Student-Led, Research-Informed and Practice Focussed: University College Cork's Journey to Sustainability

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Article Info

Abstract. Sustainability is the defining challenge of our age. As engines of social progress, universities play a foundational role in achieving the UN Sustainable Development Goals (SDGs) and shaping a secure future. A student-led, research-informed, practice-focused approach has made University College Cork (UCC) one of the world's most sustainable universities, consistently ranked in the UI GreenMetric top 10. Sustainability principles are central to teaching, research, outreach and operations at UCC, and are a cornerstone of organisational leadership, culture and strategy. UCC published its first Sustainability Strategy in 2016 and reports on priority initiatives annually. Researchers, including those in the UCC Futures Sustainability Institute, advance solutions to global challenges. Mapping research onto the SDGs ensures responsive priority setting for a sustainable future. An open-source SDG Toolkit supports the integration of sustainability in teaching, and a Connected Curriculum provides a framework to embed the SDGs in curricular and extra-curricular learning. UCC's Sustainability Academy delivers bespoke industry-aligned programmes, educating future leaders to drive transformation. UCC integrates emerging sustainability practices into operations, recently

adopting new approaches to the sustainability of its website and other digital spaces. This paper outlines UCC's holistic journey to embedding sustainability through research, education and leadership, highlighting key enablers and success factors.

1. Introduction

Higher Education Institutions (HEIs) play a foundational role in shaping a secure future, including achieving the ambitions of the UN 2030 Agenda and its Sustainable Development Goals (SDGs) [1]. Universities and HEIs have the capacity and responsibility to act as key contributors to the delivery of sustainable development [2]. Former Special Advisor to UN Secretary General Ban Ki-moon, Professor Jeffrey Sachs, describes HEIs as "partners for development in problem solving and development, vital for the success of the SDGs" [3]. Many international declarations, including the 1990 Talloires Declaration, refer to the need to include sustainability at HEIs. Sustainability in higher education has steadily grown, accelerated by the launch of the SDGs in 2015 [1]. In its beginnings, over 50 years ago, sustainability efforts in HEIs were mainly confined to teaching and research [4,5]. The SDGs provided a structured holistic framework that enabled HEIs to integrate sustainable development across all functions, replacing earlier siloed approaches [2]. SDG 4, focused on inclusive and equitable quality education and lifelong learning, is the most widely addressed in the literature (4). However, universities also play a key role in advancing the full set of SDGs, with growing emphasis on sustainable campus operations, environmental culture and responsibility, community engagement and social leadership [1,5].

At its deepest level, integration of the SDGs in HEIs is characterised by strong leadership, strategic prioritisation and a culture of commitment across all functions in collaboration with stakeholders [2]. However, less than half of universities adopt an integrated approach, with many more likely to take a reductionist approach [1,6]. Achieving deep engagement requires linking teaching, research, governance, operations, student life and community engagement to drive authentic transformation. Key challenges include infrastructure limitations, competing priorities, lack of leadership commitment, poor governance, siloed departments, resistance to change and political influences [6,7]. Overcoming these barriers is essential to building green universities and fostering a higher education ecosystem that can effectively address global societal challenges and contribute to sustainable development.

University College Cork (UCC) is a research-intensive university in Ireland with 26,000 students, and was an early adopter of the sustainability agenda, demonstrating leadership and a forward-thinking approach, beginning its journey more than 25 years ago. Steele and

Rickard's matrix of university engagement with the SDGs classifies UCC as 'transformational' based on the depth of its commitment and the extent of its innovation culture [2]. UCC has implemented a range of whole-of-university measures, including carbon reduction and divestment strategies; waste management initiatives; green procurement; biodiversity enhancement projects; sustainable transport initiatives; embedding of sustainability in research and curriculum. UCC's deep institutional commitment to sustainability, as well as its success in sustainability engagement, is exemplified by its pioneering achievement as the first university in the world to be awarded a Green Flag by the Foundation for Environmental Education (FEE) in 2010. The UI GreenMetric World University Rankings were launched in 2010 and UCC is consistently ranked in the top 10 globally, currently 4th. The Times Higher Education Impact Rankings were introduced in 2019, and UCC is consistently ranked in the top 70, peaking at 8th in 2021. In 2018, UCC was the first university outside of North America to be awarded a Gold STARS rating from the Association for the Advancement of Sustainability in Higher Education (AASHE), which was reaffirmed in 2024. In 2024, UCC became the first HEI in the world to secure a fifth Green Flag. In total, UCC has more than 40 awards for sustainability achievements and continues to deliver continuous improvement and undertake new initiatives. This has been achieved during a time when the university grew its student body from 11,500 to 26,000 students between 2000 and 2025.

A deep commitment to sustainability objectives is central to UCC's core business, but how did we get here? Using a case study approach, this paper explores the transition to sustainability at UCC over more than 25 years. It sets out a success pathway, highlighting key initiatives in research and innovation, teaching and learning, operations, stakeholder engagement, organisational culture and governance in its transition to a more sustainable campus. Furthermore, it evaluates the underlying process including delivery methods, key enablers and success factors that drove the transformation. By analysing UCC's progress, this study provides insights on embedding sustainability and contributes to our understanding of how HEIs support the implementation of the SDGs.

2. Theoretical Approach

The successful embedding of sustainable development and the SDGs at UCC has its roots in a cohesive, collaborative and interdisciplinary approach that matches bottom-up activism with top-down commitment and middle-out collaboration. Each element contributes to UCC's internationally renowned Green Campus, which is student-led, research-informed and practice-focused. UCC's institutional transformation was inspired by students, enabled by leadership and delivered by the university community.

2.1. Sustainability Journey Timeline

While teaching and research at UCC have addressed sustainability issues in pockets of excellence for more than 50 years, UCC's journey to becoming a green university began in earnest in the early years of this century, when a dedicated Environmental Research Centre was opened in 2000. In 2007, the UCC Green Campus Committee was established by students, paving the way for the university's first Green Flag and ISO 50001 certification in 2010. In 2013, the UCC Green Forum was established to provide strategic oversight and facilitate staff involvement. In 2016, a university-wide module on sustainability was created. Also in 2016,

UCC was the first HEI in Ireland to launch a Sustainability Strategy providing a framework for embedding sustainability across all functions. In 2017, UCC's first dedicated Sustainability Officer was appointed. In 2018, annual sustainability reporting commenced, and sustainability was formally embedded in the curriculum. In 2019, a Living Laboratory Programme was launched to address real-life problems using the university campus as a testbed. In 2020 Sustainable Futures was launched to provide bespoke training for industry. In 2021, UCC launched an open-source SDG Toolkit to support the embedding of the SDGs in the curriculum, and was also granted observer status at the UN COP for the first time. In 2022, a dedicated Office of Sustainability & Climate Action was established to coordinate and support sustainability actions. In that year the UCC Futures: Sustainability cluster recruitment commenced. Together with Queen's University Belfast, UCC established SDSN (Sustainable Development Network Solutions) Ireland in 2023. Also in 2023, sustainability was embedded as a priority action in UCC's *Strategic Plan 2023–2028: Securing Our Future*, and an Associate Vice President for Sustainability was appointed. UCC also became a Plastic Free Campus, eliminating all single-use plastics, and the Green Shoots Programme was launched to actively engage students in sustainability. In 2024 a digital sustainability pilot project was launched, and a biodiversity walkway was opened along the river that runs through the campus. In 2025, the UCC Futures Sustainability Institute was established to provide coherent oversight of sustainability in teaching and research across the university.

2.2. Top-Down, Bottom-Up, Middle-Out

The institutional sustainability ecosystem at UCC builds on a successful people-centred blend of top-down, bottom-up and middle-out approaches. In a top-down approach, university leadership, culture and strategy are the primary drivers of organisational change. The bottom-up or grassroots approach, provides for student-led campaigns to drive individual and collective change. As HEIs around the world work to improve sustainability, there has been much interest in which of these approaches is most effective [8]. This largely ignores the potential for a middle-out approach, which recognises agents of change that are located between the top and the bottom, and who can affect change upwards, downwards and sideways simultaneously, connecting leadership with ground-level execution [9]. Staff members are critical leaders in efforts to implement lasting progress towards campus sustainability and provide a middle-out approach well positioned to complement the traditional top-down and bottom-up perspectives [8]. Here, much of the innovative and collaborative action takes place and significant opportunities for capacity building and ownership of sustainable development exist. At UCC, drivers of organisational change derived from all three directions have enabled the delivery of institutional competencies to advance sustainability. This has proven to be an effective approach that includes students, staff and leadership, and ensures representation of stakeholders working at all levels, resulting in an authentic whole-university approach. The relationship between the three approaches is well connected at UCC, linking relevant stakeholders and creating an organisational ecosystem rooted in sustainability to maximise success (Figure 1).

2.3. Student-Led, Research-Informed, Practice-Focussed

UCC students initiated a pilot Green Campus Programme in the early 2000s, motivated by the lack of recycling facilities and broader sustainability strategies on campus. Inspired by the transformative power of the Green Flag in schools, they knew that its collaborative and

continual improvement approach could have a radical impact in higher education. In 2007, a Green Campus Committee was created and students engaged directly with university leadership to initiate a pilot project on campus sustainability. This initiative led to the introduction of the Green Campus Programme for the Irish tertiary education sector, aiming to maintain a seamless approach to sustainable development across all education levels. Just three years later, in 2010, UCC became the first university campus in the world to be awarded a Green Flag. Today, for students engaged in climate and social justice activism, the SDGs offer a powerful entry point into sustainability at third level.
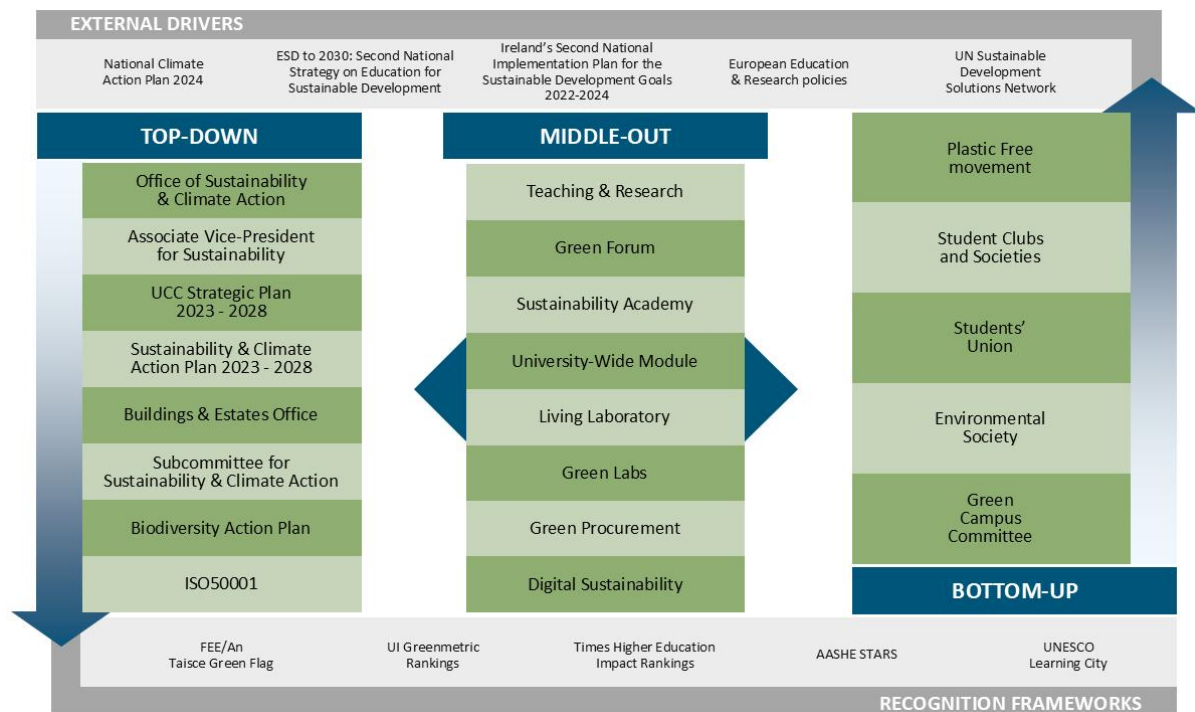

Figure 1. UCC's Bottom-up top-down middle-out sustainability ecosystem [10].

UCC has a large research community working on multiple aspects of sustainability and its journey to become a green university was deeply rooted in evidence-based research. In 2019, this link was formalised with the launch of the Living Laboratory Programme to support projects that use the knowledge and research capabilities of students and staff to solve issues relating to campus infrastructure and practices. In 2021, UCC launched UCC Futures, a creative and inclusive interdisciplinary strategy across ten thematic areas including sustainability. The new UCC Futures Sustainability Institute, established in 2025, reorganises capacity outside of the usual disciplinary framework to support the delivery of an integrated research ambition for sustainability. It encompasses several research centres to drive cohesive research and innovation, centralising evolving interdisciplinary, transdisciplinary and multidisciplinary focus to develop holistic solutions across all aspects of sustainability. Linking research with teaching for the SDGs at UCC is crucial to equip students with aptitudes that promote civic participation, sustainability and global citizenship.

Management and leadership at UCC were engaged from the very beginning in the transition to a green campus focussing on the translation of sustainability research into transformative practice. This top-down commitment facilitated the positioning of environmentally friendly practices across policies and practices for teaching, research, operations and management of UCC's campus estate. Across the campus, UCC promotes a

reduction in energy consumption, reduced plastic consumption and improved waste management, green electricity generation, green procurement, sustainable transport and biodiversity conservation through the setting of clear targets and measures [11]. The *Sustainability & Climate Action Plan 2023 – 2028* sets out how UCC will continue to embed sustainability goals and targets across all aspects of its educational, research, ancillary operations, infrastructural developments and interactions with the community. This includes the ambition to operate within a strict 2030 carbon budget and mitigate the impact of climate changes on campus while achieving net zero emissions by 2040.

3. Implementation

A number of key enablers have been critical to UCC's accomplishments in embedding sustainability and the SDGs into every function of the university to deliver a truly green university. The alignment of strategic planning with all levels of the organisation has enabled the implementation of goals and targets across all aspects of learning and teaching, research and innovation, ancillary operations, infrastructural developments and external engagement.

3.1. Student Activism

Students, as the largest group of individuals in university communities, have enormous potential to influence institutional change, and their involvement is important in shaping discourse around strategic issues [12]. While there has been much focus on the role of HEIs in educating to enact change for sustainability, in many cases students themselves are motivated to take bottom-up action for climate change and campus greening [12]. The green movement at UCC grew out of students' expectations around sustainability and climate action, which motivated grassroots activism. The connection between those early student activists and university leadership grew into collaboration and flourished through dedicated coordination to deliver institutional transformation on the ground. Its early growth was centred on the adaptation of two environmental frameworks, the Green Flag Programme and the ISO50001 international standard for energy management systems, which led to very early international recognition. The Green Campus Committee, in operation since 2007, is the student-led and staff-supported element of UCC's sustainable transformation that provides an important channel for university leadership to stay informed of the ambitions and priorities of the students. Student-led initiatives at UCC have delivered many impactful outputs, beginning with becoming the first university in the world to be awarded a Green Flag in 2010. Waste management continues to be a priority for students at UCC, and in 2017, UCC Library replaced waste bins with recycling stations and banned the use of disposable cups. This hugely successful initiative inspired the student body to establish a Plastic Free UCC campaign, which resulted in the banning of single use plastics in 2023, saving over 2 million single use cups from landfill to date. To maximize their impact, student-led sustainability efforts should be supported and integrated across campus.

3.2. People and Leadership

People have been key to UCC's success, and early bottom-up initiatives were met with a top-down commitment from management resulting in transformational change across the whole institution. The commitment of leadership and the positioning of sustainability as an institutional commitment, reflected in organisational culture and governance, as UCC has done, are recognised best practice and have been key success factors for advancing the

SDGs. There is a clear need to align strategic planning with all hierarchical levels of a university to best inform leadership decision making [13] and overcome the fragmented organisational structures often recognised as a barrier to the implementation of sustainable principles [6]. At UCC, the whole-university governance structures evolved as the university and its sustainability ambition grew. Today, sustainability is a core value at UCC embedded in the university's *Strategic Plan 2023 – 2028: Securing Our Future* and its *Sustainability and Climate Action Plan 2023 – 2028*. At the core of this framework is the Office of Sustainability & Climate Action which co-ordinates university-wide sustainability initiatives and external engagement. The Buildings & Estates Office lead many of the day-to-day operational actions and deliver strategic capital projects key to achieving a net zero and energy efficient campus. Professional training opportunities have enormous potential to empower leadership to embed sustainability at HEIs and UCC is the only public sector body in Ireland to develop and deliver its own Climate Leadership Training for its Leadership Team.

3.3. Learning and Teaching

At UCC, embedding and integrating the SDGs across the curricula is driven by expressed institutional needs, national strategy, and in response to the SDGs. It is a cross-disciplinary responsibility, delivered through curriculum design, research-led teaching, transdisciplinary connections and active learning. Sustainability is implemented in both curricular (Connected Curriculum) and extra-curricular areas (Graduate Attributes Programme). The GAP programme supports students to become effective global citizens who can contribute to achieving the SDGs. UCC's inaugural *Academic Strategy 2018 – 2022* introduced the Connected Curriculum framework of six central elements, including sustainability. It takes a systematic and intentional transdisciplinary approach to integration the SDGs across the curriculum. It showcases examples of best practice; provides a self-evaluation tool to map modules and programmes; and a Digital Badge 'The Connected Curriculum and You' to develop a shared language and understanding; intensive curriculum design sprints; and teaching enhancement grants. This multi-pronged approach ensures broad staff engagement. UCC's Sustainability Academy is a leading sustainability training provider for stakeholders ranging from individuals to large industry partners enabling UCC to respond flexibly and rapidly to the growing demand for sustainability training.

The literature highlights the need to embed sustainability education across disciplines to build sustainability competencies [14]. In 2016, UCC took this one step further by launching a university-wide, interdisciplinary sustainability module focussed on the SDGs, titled 'Putting Sustainability in its Place: Putting Yourself in the Picture', as a foundation for sustainability citizenship outside of existing disciplinary frames. Open to students, staff and the public, it is offered as an accredited module, Continuing Professional Development (CPD) or Digital Badge, and this flexibility has been integral to its reach and success. Its action-based, locally focused group assignments make it a model of transdisciplinary practice.

Mapping sustainability across university curricula ensures that courses contribute meaningfully to the SDGs [15] and in 2018 and 2022 UCC assessed all courses and modules for sustainability as part of its application to the STARS process of AASHE [16,17]. Substantial progress was seen in the inclusion of sustainability in the curriculum, and the percentage of sustainability-specific and sustainability-inclusive courses offered at UCC rose from 5.6% to 10.7%, and academic departments with sustainability course offerings rose from 60.7% to 66.7%, over this interval. By 2025 75% of undergraduate programmes were mapped to at least one Goal. A combination of factors, including the Connected Curriculum framework and

the SDG Toolkit and associated CPD offerings, were key success factors.

The 2018 STARS evaluation revealed a lower-than-expected focus on sustainability across the UCC curriculum, prompting the development of an SDG Toolkit for Teaching and Learning to support teaching staff. Toolkit development was a co-creative process with UCC teaching staff and students, other Irish HEIs and community stakeholders. Staff were supported to explicitly frame their curriculum through the lens of the SDGs and to consider aligning activities, assessments, and learning outcomes with sustainability. Resources included mapping tools, a curated library and a Digital Badge 'Learning and Teaching with the SDGs'. An additional tool was created within the SDG Toolkit to encourage research-based teaching, reflective of the staff member's own research interests. In 2020, the UCC-developed SDG Toolkit was launched as an open-source web-based resources intended for all ESD skill levels. The global reach of the SDG Toolkit has exceeded expectations, and as of March 2025, there were over 25,000 visitors to web page from over 120 countries.

3.4. Research and Innovation

Interdisciplinary and collaborative research at HEIs plays a crucial role in the effective achievement of the Agenda 2030 and its SDGs, generating evidence-based solutions to sustainability challenges and contributing to capacity building [1]. UCC researchers, including those in the UCC Futures Sustainability Institute, advance scalable solutions to a wide range of global challenges. In 2021, UCC launched UCC Futures, a programme of research prioritisation across ten areas of strategic importance, informed by the SDGs to support the delivery of transformative interdisciplinary research addressing complex sustainable development challenges.

There is a growing interest in mapping research topics at HEIs to the SDGs to identify strengths and gaps to support delivery of solutions to sustainable development challenges [18]. In 2022 UCC mapped research across all disciplines that contributes to the achievement of the SDGs [19]. The SciVal research performance tool was used to analyse over 25,000 active titles from 7,000 publishers between 2017 and 2021, to map publications against Goals 1 to 16, as SciVal does not quantify Goal 17. 85% of researchers considered the SDGs as important in their work, and research at UCC directly contributed to all Goals, with 43% of publications addressing at least one of the SDGs. The dominant Goal addressed by UCC research was Goal 3 Good Health and Well-being, which featured in 16.6% of UCC publications, followed by Goal 7 Affordable and Clean Energy (5.3%) and Goal 9 Industry, Innovation and Infrastructure (2.6%) [19]. Impact case studies collected (n=119) also showed SDG 3 to be the dominant Goal addressed and highlighted the interconnected nature of the SDGs in research at UCC, with 76% of case studies contributing to more than one Goal. An online workshop raised awareness of the SDGs among the research community and, using an online tool, supported researchers to map their own research onto the SDGs (n=497). This project improved understanding of the SDGs, encouraged collaboration, and provided the university with an additional lens, beyond traditional structures, with which to view its research impact and potential. A network of 34 SDGs academic staff champions was established which amplified the focus on the SDGs in research. It is being utilised to build on the project's success and further increase knowledge, understanding and the potential of UCC researchers to shape and support achievement of the SDGs.

Universities have an important role as change agents beyond their campus gates. Engaged research describes action-oriented research methodologies grounded in cooperation among multiple stakeholders, defined as research 'with' society, rather than 'for'

society. At UCC, the work of many engaged researchers is directly linked to the SDGs, particularly the social, economic, and cultural dimensions of sustainable development. Considering this interlinkage, the provision of seed-funding for engaged research is directly connected to SDG Targets based on the SDG mapping tool.

Central to UCC's ambition to be a research-informed sustainable university is the idea of using the university campus as a Living Laboratory where students, academics and practitioners work together on sustainable solutions. Launched in 2018, UCC's Living Laboratory Programme provides seed funding for projects that solve real world problems; are based on partnerships between key stakeholders; test ideas in real life settings; and assess and share the findings openly. This framework has supported research in areas as diverse as the carbon footprint of websites, community wellbeing, human-nature interactions, the use of the campus arboretum for teaching and single-use plastic reduction.

3.5. Campus Operations and Practices

The environmental impact of a university campus stems from its infrastructure, energy use, transport, and waste management, as well as the environmental costs of its procurement practices. Sustainability is a cornerstone of research and teaching at universities like UCC, which has been at the forefront of the implementation of research-informed operations and practices to achieve campus sustainability for many years [11].

Reducing the environmental impact of campus buildings includes managing energy, carbon and water [20]. In line with its 2040 net-zero target, UCC has implemented a range of integrated measures. By 2024, UCC reduced Greenhouse Gas emissions by 32% improved energy efficiency by 48% through behavioural and infrastructural changes (relative to 2016-18) and. A standout example of this is the Western Gateway Building, opened in 2009, which is one of UCC's most energy efficient buildings. It features passive design elements, advanced insulation, and a groundwater heat pump system that reuses waste heat. Its heating needs are met with just 40kW of electricity per hour, with an annual heating footprint of only 24 T/CO_2 (down from 100 T/CO_2 for conventional systems) with a projected drop to 10 T/CO_2 by 2030. Green retrofitting, more efficient than rebuilding, is gaining popularity as a means of improving energy efficiency and mitigating the carbon footprint of existing campus buildings [21]. A wonderful example at UCC is the 45-year-old Enterprise Centre Building, which underwent a deep retrofit between 2022 and 2024, carefully timed around the academic calendar, avoiding displacement. This project achieved a 45% reduction in heat demand; a fully decarbonised heating system; 55% operational carbon savings (39 tonnes CO_2 annually); Heat Recovery Ventilation for improved occupant comfort and health; and modernised heating plant, all without disrupting academic activity, demonstrating the potential of sustainable renovation in active campus buildings.

Sustainable procurement, though relatively new and complex, has been an area of high impact at UCC. Sustainability is one of the six principles of the UCC's Procurement Strategy, and the Procurement Office provides links to areas of high impact including campus shops and restaurants. The greening of procurement encourages decisions based not only on cost, but also on environmental impact [7]. A key achievement was the 2018 launch of a plastic-free café, which eliminated over 100,000 disposable items in its first year and inspired the later wider Plastic Free Campus initiative. Procurement reforms have also helped embed sustainability in catering and extend its influence into the broader community.

UCC's 54-hectare campus includes 30 hectares of managed land, 31% of which is managed organically. UCC's *Biodiversity Action Plan 2018-2023* sets out research-informed

management plans for its grasslands, hedgerows, treelines and flower beds. Nature-friendly initiatives include native and companion planting, bird and bat boxes, and a no/low-mow policy introduced in 2017 that has enhanced wildflower growth. In 2024, UCC opened a biodiversity trail through its riverside campus to promote engagement with nature.

3.6. SDSN Ireland

UCC demonstrates sustainability leadership through its co-hosting of the Sustainable Development Solutions Network (SDSN) Ireland with Queen's University Belfast since February 2023. SDSN Ireland is part of a global network of 57 national and regional SDSNs functioning under the auspices of the UN Secretary General, composed of 16 member HEIs and NGOs partnering to accelerate SDG implementation on an all-island basis. SDSN works in partnership with government at local and national levels to better leverage HEIs and NGOs to support SDG progress. Working collaboratively, the network helped develop a suite of SDG indicators for fine-scale geo-spatial analyses to support urban and rural local authorities with localisation of SDGs. SDSN Ireland also focused attention on national SDG progress as Ireland is only projected to fully achieve 1 of 17 SDGs by 2030 [22]. Further, Ireland ranks only 157th of 166 nations for the 'Spillover' score measuring negative SDG impacts beyond a nation's political borders, e.g., greenhouse gases or modern slavery embodied in imports.

3.7. New Entry Points

A key driver of UCC's long-term success in embedding sustainability and the SDGs across all functions has been engagement with innovative entry points, and it has leveraged its existing competencies in research, education and operations to explore emerging opportunities for a sustainable transition. A standout example is the exploratory work on the importance of nature for students' wellbeing and the relationship between virtual reality exposure, exam anxiety and exam performance [23].

While sustainability transformation often drives the adoption of digital solutions, it is essential to recognise and address the environmental impact of digital operations themselves, which are not as visible as that of the physical environment. In 2024, a pilot project examined the sustainability of the UCC website (www.ucc.ie). The website is the university's primary communication channel with over 35,000 webpages and 5 million visits annually. Energy is expended to deliver websites, and their digital footprint is directly related to the amount of energy used. The pilot assessed how sustainable the web pages were, developed and applied practices to improve website sustainability, and measured the impact of these interventions. Environmental impact was assessed through a Digital Carbon Rating that uses estimated emissions (page data x number of visits) and page size to assign a letter grade for each page on the site, with heavier pages having lower letter grades [24]. A selection of sites across the main ucc.ie domain was examined and a range of average Carbon Ratings from F to C identified. While readability was good, the presence of unique meta-data was poor indicating that the sites were not operating sustainably. New practices developed and applied to improve sustainability included optimising image sizes and changing to new image formats; replacing PDFs with lighter web only content; rewriting pages for plainer English and better accessibility; and removing redundant content. These measures led to reduced data usage, improved Digital Carbon Ratings across some of the sites and a slight improvement to page readability. A total data usage reduction of 19% was achieved for sites included in this pilot study. The estimated reduction in carbon emissions was approximately 65%. This is an emerging area of practice, and further research is required to evaluate the robustness of the

methodologies currently in use.

4. Conclusions and Future Perspectives

The global sustainability movement is driving higher education to orient its teaching, research, operations and engagement functions to deliver on the SDGs (6). This paper describes UCC's progressive engagement with global sustainability challenges. It shows that, to be truly transformative, the SDGs must become embedded in everything universities do, including leadership, strategies, research and innovation, learning and teaching, partnerships, operations, engagement and advocacy (2,4). UCC's considerable success in this endeavour was underpinned by a whole-university approach and focus on creating a culture of sustainably across its campus. The sustainability ecosystem was embedded across the institution with the support of stakeholders from the top-down, bottom-up and middle-out into all levels of the University, enabling the participation of all students and staff. An ongoing commitment to driving advancement and exploring new and innovative entry points has been key to sustaining momentum. This paper highlights the importance of leadership, collaboration and agility as we work to secure a more sustainable future. It demonstrates the importance of integrating sustainability in strategic planning across all university functions. It strengthens our understanding of how the contribution of Higher Education to the SDGs can be achieved and how they can support societal transformation towards sustainability.

What has been integral to UCC's efforts is the emergence of global, regional and local organizations, such as AASHE, UNESCO and FEE, that have developed recognition frameworks for universities' integration of sustainability principles. UCC's commitment to, and success in, these initiatives provide opportunities to engage with innovative practices. UCC's continued pursuit of new entry points has borne remarkable success, establishing a model that can be employed across HEIs. UCC anticipates the post-2030 sustainable development agenda as a touchstone along its continued sustainability journey. The UN Pact of the Future, ratified in 2024, can potentially provide a key transitional element in this regard (25). UCC is well positioned to support the Pact's emerging themes with its student-centred whole-of-institution approach for advancing sustainable development while providing a supportive environment for connected research, teaching, learning and societal engagement characterised by an inclusive top-down, bottom-up, and middle-out institutional culture.

Digital Badge. Finally, we thank Professor Sir Ian Greer, Vice Chancellor Queen's University Belfast, who is Co-Chair of SDSN Ireland.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Authors Contribution

J.O'H. was responsible for conceptualisation of the work presented, had oversight and leadership responsibility for the activities therein, and contributed to preparation, review and editing of the manuscript. He is co-chair of both the UCC Green Campus Forum and SDSN Ireland. **J.F.B**. led on creation of the SDG Toolkit and is the manager of SDSN Ireland. He wrote the SDG Toolkit and SDSN Ireland sections and contributed to manuscript preparation, review and editing. **S.C.** led the conceptualisation and supervision of the mapping of UCC research to the SDGs and contributed to manuscript review and editing. **S.I.** was responsible for administration and for preparation of the initial draft manuscript from all sources, including visualisation, review and final editing. **M.J.K.** contributed content on the Sustainability Journey and manuscript review and editing. **G.M.** is co-founder and coordinator of the University wide Sustainability module and contributed to content of the Learning and Teaching Section. **D.N.** and **C.O'M**. also contributed to content of the Learning and Teaching section. **J.O'D**. led the project on mapping of UCC research onto the SDGs, including data collection, curation and analysis, and all stakeholder engagement. She wrote the Research and Innovation section. **M.P.** is co-chair of UCC's Green Campus Forum, is UCC's Energy Performance Officer and Sustainability Champion. He was responsible for oversight and leadership of the Campus Operations and Practices work. **M.R.** conceived the sustainable website pilot project, designed the methodology for the project, and led on data collection, analysis and interpretation. He wrote the New Entry Points section and contributed to manuscript review and editing. All authors reviewed and approved the final version of the manuscript.

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