

# Higher Education Institution policies in the Climate and Ecological Emergency

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**Key words/terms: Higher Education; institutional policy; climate emergency**

*This article aims to assist readers in understanding the relevance of utilising HEI-level policy and governance to advance environmental sustainability. Specifically, the contents may provide a bridge for those working on Irish HEI strategy/ governance / policy and those in sustainability planning in HEIs, by demonstrating that embedding environmental sustainability into existing and new policy instruments can deepen and broaden the embodiment of a HEI's sustainability ambitions.*

## 1. Introduction

The human-caused climate and ecological emergency is already causing irreversible changes to our biosphere and will be exacerbated further with each year of uncurbed greenhouse gas emissions and environmental degradation (1; 2; 3; 4; 5). In the context of this global emergency, public sector higher education institutions (HEIs) must consider their multi-faceted role and how they demonstrate leadership. Ireland's legal obligations such as the 'Paris Agreement' (6) and other commitments such as the Sustainable Development Goals (7) are relevant to all 'Public Sector Bodies' including HEIs (8; 9). Inherent in these global agreements is the acknowledgement of the fragility of the biosphere, the detrimental impact of unsustainable human practices and that those least responsible are already and will be disproportionately impacted by anthropogenic climate change (10; 11; 12; 13).

HEIs with comprehensive curricula, those based in wealthy countries and communities, and those attracting funding based on sustainability scholarship have the capacity and responsibility to embody environmental sustainability across their whole organisation. A growing scholarship base aims to understand whether, why and how HEIs with stated ambitions on environmental sustainability (particularly climate change) have been achieved or embodied through their various actions (14). McCowan's HEI-specific framework for climate sustainability across all major university activities reveals scope for breadth and depth of embodiment and positive impact (15). Raworth's *Doughnut Economics* provides all organisations with a framework for a social floor, an ecological ceiling, and a range of corporate responses to model the necessary transformations (16; 17). Many Irish HEIs have only recently begun to embed environmental sustainability in its policies (18).

## 2. Why does HEI policy and governance matter?

Irish public sector HEIs self-govern within an agreed sectoral framework of relevant and dedicated legislation, statutory, collective, and voluntary instruments (19; 20; 21; 22; 23). This framework includes the capacity and expectation of HEIs as autonomous institutions to write and transparently publish their own statutes, regulations, policies, and procedures for the effective operationalisation of their ‘distinct missions’ (24). A HEI has more autonomy and agility than most other public sector organisations.

With increasing levels of complexity and geographic spread, HEIs are no longer single-campus institutions for teaching and research. Their students are increasingly spread across the globe with online learners and international campuses, and with operations including investments, global research, subsidiaries for property, recreation and other activities. With expectations of transparency and demonstrably effective policies, high-level HEI policy is the only option available to deliberately embed environmental sustainability across its entire operation.

Given their unique nature, HEIs can use their discretion to enact ‘top-down’ policies to facilitate ‘bottom-up’ activity’ (25). Unlike European and North American counterparts, Irish HEIs had until very recently been observed to have little by way of formalised policies and / or strategies for environmental sustainability (26), however that is now rapidly changing (27). Large organisations such as HEIs are an important group of intermediate policymakers, and so how they provide for climate and nature in their policies has ‘enormous potential’ (28). For example, they apply to the day-to-day learning and employment experiences of 100,000’s of people in Ireland. The current Climate Action Plan and Education for Sustainable Development (ESD) Implementation Plan suggest that a mixture of broad frameworks and mandatory reporting will be in place over time (29; 30). Using the current structural reforms of traditional and technological universities to embed sustainability by design at HEI level can present a statement of intent and a blueprint for others.

Self-review of a HEI’s policy and governance instruments governance instruments for environmental sustainability is useful for reasons including:

- **Autonomy and Scale:** the institution’s autonomy and considerable policy suite means that it is of sufficient size and impact through its own self-regulation to generate strategic options.
- **Transparency and Replicability:** policies are usually public documents, thus providing easy access and a large degree of replicability (e.g., 31). Irish public sector HEIs are subject to Freedom of Information and Aarhus / Access to Information on the Environment (32).
- **Measurement:** review or use of appropriate policy is required in rankings applications, ISO accreditation, Codes of Governance and related annual statements, Statement of Internal Control, etc. They are often provided as evidence of commitments in action and can be built into workload models.
- **Reliability and Longevity:** grassroots and ‘bottom up’ initiatives and networks can produce excellent results for the organisation and for communities but can be lost if members leading those initiatives leave the organisation. Regulations and policies, once updated, can provide longevity and a reliable avenue to progress ambitions to

overcome entrenched, unsustainable behaviours in a way that many other organisations cannot (33).

- **Comprehensiveness:** unlike initiatives and local level ‘opt in’ programmes, employees, students and suppliers of the HEI are subject to statutes, policies and regulations once approved at the appropriate level – they form part of employment, student and purchasing contracts. In short, policy and governance intersect with every member of the HEI’s community.
- **Objectivity:** reviews of informal custom and practice, surveys and interviews will yield data but may not assess what the organisation has set out to do, and its governance provisions in achieving those objectives at a point in time. Surveys can be limited by the awareness and expertise of respondents (34). Objective assessment of documented policy instruments is therefore helpful (standalone or in combination).

In devising their own organisational policies embedding environmental sustainability, each HEI can recognise and celebrate its own autonomy and distinctive mission, sensitive to organisational culture and strengths. A comprehensive review of organisational policies and documented governance will reveal what has been documented and has been left to custom and practice governance, with implications for each approach. This provides valuable data for strategic planning, and for seizing **a critical opportunity in the Climate and Ecological Emergency: to use the bureaucracy of complex, large, public sector organisations to demonstrably integrate the science into board, management and academic policies.**

### 3. HEI Policy Actions

Within a HEI's autonomous governance, there is a range of policy measures possible to embed and advance environmental sustainability. The following are provided by reference to Board, Executive Management and Academic Governance, recognising likely distinctions in institutional terminology.

#### 3.1. HEI Board Level Actions

A HEI's legal obligations and strategy are ultimately a matter for its board to oversee and monitor that senior management role holders have dispensed their duties towards achieving what is required in law and what has been proposed in strategy. Implementation of a transformational strategy requires time and deliberate investment from the board and executive (35), such as one aiming towards generous environmental sustainability (36). The following are considerations for trustees / board members of individual HEIs.

#### **Statutes**

Use of a dedicated or integrated statute to set a high-level framework of responsibilities, target setting, reporting, and transparency measures in the context of the climate and ecological emergency demonstrates an expressive function through use of its most influential form of policy and practical applications arising (37). Responsibilities of research entities, individual role(s) and others to contribute or give expert advisory could be signalled here.

As the climate and ecological emergency will increasingly dictate strategic options, public sector duties and dynamic risks, the use of the highest form of policy instrument available to a HEI ensures that all policies, frameworks and strategies align to 21<sup>st</sup> Century realities for its core and subsidiary activities.

#### **Risk Management: Framework, Risk Registers and Climate Risk competence**

Corporate risk management has evolved from a financial and insurance tool to a critical function that helps protect against adverse outcomes, distress, or inability to carry out a company's strategy (38). The World Economic Forum published a comprehensively informed 'global risks' report, with 'climate action failure', 'extreme weather', and 'biodiversity loss' as the top three risks to manage in the medium term (39). From a HEI's perspective, identifying and managing risk involves careful consideration of the complex responsibilities, supply chains and relationships inherent in its institution's models (40).

Closer consideration of risk can provide protection, illustrate urgency and responsibility, but also reveal strategic opportunities (41). HEIs may develop themselves as community hubs and living labs for research for hybrid mitigation of and adaptation to environmental harms and climate change. This involves the integration of climate risks into existing risk management frameworks and registers, development of executive and operational competencies for understanding drivers and barriers to environmental sustainability and to take leadership on these with the academic expertise uniquely at hand in a university (42). A dedicated section addressing requirements in a risk framework, standards for formulating climate-related risks and cycles of audits may be tools used to commence these. A HEI's audit and risk committee(s) could have a documented role in monitoring these risks, with

each member of senior management tasked with identifying risks across their geographical and thematic areas of responsibility. This involves competence building at several levels.

### Policy Management Framework

A policy management framework could include guidance on mandatory or advisory environmental impact components, beyond those legally necessary, based on broad principles such as those in *Doughnut Economics* (43) or through a lens such as the precautionary principle (44). Alternatively, the policy management framework could require environmental and campus policies to support compliance with ISO14001 by a certain date (45). Certain policies could be required for review or oversight through an expert panel (e.g., 46).

### Policies for Climate and Sustainability Strategies and Roadmaps

Beyond compliance with legislative requirements for ‘climate action’ (e.g., 47), boards may approve strategies pursuant to a range of environmental goals set to a compliance level up to ‘do no harm’ or ‘generous’ levels (48), using subject-matter experts to inform strategic options and a dedicated sustainability external analysis (49; 50). They may then develop policies and regulations to ensure ambitious goals have measured pathways (51; 52; 53) and are inclusive of the stakeholders identified as critical, e.g., students, employees, local community, alumni, business partners, local government, etc (54). Such sustainability policies can then be delegated to executive management to oversee with appropriate and transparent reporting. Strategies and their pursuant policies will need to navigate complex and competing issues, e.g., the conceptualisation of internationalisation (55).

### Quality Assurance and Enhancement

Quality policies can include requirements and standards for Education for Sustainable Development (ESD) and environmental sustainability principles in subject benchmarks and quality markers throughout academic and corporate activities (56; 57; 58). Sections for corporate units with new sustainability duties or requirements may be useful to ensure organisational accountability (59).

### Funding and Income Policies

Divestment, investment, funding, and income policies for a HEI’s core and subsidiary entities should be consistent to climate emergency declarations and divestment announcements made by the HEI (60; 61; 62; 63; 64; 65). These need to be carefully considered against the imperative for academic freedom.

### Board Capacity, Code of Conduct and related Policies

Board capabilities and its Code of Conduct (and related manuals) should refer to obligations under the Climate Action Plan, Access to Information on the Environment, and any SDG-related ISO, (e.g., ISO37000 66), Science-Based Targets (67), Principles for Responsible

Investment and other frameworks that require board competence and compliance (68). If sustainability governance training is considered mandatory, this should be laid out in the Code of Conduct.

### **Environmental Regulations**

Regulations often sit above individual policies in policy frameworks; as such, these should be utilised to transparently set out the key requirements in obtaining and maintaining agreed environmental standards. These could include energy management, indoor space, environmental management, green teaching and research lab management, data management, etc. Key aspects of ISO and other standards could be incorporated, with target setting and public reporting mechanisms signposted (69; 70; 71; 72; 73).

### **3.2. Management Policies to Empower Environmental Sustainability**

Much of the running of a HEI is devolved to university senior management. Through revision of existing instruments and introduction of new ones, management level policies can operationalise a university's stated ambitions in environmental sustainability. For these management actions to have maximum impact, a communications campaign on campus, online and directly to stakeholders will help these become operational, and of strategic outreach value (74).

### **Financial Policies and Reporting**

A range of financial management policies could be developed to support institutional sustainability strategies. These should advance the funding, financial and capital investments, and divestment decisions of the HEI Board, e.g., responsible income policy. In its annual financial reporting, the HEI can integrate/signpost existing Climate Action Plan and other agreed environmental commitments, targets and results for the year (e.g., 75).

### **Energy and Emissions Policies**

These can commit to calculate and publish Scope 1, 2 and an increasing range of Scope 3 emissions, with reduction principles beyond legislated requirements and across all operating campuses (76; 77; 78). Policies can address efficiency targets and investments, use of feasibility studies, modelling and forecasting to reduce energy consumption, change sources of energy and plan integration of renewables, set targets for self-generated renewables, address decarbonisation of heat and transport (79; 80; 81). Policies can commit to transparency and ease of information access, sharing of good practice, benchmarking and establishment of expert advisory group(s). Over time, policies could articulate district projects led by the HEI that benefit the local community.

### **Green and Ethical Procurement Policies**

Such policies can codify existing green procurement measures mandated for public sector with additional ambitions, e.g., for improved circularity, purchasing of second-hand or upcycled goods, investments to reduce single-use items, defaults for regular ordering, actions to incorporate human rights, fair trade, and gender equality throughout local and international supply chains (82;83; 84; 85). Can develop to include procurement hubs with other HEIs and public sector organisations to reduce GHG (86).

### **Food Policies**

The scope of these policies can encompass purchasing, HEI-owned subsidiaries and vendors in campus shops and restaurants over time. Policies can address principles of sustainable and healthy food, addressing sourcing, provision, reduction of food waste, etc. The promotion of locally sourced, plant-based, vegan, and vegetarian food options ('flipped' to majority of offerings) can be advanced through policies, with a commitment to raise awareness of environmental cost and GHG emissions of food waste and supply chains (87;88;89;90;91;92).

### **Water Policies**

These policies can address principles regarding the management of water and wastewater on campus, addressing legislative, ISO and other standards adhered to, reporting water usage and conservation targets and actions. Policies can address specific and visible action to demonstrate intentions of responsible consumption of a scarce resource, e.g., on drinking water fountain provision and maintenance to reduce single-use plastics, on rainwater harvesting for various uses (93 ; 94; 95).

### **Waste and Circular Policies**

These policies can address principles, roles and responsibilities and standards used in circularity, waste reduction and waste management. Waste management for different types of waste, its recycling and safe disposal should be clearly articulated, with reporting against targets. This can include principles for student-led, research and community projects to initiate change and publish on same, incorporating roles for HEI units such as Estates, Library, Finance, Procurement, etc. ( 96; 97; 98; 99 ; 100; 101; 102 ; 103 ; 104 ; 105; 106; 107).

### **Commuting and Remote/Hybrid Working Policies**

Policies can address Principles, goals and benefits of more sustainable living and commuting. HEIs can codify commuting plans and programmes into policy, e.g., bicycle infrastructure, public transport card schemes through payroll, etc., to ensure this is clearly understood and uptake is reported. Additional supports, e.g., advice on retrofitting, can form part of a university Climate Action Roadmap. Policies can include commitments to capture, record and publish commuting related GHG emissions, with dedicated projects funded from car parking charges (e.g., bus routes not otherwise adequately provided to encourage more travel to campus via public transport). To advance understanding of climate and health impacts of

hybrid/remote working policies, the HEI could commit to recording more data on commute versus remote working to inform national policy, e.g., GHG emissions from commutes versus home heating and power, qualitative wellbeing metrics for staff and students, etc. (108 ;109).

### **Corporate Travel Policy**

This policy can provide principles and responsibilities to ensure lowest harm to environment, incorporating prioritisation of alternatives to travel available, principle of no personal benefit (e.g., airmiles are property of the HEI), etc. Travel policies could commit to leading by example, a recognition of need for travel under prioritised activities. Introducing ‘avoid-shift-improve’ frameworks that require accurately calculating the GHG of staff and student air travel based on curriculum, expenses and procurement, setting targets of reduction and commitment to offset as a last resort, with a commitment to regular review of policy in light of climate emergency ( 110; 111;112; 113; 114; 115).

### **Biodiversity Policies and Strategy**

HEI biodiversity policies can engender living lab, green infrastructure, and innovation policies, and commit to minimum and exemplar wild and native pollinator spaces on campus and prestigious locations owned and operated by the HEI, ( 116; 117; 118; 119 ; 120; 121; 122). Such policies can also incorporate commitments to identifying activities of greatest impact on biodiversity with a targeted programme, and undertaking a minimum number of community-engaged and staff development events in addressing biodiversity loss.

### **Sustainability in IT and Data Management Policies**

Policies for managing data and computing practices in line with sustainable corporate and research ambitions will involve integration of efficiency measures; best practices adopted; monitoring and reporting of emissions, choice of suppliers and commitment to continuous review of best practice for energy efficiency and emissions ( 123;124; 125; 126). Policies can signal advisory resources to assist researchers when choices are not centrally managed.

### **Record Management Policies**

Such policies can incorporate obligations under the Aarhus Convention/ *Access to Information on the Environment* and commit to providing details of the location of a HEI’s environmental information with good accessibility to the public (127).

### **Conflict of Interest Policies**

Such policies can incorporate explicit reference to financial, lobbying, or personal interests in fossil fuel industries for specific role holders, such as board, senior management, and research reviewers, as applicable to commitments made by the HEI (128). Measures to manage perceived or action conflicts may be outlined for important roles or decision types.



### **Employee Induction, Probation, Performance Management, and Promotion Policies**

Such policies can recognise sustainability knowledge and skills as critical for all employees, with such documents signposting that specific and general skills are to be identified through a framework (129). Satisfactory completing of induction and / or probation could include mandatory learning or training, such as awareness of UCD's obligations under the Climate Action Plan and others (130). Workload modelling and promotions frameworks may incorporate ESD/sustainability expertise provision internally and externally through advisory, partnership and consultancy work more explicitly.

### **Employee Learning, Training, Development, and Conference Allowance Policies**

Such policies can incorporate commitments through climate and sustainability commitments, from general sustainability thresholds for all (e.g., global citizenship, carbon literacy, SDGs) to specific competencies for a range of identified roles ( 131; 132; 133; 134). Fee concession policies for employees can prioritise sustainability-related learning at a modular level to make HEI-based learning accessible and manageable, with a commitment to provision of networking and training. HEIs can commit to incentivising employees to virtually attend conferences, e.g., by carrying over conference allowance where it would otherwise be forfeited, which may also benefit those with caring responsibilities.

### **Employee Volunteering Policies**

Such policies can explicitly facilitate and encourage employees engaging in pro-environmental volunteering with time flexibility and incorporation into workload management. Policies can articulate commitments to provide HEI-organised opportunities as well as support on- and off-campus 'bottom up' volunteering, and to recording such volunteering on a system to understand impacts ( 135; 136; 137; 138; 139).

### **Employee Wellbeing, Physical and Mental Health Policies**

Such policies can incorporate encouragement of pro-environmental activities and contributions as part of employee wellbeing in voluntary, professional and development activities. Integration of nature-based programmes to wellbeing programmes may be committed to by the HEI in these policies.

### **Employee Secondment and Sabbatical Policies**

Such policies can incorporate encouragement of pro-environmental secondments and sabbaticals (140), through protected employment status arrangements similar to those for when employees are elected to national office. Sabbaticals to reorient teaching, research and professional roles for employees whose areas are undergoing considerable change may be facilitated through such policies ( 141; 142).

### 3.3. Academic Policies in a Climate and Ecological Emergency

Balancing the need for academic freedom of faculty, institutional autonomy, and the needs of graduates and society in the emergency are challenges that can be addressed through a HEI's academic regulations and policies.

#### **Academic Regulations, Subject and Programme Policies**

The overarching academic regulations of a HEI can confirm principles, roles and responsibilities to codify Education for Sustainable Development (ESD), climate and environmental sustainability principles throughout its curriculum in ways appropriate to subjects and disciplines ( 143;144; 145). It can signify the requirement for review of best practice and the needs of graduates to reflect the realities of the emergency, both transferrable and programme specific. Specific roles may be created, such as a Dean or Academic Officer, and teaching, supervision and other roles may be required to undertake a thematic review (146; 147; 148; 149). ESD and environmental sustainability content may be appropriately embedded in programmes, and this may be prioritised for short programmes delivered to professional learners and current decision-makers in the first instance. To ensure clear understanding of the minimum thresholds for a HEI's programmes badged with 'climate', 'eco' and related terms, modules and programmes using these may undergo additional checks or reserved decision-making.

#### **Mature, Professional, CPD and Executive Education Policies**

HEIs providing programmes dedicated to mature learners, career shifters, professional and executive education are in a privileged position to equip those learners with knowledge and skills to advance ESD and environmental sustainability within their careers. Through policies governing these programmes, pathway, vocational and community programmes, executive education and other types of learning can incorporate ESD components, 'wisdom-enquiry' and relevant sustainability content ( 150; 151; 152; 153; 154; 155; 156; 157; 158).

#### **Student Code of Conduct and related Policies**

Such policies can incorporate both the HEI's and the student's duty of care and interdependence on the natural world, and a recognition of the emergency. This may include the SDGs or other frameworks as guiding principles and specific commitment to ensure students understand climate change and their capacity for climate action (159).

#### **Student Mental Health and Wellbeing Policies**

Dedicated section in these policies may situate mental health in the context of the climate and ecological emergency, with university supports and empowerment, psychological benefits of nature and not pathologising normal reactions to climate anxiety ( 160; 161; 162).

### **Research Ethics and Integrity Policies**

These policies may incorporate considerations of the climate and biodiversity emergency in relation to mandatory training and awareness, duty of care, possible harms, and conflicts of interest ( 163; 164; 165; 166).

### **Student Empowerment, Student Engagement and Student Leadership Policies**

Whilst likely to be incorporated within other teaching and learning policies, statements to empower and engage students as leaders in sustainability and sustainable development can be advanced through its policies. This may include principles of empowering pro-environmental behaviours and attitudes, ring-fenced sustainability funding for its Students' Union, student involvement in sustainability governance (167). Policies could also signify bespoke student scholarships for sustainable development champions (like supports for athletes and musicians), modules to enable students to engage with campaigns and public consultations, student innovation, living lab and community engagement funds that embed active sustainability into the everyday experience of student life ( 168; 169; 170).

### **Public and Community Engagement, Living Lab, and Innovation Policies**

Policies that seek to embed concepts of 'living lab' methodologies, community engagement and public engagement in HEIs can frame their principles through sustainability and sustainable development commitments. Prioritisation to activities that advance sustainability and public health can be articulated in these, and the use of local and global partnerships for engaged research, innovation and outreach can advance commitments to global citizenship and the SDGs ( 171; 172; 173; 174; 175; 176; 177;178).

### **Visiting Academic and Adjunct Staff Policies**

Such policies can include examples to signpost what types of members of society are welcome to be proposed, such as leaders in ENGOs and civil society who influence environmental campaigns using science, climate activists.

## **4. Conclusion**

The collective strength of HEIs' action in the face of ambitious climate mitigation and adaptation is considerable and urgent (179); their responsibility and opportunities to creatively embody sustainability has often been demonstrated (180). In considering implementation of ambitious strategy and policy agendas for sustainability, real ambition and practical action should be considered at each level of the organisation.

At an Irish Higher Education event, the Director General of the EPA commented that organisations have moved from 'pollute less', through 'be more efficient', to the realisation

that ‘all sectors need to reinvent themselves’ (181). Within the HE sector, organisations are changing in a variety of ways ( 182; 183; 184).

As others have acknowledged, some of the recommendations contained herein are quite ‘managerialist’ and conservative, relative to the existential nature of the emergency (185). At its best, however, an integrated environmental sustainability programme can harness a HEI’s resources to unlearn, relearn and co-learn at scale, offering solidarity and hope in action. Notwithstanding the pandemic or the challenges inherent in sustainability implementation, there was never any time to waste. HEIs’ self-determined leadership in the climate and ecological emergency may demonstrate proof of concepts, bring authentic transitions to life, use the HEI’s bureaucracy to aid fundamental shifts in culture, bolster the credibility of the HEI, and ignite evidence-based conversations about emergency actions and positive ‘tipping points’ in wider society (186; 187).

HEIs can be at the forefront of these tipping points. HEIs that initiate transformations can also readily loop these actions directly into their core business, i.e., teaching and research (e.g., see 188). A commitment to support these transformations through governance, seed funding and visibility of outputs could prove beneficial for many academic disciplines in their respective journeys and demonstrably embrace the heterogeneity of the academy (189).

When scientists called on national governments for greater urgency, transparency, and scrutiny of their climate commitments, they made a comment fitting to all aspiring to environmental sustainability: “**Ambition is no substitute for action**” (190). Under a cloud of existential threats, few institutions other than universities can serve through intergenerational solidarity, global partnerships and creative innovations for environmental stewardship and sustainable development.

#### 4.1. Practical Implementation

The following table summarises the approach a HEI could take to review and implement a governance and policy programme to embed environmental sustainability. Within reserved and delegated functions from board to role(s), boards might consider which instruments are critical to environmental ambition and retain oversight in an implementation period.

Policy Level	Instruments to utilise – Amend Existing and Introduce New	
<b>1. Board / Governing Authority Instruments</b>	<ul style="list-style-type: none"> <li>i. Statutes – roles, ambition, accountability, value for sustainability.</li> <li>ii. Board Instruments – reserved and delegated authority</li> <li>iii. Board level strategic planning, including external analysis for benchmarking, target setting, investment, and funding opportunities.</li> <li>iv. Risk Management, Financial Management: new sustainability focus</li> <li>v. Board-level sustainability framework: policies, regulations, transparency</li> <li>vi. Declaration: Divestment, donations, funding and investments decisions (university, its subsidiaries and foundation)</li> </ul>	
<b>1a. Roles</b>	<ul style="list-style-type: none"> <li>i. Senior role – with documented responsibilities for Climate Action, ESD, sustainability strategy and planning, policy, resources, etc.</li> <li>ii. Expert Advisory Panel / ‘Responsible Academic Officer’ or equivalent – consider direct reporting to GA/Audit &amp; Risk Committee (model from Research Ethics and Audit functions).</li> <li>iii. Changes to roles and job descriptions, starting with senior management.</li> </ul>	
<b>2. Code</b>	<ul style="list-style-type: none"> <li>i. GA Code of Conduct and Code of Governance responses: Regular, voluntary reporting of Scope 1,2,3 emissions, water, waste, and other environmental management aspects in all HEI locations.</li> </ul>	
<b>3. Terms of Reference (ToRs)</b>	<ul style="list-style-type: none"> <li>i. Review all ToRs for Board, management, academic.</li> <li>ii. Guidelines for local committees</li> </ul>	<ul style="list-style-type: none"> <li>iii. ToR for Board/ Management level Sustainability Committee and Advisory structure</li> </ul>
<b>4. Regs– Review and Introduce</b>	<ul style="list-style-type: none"> <li>i. Review Academic Regulations for ESD –integrate relevant student and academic aspects.</li> </ul>	<ul style="list-style-type: none"> <li>ii. Energy, Environment &amp; Sustainability Regs: incorporate ISO, other ambitions, reporting.</li> </ul>
<b>5. Policies – Review and Introduce</b>	<ul style="list-style-type: none"> <li>i. Review of existing and new Board policies.</li> <li>ii. Revise and add management policies as per delegated authority.</li> <li>iii. Empower highest ambition in academic regulations and policies.</li> <li>iv. Consider reserved authority at board level for most impactful policies for environmental sustainability, thus ensuring ambition cannot be diluted.</li> </ul>	
<b>6. Other</b>	<ul style="list-style-type: none"> <li>i. Retain programmes, incentives, and initiatives that promote environmental sustainability, link to policies where applicable.</li> <li>ii. Implement curriculum and research reforms as quickly as possible, for executive/professional development (i.e., current decision makers) and then all taught and research programmes.</li> <li>iii. Revise/implement other programmes and initiatives under revised and new policies and in support of new strategies.</li> <li>iv. Include students, local community and diverse stakeholder groups in implementation, including outreach and public debate activities.</li> <li>v. Implement programmes prioritised by co-benefits, e.g., environmental sustainability and empowerment / health benefits.</li> <li>vi. Document, case study, publish as much as possible</li> </ul>	

*Figure: Implementation Summary for Environmental Sustainability*

## Acknowledgements

*These policy considerations were developed following a comprehensive review of UCD's strategy (ambition, n=10) and its formal policy and governance (action, n=190) instruments, using McCowan's HEI climate sustainability framework, Raworth's Doughnut Economics and Weaver and Brunsson's 'organised hypocrisy' concepts.*

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## References

- 1 IPCC, 2022. *Summary for Policymakers*. In: *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. [Online] Available at: [https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC\\_AR6\\_WGII\\_SummaryForPolicymakers.pdf](https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf) [Accessed 29 March 2022].
- 2 IPBES, 2019. *Global assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. [Online] Available at: <https://ipbes.net/global-assessment> and <https://zenodo.org/record/3553579#.YbjjGr3P2Uk> [Accessed 1 April 2022].
- 3 Lenton, T. M. *et al.*, 2019. Climate tipping points — too risky to bet against. *Nature*, Volume 575, pp. 592-595.
- 4 Rockström, J. *et al.*, 2017. A roadmap for rapid decarbonization. *Science (American Association for the Advancement of Science)*, pp. 1269-1271.
- 5 Ripple, W.J., Wolf, C., Lenton, T.M., Gregg, J.W., Natali, S.M., Duffy, P.B., Rockström, J. and Schellnhuber, H.J., 2023. Many risky feedback loops amplify the need for climate action. *One Earth*, 6(2), pp.86–91. doi: <https://doi.org/10.1016/j.oneear.2023.01.004>.
- 6 UNFCCC, 2015. *Paris Agreement to the United Nations Framework Convention on Climate Change*. [Online] Available at: [https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf) [Accessed 20 April 2022].
- 7 UN General Assembly, 2015. A/70/L.1 Resolution: "*Transforming our world: the 2030 Agenda for Sustainable Development*". [Online] [https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A\\_RES\\_70\\_1\\_E.pdf](https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf) [Accessed 19 February 2023].
- 8 DECC, 2022. *Department of the Environment, Climate and Communications: Climate Action Plan 2021* via gov.ie. [Online] Available at: <https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/> [Accessed 5 June 2022].
- 9 Government of Ireland, 2022. *ESD to 2030: Second National Strategy on Education for Sustainable Development*. [Online] Available at: <https://www.gov.ie/en/publication/8c8bb-esd-to-2030-second-national-strategy-on-education-for-sustainable-development/> and <https://assets.gov.ie/228330/c69895a6-88f0-4132-b6d1-9085a9c31996.pdf> [Accessed 25 February 2023].
- 10 Figueres, C. & Rivett-Carnac, T., 2020. *The future we choose: surviving the climate crisis*. 1st ed. London: Manilla Press.
- 11 Bodansky, D., 2016. The Paris Climate Change Agreement: A New Hope? *The American Journal of International Law*, 110(2), p. 288.
- 12 Ripple, W.J., Wolf, C., Lenton, T.M., Gregg, J.W., Natali, S.M., Duffy, P.B., Rockström, J. and Schellnhuber, H.J., 2023. Many risky feedback loops amplify the need for climate action. *One Earth*, 6(2), pp.86–91. doi:<https://doi.org/10.1016/j.oneear.2023.01.004>.
- 13 Hickel, J., O' Neill, D. W., Fannin, A. L. & Zoomkawala, H., 2022. National responsibility for ecological breakdown: a fair-shares assessment of resource use, 1970–2017. *The Lancet Planetary Health*, 6(4), pp. 342-349.
- 14 Maxwell, N. 2014, *How universities can help create a wiser world: the urgent need for an academic revolution*, Imprint Academic, Exeter, England.

- 
- 15 McCowan, T., 2020. The impact of universities on climate change: a theoretical framework. *Transforming Universities for a Changing Climate. Working Paper Series No. 1*, August.
- 16 Raworth, K., 2017. Chapter 6: Create to Regenerate. *Doughnut Economics: seven ways to think like a 21st-century economist*. London, UK: Penguin Random House Business Books, pp. 206-242.
- 17 DEAL, 2022. *Doughnut Economics Action Lab (DEAL): Tools and Stories*. [Online] Available at: <https://doughnuteconomics.org/tools-and-stories> [Accessed 11 July 2022].
- 18 Shawe, R., Horan, W., Moles, R. & O'Regan, B., 2019. Mapping of sustainability policies and initiatives in higher education institutes. *Environmental Science & Policy*, Volume 99, pp. 80-88.
- 19 Government of Ireland, 1997. *Universities Act, 1997*. Dublin: Irish Statute Book, Houses of the Oireachtas [Online] Available at: <https://www.irishstatutebook.ie/eli/1997/act/24/enacted/en/print> [Accessed 6 June 2022].
- 20 HEA, 2020. *Governance Framework for the Higher Education System*. [Online] Available at: <https://hea.ie/funding-governance-performance/governance/governance-framework-for-the-higher-education-system/the-hea-and-higher-education-institutions/> [Accessed 26 February 2023].
- 21 Government of Ireland, 2022. *Higher Education Authority Act 2022*. Dublin: Irish Statute Book, Houses of the Oireachtas [Online] Available at: <https://www.irishstatutebook.ie/eli/2022/act/31/enacted/en/html> [Accessed 26 February 2023].
- 22 IUA / HEA, 2019. *Code of Governance for Irish Universities 2019*. [Online] Available at: <https://www.iua.ie/wp-content/uploads/2019/09/Code-of-Governance-for-Irish-Universities-14.10.19-digital-1.pdf> and <https://www.iua.ie/publications/code-of-governance-for-irish-universities-2019/> [Accessed 14 May 2022].
- 23 Government of Ireland, 2018. *Technological Universities Act 2018*. Dublin: Irish Statute Book, Houses of the Oireachtas [Online] Available at: <https://www.irishstatutebook.ie/eli/2018/act/3/enacted/en/html> [Accessed 26 February 2023].
- 24 HEA, 2020. *Governance Framework for the Higher Education System*. [Online] Available at: <https://hea.ie/funding-governance-performance/governance/governance-framework-for-the-higher-education-system/the-hea-and-higher-education-institutions/> [Accessed 26 February 2023].
- 25 Katayama, J. & Gough, S., 2008. Developing sustainable development within the higher education curriculum: observations on the HEFCE strategic review. *Education for Sustainable Development in Higher Education*, 14(4), pp. 413-422.
- 26 Shawe, R., Horan, W., Moles, R. & O'Regan, B., 2019. Mapping of sustainability policies and initiatives in higher education institutes. *Environmental Science & Policy*, Volume 99, pp. 80-88.
- 27 ALLEA, 2022. *All European Academies ALLEA Report: Towards Climate Sustainability of the Academic System in Europe and Beyond*. [Online] Available at: <https://allea.org/wp-content/uploads/2022/05/ALLEA-Report-Towards-Climate-Sustainability-of-the-Academic-System.pdf> [Accessed 26 February 2023].
- 28 Garnett, E.A. & Balmford, A., 2022. The vital role of organizations in protecting climate and nature. *Nature Human Behaviour*. Volume 6, pp. 319-321.



- 29 DECC, 2022a. *Department of the Environment, Climate and Communications: Climate Action Plan 2021 via gov.ie*. [Online] Available at: <https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/> [Accessed 5 June 2022].
- 30 Government of Ireland, 2022. *ESD to 2030: Second National Strategy on Education for Sustainable Development*. [Online] Available at: <https://www.gov.ie/en/publication/8c8bb-esd-to-2030-second-national-strategy-on-education-for-sustainable-development/> and <https://assets.gov.ie/228330/c69895a6-88f0-4132-b6d1-9085a9c31996.pdf> [Accessed 25 February 2023].
- 31 UCD, 2023. *University College Dublin Governance: Document Library*. [Online] Available at: <https://www.ucd.ie/governance/documentlibrary/> [Accessed 20 February 2023].
- 32 Department of the Environment, Climate and Communications, 2021. *Access to Information on the Environment (AIE)*. [online] Available at: <https://www.gov.ie/en/organisation-information/1e52cb-access-to-information-on-the-environment-aie/#guidelines> [Accessed 26 Feb. 2023].
- 33 Baker-Shelley, A., va Zeijl-Rozema, A. & Martens, P., 2017. A conceptual synthesis of organisational transformation: How to diagnose, and navigate, pathways for sustainability at universities? *Journal of Cleaner Production*, pp. 262-276.
- 34 Sima, M., Grigorescu, I., & Bălteanu, D., 2019. An overview of campus greening initiatives at universities in Romania. *International Journal of Sustainability in Higher Education*. Volume 20(3), pp. 410-422.
- 35 Weaver, C., 2008. *Hypocrisy Trap*. 1st ed. Oxford: Princeton University Press
- 36 Raworth, K., 2017. *Doughnut Economics: seven ways to think like a 21st-century economist*. London: Random House Business Books.
- 37 Sunstein, C., 1996. On the Expressive Function of Law. *University of Pennsylvania Law Review*, 144(5), pp. 2021-2053.
- 38 Stulz, R., 2022. Rethinking Risk Management. *Journal of Applied Corporate Finance*, 34(1), pp. 32-46.
- 39 WEF, 2022. *World Economic Forum: The Global Risks Report 2022 17th Edition*. [Online] Available at: <https://www.weforum.org/reports/global-risks-report-2022/> and [https://www3.weforum.org/docs/WEF\\_The\\_Global\\_Risks\\_Report\\_2022.pdf](https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2022.pdf) [Accessed 30 April 2022].
- 40 IUA / HEA, 2019. *Code of Governance for Irish Universities 2019*. [Online] Available at: <https://www.iua.ie/wp-content/uploads/2019/09/Code-of-Governance-for-Irish-Universities-14.10.19-digital-1.pdf> and <https://www.iua.ie/publications/code-of-governance-for-irish-universities-2019/> [Accessed 14 May 2022].
- 41 Giddens, A., 1999. Risk and Responsibility. *The Modern Law Review*, 62(1), pp. 1-10.
- 42 Kautto, N., Trundle, A. & McEvoy, D., 2018. Climate adaptation planning in the higher education sector. *International Journal of Sustainability in Higher Education*, 19(7).
- 43 Raworth, K., 2017. *Doughnut Economics: seven ways to think like a 21st-century economist*. London: Random House Business Books.
- 44 EU, 2016. “*The precautionary principle*” via EUR-Lex [Online] Available at: <https://eur-lex.europa.eu/EN/legal-content/summary/the-precautionary-principle.html> [Accessed 30 July 2022].
- 45 Nottingham Trent University, 2023. *Policies and Reports: ISO14001*. [online] Available at: <https://www.ntu.ac.uk/about-us/strategy/sustainability/policies-and-reports> [Accessed 2 March 2023].

- 46 University of Cambridge, 2023. *Environmental Sustainability Strategy Committee (ESSC)*. [Online] Available at: <https://www.environment.admin.cam.ac.uk/ESSC> [Accessed 23 February 2023].
- 47 SEAI, 2022. “*Public Sector Bodies Climate Action Roadmaps Guidance V1.0 October 2022*”. [online] Available at <https://www.seai.ie/business-and-public-sector/public-sector/public-sector-energy-programme/obligations-and-targets/> and [https://www.seai.ie/publications/Public\\_Sector\\_Bodies\\_Climate\\_Action\\_Roadmaps\\_Guidance.pdf](https://www.seai.ie/publications/Public_Sector_Bodies_Climate_Action_Roadmaps_Guidance.pdf) [Accessed 20 February 2023].
- 48 Raworth, K., 2017. *Doughnut Economics: seven ways to think like a 21st-century economist*. London: Random House Business Books.
- 49 Lafley, A.G., Martin, R.L., Rivkin, J.W., Siggelkow, N., 2012 Bringing Science to the Art of Strategy. *Harvard Business Review*. September 2012, Vol. 90, Iss. 9, p 56-66.
- 50 Whelan, T., 2022. ESG Reports Aren't a Replacement for Real Sustainability. *Harvard Business Review*. [online] July 2022. Available at: <https://hbr.org/2022/07/esg-reports-arent-a-replacement-for-real-sustainability>
- 51 Stockholm University, 2023. *Stockholm University Climate Roadmap for the period 2020–2040 - Staff*. [online] Available at: <https://www.su.se/staff/organisation-governance/governing-documents-rules-and-regulations/environment/stockholm-university-climate-roadmap-for-the-period-2020-2040-1.641862> [Accessed 26 Feb. 2023].
- 52 Cilimingras, L., 2022. *What's Your Climate Era Strategy?* Via IDEO.com [online] Available at: <https://www.ideo.com/journal/what-s-your-climate-era-strategy> [Accessed 2 January 2023].
- 53 Steffen, A., 2022. *The Snap Forward: Old thinking will break your brain*. [Online] Available at: <https://alexsteffen.substack.com/p/old-thinking-will-break-your-brain> [Accessed 3 June 2022].
- 54 University of Nottingham, 2020. *Strategic Delivery Plan for Environmental Sustainability*. [Online] Available at: <https://www.nottingham.ac.uk/strategy/documents/environmental-sustainability-strategic-delivery-plan-2021.pdf> [Accessed 15 July 2022].
- 55 ALLEA, 2022. *All European Academies ALLEA Report: Towards Climate Sustainability of the Academic System in Europe and Beyond*. [Online] Available at: <https://allea.org/wp-content/uploads/2022/05/ALLEA-Report-Towards-Climate-Sustainability-of-the-Academic-System.pdf> [Accessed 26 February 2023].
- 56 Kemp, S., 2022. "Why updating subject benchmarks to include ESD is important across higher education" via EAUC. [Online] Available at: [https://www.eauc.org.uk/why\\_updating\\_subject\\_benchmarks\\_to\\_include\\_esd](https://www.eauc.org.uk/why_updating_subject_benchmarks_to_include_esd) [Accessed 30 July 2022].
- 57 McCowan, T., 2021. *Climate change in higher education: a curriculum topography approach*, London: Climate-U, UCL climate-uni.com.
- 58 McCowan, T., 2020. The impact of universities on climate change: a theoretical framework. *Transforming Universities for a Changing Climate. Working Paper Series No. 1*, August.
- 59 Hurth, V. & Stewart, I. S., 2022. Re-purposing Universities: The Path to Purpose. *Frontiers in Sustainability*, 5 January. Volume 2.

- 60 Lozano, R. et al., 2013a. Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. *Journal of Cleaner Production*, Volume 48, pp. 10-19.
- 61 Stand Earth & 350.org, 2022. *Global Fossil Fuel Divestment Commitments Database*. [Online] Available at: <https://divestmentdatabase.org/> [Accessed 12 July 2022].
- 62 Grostern, J., 2022. *Oxford University took at least £1.6m last year from fossil fuel firms* via the Guardian. [Online] Available at: <https://www.theguardian.com/education/2022/feb/21/oxford-university-took-at-least-pounds-16m-last-year-from-fossil-fuel-firms> [Accessed 20 June 2022]
- 63 PRI, 2022. *Principles for Responsible Investment: Signatories*. [Online] Available at: <https://www.unpri.org/signatories> [Accessed 24 July 2022].
- 64 ALLEA, 2022. *All European Academies ALLEA Report: Towards Climate Sustainability of the Academic System in Europe and Beyond*. [Online] Available at: <https://allea.org/wp-content/uploads/2022/05/ALLEA-Report-Towards-Climate-Sustainability-of-the-Academic-System.pdf> [Accessed 20 February 2023].
- 65 Kelly, O. et al., 2022a. *Tertiary Education in a Warming World, Reflections from the Field*, Dublin: University College Dublin Press.
- 66 ISO, 2021. *ISO standards: ISO37000:2021 Governance for Organisations - Guidance*. [Online] Available at: <https://www.iso.org/standard/65036.html> [Accessed 18 February 2023].
- 67 SBTi, 2022. *Science Based Targets initiative*. [Online] Available at: <https://sciencebasedtargets.org/> [Accessed 30 July 2022].
- 68 IBEC, 2022. *IBEC / Chapter Zero Ireland: for Non Exec Directors*. [Online] Available at: <https://www.ibec.ie/Influencing%20for%20Business/Ibec%20Campaigns/Chapter%20Zero> [Accessed 21 May 2022].
- 69 ISO, 2022. *ISO 14000 Family: Environmental Management*. [Online] Available at: <https://www.iso.org/iso-14001-environmental-management.html> [Accessed 20 February 2023].
- 70 NSAI, 2018. *NSAI National Standards Authority of Ireland: ISO50001 Energy Management*. [Online] Available at: <https://www.nsai.ie/certification/management-systems/iso-50001-energy-management/> [Accessed 19 June 2022].
- 71 University of Copenhagen, 2022a. *Sustainability 2030: Chemistry*. [Online] Available at: <https://sustainability2030.ku.dk/biodiversity--chemistry/> [Accessed 30 July 2022].
- 72 Kilcoyne, J., Bogan, Y., Duffy, C., & Hollowell, T., 2022. Reducing environmental impacts of marine biotoxin monitoring: A laboratory report. *PLOS Sustainability and Transformation*. Volume 1 (3).
- 73 Irish Green Labs, 2022. *Replacing Single-Use Lab Based Plastics*. [Online] Available at: <https://irishgreenlabs.org/replacing-single-use-lab-based-plastics/> [Accessed 20 February 2023].
- 74 McCowan, T., 2020. The impact of universities on climate change: a theoretical framework. *Transforming Universities for a Changing Climate*. Working Paper Series No. 1, August.
- 75 ESB, 2022. *2021 ESB Annual Report and Financial Statements*. [Online] Available at: <https://esb.ie/docs/default-source/investor-relations-documents/esb-annual-results-2021.pdf> [Accessed 19 February 2023].

- 76 ALLEA, 2022. *All European Academies ALLEA Report: Towards Climate Sustainability of the Academic System in Europe and Beyond*. [Online] Available at: <https://allea.org/wp-content/uploads/2022/05/ALLEA-Report-Towards-Climate-Sustainability-of-the-Academic-System.pdf> [Accessed 26 February 2023].
- 77 Helmers, E., Chang, C. & Dauwels, J., 2021. Carbon footprinting of universities worldwide: Part I—objective comparison by standardized metrics. *Environmental Sciences Europe*, 33(1).
- 78 University of Padua, 2020. *The University of Padua Greenhouse gas emissions - Carbon Footprint*. [Online] Available at: <https://www.unipd.it/en/node/8335> and <https://www.unipd.it/en/sites/en.unipd.it/files/Grafici%20GHG.pdf> [Accessed 1 July 2022].
- 79 University of Edinburgh, 2003. *UoE Energy Policy*. [Online] Available at: [https://www.ed.ac.uk/sites/default/files/atoms/files/energy\\_policy\\_2003.pdf](https://www.ed.ac.uk/sites/default/files/atoms/files/energy_policy_2003.pdf) [Accessed 2 July 2022].
- 80 University of Edinburgh, 2022d. *Energy and Buildings*. [Online] Available at: <https://www.ed.ac.uk/sustainability/topics/energy-and-buildings> [Accessed 14 July 2022].
- 81 University of Ghent, 2021. *Sustainability Report 2020*. [Online] Available at: <https://www.ugent.be/en/ghentuniv/principles/sustainability/sustainabilityreport2020.pdf> [Accessed 30 July 2022].
- 82 EPA, 2020. *EPA Environmental Protection Agency Green Public Procurement Report 2020*. [Online] Available at: [https://www.epa.ie/publications/circular-economy/resources/GPP\\_Report\\_2020\\_07.pdf](https://www.epa.ie/publications/circular-economy/resources/GPP_Report_2020_07.pdf) [Accessed 16 April 2022].
- 83 EPA, 2021. *EPA Environmental Protection Agency Green Public Procurement Guidelines*. [Online] Available at: <https://www.epa.ie/publications/circular-economy/resources/green-public-procurement-guidance.php> [Accessed 16 April 2022].
- 84 Net Positive, 2022. *Net Positive Supplier Tool for Higher Education (UK)*. [Online] Available at: <https://supplierengagementthe.net-positive.org/> and <https://www.netpositivesupplier.co.uk/suppliers-to-he-using-the-tool-v2/> [Accessed 31 July 2022].
- 85 University of Sheffield, 2022a. *Procurement Strategy*. [Online] Available at: <https://www.sheffield.ac.uk/procurement/procurement-strategy> [Accessed 30 July 2022].
- 86 ALLEA, 2022. *All European Academies ALLEA Report: Towards Climate Sustainability of the Academic System in Europe and Beyond*. [Online] Available at: <https://allea.org/wp-content/uploads/2022/05/ALLEA-Report-Towards-Climate-Sustainability-of-the-Academic-System.pdf> [Accessed 26 February 2023].
- 87 University of Edinburgh, 2020b. *University of Edinburgh Good Food Policy*. [Online] Available at: [https://www.ed.ac.uk/sites/default/files/atoms/files/good\\_food\\_policy.pdf](https://www.ed.ac.uk/sites/default/files/atoms/files/good_food_policy.pdf) and <https://www.ed.ac.uk/sustainability/topics/food> [Accessed 12 July 2022].
- 88 UCC, 2022. *UCC Green Campus: Food, Health and Wellbeing*. [Online] Available at: <https://www.ucc.ie/en/greencampus/practice/food-health-and-wellbeing/> [Accessed 14 July 2022].
- 89 Feijoo, G. & Moreira, M., 2020. Fostering environmental awareness towards responsible food consumption and reduced food waste in chemical engineering students. *Education for Chemical Engineers*, Volume 33, pp. 27-35.
- 90 UCL, 2022. *University College London*. [Online] Available at: <https://www.ucl.ac.uk/sustainable/positive-climate/sustainable-food> [Accessed 30 July 2022].

- 
- 91 EPA, 2022. *Ireland's Greenhouse Gas Emissions Projections: 2021-2040*, Co. Wexford: Environmental Protection Agency.
- 92 System IQ, 2023. *The Breakthrough Effect: How to Trigger a Cascade of Tipping Points to Accelerate the Net Zero Transition*. [online] Available at: <https://www.systemiq.earth/wp-content/uploads/2023/01/The-Breakthrough-Effect.pdf> [Accessed: 18 February 2023].
- 93 University of Edinburgh, 2020a. *Free Water Points*. [Online] Available at: <https://www.ed.ac.uk/estates/buildings-information/free-water-points> [Accessed 29 July 2022].
- 94 University of Edinburgh, 2017b. *Drinking Water Policy*. [Online] Available at: [https://www.ed.ac.uk/sites/default/files/atoms/files/2017\\_-\\_drinking\\_water\\_policy\\_0.pdf](https://www.ed.ac.uk/sites/default/files/atoms/files/2017_-_drinking_water_policy_0.pdf) [Accessed 30 July 2022].
- 95 Nottingham Trent University, 2022. *Water Policy*. [Online] Available at: [https://www.ntu.ac.uk/\\_data/assets/pdf\\_file/0028/1694440/Water-Policy-2022.pdf](https://www.ntu.ac.uk/_data/assets/pdf_file/0028/1694440/Water-Policy-2022.pdf) [Accessed 26 February 2023].
- 96 University of Amsterdam, 2021. *Sustainable Waste Separation*. [Online] Available at: <https://www.uva.nl/en/about-the-uva/about-the-university/sustainability/sustainable-operations/sustainable-waste-separation/sustainable-waste-separation.html> [Accessed 2 July 2022].
- 97 Nottingham Trent University, 2022. *Waste Policy*. [online] Available at: [https://www.ntu.ac.uk/\\_data/assets/pdf\\_file/0039/1694487/Waste-Policy-2022.pdf](https://www.ntu.ac.uk/_data/assets/pdf_file/0039/1694487/Waste-Policy-2022.pdf) [Accessed 4 March 2023].
- 98 UCL, 2022c. *Waste, Resuse and Recycling*. [Online] Available at: <https://www.ucl.ac.uk/estates/our-services/waste-reuse-and-recycling> [Accessed 31 July 2022].
- 99 University of Edinburgh, 2018. *Waste Strategy*. [Online] Available at: <https://www.ed.ac.uk/estates/waste-recycling/waste-strategy> and [https://www.ed.ac.uk/sites/default/files/atoms/files/waste\\_strategy.pdf](https://www.ed.ac.uk/sites/default/files/atoms/files/waste_strategy.pdf) [Accessed 31 July 2022].
- 100 DEAL, 2022. *Doughnut Economics Action Lab (DEAL): Tools and Stories*. [Online] Available at: <https://doughnuteconomics.org/tools-and-stories> [Accessed 11 July 2022].
- 101 UCC, 2022. *UCC Green Campus Case Studies*. [Online] Available at: <https://www.ucc.ie/en/greencampus/resources/case-studies/> and <https://www.ucc.ie/en/greencampus/student-led/> [Accessed 24 July 2022].
- 102 EPA (2023). *The Circular Economy*. [online] [www.epa.ie](http://www.epa.ie). Available at: <https://www.epa.ie/environment-and-you/circular-economy/> [Accessed 26 February 2023].
- 103 MIT, 2022. *MIT Office of Sustainability: Designing out waste and contamination*. [Online] Available at: <https://sustainability.mit.edu/tab/waste> and <https://ellenmacarthurfoundation.org/articles/driving-the-circular-economy-on-a-university-campus> [Accessed 5 July 2022].
- 104 Mendoza, J., Gallego-Schmid, A. & Azapagic, A., 2019. Building a business case for implementation of a circular economy in higher education institutions. *Journal of Cleaner Production*, Volume 220, pp. 553-567.
- 105 Simpson, J., 2019. Real World Objects: Conceptual Framework and University Library Consortium Study. *The Journal of Academic Librarianship*, 45(4), pp. 332-342.
- 106 Library of Things, 2022. *Why Buy When You Can Borrow*. [Online] Available at: <https://www.libraryofthings.co.uk/> [Accessed 4 August 2022].

- 107 UNEP, 2020. *The Little Book of Green Nudges*. [Online] Available at: [https://www.unep.org/resources/publication/little-book-green-nudges?\\_ga=2.89431960.2038600515.1659817249-709806192.1659817249](https://www.unep.org/resources/publication/little-book-green-nudges?_ga=2.89431960.2038600515.1659817249-709806192.1659817249) and <https://wedocs.unep.org/bitstream/handle/20.500.11822/33578/LBGN.pdf?sequence=1&isAllowed=y> [Accessed 2 April 2022].
- 108 Nottingham Trent University, 2022b. *Transport Policy*. [Online] Available at: <https://www.ntu.ac.uk/about-us/strategy/sustainability/our-impact/travel-and-transport> [Accessed 3 March 2023].
- 109 UNEP, 2020. *The Little Book of Green Nudges*. [Online] Available at: [https://www.unep.org/resources/publication/little-book-green-nudges?\\_ga=2.89431960.2038600515.1659817249-709806192.1659817249](https://www.unep.org/resources/publication/little-book-green-nudges?_ga=2.89431960.2038600515.1659817249-709806192.1659817249) and <https://wedocs.unep.org/bitstream/handle/20.500.11822/33578/LBGN.pdf?sequence=1&isAllowed=y> [Accessed 2 April 2022].
- 110 Stockholm University, 2022. *Policy for meetings and travel*. [Online] Available at: <https://www.su.se/staff/organisation-governance/governing-documents-rules-and-regulations/personnel/policy-for-meetings-and-travel-1.534559> [Accessed 15 July 2022].
- 111 KU Leuven, 2022. *Sustainable Travel Policy*. [Online] Available at: <https://www.kuleuven.be/duurzaamheid/sustainability/sustainable-travel-policy> [Accessed 3 July 2022].
- 112 University of Amsterdam, 2019. *Sustainable Travel*. [Online] Available at: <https://www.uva.nl/en/about-the-uva/about-the-university/sustainability/sustainable-operations/sustainable-travel/sustainable-travel.html?cb&cb&cb> [Accessed 24 July 2022].
- 113 Kreil, A. & Stauffacher, M., 2021. Reducing air travel related greenhouse gas emissions in academia: An empirical policy overview. *SocArXiv*, Volume doi:10.31235/osf.io/bzrfq.
- 114 Kreil, A. S., 2021. Does flying less harm academic work? Arguments and assumptions about reducing air travel in academia. *Travel Behaviour and Society*, Volume 25, pp. 52-61.
- 115 ALLEA, 2022. *All European Academies ALLEA Report: Towards Climate Sustainability of the Academic System in Europe and Beyond*. [Online] Available at: <https://allea.org/wp-content/uploads/2022/05/ALLEA-Report-Towards-Climate-Sustainability-of-the-Academic-System.pdf> [Accessed 26 February 2023].
- 116 University of Edinburgh, 2022a. *Biodiversity Plan 2022*. [Online] Available at: <https://www.ed.ac.uk/c/biodiversity-plan-2022> [Accessed 2 July 2022].
- 117 Durham University, 2022. *Biodiversity Policy*. [Online] Available at: <https://www.dur.ac.uk/greenspace/policies/biodiversitypolicy/> [Accessed 20 July 2022].
- 118 University of Nottingham, 2020. *Strategic Delivery Plan for Environmental Sustainability*. [Online] Available at: <https://www.nottingham.ac.uk/strategy/documents/environmental-sustainability-strategic-delivery-plan-2021.pdf> [Accessed 15 July 2022].
- 119 All-Ireland Pollinator Plan, 2022. *Top Ten Ways to Help Pollinators*. [Online] Available at: <https://pollinators.ie/top-ten-ways-to-help-pollinators/> [Accessed 1 August 2022].
- 120 World Economic Forum, 2020. *New Nature Economy Report II: The Future Of Nature And Business*. World Economic Forum. [online] Available at: [https://www3.weforum.org/docs/WEF\\_The\\_Future\\_Of\\_Nature\\_And\\_Business\\_2020.pdf](https://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf) [Accessed 5 March 2023].
- 121 Business for Biodiversity, 2023. *Business for Biodiversity: Resources*. [online] Available at: <https://businessforbiodiversity.ie/resources/> [Accessed 5 March 2023].

- 122 University of Leicester, 2022. *Biodiversity*. [Online] Available at: <https://le.ac.uk/about/making-a-difference/sdgs/biodiversity#:~:text=We%20are%20committed%20to%20conserving,local%20and%20regional%20action%20plans>. [Accessed 21 August 2022].
- 123 IMEC, 2021. *IMEC Sustainability Report 2020*. [Online] Available at: [https://www.imec-int.com/sites/default/files/2021-09/imec\\_SustainabilityReport\\_2021\\_FINAL.pdf](https://www.imec-int.com/sites/default/files/2021-09/imec_SustainabilityReport_2021_FINAL.pdf) [Accessed 2 July 2022].
- 124 EPFL, 2020. *EPFL Carbon Accounting of Research Activities in the School of Life Sciences*. [Online] Available at: [https://www.epfl.ch/schools/sv/wp-content/uploads/2020/10/ZEG\\_SV\\_Carbon\\_Accounting.pdf](https://www.epfl.ch/schools/sv/wp-content/uploads/2020/10/ZEG_SV_Carbon_Accounting.pdf) [Accessed 1 July 2022].
- 125 Lannelongue, L., Grealey, J., Bateman, A. & Inouye, M., 2021. Ten Simple Rules to Make Your Computing More Environmentally Sustainable. *PLOS Computational Biology*, 17(9), p. e1009324.
- 126 ALLEA, 2022. *All European Academies ALLEA Report: Towards Climate Sustainability of the Academic System in Europe and Beyond*. [Online] Available at: <https://allea.org/wp-content/uploads/2022/05/ALLEA-Report-Towards-Climate-Sustainability-of-the-Academic-System.pdf> [Accessed 26 February 2023].
- 127 Department of the Environment, Climate and Communications, 2021. *Access to Information on the Environment (AIE)*. [online] Available at: <https://www.gov.ie/en/organisation-information/1e52cb-access-to-information-on-the-environment-aie/#guidelines> [Accessed 26 Feb. 2023].
- 128 Collin, J., Wright, A., Hill, S. & Smith, K., 2021. Conflicted and confused? Health harming industries and research funding in leading UK universities. *BMJ*, p. doi:10.1136/bmj.n1657.
- 129 Cornell University, 2022. *Staff Sustainability Opportunities and Resources*. [Online] Available at: <https://sustainablecampus.cornell.edu/programs-guides/employee-resources/staff-sustainability-training> [Accessed 30 July 2022].
- 130 DECC, 2022a. *Department of the Environment, Climate and Communications: Climate Action Plan 2021 via gov.ie*. [Online] Available at: <https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/> [Accessed 5 June 2022].
- 131 University of Sheffield, 2022. *Procurement Strategy*. [Online] Available at: <https://www.sheffield.ac.uk/procurement/procurement-strategy> [Accessed 30 July 2022].
- 132 Cornell University, 2022a. *Staff Sustainability Opportunities and Resources*. [Online] Available at: <https://sustainablecampus.cornell.edu/programs-guides/employee-resources/staff-sustainability-training> [Accessed 30 July 2022].
- 133 Nottingham Trent University, 2022c. *Carbon Literacy Training for Educators, Communities, Organizations and Students (CLT-ECOS)*. [Online] Available at: <https://www.ntu.ac.uk/about-us/sustainability/sustainability-in-education/carbon-literacy-training> [Accessed 31 July 2022].
- 134 Government of Ireland, 2022. *ESD to 2030: Second National Strategy on Education for Sustainable Development*. [Online] Available at: <https://assets.gov.ie/228330/c69895a6-88f0-4132-b6d1-9085a9c31996.pdf> [Accessed 5 July 2022].
- 135 Shiel, C., Filho, W. L., do Paço, A. & Brandli, L., 2016. Evaluating the engagement of universities in capacity building for sustainable development in local communities. *Evaluation and Program Planning*, Volume 54, pp. 123-134.

- 136 University of Manchester, 2022. *Social Responsibility: 10,000 Actions*. [Online] Available at: <https://www.socialresponsibility.manchester.ac.uk/signature-programmes/10000-actions/> [Accessed 30 July 2022].
- 137 Gardner, C. J., Thierry, A., Rowlandson, W. & Steinberger, J. K., 2021. From Publications to Public Actions: The Role of Universities in Facilitating Academic Advocacy and Activism in the Climate and Ecological Emergency. *Frontiers in Sustainability*, 31 May, Volume 2, pp. 82-87 in Research Topic e-book.
- 138 Kelly, O. *et al.*, 2022a. *Tertiary Education in a Warming World, Reflections from the Field*, Dublin: University College Dublin Press.
- 139 Kemp, S., 2022. "Why updating subject benchmarks to include ESD is important across higher education" via EAUC. [Online] Available at: [https://www.eauc.org.uk/why updating subject benchmarks to include esd 1](https://www.eauc.org.uk/why Updating subject benchmarks to include esd 1) [Accessed 26 February 2023].
- 140 McCowan, T., 2020. The impact of universities on climate change: a theoretical framework. *Transforming Universities for a Changing Climate. Working Paper Series No. 1*, August.
- 141 Cornell University, 2017. *Sustainability Framework at Cornell*. [Online] Available at: <https://sustainablecampus.cornell.edu/our-leadership/sustainability-framework> [Accessed 30 July 2022].
- 142 Cornell University, 2022b. *Sustainability Teams and Sustainability Ambassadors*. [Online] Available at: <https://sustainablecampus.cornell.edu/take-action/sustainability-teams> and <https://sustainablecampus.cornell.edu/programs-guides/sustainability-teams/sustainability-ambassadors> [Accessed 31 July 2022].
- 143 McCowan, T., 2021. *Climate change in higher education: a curriculum topography approach*, London: Climate-U, UCL climate-uni.com.
- 144 McCowan, T., 2020. The impact of universities on climate change: a theoretical framework. *Transforming Universities for a Changing Climate. Working Paper Series No. 1*, August.
- 145 UNESCO, 2022b. *UNESCO Education for Sustainable Development Toolbox*. [Online] Available at: <https://en.unesco.org/themes/education-sustainable-development/toolbox> [Accessed 4 July 2022].
- 146 UTS, 2023. *University of Technology, Sydney: Responsibilities of Responsible Academic Officers*. [Online] Available at: <https://www.uts.edu.au/about/uts-governance/faculty-management#currentraos> [Accessed 5 March 2023].
- 147 Kemp, S., 2022. "Why updating subject benchmarks to include ESD is important across higher education" via EAUC. [Online] Available at: <https://www.eauc.org.uk/why updating subject benchmarks to include esd 1> [Accessed 26 February 2023].
- 148 University of Leicester, 2021. *Climate Change: Positive Impact*. [Online] Available at: <https://le.ac.uk/about/making-a-difference/climate-change/positive-impact> [Accessed 21 August 2022].
- 149 Emblen-Perry, K., 2019. Can sustainability audits provide effective, hands-on business sustainability learning, teaching and assessment for business management undergraduates?. *International Journal of Sustainability in Higher Education*, 20(7), pp. 1191-1219.
- 150 EPALE, 2020. *E-Platform for Adult Learning in Europe: The role of adult education in fostering environmental awareness*. [Online] Available at:



[https://epale.ec.europa.eu/sites/default/files/epale\\_2020\\_publication\\_en.pdf](https://epale.ec.europa.eu/sites/default/files/epale_2020_publication_en.pdf) [Accessed 2 July 2022].

151 CEU, 2022. *Council of the European Union: Council recommends European approach to micro-credentials*. [Online] Available at: <https://www.consilium.europa.eu/en/press/press-releases/2022/06/16/council-recommends-european-approach-to-micro-credentials/> [Accessed 18 June 2022].

152 Government of Ireland, 2022. *ESD to 2030: Second National Strategy on Education for Sustainable Development*. [Online] Available at: <https://assets.gov.ie/228330/c69895a6-88f0-4132-b6d1-9085a9c31996.pdf> [Accessed 5 July 2022].

153 Lehigh University, 2022. *Welcome 2022 Global Classroom Students*. [Online] Available at: <https://wordpress.lehigh.edu/globalclassroom/> [Accessed 5 March 2023].

154 Lozano, R., *et al.*, 2013b. Advancing higher education for sustainable development: international insights and critical reflections. *Journal of Cleaner Production*, Volume 48 (8), pp. 3-9.

155 CISL, 2022. *Cambridge Institute for Sustainability Leadership: Find a world-class business sustainability course for individuals and organisations*. [Online] Available at: <https://www.cisl.cam.ac.uk/education> [Accessed 2 July 2022].

156 Maxwell, N. 2014, *How universities can help create a wiser world: the urgent need for an academic revolution*, Imprint Academic, Exeter, England.

157 McCowan, T., 2021. *Climate change in higher education: a curriculum topography approach*, London: Climate-U, UCL climate-uni.com.

158 McCowan, T., 2020. The impact of universities on climate change: a theoretical framework. *Transforming Universities for a Changing Climate. Working Paper Series No. 1*, August.

159 Renouf, J. S. *et al.*, 2019. Why universities need to declare an ecological and climate emergency. *Times Higher Education*, 27 September. [Online] available at: <https://www.timeshighereducation.com/blog/why-universities-need-declare-ecological-and-climate-emergency>.

160 University of Leicester, 2022. *Biodiversity*. [Online] Available at: <https://le.ac.uk/about/making-a-difference/sdgs/biodiversity#:~:text=We%20are%20committed%20to%20conserving,local%20and%20regional%20action%20plans>. [Accessed 21 August 2022].

161 Lawrance, E., Thompson, R., Fontana, G. & Jennings, N., 2021. The impact of climate change on mental health and emotional wellbeing: current evidence and implications for policy and practice. *Grantham Institute Briefing Paper*, May, pp. [online] Available at <https://www.imperial.ac.uk/grantham/publications/all-publications/the-impact-of-climate-change-on-mental-health-and-emotional-wellbeing-current-evidence-and-implications-for-policy-and-practice.php>.

162 Hayes, K. *et al.*, 2018. Climate change and mental health: risks, impacts and priority actions. *International Journal of Mental Health Systems*, 12(1), [online].

163 UNESCO, 2019. *The ethical principles of climate change*. [Online] Available at: <https://en.unesco.org/news/ethical-principles-climate-change> [Accessed on 31 July 2022].

164 ISO, 2022. *ISO 14000 Family: Environmental Management*. [Online] Available at: <https://www.iso.org/iso-14001-environmental-management.html> [Accessed 9 July 2022].

- 165 Collin, J., Wright, A., Hill, S. & Smith, K., 2021. Conflicted and confused? Health harming industries and research funding in leading UK universities. *BMJ*, p. doi:10.1136/bmj.n1657.
- 166 Wadih Raffoul, A., *et al.*, 2021. “The climate crisis gives science a new role. Here’s how research ethics must change too” *via The Conversation*. [Online] Available at <https://theconversation.com/the-climate-crisis-gives-science-a-new-role-heres-how-research-ethics-must-change-too-171201> [Accessed 14 August 2022].
- 167 People and Planet, 2022a. *Planet & Planet: About / History*. [Online] Available at: <https://peopleandplanet.org/about/history> [Accessed 30 May 2022].
- 168 UCL, 2022b. *University College London*. [Online] Available at: <https://www.ucl.ac.uk/sustainable/education/living-lab> [Accessed 30 July 2022].
- 169 Cornell University, 2022b. *Sustainability Teams and Sustainability Ambassadors*. [Online] Available at: <https://sustainablecampus.cornell.edu/take-action/sustainability-teams> and <https://sustainablecampus.cornell.edu/programs-guides/sustainability-teams/sustainability-ambassadors> [Accessed 31 July 2022].
- 170 University of Edinburgh, 2021. *Student Leadership for Sustainability*. [Online] Available at: <https://www.ed.ac.uk/sustainability/programmes-and-projects/student-leadership-for-sustainability> [Accessed 5 July 2022].
- 171 UCL, 2022b. *University College London*. [Online] Available at: <https://www.ucl.ac.uk/sustainable/education/living-lab> [Accessed 30 July 2022].
- 172 Trencher, G. *et al.*, 2014. University partnerships for co-designing and co-producing urban sustainability. *Global Environmental Change*, Volume 28, pp. 153-165.
- 173 McCowan, T., 2021. *Climate change in higher education: a curriculum topography approach*, London: Climate-U, UCL climate-uni.com.
- 174 Field Museum, 2022. Volunteer 'community scientists' do a pretty darn good job generating usable data. *Science Daily*. 27 June 2022. [Online] Available at: <https://www.sciencedaily.com/releases/2022/06/220627100204.htm> [Accessed 30 July 2022].
- 175 UNESCO, 2022. *UNESCO Education for Sustainable Development Toolbox*. [Online] Available at: <https://en.unesco.org/themes/education-sustainable-development/toolbox> [Accessed 4 July 2022].
- 176 University of Birmingham, 2022. *Public Engagement with Research*. [Online] Available at: <https://intranet.birmingham.ac.uk/staff/resources/public-engagement/index.aspx> and <https://thinkpe.net/site-map/opportunities-2/> [Accessed 28 July 2022].
- 177 Latter, B., 2022. Climate Change Communication and Engagement With Older People in England. *Frontiers in Communication*, 7(doi:10.3389/fcomm.2022.848671.).
- 178 University of Copenhagen, 2021. *Knowledge and Responsibility. Sustainable Institution 2030*. Ku.dk[online] Available at: [https://sustainability2030.ku.dk/pdfer/B\\_redygtighedsm\\_1\\_2030\\_UK.pdf\\_copy](https://sustainability2030.ku.dk/pdfer/B_redygtighedsm_1_2030_UK.pdf_copy) and <https://sustainability2030.ku.dk/ucphs-approach/> [Accessed 26 February 2023].
- 179 Renouf, J. S. *et al.*, 2019. Why universities need to declare an ecological and climate emergency. *Times Higher Education*, 27 September. [Online] available at: <https://www.timeshighereducation.com/blog/why-universities-need-declare-ecological-and-climate-emergency>.
- 180 Kelly, O. *et al.*, 2022b. Education in a warming world: Trends, opportunities and pitfalls for institutes of higher education. *Frontiers in Sustainability*, Volume 3:920375.

- 
- 181 Burke, L., 2022. *IUA Future of Ireland Webinar*. [Online] Available at: <https://www.iaa.ie/events/iaa-future-of-ireland-webinar-rising-to-the-sustainability-challenge-friday-20th-may-1200-1300/> [Accessed 20 June 2022].
- 182 Waterson, J. & Carrington, D., 2022. 'Wellcome Trust sells stakes in large oil and mining companies' via *The Guardian*. [Online] Available at: [https://www.theguardian.com/environment/2022/jul/21/wellcome-trust-sells-stakes-in-large-oil-and-mining-companies?CMP=Share\\_iOSApp\\_Other](https://www.theguardian.com/environment/2022/jul/21/wellcome-trust-sells-stakes-in-large-oil-and-mining-companies?CMP=Share_iOSApp_Other) [Accessed 21 July 2022].
- 183 Bryant, M., 2021. *How Durham University turned itself green* via *The Guardian*. [Online] Available at: <https://www.theguardian.com/education/2021/dec/09/how-durham-university-turned-itself-green> [Accessed 30 April 2022].
- 184 Mendoza, J., Gallego-Schmid, A. & Azapagic, A., 2019. Building a business case for implementation of a circular economy in higher education institutions. *Journal of Cleaner Production*, Volume 220, pp. 553-567.
- 185 Gardner, C. J., Thierry, A., Rowlandson, W. & Steinberger, J. K., 2021. From Publications to Public Actions: The Role of Universities in Facilitating Academic Advocacy and Activism in the Climate and Ecological Emergency. *Frontiers in Sustainability*, 31 May, Volume 2, pp. 82-87 in Research Topic e-book.
- 186 System IQ, 2023. *The Breakthrough Effect: How to Trigger a Cascade of Tipping Points to Accelerate the Net Zero Transition*. [online] Available at: <https://www.systemiq.earth/wp-content/uploads/2023/01/The-Breakthrough-Effect.pdf> [Accessed: 18 February 2023].
- 187 Otto, I. *et al.*, 2020. Social tipping dynamics for stabilizing Earth's climate by 2050. *Proceedings of the National Academy of Sciences*, 117(5), pp. 2354-2365.
- 188 Seery, C., Andres, A., Moore-Cherry, N. & O'Sullivan, S., 2021. Students as Partners in Peer Mentoring: Expectations, Experiences and Emotions. *Innovative Higher Education*, Volume 46, pp. 663-681.
- 189 Priyadarshini, P. & Abhilash, P. C., 2022. Rethinking of higher education institutions as complex adaptive systems for enabling sustainability governance. *Journal of Cleaner Production*, Volume 359, p. 132083.
- 190 Viktor, D. G. *et al.*, 2017. Prove Paris was more than paper promises. *Nature*, Volume 548, pp. 25-27.