HOW CAN CARBON OFFSETTING HELP UK FURTHER AND HIGHER EDUCATION INSTITUTIONS ACHIEVE NET ZERO EMISSIONS?

There are a range of views on the use of carbon offsetting among academics, higher and further education professional staff, corporates and offsetting providers. When and where offsets should be used or not used, and what types of offsets to use, are to some extent value-laden choices. These choices are being actively debated at the international and community level. This briefing note provides guidance to support the development of further and higher education offsetting policies and to challenge institutions, including our own. It specifically discusses the use of offsetting in the context of net zero strategies. We are also using the briefing to consult our institutions on the approaches they are taking. We hope it prompts discussion and collective action towards making net zero a reality.

KEY MESSAGES

- **Reducing emissions must always be a priority** for UK further and higher education (FHE) institutions but carbon offsetting can also play a role in reaching net zero emissions.
- **Institutions should establish robust principles** to justify which emissions can and cannot be offset, and reassess them regularly to prioritise emissions reductions.
- **The quality and integrity of offsets need to be assessed with care**, as even certified schemes can carry risks. Furthermore, offsets must not cause environmental or social harm and should ideally advance the Sustainable Development Goals.
- **Social- and biodiversity-related impacts** ('co-benefits') are an important consideration when selecting offsets, but net zero-aligned offsetting requires that the actual impact on atmospheric carbon remain paramount.
- **A progressive transition to effectively permanent carbon storage needs to be central to any sustainable offsetting strategy,** to address the permanent impact of any remaining emissions. Nature-based offsets are critical in the short- and medium-term, and properly-protected and managed ecosystems can store carbon for millennia, but the capacity of the biosphere to absorb additional carbon is much less than current fossil fuel emissions and will be further compromised by climate change itself. Hence offsetting strategies must account for the fact that, within two or three decades, any remaining hard-to-abate carbon emissions may require offsetting with carbon storage on near-permanent timescales using a range of solutions.
- **Emission reduction offsets in particular are perceived as problematic by some stakeholders,** and their use may be deemed unacceptable. We recommend avoiding most emission reduction offsets and prioritising a transition toward carbon removal offsets.
- **The FHE sector would benefit from forming a coalition** to support high-integrity offsetting, for instance by co-financing projects and establishing sector-wide offsetting criteria.
- **Standardised reporting across the sector,** such as consistent emissions accounting and disclosure of offsetting strategies, will improve emissions data quality and help track progress towards net zero.
- **Travel emissions including student flights** should be included as part of more consistent reporting of institutions' emissions, given the UK FHE sector's international outlook.
- **Educational opportunities** from offsetting approaches could be unlocked, such as developing learning resources for staff and students or using offset projects as educational case studies.

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INTRODUCTION

A primary purpose of UK further and higher education (FHE) institutions is to support the wellbeing of future generations, which is in part dependent on society at large achieving the goal of net zero emissions. Many UK universities rely heavily on activities that generate so-called 'hard-to-abate' emissions[1] including air travel, as part of their internationally-oriented business and education models. At the same time, these institutions produce world-leading research on climate change and the technologies and actions needed to avert it, and are therefore equipped with state-of-the-art knowledge. They are able to take an informed, ambitious, and long-term approach to decarbonising to the greatest practicable extent before offsetting residual emissions.

Some UK FHE institutions have made significant progress on reducing emissions[2]. However, pressure is mounting from students, academics, professional staff, and alumni as well as outside stakeholders to do more. Demonstrating that net zero FHE is achievable by mid-century or sooner would allow these institutions to maintain their credibility and show civic leadership. Given that the dates by which many FHE institutions have committed to achieve net zero are fast approaching, some as soon as 2030, it seems inevitable that some form of carbon offsetting will need to accompany the process of absolute decarbonisation.

Reduction or removal?
Emission reductions occur when a carbon project leads to lower emissions relative to a baseline (e.g. carbon capture and storage on a cement plant or avoided deforestation).
Carbon removals occur when CO_2 is physically pulled from the atmosphere and stored (e.g. peatland restoration, growing trees, or direct air capture with carbon storage).

Provided strict criteria are met, both enable progress toward global net zero emissions. However, carbon removal will become the only option once all available emission reductions have been performed.

Short- or long-lived storage?
Short-lived storage is carbon stored with an uncertain or higher risk of being reversed within decades (e.g. carbon stored in forests or soils).
Long-lived storage is carbon stored with a low risk of reversal over centuries to millennia (e.g. carbon stored in mineralised form or in geological formations).

Both short and long-lived storage options are a finite resource with potential risks when relied on too heavily.

Many types of offsets exist, but they fall into two broad groups – emission reductions and carbon removals. Examples of emission reduction offsets include reducing or capturing emissions of harmful, long-lived pollutants and avoiding deforestation. Examples of carbon removal offsets include nature-based solutions such as the restoration of peatlands, coastal habitats, and native forests, and technology-based solutions such as direct carbon capture or mineralising CO_2 into building materials. Many projects promoting the sustainable management of working lands constitute a mix of emission reduction and carbon removal.
While reductions are incapable of taking out carbon from the atmosphere that was previously emitted by an FHE institution, the net impact on the overall environment can be the same in advance of achieving global net zero emissions. There are advantages and disadvantages of each type. Nature-based carbon removal is deployable at scale today, for example, and can support ecosystem restoration, biodiversity and livelihoods and protection for people from climate change impacts (collectively referred to as "co-benefits") while remaining relatively cheap[3]; however, these projects cannot always demonstrate additionality (proof that the reduction or removal would not have happened but for the activities of the carbon project) or longevity. More permanent geological storage options are likely to have fewer co-benefits, but will still be needed at scale. Many types of offsets will be useful for achieving net zero, but none are a substitute for an institution reducing its own emissions.

We are using this briefing note to make suggestions to our own and other FHE institutions on how to use offsetting within the context of net zero emission policies. We also hope the briefing can serve as a starting point to consult with FHE institutions on aspects of their particular offsetting strategies. This consultation covers three areas: 1) **calculating and reporting emissions,** 2) **determining which emissions to offset,** and 3) **determining which carbon credits to use when offsetting.**

I. CALCULATING AND REPORTING UK FURTHER AND HIGHER EDUCATION EMISSIONS

To identify the role that offsetting may play within the FHE sector, it was first necessary to assess the volume and character of emissions sector-wide.

Indirect GHG emissions, including business and student flights data should be collected – Data provided by the Higher Education Statistics Agency (HESA) covering 161 universities allow for estimates of the Greenhouse Gas (GHG) emissions of UK universities (sufficient data for other FHE institutes are not currently available).

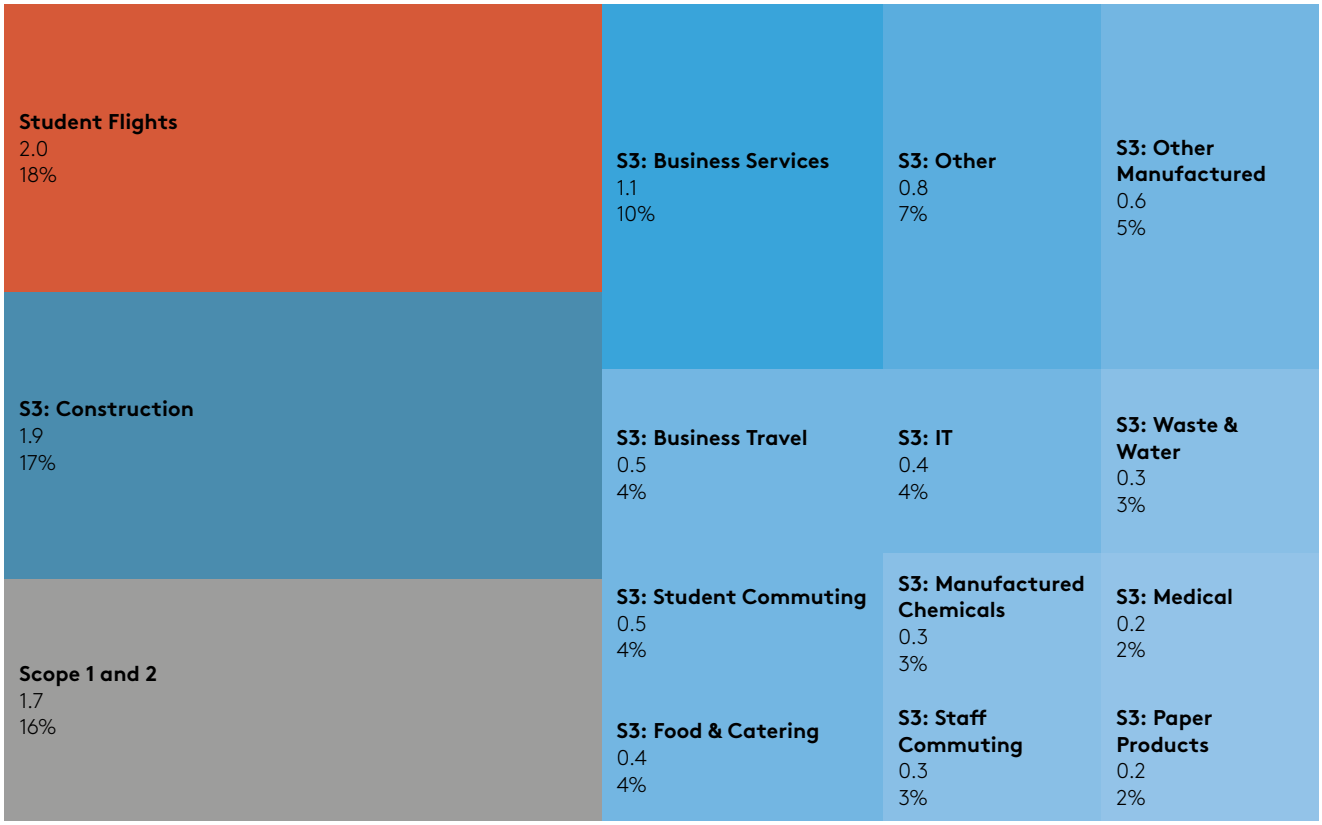

Figure 1: UK universities' emissions estimate for the 2018/2019 academic year. Units are million metric tonnes of carbon dioxide equivalent ($MtCO_2e$), and percentages of total emissions are also shown. This estimate is based on data from all 161 universities that report emissions to the Higher Education Statistics Agency (HESA), but extrapolated to the full sector using emission intensity coefficients (CO_2e /total annual spend). Student flights are not currently reported by any university, and were estimated by (conservatively) assuming 2 return flights per international student per academic year for the explicit purpose of attending their programme. "S3" refers to Scope 3 emissions as defined by the Greenhouse Gas Protocol. Colors added for clarity, showing Scope 1 & 2 emissions in gray, Scope 3 emissions in blues, and out-of-scope but critically relevant emissions (student flights) in red. See Supplementary Information for all assumptions, conversion factors, and other methodology details.

Collectively, UK universities emitted ~1.7 million metric tonnes of CO_2 equivalent emissions ($MtCO_2e$) in Scope 1 (direct GHG emissions) and Scope 2 (electricity – indirect GHG emissions) emissions in 2018/2019 academic year, approximately 0.5% of the UK's emissions. When estimates of Scope 3 emissions (other indirect GHG emissions, including work-related flights) as well as estimates of emissions from flights taken by students to and from their studies are included, we estimate the total to be ~11 $MtCO_2e$, 3% of UK emissions (see Supplementary Information for methodology). Including an estimate of student flights to and from their studies is novel since they are not currently considered Scope 3 emissions of universities, but it seems appropriate to do so if institutions embrace the challenge of counteracting the overall carbon impact of their activities. While more robust data on student flight frequency and distance must be collected to refine this estimate, even conservative assumptions show it to be the largest single category of emissions (Figure 1).

Scope 3 emissions are currently inconsistently and insufficiently measured and reported. Standardisation in measuring and reporting of all emissions, and a raising of ambition, are urgently needed along with recognition of the training and resources that would be required by the teams responsible for emissions accounting within FHE institutions.

2. DETERMINING WHICH EMISSIONS TO OFFSET

Mitigation hierarchy – Carbon offsetting must always be supplemental within a broader net zero strategy and 'mitigation hierarchy' that begins with calculating an institution's emissions, continues with reducing or removing these emissions as much as practicable, and concludes with offsetting only unavoidable emissions[4]. Offsetting should only be used in parallel with executing all practicable measures to reduce emissions, supplementing rather than replacing genuine reductions of an institution's own emissions[5–7].

Setting system boundaries and accounting for emissions – Setting the boundaries for what is included in the calculation of emissions profoundly affects what it means to achieve net zero. The Greenhouse Gas Protocol[8] categories of Scope 1, 2, and 3 emissions are a useful starting point. However, we suggest that there are other emissions clearly attributable to an FHE institution's mission (e.g. flights that students are obliged to take to attend courses) that fall outside of this framework but that should ideally be included in both emissions accounting and the net zero targets towards which carbon offsetting will apply. This clearly poses a greater challenge for institutions in terms of reconciling their internationalisation and emission reduction objectives, but it would help the sector to show leadership in taking responsibility for the full impact of their student recruitment and operational decisions.

The inconsistent Scope 3 emissions data that FHE institutions publicly report (see Figure 1 above) suggest that these indirect emissions are not always rigorously measured and reported, even though our estimates indicate that Scope 3 emissions make up a significant majority of total emissions. In the case of student flights, the allocation of responsibility for offsetting those emissions can be left up to each individual institution—but it would be helpful, not least to promote transparency, to include them in reporting. Currently, universities in the UK are not required to report Scope 3 emissions, and other FHE institutions are not required to report *any* emissions, leaving large data gaps.

Throughout this brief we pose consultation questions for sustainability practitioners and other stakeholders in offset strategy setting at FHE institutions to consider. We hope they spur useful dialogue among peers and can feed into a larger partnership for coherent FHE offsetting in the UK.

Consultation Question 1:

a. As an FHE institution, which emissions do you report (e.g. based on Scope 1, 2, 3, and student flight emissions)?

b. Do you adhere to principles of Transparency, Relevancy, Accuracy, Completeness and Consistency (TRACC)* in your emissions reporting?

c. Does your institution have carbon reduction and net zero targets and how are they defined?

d. Do you have resources for training and upskilling staff in awareness and best practice of carbon mitigation and offsetting issues?

Reduce emissions and define those that are 'unavoidable' – It is preferable to begin reducing emissions toward a level that is "as low as reasonably practicable"[6]. Remaining emissions would then be classified as 'unavoidable', perhaps in keeping with the current consensus of which sectors are considered difficult to decarbonise[1] (e.g. air travel, though virtualisation is rapidly demonstrating that much academic travel may be eminently avoidable). Continual reassessment may lead to a reclassification of some previously 'unavoidable' emissions as 'avoidable when new technologies become available or political and economic conditions change. It is expected that the role of offsets will therefore diminish over time as unavoidable emissions dwindle, and will be limited predominately to counteracting Scope 3 emissions, since most or all Scope 1 and 2 emissions can be eliminated directly today. After achieving net zero emissions, institutions may choose to remove carbon to continue as net negative emitters and begin addressing their proportionate and historic responsibilities for carbon pollution.

Consultation Question 2:

a. How does your institution consider which emissions can be reduced as much as reasonably practicable, and which are unavoidable?

b. Do you continually reassess what is defined as 'unavoidable' emissions as new technologies become available?

c. Is your offsetting approach made public?

d. Do you plan to consider net negative emissions using carbon removal offsets to compensate for historical emissions once net zero has been achieved?

Beware carbon offsets reducing motivation to mitigate – In some cases offsetting can appear cheaper in the short-term compared with investing in infrastructure or technologies that reduce emissions on an enduring basis. This can risk redirecting attention and limited financial resources away from meaningful mitigation[9]. If your institution uses offsets as a self-imposed carbon price to incentivise emission reductions, then very low-priced offsets, like low carbon prices, will fail to drive change. The well-known rebound effect, most typically observed when adopters of energy efficiency measures use more energy and erode some of the carbon savings[10], may result from offset purchases and should be considered in net zero strategies.

* ISO 14064-1 details principles and requirements for designing, developing, managing and reporting organisational-level GHG inventories. It includes requirements for determining GHG emission and removal boundaries, quantifying an organisation's GHG emissions and removals, and identifying specific company actions or activities aimed at improving GHG management. It also includes requirements and guidance on inventory quality management, reporting, internal auditing and the organisation's responsibilities in verification activities.

Finally, from a climate justice perspective, just as organisations and countries with the greatest cumulative historical emissions have a duty to achieve the fastest emission reductions and consume a smaller share of the remaining carbon budget,[5] so too could it be argued that they must minimise their use of the finite supply of high-quality offsets to achieve net zero.

Consultation Question 3:

a. Do you regularly assess mitigation targets and offsetting policies to ensure that offsetting does not redirect resources away from meaningful mitigation, and that ethical concerns around equitable and judicious use of offsets are assessed?

b. Does your institution think of offsets as a self-imposed carbon price primarily intended to motivate rapid emission reduction (in which case low-priced offsets are potentially counterproductive)?

c. Does your institution think of offsets as remediation for unavoidable emissions (in which case an assessment of the quality and permanence of offsets is essential)?

3. DETERMINING WHICH OFFSETS TO USE

After determining which emissions to mitigate and which are unavoidable and must therefore be offset, FHE institutions need to determine which offsets they will use to achieve net zero. Certification bodies that validate offset integrity aim to ensure strong monitoring, evaluation, and governance procedures are used, but there are known issues with all of them. Given the voluntary nature of carbon offsetting (versus regulated carbon markets), even certified offsets can be of vastly different quality, and need careful consideration beyond a certifier's endorsement. Exclusive reliance on these certifications carries risks. These risks can be reduced if an institution or coalition develops its own policies on offset characteristics, and focuses the composition of their offset portfolio on carbon removals and long-lived storage. The essential criteria for high-quality offset are listed below, and are reviewed in greater detail in other resources and offsetting guides[7,11].

- **Permanence:** If the offset involves storing carbon, is the stored carbon locked away for a very long time (ideally thousands of years) or is there a significant risk of it being re-emitted back into the atmosphere in the coming decades? Are there legal, institutional, physical, or financial protections in place to reduce the risk of reversal?
- **Additionality:** Would the emission reduction or the carbon removal have occurred in the absence of the project?
- **Avoidance of double-counting:** The reductions or removals that an offset project generates must not be claimed by more than one party (e.g. both the purchaser and the government of the project's host country).
- **Avoidance of "carbon leakage":** There needs to be only a very low risk that a carbon project has merely displaced the emissions to another place or time.
- **Accurate carbon accounting:** Offsets issued by a carbon project must accurately reflect the quantity of reduced or removed greenhouse gas, as well as account properly for the warming impacts of non-CO_2 climate pollutants (e.g. short-lived climate pollutants like methane).
- **Atmospheric outcome secured:** Offsets should ideally stem from actions that are confirmed to have already taken place. For example, projects should not give full credit upfront for carbon removal that will take decades to be fully realised. If offsets are not secured, the future action that the offset pays for must be proximate (not decades away) and guaranteed.
- **Sustainable:** Offsets must not cause environmental or social harm, must protect the self-determination of local communities and Indigenous Peoples, and should ideally *advance* the Sustainable Development Goals (e.g. biodiversity protections, equality, etc.).

Shifting offsets to removals – For FHE institutions to use offsets as part of a strategy for reaching net zero by mid-century or sooner, the offsets selected must ultimately transition (see Figure 2) from emissions reduction to carbon removal. Emission reduction offsets in particular are perceived as problematic by some stakeholders, and their use may be deemed unacceptable. Most emission reduction offsets are avoided deforestation, renewable energy, or energy efficiency offsets that have been found to be insufficiently permanent or additional in many cases[12,13], despite being labelled genuine offsets by third-party certifiers. On the other hand, there are strong advocates for investing in high-integrity projects that avoid loss and damage to peatlands and intact old-growth forests as vital long-term carbon stores, both of which are emission reduction project types. We recommend approaching the selection of emission reduction offsets with great care and caution, and prioritising carbon removals.

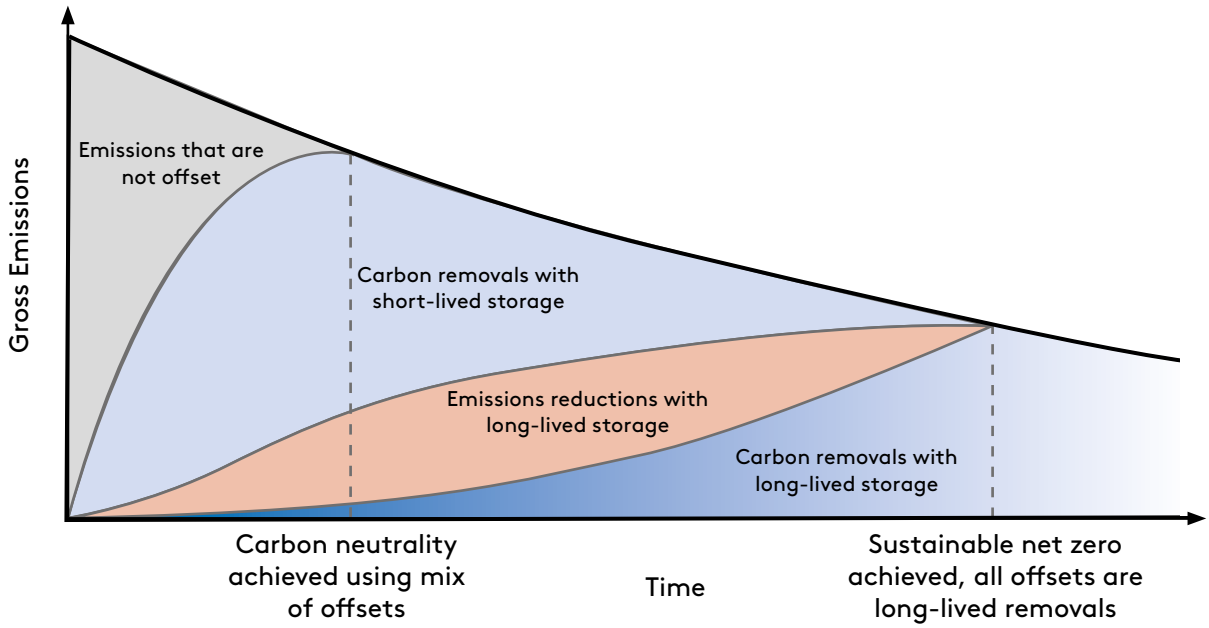

Figure 2: An illustrative breakdown of a hypothetical portfolio of offsets evolving over time that is applied against unmitigated emissions. Gross emissions (thick black line) decline toward absolute zero over time, but net zero emissions is achieved early on through the use of offsets (non-grey colours). Carbon removal techniques with short-lived and long-lived storage are shown in blue. Emission reduction offsets with long-lived storage are shown in red. Some example project types are referenced in the explainer box (pg 2) and shown in Figure 3 below. This hypothetical evolution of offset portfolio allocation is not prescriptive, but shows one possible pathway an FHE institution's offsetting plan might follow, illustrating the shift toward carbon removal with long-lived storage. Institutions may construct their offsetting portfolio differently, but it is important that they disclose the types of offsets they are using to allow stakeholders the opportunity to critique and influence that composition. Figure adapted from the Oxford Principles for Net Zero Aligned Carbon Offsetting[21].

Long-lived carbon storage – FHE institutions should prioritise long-lived carbon storage in all of the offsets they purchase. Nature-based offsets should make use of legal, institutional, financial, and physical protections to reduce the risk of reversal or ensure remediation of leaks. Where mineralisation and/or geological offsets are used, which will increase in importance over time, these should meet the standard of long-lived storage with little to no risk of leakage over time.

Consultation Question 4:

a. Which types of offset are you currently using (removals vs. reductions, long-lived vs. short-lived storage)?

b. Which types of offsets are you considering adding or transitioning to – and on what time frame?

Why offsetting needs to support carbon removal and long-lived, permanent storage – Net zero greenhouse gas emissions are required to halt global warming. The IPCC Special Report on 1.5°C made clear that large volumes of carbon removal (100–1,000 $GtCO_2$ over the 21st century) will likely be required to keep warming below 1.5°C[1,14]. Nature-based solutions *and* geological solutions can both deliver carbon removals, and are each a necessary part of global 1.5°C-compliant pathways[3,6]. Currently, nature-based climate solutions such as restoring forests, planting new natural woodland, and peatland restoration are the only carbon removal options being used at scale. Such restoration of the natural world is critical and must accelerate dramatically to achieve Paris Agreement goals, but whether it should be financed primarily through offsets or through non-offsetting mechanisms is an open question. The threat of future climate change to the Earth's biosphere, and the potential for continued rapid deforestation for economic or political reasons, means that carbon storage in ecosystems may not provide the same degree of permanence of carbon storage provided by other means such as geological reservoirs, enhanced weathering, and mineralisation[17,18]. Nature-based solutions compete with agriculture and other uses for a finite land supply, limiting overall storage capacity and necessitating careful accounting of "indirect carbon leakage" in the global economy for food and fibre[19]. Global warming itself may turn many components of the biosphere from net carbon sinks to carbon sources[20]. These risks, and in particular the degree of permanence offered by different storage approaches, needs to be factored into the evaluation of offsets. Both nature-based and geological solutions currently lack investment and carry different costs (see Figure 3). UK FHE institutions have an opportunity to support the development of both through combined offset purchases.

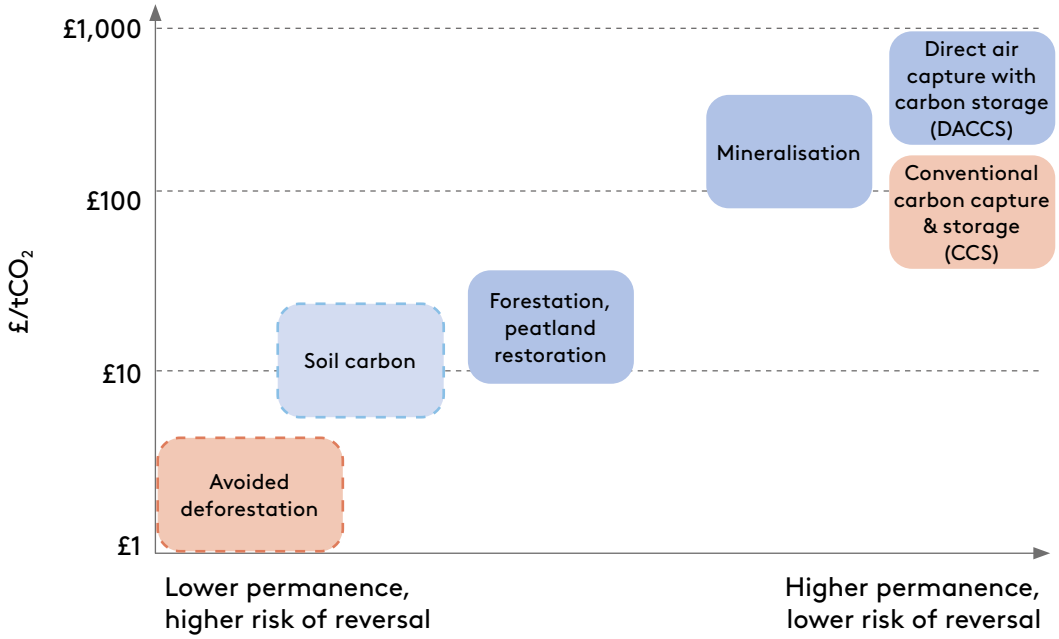

Figure 3: Schematic illustration of how different carbon project types compare on the basis of permanence of storage and cost. Emission reduction project types are shown in red and carbon removals in blue. We do not necessarily endorse these specific carbon project types – the schematic is intended solely to depict some of the available options. Cost estimates are informal and subject to change as technologies evolve and availability of storage space (whether biological or geological) changes.

While the FHE sector's overall footprint is small relative to some heavy-emitting industries, early carbon project financing has a powerful signalling effect and helps put high-quality offsets on the path to scale and affordability that will allow them to play a significant role in achieving net zero emissions by 2050. In the undesirable but increasingly likely event that carbon removal and storage technologies need to be deployed at large scale, early leadership in this area may contribute to climate justice goals by decreasing their cost for other nations with lower historical responsibility for climate change. Upscaling carbon removal also opens the possibility for FHE institutions, and the UK as a whole, to achieve and sustain net-negative emissions beyond the date they achieve net zero, to begin addressing their historical emissions.

Balancing other motivations for offsetting – UK FHE institutions will likely have other motivations for offsetting beyond achieving and sustaining net zero emissions, including: a) reputational value of specific offset choices, b) generating added value through linking carbon projects with teaching, student engagement, and research, c) supporting equity, environmental justice, and other social and environmental goals beyond achieving net zero carbon emissions – as long as reductions and removals are not compromised.

Consultation Question 5:

a. Do you use offsets to support other goals beyond carbon reduction and what are they?

b. How does your institution think about the tradeoff between cost-effective but sub-standard conventional offsets and the more expensive, higher quality offsets that will become increasingly important?

c. Do you want to link carbon offsetting projects to your teaching?

SUGGESTIONS FOR IMPLEMENTATION OF CARBON OFFSETS BY UK FURTHER AND HIGHER EDUCATION (FHE) INSTITUTIONS

UK FHE institutions should consider forming an offsetting coalition. This need not be a new entity per se, but rather a set of methods, standards, principles and practices that institutions can follow to form a broad sector-wide coalition around high-integrity offsetting. Some roles such a coalition could play include:

- **Co-finance carbon projects** – The coalition could provide a platform for aggregating demand for high-quality offsets into a larger pool that allows for favorable pricing and provides leadership to encourage early projects.

- **Establish sector-wide offsetting criteria** – The coalition could steward a 'review and ratchet' FHE sector-specific definition of which emissions can be reasonably and practicably reduced, rather than offset. For the offsets themselves, the coalition could similarly propose guidance for which offsets can be used as the basis of net zero claims, and in what relative proportion (for example the mix of short and long-lived storage, and how this mix changes over time). These would also ensure that institutions procure offsets of the highest standard of environmental, social, and ethical integrity.
- **Common and consistent high-quality reporting standards** – Encourage members to calculate and report in accordance with internationally-agreed standards (e.g. ISO 14064-1) and adhere to widely-adopted governing principals (e.g. "TRACC").
- **Publicly disclose offsetting strategies** – There are likely benefits for institutions to make offsetting strategies public, allowing other sectors to imitate and adapt their work. The coalition could collate information on individual members' carbon calculation, reduction, and offsetting strategies. FHE institutions can learn from one another and create public-facing, side-by-side comparisons of offsetting approaches, encouraging collaboration to increase ambition and develop solutions. The coalition can showcase institutions with particularly ambitious strategies, for example those with a desire to go beyond net zero and pursue net negative emissions to address proportionate historical emissions, including indirect emissions such as student flights.
- **Join wider efforts** – We encourage institutions, either individually or through a coalition, to join other initiatives such as the EAUC sector-wide programme on offsets currently in development or the UN's Race to Zero through the Global Universities and Colleges Climate Letter[2].

Consultation Question 6:

a. What are your views on forming an FHE sector carbon offsetting coalition, and how might it work most effectively?

b. What extra support do you need?

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HOW TO CITE THIS PAPER

Mitchell-Larson, E., Green, T., Lewis-Brown, E., Jennings, N., Joly, C., Goodwin, F., Reay, D., Rothman, R., Scott, C., Allen, M. and Forster, P. (2020) How can carbon offsetting help UK further and higher education institutions achieve net zero emissions? *COP26 Universities Network Briefing.*

THE COP26 UNIVERSITIES NETWORK

This briefing is produced in association with the COP26 Universities Network, a growing group of more than 50 UK-based universities and research institutes working together to help deliver an ambitious outcome at the UN Climate Summit in Glasgow and beyond.

The briefing represents the views of its authors (listed on page one) and not necessarily that of every University or institution participating in the network. For more information about the COP26 Universities Network, please contact **cop26universities@imperial.ac.uk**

This publication was created in partnership with EAUC – the alliance for sustainability leadership in education.