

Submitted 131221

A University's Transformational Change Agenda and Impact on Local, National and International Sustainability Initiatives

Longhurst, J.W.S., Gough, G.K. and Brooks, I.

University of the West of England, Frenchay Campus, Coldharbour Lane, Bristol,

BS16 1QY, United Kingdom

Corresponding author: James.Longhurst@uwe.ac.uk

Keywords UWE Bristol, Transformational, ESD, Change, Chronology

Abstract

This chapter presents a chronological review of the University of West of England, Bristol (UWE) and its engagement with the environmental agenda of the late 20th century before reviewing its transformational sustainability agenda over the last twenty years within the university staff, student and leadership bodies. It considers actions undertaken by staff to promote environmental action in the late 1990s and explores key factors that have enabled, supported and directed the sustainability agenda within the university. Significant amongst these factors have been the interests and enthusiasm of staff, the expectation and latterly demand of students, and senior staff leadership. In the last two decades strategic direction has become clearer and embedded within the overarching university strategy that, in turn, has set clear targets and timescales for action. The university has been willing to embrace change and has learned from failure to fully embed sustainability within decision making or to carry through sustainability ambitions when faced with short-term cost challenges or value engineering decisions. These latter issues have improved through external certification to ISO 14001 and Responsible Futures accreditation as well as from the increasing expectation of

students and staff for demonstrably sustainable outcomes from university actions and investments. Throughout the university's transformational change process a critically important element has been the partnership with the Students' Union (SU) External drivers of transformational change are discussed and opportunities to celebrate sustainability actions, such as in 2015 when Bristol was the European Green Capital noted. Four case studies conclude the chapter exemplifying the transformation the university has undergone over the last thirty years as it addressed the environmental and later the sustainability challenges that society faces.

Introduction.

The University of the West of England, Bristol (UWE) occupies three campus locations in the City of Bristol and in South Gloucestershire. It has over 30,000 students, some 4,000 staff and a 2019/20 income of approximately £300 million (UWE, 2020a). Students come to UWE from all parts of the UK, as well as a significant and growing number of international students from over 140 countries worldwide. UWE currently has four faculties covering Arts, Creative Industries and Education, Business and Law, Environment and Technology, Health and Applied Sciences. The university has invested over £300m on projects as part of the UWE Campus Masterplan with developments including a new Engineering building (opened in 2021), a new Bristol Business School (2017), a new Students' Union building (2015), ongoing redevelopment of the Bower Ashton Campus, creation of the City Campus (2018) and new student accommodation on Frenchay Campus over the last 6 years. The next development is a 900-bed student hall of residence designed and to be built to the PassivHaus standard. Through the breadth and quality of its teaching and research, and by providing expertise for businesses, UWE makes a major contribution to the development of Bristol and the wider region. It recognises that it must do this in the most sustainable manner possible to meet the ambitions and mission of Strategy 2030 to transform futures (UWE, 2020b).

The university has a long association with environmental management and sustainability. Its environmental management system is certified to ISO 14001-2015 standard (UWE, no date) having initially been certified to the 2004 standard. Perhaps uniquely the certification covers both the traditional estates management activities and the academic endeavours of the university. From 2016 onwards the university has been accredited to the Students Organising for Sustainability Responsible Futures Mark (Students Organising for

Sustainability, no date). UWE sustainability credentials include being a signatory of the Talloires Declaration (Association of University Leaders for a Sustainable Future, no date), holding an advanced signatory status for the UN Principles of Responsible Management Education (no date) alongside being a signatory of the SDG Accord (no date) and the UN Race to Zero for Universities and Colleges (no date). The university has worked hard over many decades to reduce its direct environmental impacts and to ensure that sustainability considerations are present in the institution's teaching, research and community engagement activities. In doing so it has organically, and then consciously through strategy, sought to create a culture in which sustainability can be discussed and enabled. Critical to this approach has been a highly effective partnership with the Students' Union and with national and local sustainability organisations.

How though has the university undergone its own transformational journey? What internal actions and external drivers have influenced staff, students and senior managers to enable a complex and widespread sustainability engagement to be present within the university community? In answering these questions, this chapter reviews the key drivers over the last thirty years that have enabled UWE to develop its approach to sustainability. Initially, environmental considerations were a component of specific degree programmes and related research but today the institution seeks to embed sustainability across campus management, curriculum, research and community engagement.

Transforming UWE Engagement with Sustainability: The Early Actions

Like many universities during the 1980s and early 1990s, UWE offered degree programmes addressing planning, environmental management and biological aspects of the broad

environment and sustainability agenda. This focused on activity within individual departments and faculties and lacked strategic coherence. The 1992 UN Earth Summit, in Rio de Janeiro was perhaps the first global event that raised awareness of the multiple challenges facing society (United Nations Conference on Environment and Development, 1992a). One significant output of the summit was the agreement on Agenda 21, an action plan for sustainable development for implementation at local, national, and global levels (United Nations Conference on Environment and Development, 1992b). In the UK, recognising the key role of further and higher education response to Agenda 21 and other Earth Summit outputs, the government commissioned the Toyne Report on environmental responsibility (Toyne, 1993) and the UK government published its first Sustainable Development Strategy in 1994 (UK Government, 1994) UWE's response was largely bottom-up, with staff in the faculties of Applied Sciences, Built Environment and the Business School organising local initiatives to green activities and promote and enhance environmental education and research. In parallel, staff and students began to contribute to Agenda 21 initiatives and actions across the city region, particularly in Bristol and South Gloucestershire. Staff engagement in environmental and sustainability activity at faculty level prompted the university to develop its first Environmental Policy, approved by Academic Board in 1994. This policy focused on regulatory compliance but hinted at a wider recognition of the interrelated nature of the sustainability agenda with social, cultural and economic matters. This policy, with minor updates, remained the university's public commitment to environmental matters until mid-way through the first decade of the 21st century.

UWE's Transformative Actions in the First Decade of the 21st Century

In the early part of this decade, sustainability actions started with local initiatives in departments and faculties which gradually generated a cross institutional awareness and a more systemic engagement with the agenda emerging from 2004. Senior leaders, particularly Deans, saw the opportunity for coordination of internal and external engagement and a university Sustainability Committee was established, becoming the Sustainability Board in 2004. This structure continues to this day as the principal coordinator of action and approver and supporter of sustainability initiatives. In parallel, staff became more actively involved in national, regional and local sustainability undertakings, for example Board membership of Sustainability South West and The Natural Step UK. An important development in 2005 was the establishment of a sustainability team in Facilities tasked to lead and manage the sustainability elements of campus management and to provide inputs to the wider agenda within UWE. Emerging from the work of the Board and the energy and enthusiasm of the sustainability team, 2005 also saw the development of UWE's first Sustainability Action Plan (UWE, 2005) followed by the Environmental Purchasing plan (UWE, 2006a) and in 2007, UWE's first Sustainability Strategy (UWE, 2007) prioritising integrated action across the domains of campus, community, research and estates.

External engagement continued across the decade sharing sustainability knowledge and learning from others. Particular activities that helped shape UWE's understanding of the opportunities and challenges included staff chairing the Great Western Research Sustainability Panel (see e.g. UWE 2006b) and chairing the Higher Education Academy's Advisory Board for the Geography, Earth and Environmental Sciences Subject Centre see Chalkley,2001 for detail of GEES). Local sustainability engagement found a new emphasis in

2007 with the establishment of the Bristol Green Capital Partnership (no date). UWE staff have been heavily involved in this city-wide partnership from the outset and have twice chaired the Partnership Board. Also important here was the 2007 launch of the Bristol Environmental Technology and Services Partnership, later Low Carbon SW (Companies House, no date)). UWE became a founding member of this initiative and continues its involvement to this day with the successor body, the Future Economy Network (no date). Both these structures have provided important opportunities for student placements, internships, staff research and knowledge exchange and wider community and business engagement possibilities.

In recognition of the important role the curriculum plays in developing awareness and understanding of the sustainability challenges, the Sustainability Board initiated an institutional review of sustainability within the university's modular scheme. Reporting in 2007, this review revealed substantial elements of sustainability considerations across the modules in the scheme but also identified gaps and partial recognition of the environmental, social, cultural and economic components of sustainability within some parts of the scheme. In order to reinforce the good elements identified and to address the weaknesses, the Sustainability Board recommended the establishment of a cross university Knowledge Exchange for Sustainability Education (KESE) group with membership from each academic department, the sustainability team and the Students' Union (UWE, 2008)). In establishing KESE the university reflected upon an appropriate definition of Education for Sustainable Development and adopted the UNESCO definition current at that time, see Table 1. KESE was formally established in 2008 and charged with the promotion and enhancement of Education for Sustainable Development in both the formal and informal curriculum. The terms of reference for the KESE group specified the production of an annual action plan and a reporting route to both the Sustainability Board and to the Learning and Teaching

Committee of the university, see Appendix 1. The first KESE Action Plan was launched in 2009, with a report on progress and an action plan for the subsequent year produced annually. Meanwhile, from 2007 to 2011 the university's sustainability research and knowledge exchange activities were drawn into a Research Institute for Sustainability, Health and Environment, bringing together research on planning, architecture, water, air and carbon management, environmental law, public health, ecology and conservation and business and economics. Current research in these areas can be viewed in the university's Research with Impact web page (UWE, no date d)

UWE's Transformative Actions in the Second Decade of the 21st Century - Strategy 2020

In 2010, UWE launched Strategy 2020 (UWE, 2010) setting the institutional and wider context for a decade of action to transform the university. The strategy headlined a range of curriculum, research and campus development actions particularly through its commitment to creating:

'graduates ready and able to realise their full potential, make a positive contribution to society and their chosen field of employment or further study, and play their full part in the development of a sustainable global society and knowledge economy'
(UWE, 2010)

Strategy 2020 provided the authority to develop a new sustainability plan for the decade. After two years of development work the university published its new Sustainability Plan – Positive Footprints (UWE, 2014) to deliver the sustainability ambitions vested in Strategy

2020. The new plan was co-produced with staff and students and outlined the university's sustainability aims for the period 2013 – 2020. It defined the mechanisms by which sustainability was embedded within the university's day-to-day operation and decision-making processes and set out how the Strategy 2020 ambition of advancing the health and sustainability of our locality and region could be supported alongside explicitly setting out the contribution of ESD to Strategy 2020's priority for ready and able graduates. Importantly the Plan provided a guidance framework for the development of a sustainable estate infrastructure, especially important as the university was embarking upon a master planning process ultimately leading to some £300 million of capital investment over the decade.

The university submitted its Sustainability Strategy to the UK and Ireland Green Gown Awards 2010 and won the Continuous Improvement and Institutional Change award (EAUC, 2010).

Throughout 2010-2020, the KESE group submitted an annual report and action plan to the Learning Teaching Student Experience Committee and the Sustainability Board highlighting opportunities, achievements and barriers to progress. From its inception in 2008, the KESE group had sought to provide opportunities for ESD within each and every taught programme in UWE. By 2015 the university's internal audit processes indicated that this had been achieved with recognisable sustainability considerations present in all taught provision. As part of the annual audit for ISO 14001 certification this was externally verified by third party investigation. The research and knowledge exchange engagement with sustainability was enhanced in the early part of the decade by the award to UWE of a multi-million pound contract to establish the Environmental Technology Innovation Network for the South West funded by the Regional Development Agency, the Department of Communities and Local Government and the European Regional Development Fund. The Innovation Network was led by UWE and delivered by a consortium of universities, third sector bodies and local

authorities with the specific purpose of supporting the growth of small and medium sized enterprises (SMEs) in the environmental technology sector.

Internal coordination of sustainability within the university was enhanced by the appointment in 2011 of an Assistant Vice Chancellor (AVC; author JWSL) with specific responsibilities for Environment and Sustainability and the chairing of the Sustainability Board. This was closely followed by the appointment of the first senior lecturer in Education for Sustainable Development in UK Higher Education (author GKG) with specific responsibility for leading the KESE group. Several new developments followed these appointments, including the start of an annual ESD conference, the production of specific teaching resources to support ESD in the curriculum and the incorporation of ESD consideration in the Academic Development Programme for new staff. Internal coordination of ESD was further enhanced by the instigation of an annual meeting with each Head of Department to review progress and to explore support needs and further developed through a meeting with each Faculty Executive to ensure coordination and coherence of agreed actions.

In the early part of the decade, an important outcome of the work of the Sustainability Board was the development and approval of the university's first Ethical Investment Policy (UWE, no date). Responsibility for the policy is jointly held by the AVC and the Director of Finance. Although UWE had no investments in stocks and shares, then or now, it was important to produce a comprehensive policy that provided clarity about risks and requirements for ethical investment in the unlikely circumstance that the university would begin an investment programme. This policy is reviewed annually and updated with banking practices and pension payments explicitly brought within the purview of the policy. In common with all sustainability policies, statements, plans and reports, this policy is published on the university sustainability webpages (UWE, no date e).

In 2012, the AVC was appointed to the Higher Education Academy's (HEA) Education for Sustainable Development Advisory Group and later became chair. This role helped to create the circumstances in which the HEA and the Quality Assurance Agency (QAA) could collaborate to develop UK Higher Education's first authoritative guidance on ESD (QAA- HEA, 2014). This collaboration between the agencies and academic and student members was chaired by the AVC. The sector wide guidance was published in 2014 from which date UWE began to examine how to incorporate the precepts of the guidance within its processes and procedures. Responding to the new Sustainability Plan and the 2014 launch of the QAA – HEA Education for Sustainable Development Guidance, UWE developed a guide for staff outlining the role of the Quality Management Framework in supporting and enabling ESD within curricula. External recognition of UWE's growing sustainability engagement came in 2014 when the university joined the Association of University Leaders for a Sustainable Future as a signatory of the Talloires Declaration (ibid). Over the early part of the decade the university had developed its environmental management system and in 2014 achieved certification to ISO 14001-2004 standard, covering campus management and ESD within the university curricula.

Within the Students' Union, support for sustainability had been growing across the decade. Notable developments included appointment of a full-time sustainability coordinator, supported initially by a special award from the university, the development of a Green Team student group, establishment of a Sustainability Committee of students mirroring the university's Sustainability Board and an elected Sustainability Officer post within the SU establishment (Students' Union at UWE, no date a) The transformational success of these developments became clear through accreditation to Responsible Futures and recognition for

five years in a row as the number one students' union in the UK under the National Union of Students Green Impact Scheme (Students' Union at UWE, no date b).

From 2010 onwards, the university supported Bristol City Council's ambition to achieve the status of European Green Capital (no date). This was awarded for the calendar year of 2015 and the university became fully involved in the design and delivery of the programme of activities. The Vice Chancellor served on the Board of Bristol Green Capital, providing oversight and direction for the programme, whilst UWE launched its own Green Capital Strategy to engage staff and students in the activities. UWE, in partnership with the University of Bristol, led a successful bid to the Higher Education Funding Council for England for a two-year Green Capital Student Capital project designed to enhance student engagement in city-wide sustainability projects, placements and volunteering. This set a target to engage students in 100,000 hours of sustainability action across the year; by the end of the project over 135,000 hours had been recorded by students by the two universities (Bigg *et al.*, 2018)

In 2015, UWE staff served on Bristol City Council's (BCC) Resilience Sounding Board and helped produce Bristol's Resilience Strategy (BCC, 2016). This was undertaken as part of the Rockefeller Foundation's 100 Resilient Cities initiative (Rockefeller Foundation, no date). In 2016, the university undertook various sustainability developments including installing the largest single roof mounted photovoltaic array in the HE sector on its Frenchay Campus, and moving its external electricity supply to be Renewable Energy Guarantees of Origin certified as 100% renewably generated. That year UWE hosted EAUC's 20th Annual Conference where the university showcased its integrated approach to sustainability in campus operations, curriculum, research and community engagement. Alongside the conference, the Frenchay Campus hosted the Whole Earth exhibition 'a powerful exhibition of the environmental and sustainability challenges' that we face (UWE 2015). UWE's

support for sustainability in the city region saw the university become a founding funding partner of a newly constituted Bristol Green Capital Partnership Community Interest Company and UWE's AVC become the interim chair and later Board member. UWE supported the development of Bristol's One City office, in turn responsible for the development of the One City Plan (Bristol One City Office no date a) structured around the SDGs, and later supported development of the One City Climate Strategy (Bristol One City Office no date b).

With the launch of the Sustainable Development Goals in 2015, (United Nations General Assembly, 2015) UWE began to consider how the SDGs could be used as a lens to view sustainability practices and how institutional actions could be reported against the set of seventeen goals. In 2016, UWE launched the first phase of an institution wide SDG Mapping Project exploring the contribution of faculties and research centres to meeting the SDGs (Gough, 2017). Later on the project expanded to document the contribution of individual undergraduate and postgraduate taught provision. These initiatives were showcased when UWE hosted the UN Global Compact SDG's road show in 2016. In 2017 UWE and the Students' Union became the first UK institution to sign the SDG Accord (no date).

By 2016 UWE had made significant progress on meeting the aims of the Sustainability Plan and in 2017 published a refreshed Sustainability Plan 2.1 (UWE, 2017)) and developed a new Environmental Sustainability Policy. UWE's Sustainability Plan 2.1 directed university action to

1. reduce and manage operational environmental impacts,
2. support the entire student body to develop competencies, skills and attributes to enable them to cope with an adverse future in their professional and private lives,
3. engage in research to address global and local challenges,

4. support the local community in responding and adapting to the climate and ecological emergency, and
5. support national agencies in their sustainability engagement.

These initiatives supported the university in its transition to certification against the ISO 14001:2015 standard.

The refreshed Sustainability Plan charged the KESE group to develop the ESD agenda across the institution progressively enhancing the presence of ESD in the discourse of the university, providing opportunities for students to explore sustainable development in the context of their discipline and ensuring that ESD continued to be embedded at the programme level. The group also played a key role in supporting staff development with regards to ESD. In 2018 the work of KESE was recognised by Advance HE through a Collaborative Approach to Teaching Excellence award (Advance HE, 2018)

Support for national initiatives include the QAA and Advance HE appointing UWE's AVC as co-chair of the Advisory Group charged with updating the 2014 ESD guidance for higher education. ESD experts from across Great Britain came together over a two-year period to review and update the guidance. UWE also provided a Board member for the EAUC, later providing the chair and an EAUC Climate Commissioner. Local community engagement activities continued with five members of UWE appointed to Bristol's Advisory Committee on Climate Change (no date) and a special University Advisory Group was established to support South Gloucestershire's Climate Emergency Action Plan (no date).

Physical transformation of the UWE estate continued over the decade with significant investment on all three campus locations. Developments addressing UWE's carbon management included commissioning of a new Combined Heat and Power station and district heating network on the Frenchay campus alongside substantial efforts to improve energy efficiency and thermal comfort in the building stock.

From Achievements in Strategy 2020 to Ambitious Aims in Strategy 2030

Towards the end of the Sustainability Plan 2013 -2020, UWE reviewed its progress and remaining challenges. In the report it noted that despite a significant increase in student and staff numbers and a substantial increase in the footprint of UWE's estate, the plan had met its goals (UWE, 2021d). In the report's foreword, Vice Chancellor Professor Steve West said:

'I'm incredibly proud of the progress UWE Bristol has made through the Sustainability Plan 2020. In so doing we responded to both the climate and ecological emergency and the expectations of our students for sustainability to be embedded into their higher education experience. We will build on this fantastic progress and, over the coming decade, UWE Bristol will continue to play a key role in driving the remarkable transition to a decarbonised and regenerative economy in the west of England and beyond. Our students and our future students will be the generations most affected by the impacts of climate change and biodiversity loss, so we must continue to find ways to prepare them for the challenges that lie ahead, and through our outstanding learning, research and enterprise find and demonstrate the socially just solutions to this most fundamental of global challenges. (UWE, 2021d).

In 2020 UWE adopted an institutional Strategy 2030 (UWE, 2020b) which *inter alia* commits the whole university to 'work to address the urgency of the climate and ecological emergency and strive to fulfil our role in the achievement of the United Nations' Sustainable Development Goals'. Strategy 2030 sets seven strategic sustainability commitments for the university to meet in the decade.

1. Net-zero emissions of greenhouse gases by 2030.

2. Clear targets and plans to reduce water and energy use, cut waste generation including food waste, and support biodiversity. Towards a circular economy.
3. Eliminate all but essential single-use plastic by 2025.
4. Establish all our campuses as clean air and smoke-free zones.
5. Secure year-on-year improvement in sustainable travel.
6. Work with our students to explicitly address climate change and environmental challenges in the curriculum.
7. Support research that addresses climate change, environmental challenges and biodiversity.

Strategy 2030 provides the authority and context for the development of UWE's new Climate Action and Sustainability Strategy 2030. This in turn enables the development of a suite of action plans covering Education for Sustainable Development, Sustainability Engagement, Sustainable Food, Transport, Carbon and Energy Management, Clean Air, Circular Economy including plastics, and Biodiversity (UWE, 2021c). Concern by staff and students' led UWE's Board of Governors (2020) to declare a Climate and Ecological Emergency and that year saw the establishment of an internal Changing Climate Research Network to promote cross university engagement with the climate challenge and designation of a Climate Action and Sustainability Research Beacon.

Recent community engagement activity includes UWE students supporting the development of the Global Goals Centre in Bristol and MSc Environmental Management students working with the Bristol Green Capital Partnership to prepare a Climate Action Guide for SMEs. Recognising the importance of collaborative engagement with the climate emergency, UWE has signed the Global Climate letter, later the UN Race to Zero campaign for universities and colleges (ibid), committing to verifiable, time dated action to address the climate emergency in operations and other institutional activities. External recognition of

UWE's sustainability credentials continued in 2020, with the award of a UK and Ireland Green Gown in the Total Reporting category and in 2021 winning the Green Gown in the Tomorrow's Employees category. The Students' Union continued their impressive run of awards being designated for a fifth year in a row the leading Students' Union in the NUS Green Impact Awards. These Awards are way markers of the university's engagement in the sustainability journey, provide a moment for celebration and an opportunity for reflection on the efficacy of strategy and the need for new action.

2021 saw the launch of the QAA-Advance HE Education for Sustainable Development Guidance (QAA, 2021) and UWE's Learning, Teaching and Student Experience Committee resolving to:

1. Adopt and implement the ESD guidance within all taught provision.
2. Use the quality management system to assure itself that the ESD guidance is embedded.
3. Use the external audits undertaken as part of the ISO14001 certification and Responsible Futures accreditation as third party verification of the presence and use of the guidance within the curriculum.

Following the opening of the award-winning new School of Engineering building, designed and built as BREEAM Excellent, work has now commenced on a new student accommodation block designed to PassivHaus standard. Support of civic engagement continues with the launch of the Skills for Clean Growth (UWE, 2021b), a new programme of support for businesses in the West of England funded by the West of England Combined Authority.

Leadership and Governance

The governance of the former Sustainability Plan and the new Climate Action and Sustainability Strategy was delegated by the Vice-Chancellor to the Sustainability Board. This meets five times a year and is chaired by the AVC for Environment and Sustainability. Membership includes the PVC Research and Business Engagement alongside a further member drawn from the Directorate, the Senior Leadership team, on a rotating basis, the Director of Estates and Facilities, a representative of the faculty Deans, the President and a Vice President of the Students' Union, an Associate Dean (Teaching and Learning), an Associate Dean (Partnerships), the chair of KESE and the chair of the Climate Action and Sustainability Group. In attendance are the Action Plan Leaders, the SU Sustainability Officer and representatives from all three recognised trade unions. Students and staff attend as observers. The terms of reference are presented in Appendix 2. The Board takes its authority from and reports to the Directorate, Academic Board and the Board of Governors. At each meeting, the Board reviews progress with the themes and targets of the strategy. It undertakes regular reviews of policies including the Environmental Sustainability Policy and the Ethical Investment Policy, approves action plans, reviews progress with the commitment to the UN to Principals of Responsible Management Education (PRME) across the institution, and provides governance of the whole institution certification to ISO 14001:2015 standard and the Responsible Futures accreditation. The Sustainability Board takes operational responsibility for the implementation of the actions that follow from UWEs Board of Governors that declared a Climate and Ecological Emergency in January 2020.

Societal Benefits

UWE's teaching, research and estate management practices contribute directly to local, national and international societal benefits. With some 7,000 graduates a year and research addressing key societal challenges, UWE makes a significant contribution through its sustainability actions. Its civic engagement is diverse, with staff and students leading or supporting local organisations or initiatives such as the Bristol Advisory Committee on Climate Change, Bristol Green Capital Partnership, the Global Goals Centre, the Natural History Consortium, South Gloucestershire Council's Climate Action or Bristol's Going for Gold Sustainable Food Award. This local action extends nationally and internationally, with research activity addressing most of the social, environmental and economic SDGs and staff advising enterprises on sustainability improvements. UWE's business support includes a new green skills scheme, online resources for SMEs, business advice clinics, an entrepreneurs' support programme and a team of enterprise advisers. Together these provide an array of societal benefits, perhaps best illustrated by Oxford Economics study (Oxford Economics, 2015) showing that in Strategy 2020 UWE's direct and indirect expenditure supported one in 79 jobs in the West of England area. UWE has influenced thousands of university suppliers to engage with sustainability and the university spends more than £60 million per year within a fifty-mile radius, and 49% of its expenditure was with SMEs in 2019/20 with more than 10% of the supplier base (>70 suppliers) being charities or social enterprises.

UWE recognises that the biggest sustainability impact of HE is the lifetime impact of its graduates. If we develop a sustainability ethos in our students, it is likely that they will minimise their footprint on the planet in both their professional and private lives. We

continue to develop our capacity to prepare our students for the sustainability challenges in their life course through each and every one of our programmes of study.

Sharing of Practice

Our approach has been the subject of numerous presentations, peer reviewed publications and paper or video case studies, (see for example Bigg *et al.*, 2018; Cimil *et al.*, 2017; Fiselier and Longhurst, 2018; Fiselier *et al.*, 2018; Gough and Longhurst, 2015, 2018; Longhurst, *et al.*, 2015; Longhurst and Gough, 2018; Price *et al.*, 2021) and these are available through UWEs research repository or sustainability website. Our sustainability ethos is one of collaboration and partnership, willingly sharing our failures and successes and helping others with their own unique sustainability journeys. In 2020/21, we provided assistance to a neighbouring further- and higher-education provider, to share lessons learned. The experience of the university is transferable to both a national and international stage. Whilst the direction and rate of UWE's sustainability journey is unique to the institution, the learning experiences are relevant to a broad range of institutions. The reach is amplified by the annual graduate cohort who will live and work across the world. UWE's impact at the local level is also worthy of note, through our sustainable procurement work we are directly influencing up to 6,000 university suppliers in many industrial and business sectors, a significant number of whom are SMEs and form the hinterland of the university. Our national reach is amplified by national engagements such as the Climate Commission, the EAUC or co-chairing the development of the 2021 ESD guidance from QAA and Advance HE.

Departmental Translation of University Strategy: the Case of Computer Science

The Department of Computer Science and Creative Technologies (CSCT) is a case study of transformational change within UWE. Computer Science as a discipline does not have a strong history of engagement with matters of sustainability. The caricature of a computer science student is one whose preoccupation is with coding, algorithms and gaming. The typical approaches within computing are to define the scope boundary of a problem as tightly as possible and to stay within that scope. This is antithetical to sustainability where we need to consider global interactions and to account for the externalised impacts of systems and businesses.

UWE CSCT is now at a point where every student is aware of the SDGs (United Nations General Assembly, 2015) and where the curricula of a number of its degree programmes have been mapped towards the SDGs (Gough, 2017). It is one of the few Computer Science Departments in the UK which has a mandatory sustainability module (Sustainable Business and Computing) on one of the BSc programmes.

It might be argued that Computer Science is not part of the sustainability problem. The carbon footprint of the Information Communications Technology (ICT) sector is relatively small, at less than 2% of global emissions (Malmodin and Lundén, 2018) and it is one of the easier sectors to decarbonise by switching to electricity from renewable sources. However, the major impacts come in what ICT can enable as illustrated by the relationship to individual SDGs. Video conferencing can enable reductions in the carbon footprint of meetings by replacing travel (SDG 13). Cancer Care Informatics enables the delivery of improved health outcomes (SDG 4). Smart City initiatives are key to the delivery of sustainable city transport (SDG 11). The department is becoming increasingly good at

teaching the benefits that may be described as ICT for Sustainability (ICT4S) or Tech for Good. It is a topic that industry and professional bodies are now keen to promote.

The recent progress in the department builds on a foundation of two decades of engagement by its staff with the community in Bristol and supported by UWE policy and strategy. There is a real advantage to being based in a city with a reputation for sustainability and a well-developed network of activists and community organisations. The department is well known in the city for its CAKE programme – Community Action and Knowledge Exchange (UWE, no date b). This is a major thirty-credit module for final year students where they work in teams to deliver digital projects for community organisations. These teams create websites, digital media strategies, ICT feasibility studies, package selections and similar projects. Every year there are more community organisations applying to participate than the department has capacity. This unit exemplifies transformational change – for the local community with ICT projects which enhance their capacity to deliver sustainability, for students in what they learn about the needs of the city in which they live but might not otherwise encounter and for the university in developing relationships with organisations which are transforming the city for the better.

The department first hired a Senior Lecturer in Sustainable IT in 2015 and the initial focus was on introducing students to sustainability issues and concepts in their first week at university (Brooks, 2019). The impact of this can now be traced through to graduates choosing to work in IT companies committed to sustainability. . Now there is more teaching on sustainability embedded across the department's degree programmes, not just in the taught curriculum but also in coursework, e.g. using air quality measurement data sets in units on data analysis and presentation. There are also an increasing number of student dissertations on topics related to IT and sustainability. For example, using a Social Media Smart Meter to identify high carbon footprint activities in the city by analysing social media content, or

assessing the impact of moving applications from the university's own servers into cloud provision. There is also a current PhD student researching the use of the SDGs as requirements in Systems Engineering (Brooks, 2020).

The university strategy on sustainability provides institutional impetus for integration of sustainability into the department, building on a long-standing commitment to community outreach by many staff and programmes. Perhaps the next step in this sustainability journey is to engage more with the issues of how ICT enables activities that are damaging to sustainability (#Tech4Bad). This is a less comfortable discussion and one the ICT sector is less enthusiastic to engage with but one that academia needs to engage in a critical debate with the ICT sector.

Faculty Translation of University Strategy the Case of Bristol Business School

In 2017, UWE Bristol opened a new, £55m Bristol Business School building to serve 5,500 students in the Faculty of Business and Law (FBL). The building, at the heart of the Bristol Frenchay campus, has developed an important role in interdisciplinary working at UWE. The café in the atrium has become popular with staff and students from across the faculties and provides a space for the serendipitous interdisciplinary encounters which are such a source of value for a university campus. Interdisciplinary working is necessary to deliver holistic sustainability improvement (see for example Longhurst et al, 2015). The interdependencies within the SDGs demonstrate this. FBL is an instructive case study in interdisciplinary working towards sustainability, with many of its programmes mapped for their engagement with the SDGs (Gough, 2017).

Bristol Business School and Bristol Law School, the two key departments in FBL, have a history of active engagement with the KESE group. The Environmental Law and Sustainability Research Group in the Law School has an international reputation and staff play a significant role in international projects, such as the Global Assessment on Biodiversity and Ecosystem Services (Razzaque and Visseren-Hamakers, 2019). Staff from the group also teach on programmes in other faculties – Faculty of Environment & Technology (FET) and Faculty of Health and Applied Sciences (HAS).

Bristol Business School has also hosted interdisciplinary projects such as Greenpreneurs (Aben et al, 2016), a collaboration developed and delivered as a pilot short course in 2016 to train entrepreneurs starting up green businesses; the team FBL and FET staff. The teaching approach was based on the approach used in the BA Team Entrepreneurship programme at UWE. It was funded by Erasmus Plus, led by Mondragon Innovation and Knowledge with Turku University of Applied Sciences as another partner institution. The pilot run at UWE drew on an interdisciplinary network in Bristol including practitioners in sustainable banking, renewable energy, construction, and brewing. Some of the teaching took place at Filwood Green Business Park in Bristol, where UWE staff were on the advisory board. A number of alumni from that first pilot have gone on to significant roles in sustainability in Bristol's networks. Whilst it was difficult to develop a successful funding model for further delivery of the course, the teaching materials are available online (Rajala *et al.*, 2017). Bristol Business School is also the host department for the Sustainable Economies Research Group. This group has been created with a deliberate aim of supporting interdisciplinary research, with members from across UWE's faculties bringing expertise such as ecosystems services and social sciences to the core economics research strength.

Despite these good examples of interdisciplinary research and teaching, there are barriers that create practical obstructions to interdisciplinary working. One particular

frustration has been the inter-faculty accounting processes for staff teaching across disciplines. This can have the effect of hindering the willingness of departments to support staff teaching in other faculties because of bureaucratic and opaque process of internal accounting and recognition of the contribution.

Bristol Business School is equipping students who will run businesses that thrive in a Net Zero carbon world. They will need the core business and management skills but with an added interdisciplinary understanding of sustainability – economic, social and environmental. They benefit from learning in the context of the city of Bristol. A city which has a declared target of becoming Net Zero by 2030, well ahead of the UK national target. UWE staff are members of many of the committees and organisations in the city which are planning and delivering this structural change. This engagement in local transformation enriches the interdisciplinary experience which students receive in preparation for their careers.

University Wide Curriculum Initiatives

Critical to transformational change in and through HE are the curriculum and academic staff. In relation to sustainability, an Associate Professor in ESD and KESE progress ESD both at a strategic level and in practice. KESE is charged with supporting the transformation of the curriculum and enhancing the sustainability capabilities, capacities and competences of academics across the institution (in line with expectations of UNESCO (2020) and the United Nations Economic Commission for Europe (UNECE) Steering Committee on Education for Sustainable Development (2011). One important output of the close cross- university working engendered by the KESE group was the development of a cross institution MSc

Sustainable Development in Practice, which was launched in 2012. This programme has staff and module contributions from each of the four faculties of the university.

Over time, KESE members have become agents of change within their own academic departments and beyond. The group began as a collective of individuals from across the institution who were interested in ESD. However, a deliberate change in approach to the constituency and management of this group was enacted between 2014-2016. Representative roles for each academic department were created to ensure coverage across all disciplines of discussions about ESD and to create a mechanism by which central commitments and intentions could be disseminated to departments and, critically, vice versa. These roles were voluntary at first but as they became critical to the institutional sustainability journey formal workload allocations were made by Department Heads. Team working is supported by monthly meetings where members share approaches to engagement successes and challenges. This has proved invaluable, especially for departments who are just beginning their engagement and can learn from the journey of colleagues to more rapidly implement best practices.

In addition to representatives from all academic departments at UWE, the KESE group comprises includes staff from SU. Supported by partnership with the SU, students themselves have been involved in numerous ways with the sustainability work of KESE and the broader institution. They have unanimously welcomed involvement in these activities, saying it has helped them to develop deeper understanding of their own discipline and appreciation for ways in which their knowledge can be applied to global challenges. Interdisciplinary appreciation between students and staff is a further outcome of these discussions, and student involvement in KESE work has helped to transform our approach to and expectations for ourselves.

Through presentations at various UK and international events, conferences and institutions, UWE's work has helped to transform the way in which other institutions approach their ESD work. Through transparency of process, success and failures, we hope to have enabled more rapid and successful change within the HE sector. Further, through our curriculum work, we hope to be contributing to transformation in all of the organisations, professions and sectors in which our graduates end up being employed. Quantified measurement of such impact is impossible but through alumni stories we will keep monitoring ways by which we are supporting pro-sustainability change and where there are best opportunities to do more.

For the past six years, UWE has been engaged in mapping curriculum, research and other projects against the SDGs. This SDG mapping initiative encourages reflection on pedagogy and on the purpose of each of our programmes of study; identification of opportunities for curriculum and programme enhancement; improvement to the student experience; development of staff capacity; and partnership working with students and industry to collaboratively identify appropriate future directions for our teaching and learning. With no obligation for staff or students to engage with our SDG activity, and an institutional objective for 100% of programmes to be engaged, the KESE team takes an extremely flexible and creative approach to encouraging colleagues and students to contribute to this work. The team also strives to work in a way that maximises outcomes, impact and supports the widest possible degree of staff and student engagement. After determining that a single, pre-defined approach to the mapping would not succeed in engaging a diverse range of colleagues, it established a system whereby each team member considers their local context but the whole team shares experience of specific approaches. Critical to the success of this approach has been leadership and a willingness by staff to explore and test ways of collaborative working.

The team has actively engaged multiple stakeholders in a mutually supportive process of SDG mapping from the outset. The SU has been a key partner in the university's SDG work. Induction, training and development activity for SU presidents, elected officers and course representatives explicitly address the SDGs. The SU's latest Action Plan was framed around the SDGs and KESE's ongoing engagement with the SU has enabled students to co-produce the SDG maps with members of the team

KESE has worked to ensure that all staff and student groups within the university are involved in the planning, implementation and review of our SDG work. This exchange of sustainability knowledge has enabled a deeper level of change within the organisation than we could have achieved alone. We invite professional service staff at all levels to our discussions and events, across all of our campuses. In this way, we are able to share our ambitions and activities, to draw ideas and feedback from stakeholders and inspire other members of the university community to reflect on their engagement with the issues represented in the SDGs.

Carbon Management Case study

The university has been working to reduce its carbon emissions for at least the last twenty years but action and outcomes accelerated in the Strategy 2020 period. At the end of Strategy 2020, the university achieved a 55% reduction in emissions compared to a 2005–2006 baseline and achieved its reduction target. (UWE, 2021a) Effort is focused on achieving the university's ambition to achieve a net zero outcome by 2030. A baseline emission has been calculated according to the methodology of the Greenhouse Gas Protocol Scopes 1, 2 and 3. The 2019/20 estimated emission is 67,738 tonnes, a 15% reduction on the previous year.

However, some categories of emission are not yet fully accounted for and some assumptions need to be verified. The 2019/20 year is abnormal as for four months of the year UWE was in lockdown, and prior to this international travel was on hold.

A key performance indicator (KPI) has been included in the Corporate Scorecard based upon the annual CO₂ emission (Scope 1-3) expressed per FTE staff and student. In 2019/20 this equalled 2.415 tCO₂e per FTE. As 2019/20 is an abnormal year, the use of this value as a baseline from which to track progress needs further consideration. Institutional strategy has been defined through the Net Zero 2030 target in Strategy 2030 underpinned by the Climate Emergency Declaration (ibid).

A Carbon Management Plan (ibid) has been developed using the Greenhouse Gas Protocol (no date) and incorporating the Science Based Targets Initiative (no date) approach. This is structured using the carbon management hierarchy of avoid, reduce, replace and offset. This is supported by a suite of operational action plans covering Water Management, Sustainable Travel, Circular Economy, Sustainable Food and Biodiversity (ibid). Work to understand offsetting opportunities is underway. A Scope 3 Reduction Plan is in development and is supported by a new Sustainable Purchasing Policy. Work continues to refine our understanding of the total emissions picture. Currently it excludes carbon emissions associated with home working which will count as part of Scope 3 and has uncertainties regarding commuting, catering, and cloud computing. Each of these will be addressed in on going work to improve measuring and reporting supported by the implementation of new energy measurement software.

Investments that have supported carbon management include the CHP, PV installations and purchase of renewably generated electricity. During 2019–20, UWE completed the installation of the combined heat and power (CHP) plant and district heating

network to provide low carbon heat and electricity to Frenchay Campus. The combined £2.5 million investment will deliver savings of £1,000 per day and annual savings of 683 tonnes of CO₂e. The district heating network will initially be powered by natural gas fired engines. In the future it provides the opportunity for other lower, net zero or zero carbon technologies to be added, in addition to extending the network to supply more areas of the campus. In order to achieve the net zero target a decision on an alternative fuel, such as biomethane or hydrogen, will be required otherwise the associated emissions will need to be offset. During 2019/20 PV installations generated 490MWh across UWE Bristol sites, saving 114 tonnes CO₂e and £73.5k from the utility bill. PV installations continue to be added to the estate with the most recent being on the new School of Engineering building. From 2014 the university purchased 100% renewable electricity, assured through the Renewable Energy Guarantees of Origin (REGO) scheme. In October 2019, UWE signed a power purchase agreement, securing direct purchase of wind power from four UK windfarms to cover 20% of UWE Bristol purchased electricity for the next 10 years. In a first for public sector energy users UWE has worked in collaboration with 19 other universities to secure this clean electricity contract.

New campus developments are a visible sign of UWE's net zero ambitions. The new student accommodation designed to meet the PassivHaus standard will deliver a 74% reduction in carbon compared to conventional designs and will help reduce commuting greenhouse gas emissions by providing some 900 bedrooms on campus. The new Engineering building has achieved a BREEAM Excellent certification thus demonstrating its high quality environmental credentials. Additions to the estate, such as the Enterprise Park buildings, can have a significant impact on the carbon emissions reduction pathway. In this case the purchase introduced a new emission source into the estate.

An important part of the approach to carbon management is engagement with staff and students to raise awareness and encouragement active engagement in the reduction of carbon emissions. Engagement work with staff has focused on climate cafés, designed to raise awareness of issues and actions. These provide a forum for discussion on climate issues and a chance to develop ideas on how that specific group can make change within its own activities and sphere of influence. These have been held in various faculties and services which in turn have generated self-sustaining activity within the various teams, for example the 100 sustainability commitments initiative by teams in Estates & Facilities.

Curriculum initiatives addressing the Strategy 2030 ambition of ‘working with our students to explicitly address climate change and environmental challenges in the curriculum’ are structured and implemented via the ESD Action Plan (ibid) supported by the cross university KESE group. Carbon literacy training is being developed for staff and students and is being infused into the curriculum. As part of introduction to academic year 2019/20, a carbon literacy session was developed in partnership with the Students’ Union and offered to new and returning students, some 100 students registered for the event. UWE post graduate students are undertaking numerous MSc projects addressing carbon management challenges in both Bristol and South Gloucestershire. The university also has a wide range of professional courses addressing carbon management. Notable amongst these is the enhancement short courses for built environment students and professionals, including the spring 2020 MOOC studied by over 1,600 built environment professionals from around the world. A similar enhancement course for students had over 1,000 attendees. The SDG Mapping project has enabled staff groups to consider the climate impacts of their provision and the opportunities to address these negative impacts in the curriculum. Adaptation also applies to curriculum, as it develops to meet the employment opportunities of a low carbon future. Research initiatives addressing the Strategy 2030 ambition of ‘research that addresses

climate change, environmental challenges and biodiversity' (UWE, 2020b) are supported by the Changing Climate Research Network and the Climate Action and Sustainability Research Beacon. The 2020/21 staff sustainability survey revealed the wide range of research, both funded and unfunded, being undertaken across the four faculties of the university. UWE staff are supporting climate emergency action in local authorities. A University Advisory Group is supporting South Gloucestershire's Climate Emergency Action Plan, and five staff are members of Bristol's Advisory Committee on Climate Change (ibid) and support the development of Bristol's One City Climate Strategy. Staff are also working to support three climate-related initiatives led by the Bristol Green Capital Partnership. UWE staff have contributed to the work of the Climate Commission for UK HE and Further Education, including development of the Climate Action Toolkit for HE (Climate Commission for Higher and Further Education, 2020). A programme of work to 2030 has been established that will track and manage the delivery of the sustainability and climate ambitions of the university. Progress with the university's net zero ambition is reported annually in the public Sustainability Report (UWE, 2020d). There are significant challenges to be overcome in arriving at a net zero university but it is within our grasp. At some point in the decade, UWE will have to offset residual emissions and is actively investigating how this can be done in the most effective and strategically beneficial way. Adaptation to the future climate has not received the same attention as mitigation but action must be ramped up across the rest of the decade to protect health, buildings, infrastructure and nature on each of our campuses. The long-term aim is to reduce emissions from each scope to as low as is reasonably practicable with a small residual requiring offsetting. To do so requires sustained technological and behavioural change interventions, as outlined in this report. Scopes 1 and 2 emissions can be managed to a very low level by 2030. Amongst other actions this will require the CHP engines to be fired on biomethane or hydrogen. Managing scope 3 emissions will be

challenging but we are putting in place the mechanisms to engage with this issue. The important point to note is that our Scope 3 emissions are made up of other parties scopes 1 and 2 emissions and national and international action will be directed at reducing these emissions. UWE will continue to embed carbon awareness into all areas of the university to build staff knowledge and awareness so that they can make conscious decisions in their area of influence recognising the carbon impact of these decisions. By including carbon literacy in the curriculum and supporting the development of a future facing, climate aware curriculum we will help prepare graduates for the climate challenges of tomorrow, enabling them to develop resilience and adaptability in the face of such change.

Conclusions

This chronological review of UWE Bristol's engagement with the environmental and sustainability agenda of the late 20th and early 21st century has reviewed and discussed the factors enabling the transformational sustainability agenda within the university. Significant amongst these factors have been the interests and enthusiasm of staff, the expectation of students and the strategic leadership of senior staff. In the last two decades strategy direction has become clearer and embedded within the overarching university strategy which, in turn has set clear targets and timescales for action. Recognising the important external signals, such as the UN Sustainable Development Goals or public concern about the climate and ecological crises, alongside the clearly articulated views of students and staff, the university has been willing to embrace a change agenda designed to improve its sustainability performance. Importantly it has learned from failure to fully embed sustainability within decision making or to carry through sustainability ambitions when faced

with short term cost challenges or value engineering decisions. External Certification to ISO 14001 and Responsible Futures accreditation has highlighted where sustainability gains might have been made from university actions and investments and helped with reorientation of strategy. Throughout the university's transformational change process a critically important element has been the partnership with the Students' Union. The Students' Union has embraced the sustainability agenda, transforming its own engagement with the issues and reshaping its processes and procedures to enhance sustainability outcomes.

We strive to engage with the 30000 students, 4000 staff and numerous research, teaching and commercial partners of the University to share our sustainability story. Our external accreditations have identified the strong involvement of our various communities in the sustainability journey but we recognise that there is much more to do particularly as the community of staff and students changes on an annual cycle.

Strategy 2030 now charts the course for UWE across the decade. Sustainability is at the heart of the Strategy through which UWE will work *'to address the urgency of the climate and ecological emergency and strive to fulfil our role in the achievement of the SDGs.'*

c9500 words excluding references and tables.

Table 1. Education for Sustainable Development Description

Education for sustainable development:
is based on the principles and values that underlie sustainable development;
deals with the well-being of all four dimensions of sustainability – environment, society, culture and economy;
uses a variety of pedagogical techniques that promote participatory learning and higher-order thinking skills;
promotes lifelong learning;
is locally relevant and culturally appropriate;
is based on local needs, perceptions and conditions, but acknowledges that fulfilling local needs often has international effects and consequences;
engages formal, non-formal and informal education;
accommodates the evolving nature of the concept of sustainability;
addresses content, taking into account context, global issues and local priorities;
builds civil capacity for community-based decision-making, social tolerance, environmental stewardship, an adaptable workforce, and a good quality of life;
is interdisciplinary.

Source: UNESCO, (no date) cited in Longhurst *et al.* (2015)

Appendix 1. Knowledge Exchange for Sustainability Education group initial terms of reference and reporting relationships.

KESE Initial Terms of reference and reporting relationships
Purpose
To support the delivery of the University's Sustainability Strategy and Learning Teaching and Assessment Strategy:
Objectives
To provide strategic direction to, and oversight of, activities contributing to Education for Sustainable Development in the curriculum.
To develop networking and institutional learning opportunities in ESD.
To periodically refresh our understanding of the progress of ESD nationally and internationally through benchmarking with other institutions.
To identify opportunities for new programmes and / or short courses in ESD
To provide periodic updating of institutional developments and practices in the form of reports to the Sustainability Board, Academic Standards and Quality Committee and other UWE fora.
To provide advice and support for the training and development of UWE staff for and in ESD.

Appendix 2 Sustainability Board Terms of Reference

Purpose
To enhance the sustainability practices and developments of the university in all its educational and operational endeavours and thereby to enhance the reputation of the university and its attractiveness to current and future students and staff as a place of study or employment.
To consider contemporary and emergent sustainability risks, opportunities and challenges and to advise the University on appropriate actions.
Terms of Reference
To support the achievement of Strategy 2020's objectives
To support implementation of Strategy 2030's aims and objectives.
To guide, support and develop the University's integrated approach to embedding sustainability in all of its endeavours.
To oversee implementation and achievement of the current Sustainability Plan.
To oversee development and implementation of the Climate Action and Sustainability Strategy 2030
To advise the Vice Chancellor, Academic Board and the Board of Governors on progress with the plan and matters pertaining to risk and reputation.
To share good practice and promote continuous improvement.
To assure the university that the requirements of ISO 14001 -2015 certification are met.
To assure the university that the requirements of Responsible Futures accreditation are met.
To support the implementation of the Principles of Responsible Management Education (PRME) across the university.
To advise on the sustainability implications of current and future policies and practices.
To advise on the continuing appropriateness of the Ethical Investment Policy.
To establish appropriate procedures to ensure effective communications within the university on issues discussed and decisions taken by the Board.

References

Aben, I., Brooks, I., Esnaola, A., Jarvis, C., Lopez Perez, S., Prieto Alonso, J., & Rajala, M. (2016). GreenPreneurs. In D. Remenyi (Ed.), *Innovation & Entrepreneurship Teaching Excellence Awards: An Anthology of Case Histories 2016*, 1-13. Academic Conferences & Publishing International.

Advance HE. (2018) *Collaborative Approach to Teaching Excellence award*. [Online]. Available at: <https://www.heacademy.ac.uk/cate-2018?page=1> (Accessed: 21st November 2021).

Association of University Leaders for a Sustainable Future. (1990). *Talloires Declaration*. [Online]. Available at: <http://ulsf.org/talloires-declaration/> (Accessed: 21st November 2021).

Bigg, M., Brooks, I., Clayton, W., Darwen, J., Gough, G., Hyland, F., Longhurst, J.W.S., Tierney, A., Tweddell, H., Walsh, A. & Willmore, C. (2018) 'Bridging the gap: a case study of a partnership approach to skills development through student engagement in Bristol's Green Capital year'. *Higher Education Pedagogies*. 3:1, 417- 428.

Bristol's Advisory Committee on Climate Change (no date) *About BACCC* [Online]. Available at: <https://thebaccc.org/> (Accessed: 21st November 2021).

Bristol City Council (2016) *Bristol's Resilience Strategy*. [Online]. Available at:

<https://www.bristol.gov.uk/documents/20182/1308373/Bristol+Resilience+Strategy/31a768fc-2e9e-4e6c-83ed-5602421bb3e3> (Accessed: 5th December 2021).

Bristol Green Capital Partnership (no date) *Bristol Green Capital Partnership* [Online]

Available at <https://bristolgreencapital.org/> (Accessed: 5th December 2021).

Bristol One City Office. (no date). *One City Climate Strategy* [Online]. Available at:

<https://www.bristolonecity.com/one-city-strategies/> (Accessed: 21st November 2021).

Bristol One City Office. (no date). *One City Plan* [Online]. Available at:

<https://www.bristolonecity.com/about-the-one-city-plan/> (Accessed 21st November 2021).

Brooks, I. (2019) 'ICT sustainability from day one: Introducing new computer science students at a UK university to sustainability', in *CEUR Workshop Proceedings*. Available at:

http://ceur-ws.org/Vol-2382/ICT4S2019_paper_15.pdf (Accessed: 21st November 2021).

Brooks, I. (2020) 'The United Nations Sustainable Development Goals in Systems Engineering : Eliciting sustainability requirements.', in *7th International Conference on ICT for Sustainability (ICT4S2020)*. Bristol: ACM, p. 8. doi: 10.1145/3401335.3401359

Chalkley, B. (2001) 'Introducing the National Subject Centre: What's it all about?' *Planet*, 1:1, 3.

Cicmil, S., Gough, G., & Hills, S. (2017). 'Insights into responsible education for sustainable development: The case of UWE,' Bristol. *International Journal of Management Education*, 15(2), 293-305.

Climate Commission for Higher and Further Education. (2020) *Climate Action Toolkit for HE*. [Online]. Available at: https://www.eauc.org.uk/climate_commission (Accessed: 21st November 2021).

Companies House (no date) *Low Carbon South West CIC. Company number 07323285* [Online]. Available at: <https://find-and-update.company-information.service.gov.uk/company/07323285> (Accessed: 5th December 2021).

Environmental Association of Universities and Colleges (2010) *Green Gown Awards 2010 winners' brochure* [Online]. Available at: https://www.sustainabilityexchange.ac.uk/green_gown_awards_2010_winners_brochure (Accessed: 5th December 2021).

European Green Capital. (no date). 2015 - *Bristol* [Online]. Available at:

<https://ec.europa.eu/environment/europeangreencapital/winning-cities/2015-bristol/>

(Accessed: 21st November 2021).

Fiselier, E & Longhurst, J.W.S. (2018) 'A Critical Evaluation of the Representation of the QAA and HEA Guidance on ESD in public web environments of UK Higher Education Institutions'. In Leal Filho, W. (ed.), *Implementing Sustainability in the Curriculum of Universities*. World Sustainability Series, New York & Heidelberg: Springer. 223 – 246.

Fiselier, E.S., Longhurst, J.W.S. and Gough, G.K. (2018), 'Exploring the current position of ESD in UK higher education institutions', *International Journal of Sustainability in Higher Education*, 19 (2), 393-412.

Gough, G. (2017) *UWE Bristol and the UN SDGs*. [Online] Available at:

<http://www2.uwe.ac.uk/services/Marketing/about-us/pdf/Sustainability>

[documents/UWE_and_SDGs_Display_full_set_of_maps.pdf](http://www2.uwe.ac.uk/services/Marketing/about-us/pdf/Sustainability/documents/UWE_and_SDGs_Display_full_set_of_maps.pdf). (Accessed: 21st November 2021).

Gough, G.K. & Longhurst, J.W.S. (2015) 'Embedding Sustainability Across the Curriculum via Collaboration: A Review of Progress in the University of the West of England.' In Leal Filho, W., Azeiteiro, U.M., Caeiro, S., and Alves, F. (Eds.) *Integrating Sustainability Thinking in Science and Engineering Curricula: Innovative Approaches, Methods and Tools*. New York & Heidelberg: Springer, 513 -527.

Gough, G.K. & Longhurst, J.W.S. (2018) 'Monitoring progress towards implementing sustainability and representing the UN Sustainable Development Goals (SDGs) in the curriculum at UWE Bristol.' In Leal, Filho W. (ed.), *Implementing Sustainability in the Curriculum of Universities*, New York & Heidelberg: Springer. 279 – 290.

Greenhouse Gas Protocol (no date) [Online]. Available at: <https://ghgprotocol.org/>

(Accessed: 21st November 2021).

Longhurst, J.W.S. & Gough, G.K. (2018) 'Towards a Sustainable University. A case study of the University of the West of England, Bristol.' In Passerini, G. & Marchettini, N. (eds) *Sustainable Development and Planning X* WIT Transactions on Ecology and Environment 217. Southampton and Boston: WIT Press, 807–820.

Longhurst, J.W.S., Gough, G.K., Hills, S. & Grant, M. (2015) 'Developing a holistic approach to implementing education for sustainable development across a higher educational institute: a longitudinal study of the University of the West of England, Bristol.' In Leal Filho, W., Azeiteiro, U.M., Caeiro, S., and Alves, F. (eds.) *Integrating Sustainability Thinking in Science and Engineering Curricula: Innovative Approaches, Methods and Tools*. New York & Heidelberg: Springer, 528 – 532.

Malmodin, J. and Lundén, D. (2018) 'The Energy and Carbon Footprint of the Global ICT and E&M Sectors 2010–2015', *Sustainability*, 10(9), 3027.

Oxford Economics (2015) 'The *Economic Impact of the University of the West of England*.' [Online]. Available at: <https://www2.uwe.ac.uk/services/Marketing/about-us/pdf/UWE-economic-impact.pdf> (Accessed: 21st November 2021).

Price, E.A.C., White, R.M., Gough, G., Preist, C., Baughan, P., Hayles, C.S., Mori, K. & Longhurst, J. (2021) 'Supporting the role of universities in leading individual and societal transformation through education for sustainable development.' *Discover Sustainability*. 2, 49.

Quality Assurance Agency and Advance HE. (2021) *Education for Sustainable Development. Guidance* QAA, Gloucester. 49pp. [Online]. Available at: <https://www.qaa.ac.uk/quality-code/education-for-sustainable-development> (Accessed: 21st November 2021).

Quality Assurance Agency and Higher Education Academy. (2014) *Education for Sustainable Development: Guidance for UK Higher Education providers*. QAA: Gloucester.

Rajala, M. and the Greenpreneurs Project Team. (2017) *Greenpreneurs: A handbook for trainers*. [Online]. Available at: <http://greenpreneurs.eu/results/> (Accessed: 21st November 2021).

Razzaque, J. and Visseren-Hamakers, I. (2019) 'Global assessment Chapter 6: Options for decision makers', in *Global Assessment on Biodiversity and Ecosystem Services*.

Submitted 131221

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), p. 260.

Rockefeller Foundation (no date) *100 Resilient Cities initiative*. [Online]. Available at: <https://www.rockefellerfoundation.org/100-resilient-cities/> (Accessed: 21st November 2021).

Science Based Targets Initiative. (no date) [Online]. Available at: <https://sciencebasedtargets.org/> (Accessed: 21st November 2021).

SDG Accord. (no date) [Online]. Available at: <https://www.sdgaccord.org/> (Accessed: 21st November 2021).

Students Organising for Sustainability (no date) *Responsible Futures* [Online]. Available at: <https://www.sos-uk.org/project/responsible-futures> (Accessed: 21st November 2021).

South Gloucestershire Council. *Climate Emergency Action Plan*. (no date) [Online]. Available at: <https://beta.southglos.gov.uk/climate-emergency-in-south-gloucestershire> (Accessed: 21st November 2021).

Students' Union at UWE. (no date a) [Online]. Available at: <https://www.thestudentsunion.co.uk/union/sustainability/> (Accessed: 21st November 2021).

Submitted 131221

Students' Union at UWE. (no date b) Green Impact Scheme [Online]. Available at: https://www.thestudentsunion.co.uk/union/sustainability/award_winning/ (Accessed: 21st November 2021).

Toyne, P. (1993) *Environmental responsibility: an agenda for further and higher education*, Report of a Committee on Environmental Education in Further and Higher Education, Peter Toyne, (Chairman), London: HMSO.

UK Government. (1994) *Sustainable development: the UK strategy*, Cm 2426, London: HMSO.

UN Race to Zero for Universities and Colleges. (no date) [Online]. Available at: <https://www.educationracetozero.org/> (Accessed: 21st November 2021).

UNESCO. (no date) Cited in Longhurst, J.W.S., Gough, G.K., Hills, S. & Grant, M. (2015) 'Developing a holistic approach to implementing education for sustainable development across a higher educational institute: a longitudinal study of the University of the West of England, Bristol.' In Leal Filho, W., Azeiteiro, U.M., Caeiro, S., and Alves, F. (eds.) *Integrating Sustainability Thinking in Science and Engineering Curricula: Innovative Approaches, Methods and Tools*. New York & Heidelberg: Springer, 528 – 532.

Submitted 131221

United Nations Conference on Environment & Development. (1992a) *Agenda 21* [Online].

Available at: <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>

(Accessed: 21st November 2021).

United Nations Conference on Environment and Development. (1992b) [Online] Available

at: <https://www.un.org/en/conferences/environment/rio1992> (Accessed: 21st November

2021).

United Nations Economic Commission for Europe (UNECE) Steering Committee on
Education for Sustainable Development (2011) *Learning for the future: Competences in
Education for Sustainable Development* ; ECE/CEP/ AC.13/2011/6, United Nations
Economic Commission for Europe: Geneva.

United Nations General Assembly (2015) *Transforming our world: the 2030 Agenda for
Sustainable Development*. A/RES/70/1, United Nations, New York. [Online]. Available at:
http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E. New York:
United Nations. (Accessed: 21st November 2021).

University of the West of England (2005) *Sustainability Action Plan*. Bristol: UWE Bristol.

University of the West of England (2006a) *Environmental Purchasing Plan*. Bristol: UWE
Bristol.

University of the West of England (2006b) *UWE success with Great Western Research* [Online]. Available at: <https://info.uwe.ac.uk/news/uwenews/news.aspx?id=874> Bristol: UWE Bristol. (Accessed: 5th December 2021).

University of the West of England (2007) *Sustainability Strategy*. Bristol: UWE Bristol.

University of the West of England (2008) 'Education for sustainable development baseline study: The state of play at UWE'. Report for the Sustainability Board. Bristol: UWE Bristol.

University of the West of England (2010) *Strategy 2020*. Bristol: UWE Bristol.

University of the West of England (2014) *Sustainability Plan 2013–2020. Positive footprint: phase 2*. Bristol: UWE Bristol.

University of the West of England (2015) *WHOLE EARTH? Exhibition Unveiled at UWE* [Online]. Available at: <https://info.uwe.ac.uk/news/uwenews/news.aspx?id=3195> (Accessed: 5th December 2021).

University of the West of England (2017) *Sustainability Plan 2017–2020. Positive footprint: 2.1*. Bristol: UWE Bristol.

Submitted 131221

University of the West of England. (2020a) *Annual Report and Accounts*. [Online]. Available at: <https://www.uwe.ac.uk/about/structure-and-governance/financial-information> (Accessed: 21st November 2021).

University of the West of England. (2020b) *Strategy 2030*. [Online]. Available at: <https://www.uwe.ac.uk/about/values-vision-strategy/strategy-2030> (Accessed: 21st November 2021).

University of the West of England. (2020c) *Annual ESD Report and Action Plan* [Online]. Available at: <https://www.uwe.ac.uk/about/values-vision-strategy/sustainability/strategy-leadership-and-plans/policy-and-strategy-documents> (Accessed: 21st November 2021).

University of the West of England. (2020d) *Annual Sustainability Report, 2019/20* [Online]. Available at: <https://www.uwe.ac.uk/about/values-vision-strategy/sustainability/strategy-leadership-and-plans/policy-and-strategy-documents> (Accessed: 21st November 2021).

University of the West of England Board of Governors. (2020e) *Declaration of a Climate and Ecological Emergency*. [Online]. Available at: <https://www2.uwe.ac.uk/services/Marketing/about-us/pdf/Policies/UWE-Bristol-Board-of-Governors-Declaration-of-Climate-and-Ecological-Emergency-v3.pdf> (Accessed: 21st November 2021).

Submitted 131221

University of the West of England. (2021a) *Carbon and Energy Management Plan 2020-2030*. [Online]. Available at: <https://www.uwe.ac.uk/about/values-vision-strategy/sustainability/strategy-leadership-and-plans/policy-and-strategy-documents> (Accessed: 21st November 2021).

University of the West of England. (2021b) *Skills for Clean Growth*. [Online]. Available at: <https://blogs.uwe.ac.uk/research-business-innovation/uwe-bristol-announce-upcoming-skills-for-clean-growth-programme-for-smes-in-the-west-of-england/> (Accessed: 21st November 2021).

University of the West of England. (2021c) *Sustainability Action Plans* [Online]. Available at: <https://www.uwe.ac.uk/about/values-vision-strategy/sustainability/strategy-leadership-and-plans/policy-and-strategy-documents> (Accessed: 21st November 2021).

University of the West of England. (2021d) *Sustainability Plan - End of Plan Report* [Online]. Available at: <https://www.uwe.ac.uk/about/values-vision-strategy/sustainability/strategy-leadership-and-plans/policy-and-strategy-documents> (Accessed: 21st November 2021).

University of the West of England. (no date a) *CAKE*. [Online]. Available at: <http://go.uwe.ac.uk/cake> (Accessed: 21st November 2021)

Submitted 131221

University of the West of England. (no date b) *ISO 14001-2015 standard* [Online].

Available at: <https://www.uwe.ac.uk/about/values-vision-strategy/sustainability/iso-14001-certification> (Accessed: 21st November 2021).

University of the West of England. (no date c) *Ethical Investment Policy*. [Online]. Available

at: <https://www2.uwe.ac.uk/services/Marketing/about-us/pdf/Sustainability%20documents/Ethical-Investment-Policy.pdf>

(Accessed: 21st November 2021).

University of the West of England. (no date d) *Research with Impact*. [Online]. Available

at: <https://www.uwe.ac.uk/research/research-with-impact> (Accessed: 21st November 2021).

University of the West of England. (no date e) *Sustainability Policy and Strategy*

Documents [Online]. Available at: <https://www.uwe.ac.uk/about/values-vision-strategy/sustainability/strategy-leadership-and-plans/policy-and-strategy-documents>

(Accessed: 21st November 2021).