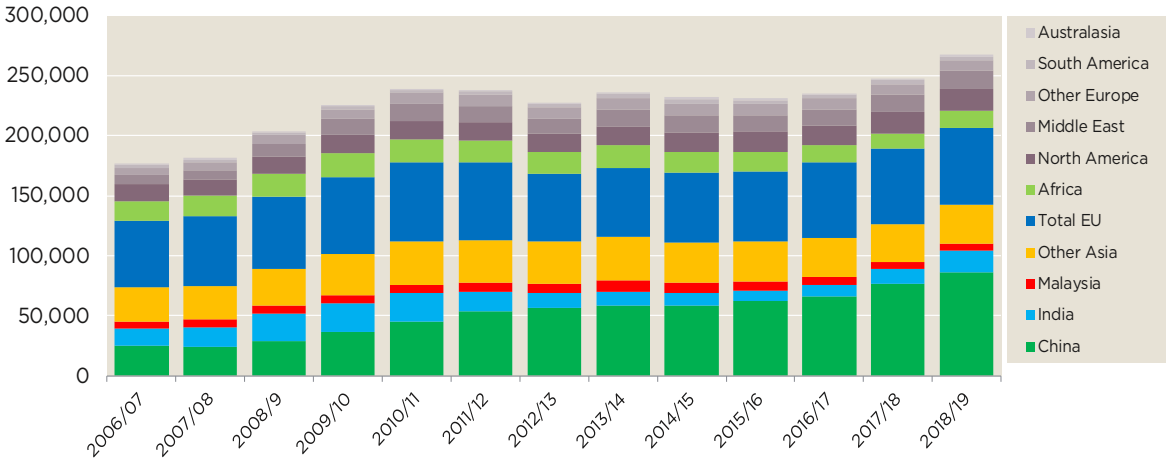
21%

of a university's carbon footprint could come from travel

186kg

is the amount of CO_2 that is produced a year by the average office worker's email usage

Non-domestic students have a carbon impact: First year non-UK domiciled students by domicile



Source HESA

4 A roadmap to a carbon neutral university

The path to carbon neutrality for universities is no easier than it is for companies, and as we have explored in the previous sections of this Spotlight, there are some challenges and opportunities that are unique to the Higher Education sector. Universities have undoubtedly led the debate on the scale of the problem, and in many cases are better-placed to lead on the solutions. However, a greater sharing of data, benchmarks and best-practice between the higher education sector and private sector building owners would undoubtedly benefit everyone.

While the topic of greening the built environment is developing fast, there are still many questions to be answered. We set out below our roadmap for identifying challenges and delivering solutions for estates teams across the industry.

The AUDE's Sustainability Scorecard breaks down the key areas of focus into four priority areas which are then subdivided into 18 frameworks. The four priority areas are:

1) Leadership & Governance;
2) Estates & Operations;
3) Partnership & Engagement;
4) Learning, Teaching & Research.

The establishment of this scorecard plays to the first step on our roadmap, which is Measurement & Verification.

1. Measurement & verification

There is already a competitive industry out there to help any organisation calculate its current carbon emissions and develop a plan to reduce them. There are also numerous tools and standards for those who have the skills to go it alone. For example, The CarbonNeutral Protocol was established in 2002 and is an open-source standard and guide that was developed for businesses who want a rigorous and transparent framework in which to move towards Carbon Neutrality.

2. Reduce energy emissions

Having established a baseline, the next step is to seek to reduce carbon emissions. The Global Universities Partnership on Environment for Sustainability has established a Greening Universities Toolkit that sets out some key strategies that they could use to become greener. The toolkit suggests a review of the following areas:

Energy conservation: staff and student training and awareness programmes; improved space utilisation; energy efficiency standards for both new construction and refurbishments.

Energy efficiency: Building retrofitting; heating; ventilation and air-conditioning; and periodic recommissioning and building tuning to optimise energy efficiency.

Renewable and alternative energy: Purchase of certified 'green power' and the installation of solar cells, wind, biomass and other renewable energy systems.

As we have discussed elsewhere in this paper, one size does not fit all and benchmarks will need to be developed and shared for universities that have different academic focuses and sizes.

3. Future estates plans - build, refurbish or retrofit?

As we discussed in Section 2 of this Spotlight, the debate around whether it is better to demolish and rebuild, retrofit or refurbish is a live and developing one. This is a particular hot topic amongst private sector developers and owners of property, and we suggest that keeping an eye on the Better Buildings Partnership (BBP) is a good strategy for the way ahead. The BBP is a collaboration of the UK's leading commercial property owners to work together to improve the sustainability of existing commercial building stock. Its membership owns over 50m square metres of commercial property, worth over £270bn, so clearly they have some fire-power to spend on answering these kinds of questions.

The BBP has just published its own Climate Change Commitment, and plans to publish a net zero carbon pathway by the end of 2020.

4. Off-set emissions where they are essential to the core business of the university

Off-setting of emissions has been an increasingly contentious issue over the last 12 months, with some commentators suggesting that it is 'greenwashing' or even writing a cheque to compensate for poor institutional or corporate behaviour. We disagree with this view, as however effective an organisation has been in reducing its emissions they cannot ever be cut to zero.

Universities have to continue to teach, research and house staff and students, and all of these functions require power from some source.

Larger universities with their own non-operational land can look into a variety of uses of their "natural capital". These can include services provided by that land such as carbon draw-down and erosion protection, or by demonstrating and measuring societal benefits such as clean air, clean water and recreation.

For more details on this concept then please see our January 2020 report "Spotlight on Natural Capital".

5. Balance the books & don't forget the core business in the rush to be green

Finally, every organisation with an aspiration to be greener should undertake a carbon balance calculation every year. Any energy use not met by on-site renewables should be met by an investment into additional renewable energy capacity off-site or a minimum 15 year renewable energy power purchased agreement (PPA).

We also believe that there is a risk of over-focusing on emissions, energy savings and the rest at the expense of the fundamental purpose of the buildings. Let's not forget that academic buildings are there to create an atmosphere in which students can learn, and we must accept that creating high-performing educational spaces will sometimes come with a higher environmental impact.

Returning to the theme of our last Higher Education Spotlight which focused on What Students Want, some key considerations for existing and new buildings must always include: indoor air quality, thermal comfort, daylight & lighting, noise, layout & signposting, amenity provision and location.

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For further information, please contact us or visit www.savills.co.uk/sectors/education

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