

SUSTAINABILITY REPORT

2018

Keele
UNIVERSITY



ROOT & BRANCH

“embedding sustainability
in all that we do”

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For information on sustainability at Keele University please see:

**keele.ac.uk/greenkeele
facebook.com/GreenKeele
twitter.com/GreenKeele**

or email:

sustainability@keele.ac.uk



Introduction



Professor Mark Ormerod

Welcome to the 2018 Sustainability Report. We decided in 2016 that we would produce our institutional Sustainability Report biennially rather than annually, with increased dissemination of sustainability activities and initiatives through other routes, including social media, to allow more time to focus on the 'doing', as well as increase the profile of sustainability across the university and beyond. This does, however mean that there is a vast amount of activity to try and collate in a single report and inevitably we have not been able to do justice to all the things that we have done in this time period.

The last two years have seen really significant progress in our strategic aim 'to embed environmental sustainability in everything we do', with activity across all aspects of the campus estate and operations, in our business and wider community engagement, and in our core business of education and research. This report builds on the significant progress that we have seen since our first Sustainability Report back in 2011. This report also forms a key part of our sustainability communication strategy, which has seen a real boost over the last six months through our Root and Branch communication campaign.

This is not to say that we have done everything that a University which genuinely aims to embed sustainability can or should do. The next few years will see

a real step-change in progress associated with some specific initiatives, including major campus-wide sustainability projects – our Smart Energy Network Demonstrator and HyDeploy (more details in section 6.1), as well as the launch of our new interdisciplinary, institution-wide research institute, the Institute for Sustainable Futures. These transformative initiatives will allow Keele to develop its unique position as a genuine Living Laboratory, where we can trial sustainability solutions at the scale of a small town, through engagement with our wider and business communities, and maximise links with our education and research.

Importantly, this progress is not the work of just a few individuals, rather it is due to a wholesale cultural change where the whole campus community is contributing to the shift that we are seeing. So I would like to thank everyone in the Keele community who has contributed to the significant progress that we have made, and I look forward with excitement to further accelerating this progress as we strive to become a truly sustainable university with an international reputation for our whole-institution approach to sustainability and for the quality of our research and education.

A handwritten signature in black ink that reads "Mark Ormerod". The signature is fluid and cursive.

Professor Mark Ormerod

Deputy Vice-Chancellor and Provost
University Strategic Lead for Environment
& Sustainability





1. Vision and Key Achievements



Keele University is different, and we like to think that our approach to sustainability is a bit different too. As a rural campus university situated on top of a hill, with a combined staff and student population of around 14,000, and a 615 acre campus with extensive woodland, grassland, and a lake system that is the headwaters to a major river system, our campus provides a unique set of sustainability challenges and opportunities.

One of our six strategic aims is to “embed environmental sustainability into all that we do” and our vision is to be an international leader in campus sustainability. Our campus environment, allows us to work towards becoming a genuine ‘living laboratory’ to trial sustainability solutions at the scale of a small-town, as demonstrated by our two exciting energy projects SEND and HyDeploy. Through our education and research, our local and business communities, our campus estate and operations, we will be at the forefront of working towards a more sustainable future. This is our vision. In May 2019 Keele declared a ‘climate emergency’ and set the ambitious target to be carbon neutral by 2030 in recognition of the urgency to act to mitigate against the impacts of climate change.

Since our last report in 2016 we have seen a large number of significant achievements, some of which are highlighted below:

- A university-wide communication strategy, Root and Branch, led by our marketing directorate, making sure all our campus community are aware of our sustainability work
- Re-accreditation to the NUS Responsible Futures scheme, demonstrating excellence in partnership working between the University and Students’ Union, resulting in over 2000 students engaged in different activities
- Keele Students’ Union successfully achieved the highest score of ‘Excellent’ under the NUS Green Impact scheme, showing the SU team’s commitment to sustainability
- Confirmation and initiation of the Smart Energy Network Demonstrator and HyDeploy projects
- Close to 100% coverage of sustainability in our undergraduate programmes, through an approach awarded “Highly Commended” in the 2016 Learning and Skills Green Gown awards
- University support for the launch of the Institute of Sustainable Futures to drive interdisciplinary sustainability research
- 6.1% reduction in electricity use between 2013/14 and 2016/17; 12.8% reduction in CO₂e emissions between 2014/15 and 2016/17, and Halls of Residence recycling increased to 30% over the past few years
- Procurement-driven savings amounting to £5,000, 2 tonnes of CO₂e and 1 tonne of waste diverted from landfill through Warp-it, 3 tonnes of food for the Trussell Trust Food Bank and £10k of donations made to the British Heart Foundation in 2017
- Continued growth in our National Cherry Tree Collection to 280 varieties, and continued integration of the Keele arboretum and grounds into wellbeing, curriculum and outreach activities
- Establishment of an ethical investment policy and a commitment to divestment and investing in companies with a positive environmental and social impact, including in clean energy
- Around 800 unique visitors per month engaged through our sustainability outreach activities including schools, companies, visiting academics for conferences and members of the public. More than 10,000 people in total were engaged through workshops and activities between February 2016 and May 2018
- Appreciation for excellence in individuals-award in 2018 of an Honorary Doctorate for Dave Emley following a British Empire Medal awarded in the 2017 New Year’s Honours list, award for Sustainability Staff Champion in the 2016 Green Gown awards for his services to natural history education



2. Governance and People

At Keele we don't have a single 'Sustainability Co-ordinating Office' - we believe that sustainability is the responsibility of everybody in the university. We have one overarching University Sustainability Board, the Environment & Sustainability Steering Group (ESSG), chaired by the Deputy Vice Chancellor, and on which representatives from directorates across the University play a role, as outlined below



Mark Ormerod
ESSG Chair. Deputy Vice Chancellor. University strategic lead for Environment and Sustainability



Jane Barker
Head of Grounds



Sarah Briggs
Sustainability Project Officer



Phil Butters
Director of Estates & Development



Huw Evans
Environmental Manager



Sharon George
Sustainability Hub Manager; Course Director MSc Environmental Sustainability and Green Technology



Elliot Jones
Energy Manager



Ian Madley
Head of Partnership Development (Natural Sciences)



Russell Reader
Head of Communications



Zoe Robinson
Director of Education for Sustainability



Linda Sutton
Procurement Manager



Susan Warrender
Head of Catering and Retail



John White
Deputy Director of IT Services



Rachel Hadley
Student Voice Co-Ordinator, Keele SU



Sam Gibbons
Activities and Societies Sabbatical Officer, Keele SU



Student representation at ESSG is provided through an elected full time sabbatical officer, and the elected part time Environment and Campus Officer sitting on the committee. These officers are re-elected on an annual basis but provide a student voice to the committee and input relating to student-led sustainability activities.

The Sustainability Project Officer, Director of Education for Sustainability, and Environmental Manager, form an informal 'sustainability team' who network closely with others to disseminate information and drive initiatives.

ESSG reports to the University Senate and University Council, and each of the individuals above act as conduits of

information and activity between their area of responsibility and the overarching sustainability governance. Sustainability strategies and operational plans exist for the different areas outlined above and are embedded into decisions on a day-to-day basis.

The University strategy is being revised in 2018, and sustainability will continue to play a key role in this overarching strategy for the University. A new Sustainability strategy is also being written to support the new University Strategy, which will sit alongside the existing overarching environment and sustainability policy. The University's sustainability policies are available to view from the Green:Keele web pages.



**EMBEDDING
SUSTAINABILITY
IN ALL THAT WE DO**

3. Communication

Communication is key to embedding sustainability across the University. Consistent high level messaging about the importance of sustainability for the University is a key part of our success, and the engagement with sustainability in the work of so many of our staff. Specific approaches to enhance communication are outlined below.

Launch of Root and Branch Campaign

A University-wide sustainability communication campaign was launched in October 2017 to make the hidden aspects of sustainability developments more visible to the campus community, and celebrate the progress the University is making towards achieving the aim of embedding sustainability in all that we do.

The 'Root and Branch' Campaign depicts the campus and campus community itself as the root of the University's sustainability endeavours, whilst the branches

represent the people who are University stakeholders, including alumni, external and collaborative partners, businesses, and local community groups, and the University's roles in global research and educational and knowledge exchange activities. The campaign includes a suite of symbols which represent key aspects of sustainability, including amongst others energy, transport, education, and resources.



Physical signage around sustainability infrastructure construction

A series of major construction works related to campus wide sustainability infrastructure projects have started to take place in 2018. The purpose of these construction works and information on the contribution of the works to the sustainability of the university is communicated through signage using the Root and Branch logo, helping to make the invisible visible to the campus community.



Sustainability Network

A new Sustainability Network was launched in 2017 to replace Keele's engagement with the National Union of Students' Green Impact scheme. As well as facilitating an annual university-wide sustainability benchmark audit, supported by annual sustainability awards, the network is also designed to increase and improve communication about sustainability at Keele. A lead Sustainability Representative in each School/Directorate is the main point of contact for the core 'sustainability team' to disseminate information for wider dispersal amongst the Keele community. Crucially, this is a two-way communication channel, enabling Schools and Directorates to feed back on sustainability issues in their local area and to access support. More information is available under section 4 - Engagement.

Root and Branch (formerly Green:Keele) Newsletter

A campus-wide, electronic newsletter is published approximately three times a year aimed at sharing news, promoting events, and increasing communication about the positive sustainability actions taking place on campus and beyond into the local community. All staff and students, Schools and Directorates can contribute to the newsletter by emailing sustainability@keele.ac.uk

Social Media

Social media using the 'Green:Keele' brand has been used widely to promote sustainability activities and events on campus to staff, and particularly students. Green:Keele has over 1050 followers on Twitter and 165 Facebook page likes.

Residence Magazine

Students living on campus receive a copy of Residence Magazine when they move into their Halls. The magazine includes information on ways to live more sustainably including waste and recycling, saving energy, and sustainability activities on campus.

Sustainability in Campus Tours

Through partnership with the Student Ambassadors team, some additional stops have been added to the campus tours which are delivered for events such as Open Days and Offer Holder Days. Visitors and prospective students can now find out about flagship sustainability projects as part of these tours, including visits to the Sustainability Bungalow and the Walled Garden allotments and Student Eats project.

Feedback and ideas by email

A central sustainability email address sustainability@keele.ac.uk can be used by all staff and students to communicate ideas and feed back to the core sustainability team.





4. Engagement with Sustainability

Sustainability Engagement in Numbers

Over 2000 students and 250 staff have been directly engaged over just the last 12 months in sustainability activities organised by the sustainability team, Students' Union, Halls Life, Careers, Student Support and the student-led service **Think:Green**.

Across the campus, a number of initiatives, activities and events take place to engage the whole Keele community. Some activities specifically target Keele staff, whilst others focus on embedding sustainability into the student experience.

Whole community events

Sustainability Network

The Keele Sustainability Network launched in January 2018 and aims to create a cross-university platform to help share best practice of embedding sustainability. The Sustainability Network is made up of Sustainability Representatives from each School/Directorate who work together to promote sustainability in their work area, supported by the core sustainability team.

The Sustainability Network has introduced a Sustainability Benchmark Audit, which builds on the previous NUS Green Impact scheme. The Keele Sustainability Benchmark criteria are based on the University's environmental and sustainability policies and strategies, making it easier for Schools and Directorates to contribute to the implementation of these. Additional criteria enable Schools and Directorates to embed sustainability into their operations in creative and innovative ways that work with their individual priorities.

Prior to launching the Sustainability Network, staff from across the University were invited to take part in focus groups to feed into the design of the network and audit process. As a result of these sessions, 'Sustainability Guru' roles have been created, enabling individuals with knowledge about particular subjects to put themselves forward to support other members of the university community.

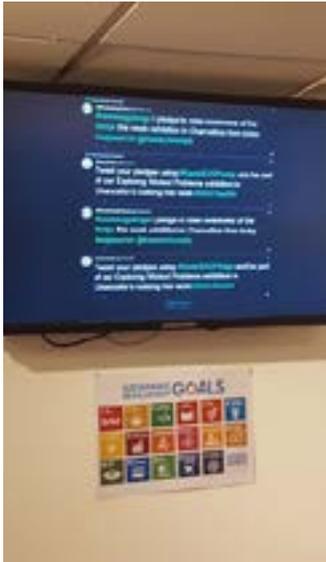
To recognise and reward positive contributions towards university sustainability initiatives, the Sustainability Awards and celebration event have been launched. Three types of award are available – Sustainability Benchmark

Award for successful completion and audit of the Benchmark Criteria; Individual Awards for staff and student contributions to sustainability on campus and in the local community; and Innovation in Sustainability Awards for sustainability projects. The Innovation in Sustainability Awards have three levels – 'Seed', 'Sapling' and 'Blossom' - based on their reach and impact either on or off campus. A Sustainability Fund has also been launched, aimed at funding at least six projects per year.

SDG Teach-in



The NUS held its first SDG Teach-in week in 2018 - a national campaign to promote the use of the Sustainable Development Goals as a vehicle for embedding sustainability in the curriculum. Green:Keele and the Listening Project (see section 12) collaborated to create a special exhibition entitled 'Exploring Wicked Problems: Responsible Citizenship and Global Awareness'. The exhibition included interactive activities enabling staff and students to explore the Sustainable Development Goals. Links between the SDGs and Education for Sustainability at Keele were highlighted and explored in the exhibition to demonstrate the relevance





of the goals, and the roles that different disciplines can play in achieving them.

In advance of the Teach-in, a photography competition invited students to submit photographs that represented different Sustainable Development Goals. The entries were displayed during the week and will be used to create a resource depicting what the SDGs mean to Keele students (below).



Green Christmas Lecture series



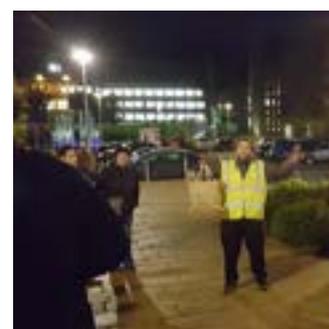
The Green Christmas lecture series launched in 2017 with a lecture by Professor Carolyn Roberts, entitled 'I'm Dreaming of a Green Christmas' hosted in partnership with the Institute of Liberal Arts and Sciences. An audience of 50 individuals enjoyed an informal look at the issues of consumption surrounding the festive period, and the role that universities could play in promoting innovation and development of new technologies to address the key challenges sustainability presents in order to avert climate chaos.

Campus biodiversity walks

Throughout each year a series of walks are held to educate the university community about the campus biodiversity. These have included a bird walk and talk, ahead of the RSPB Big Garden Birdwatch; regular walks by Dr Dave Emley and Dr Peter Thomas as part of the Keele arboretum based around seasonal highlights to view on campus; and a bat walk for Halloween using bat detectors, run by Philip Playford from Staffordshire Bat Group - a Keele Geography alumnus.



Winter bird walk



Demonstrating the use of bat detectors



Fairtrade Fortnight

FAIRTRADE FORTNIGHT 2018
26 FEBRUARY – 11 MARCH



The annual Fairtrade Fortnight events have continued to raise awareness within the Keele community about Fairtrade issues around the production of commodities such as tea, coffee, fruit, chocolate and cotton. The annual Fairtrade Bake Off invites entries from staff and students, with cakes being required to use Fairtrade certified ingredients. Other activities have included making pledges, selfie competitions, and a spinathon which raised over £100 for the Fairtrade Foundation..



(Below) The Spinathon raised over £100

Green Week

GreenWeeks (@GreenWeeks) · Mar 12
We've had fun playing the Great Carbon Footprint Game with lunch from @Lumina_Energy @LuminaEnergy @GreenWeeks_2018



Green Week is an annual highlight on the Keele sustainability engagement calendar, offering a range of activities for students and staff to get involved with, from film nights to awareness campaigns, surveys to walks and talks. Activities take place across the whole campus, including contributions from the Library, Students' Union, Sports Centre and catering outlets.

2018 was the first Green Week to be themed, focusing on Plastic Waste and how we can act to reduce its impact on the environment and society. The week launched with a screening of 'A Plastic Ocean' including a Q and A with Dr Deirdre McKay and Dr Sharon George. A workshop based on the Play with Plastic sessions delivered in collaboration with local community organisation B-Arts also ran, enabling students to contribute to building a plastic coral reef.





Staff Specific Events

Welcome to Keele

As part of the induction process, all new members of staff are required to attend a Welcome to Keele training day. The training contains a section introducing staff to sustainability at Keele, key activities and initiatives in place on campus, and how they can get involved with sustainability whilst working at Keele.

People Strategy launch

Health and Wellbeing is a key part of sustainability, and the Sustainability Team welcomed the opportunity to promote activities to staff at the People Strategy launch event.

The team has also held marketplace stalls at other staff events including the Keele Communities Together Day and Professional Services Staff Conference.



The Keele Communities Together Day

Student Specific Events

WSEN Conference



Keele was proud to be the joint host of the 9th World Student Environmental Network (WSEN) Summit, along with the University of Sussex in 2016. The WSEN summits are organised for students, by students, with the support of an international committee. Keele students have attended WSEN summits since 2013. 2016 was the first time the event was hosted in the UK.

The WSEN is a global network of students whose core mission is to support creative student initiatives to promote the incorporation of sustainability in local, national, and international level higher education systems and policies.

The Keele student conference team collaborated to raise funds, set a program of workshops, invite speakers, and run the 5-day event, which was themed 'Sustainability Together' to highlight the importance of collaboration and cooperation in achieving a sustainable future. The committee liaised with the Events and Conferencing team to plan vegan catering including a gala vegan dinner at Keele Hall.

The WSEN global summit at Keele in 2016



The WSEN 2016 Organising team



Induction



Sustainability is embedded throughout a range of induction and welcome events, with stalls providing information about opportunities for students to engage with sustainability at pre-arrival marketplace events for mature, commuter, and clearing students, and international, postgraduate and undergraduate registration events.

During the Welcome Festival and Society Sign-up, a range of student-led sustainability societies are present including Think:Green, Student Eats and Veg Soc, along with opportunities to sign up to the NUS Student Switch Off scheme, and purchase items donated when students moved out of Halls of Residence the previous summer, which generated over £499 for Think:Green in 2017.



Promoting the NUS Student Switch Off scheme

Embedding sustainability in student training schemes

Sustainability issues are delivered as part of training to students involved in various co-curricular roles and activities, including Student Voice Representatives, student societies, and Student Ambassadors.

- **Student Sustainability Representative** roles enable students to consider and feed back to course teams about how effectively Education for Sustainability is embedded into the curriculum in their degree programme. Training was delivered to around 50 students during the SU Student Voice Conference in October 2017.
- **Sustainability is embedded** into societies training through the SU Activities and Societies Conference, promoting sustainability themes relating to student societies, and exploring how societies can reduce their environmental impact and have positive social impacts.
- **Student Ambassadors** cover sustainability in their training, introducing the Ambassadors to Education for Sustainability, and the opportunities to get involved with sustainability-related activities at Keele.

Work Placement Opportunities

A number of students have taken part in work placement activities on campus, including students studying BSc Environment and Sustainability and MSc Environmental Sustainability and Green Technology. Students from local schools and colleges also worked with academic staff, the Sustainability Project Officer, and Estates to learn about sustainability and environmental management on campus.



Student Eats

The Student Eats allotments continue to engage a range of students from across the University, with weekly gardening sessions running on Wednesday and Friday lunchtimes. The allotments also hosted mindfulness gardening sessions during Exam Plus and during the SU Mental Health Awareness week.



Keele Food Co-op

Keele Food Co-op was successful in a funding bid to expand the existing veg bag scheme. The £1000 scale-up funding will enable students to supply dried goods and promote a reduction in packaging waste, as well as encouraging students to cook healthy, affordable and meat-free meals.



Sustainability Collaborations

A number of events and activities have run as part of initiatives run by other teams within the University. Working with the Students' Union, Student Services, Careers and Employability, and the University's Student Experience and Engagement Officer, sustainability themes have been embedded into 'Halls Life', 'Exam Plus', and 'Be More' activities, using activities that promote health and wellbeing, responsible consumption, and biodiversity to engage a diverse student population.

• Halls Life



In addition to the usual campaigns to promote waste reduction and energy awareness in the University's Halls of Residence, additional events and communications have been promoted through Halls Life social media channels to engage on-campus students. These include recipe sharing to help reduce food waste and promote healthy and lower-carbon eating, including promoting leftover pumpkin recipes at Halloween and vegetarian/vegan recipes for World Vegan Day.

At the end of the academic year, the Halls Life Ball celebrated the Halls of Residence which won the most Halls Points based on energy saving through engaging with the NUS Student Switch Off scheme, recycling rates, and quizzes. Hawthorns Hall won in 2017, with Barnes taking the trophy in 2018.

• Exam Plus



Exam Plus weeks focus on de-stressing and remaining calm. Mindfulness activities including Plant Pot Painting have been run using surplus plant pots from the SU's 'Project Plant Pot' campaign (where off-campus students are encouraged to give a plant to a neighbour). Students decorate their pots which can then be used to plant herbs, salad vegetables or houseplants. Rock Painting and Hunting activities have taken place where students search for decorated pebbles around the campus, encouraging students to explore the campus.

• Be More

Be More weeks co-ordinated by the Careers and Employability team include a diverse programme of activities for students to develop their graduate attributes after exams. Sustainability has featured in a number of activities including:

- Be More Womble (2017) – Students went 'wombing' in the campus woods to retrieve discarded items in a litter pick.
- Be More Green (2017) – Students learned about innovative ways to minimise their impact on the environment, including through 'The Great Carbon Footprint Game'.
- Be More Eco-enterprising (2017) – Dr Sharon George ran a 'Dragon's Den' style event challenging participants to generate enterprising solutions to overcome an environmental challenge.
- Be More Wild and Free (2017/2018) – exploring the foraging potential of the campus.
- Be More Upcycle (2018) – Students



Exam Plus Plant Pot Painting



Be More Wild and Free



De-stress space in K2 Bubble



chose to work on an individual or group upcycling project to repurpose items, such as turning T-shirts into bags and making candles in tea cups.

- Be More Bat (2018) – Phil Playford from Staffordshire Bat Group led a bat walk and talk around Keele woods and lakes.
- Bee More (2018) – This biodiversity promoting event included a talk on habitat loss and fragmentation. Students carried out pollinator surveys by the Sustainability Hub (below).



- Listen More (2018) – Following on from the HEFCE funded Listening Project, this session promoted the dialogue and active listening skills necessary for a more sustainable society.

• Mental Health Awareness Week

The Sustainability Team collaborated with the Students' Union during Mental Health Awareness Week and Exam Plus to create a De-stress Space. Activities

included mindfulness colouring and graffiti walls, to share positive messages with other students, and to share things students were thankful for. During World Mental Health Day a stall publicising sustainability activities on campus that can promote mental health engaged over 30 people as part of a University Mental Health Marketplace.

• The Great Donate/Green Move Out



Students moving out of Halls of Residence donate kitchen items to be made available to new students as they move into University accommodation, meaning items that are still usable are not thrown away. Towels are donated to animal shelters, unopened food is collected for the local food banks, and any leftover items are donated to local charities and through the British Heart Foundation bring banks on site. From 2018, the scheme has been rebranded 'The Great Donate', with plans to collaborate with neighbouring Staffordshire University.





5. Sustainability in the Curriculum

Sustainability in the Curriculum in Numbers

- 96% of undergraduate programmes provide students with the opportunity to explore their discipline through a sustainability lens through core or option modules.
- 19% of modules provided the opportunity to engage with EfS through the curriculum in 2016-17. 46 modules had *strongly-embedded* EfS, 269 modules had an *element* of embedded EfS, and 477 modules had *the potential* to embed EfS.

Sustainability in Academic Schools

There have been concerted efforts to embed sustainability in the curriculum since 2012, supported by the Sustainability Team and monitoring through regular audits of sustainability content in modules and programmes. Recent analysis shows that sustainability now features in almost every undergraduate programme in the University. This work is supported by an Education for Sustainability strategy.

Highlights of sustainability in the curriculum from the University's 14 different Schools are given below. Detailed examples of best practice at module level have been disseminated through a Module Case Studies document, promoting modules at all levels of study and from a diverse range of disciplines.

School of Chemistry and Physics

Dr Katherine Haxton's module Sustainable Chemistry was featured in the NUS 'A-Z of Sustainability' guide. The Sustainable Chemistry module covers many topics in sustainability, from health care to food and water security, and was presented at 'Variety in Chemistry Education' and 'Horizons in STEM Education' in 2016.

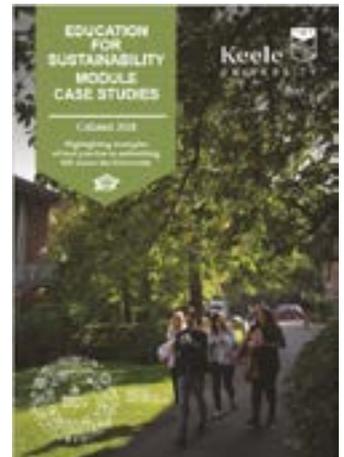
Chemistry also embeds ESD in many other modules, covering topics such as 'chemistry that changed the world', 'chemistry without carbon', green and sustainable chemistry, including student presentations on the '12 principles of green chemistry' or 'greening an industrial process', and issues relating to recycling of e-waste, and rare earth metal resources covered in the chemistry of technology. Third year projects have also featured sustainability issues, including topics such as antimicrobial wound dressings linking to global health care issues, and projects on developing new catalysts for more efficient and green chemical processes.

School of Psychology

Sustainability is a key aspect of psychological literacy and is embedded in many areas within the curriculum. For instance, students apply psychology to thinking about ways in which environmentally-friendly behaviours can be encouraged. Ecopsychology covering the relationship between nature and human wellbeing, and the importance of nature for wellbeing are covered in modules from 1st to 3rd year as well as in the MSc in Psychology of Health and Wellbeing, and MSc Counselling and Psychotherapy, and sessions on Ecotherapy are also run by specialists in this area, as well as nature-based exercises embedded within the programme. Students on the MSc Psychology programmes complete a CV audit, considering all aspects of their personal development as a researcher, including a section on sustainability issues, skills and experience.

School of Geography, Geology and the Environment

The Geology undergraduate programme at Keele has mapped their programme content against the UN Sustainable Development Goals, highlighting links between geology and a more sustainable future. The programme includes a module on Geoscience and Society, which includes sessions on geodiversity, geoconservation and geoheritage. The role of geology in low carbon energy is included in the course including geothermal energy, and Carbon Capture and Sequestration, as well as exploration of sustainability issues of resource extraction. Sustainability issues are also a key part of the rest of the School's undergraduate and postgraduate programmes.





School of Computing and Maths

The School of Computing and Maths embeds sustainability in its programmes in many different ways, including mathematical modelling of sustainability issues such as population growth, renewable energy, and human impacts on ecosystems.

Since 2015, Computing offers Level 6 students a list of sustainability projects to be carried out with a university 'client' (from a range of sustainability academic and estates staff) who proposes a sustainability project, for example a website to help urban farmers and community gardeners to measure and improve the impact of their work, to aid the worldwide collation of this information from participating projects. In 2017 as part of the MSc Collaborative Application Development module, students created a website and an app to help the Student Sustainability Bungalow manage their recycling.

School of Life Sciences

Throughout the Biology programme there is much use of the campus grounds for all years of undergraduate students, for example through modules such as Biodiversity, Ecology and Environment; Conservation Biology; and Trees in their Environment. In addition, undergraduate students on all Life Science programmes are required to engage with sustainability. Following a session covering a range of sustainability focused issues, second year students are required in an assessment to consider the sustainability implications of their proposed third year research.

School of Health and Rehabilitation

Sustainability is tackled in many programmes in the School of Health and Rehabilitation in different ways. The BSc in Rehabilitation Science includes a focus on health and wellbeing and evaluation of national strategies to promote the public health agenda. The BSc Physiotherapy and Radiography programmes are working with Practice Educators and Clinical Placement Facilitators to verify the contemporary nature of their programme/s and make recommendations to optimise a sustainable curriculum.

School of Nursing and Midwifery

The Adult Nursing course covers sustainability issues in many different ways, from investigation of issues of waste generated in the clinical skills lab, and the environmental impacts of waste, as well as issues of climate change and health nationally and globally, social

determinants of health links with mental health, and sustainability issues relating to procurement and commissioning within the NHS.

School of Medicine

The medical school integrates sustainability topics into its problem based learning courses and has several lectures in years 1 and 2 which highlight health issues relating to environmental and sustainability themes. In addition, in year 1, topics around sustainability are made available for students to select for their independent literature review. In year 3 students are given a lecture and workshop session on sustainability issues in the NHS including food waste, recycling surgical materials, prescription drug wastage, and energy and carbon demands through travel. Students work in groups to identify the issues and think of ways to solve or ease them. They are encouraged to draw on examples they have seen in their practice. The learning and teaching delivered in year 3 were developed and shared with the Sustainable Healthcare Education (SHE) Network and is included in their paper on embedding sustainability into medical students' curriculum.

School of Pharmacy

Topics covering sustainability in pharmacy and the pharmaceutical industry have been embedded within the MPharm and BSc programmes operated by the School of Pharmacy for many years including sustainable pharmacy practice, medicines wastage, the carbon footprint of drug discovery and development, ways to reduce this using 'green' manufacturing and formulation methods, packaging and recycling. Students studying the BSc in Pharmaceutical Science, Technology and Business programme currently have eight core sessions in their Level 5 curriculum which are devoted to sustainability in the pharmaceutical industry. This includes in-depth studies in: process chemistry, application of 'green' chemistry and biotransformations in process development, the holistic manufacturing process, and regulatory aspects of products and packaging in comparison to more sustainable options.

School of Humanities

Sustainability and environmental issues feature in the diverse undergraduate programmes of the School of Humanities in many different ways. For example, in English, environmental issues are central to a module on 'Writingscapes' in which students produce their own creative writing



in response to the natural and social environments, while Eco-criticism is also covered, covering such topics as how lyric poetry redefined how the natural world was viewed, and a module on 'Writing at the Borders: Migrant and Refugee Narratives' includes considerations of ecological disasters.

Environmental history is a central theme to the study of the past at Keele in the History programme. A module on 'Natural Cultures: Humans and their Environments since 1700' explores environmental history and the social and cultural changes that have led to the current unprecedented human-generated environmental change, and how environmentalism emerged through cultural responses to it. Environmental history is also incorporated into a number of different modules at different levels of study.

Several staff who contribute to the undergraduate programme in Media, Communication and Culture have environmental and sustainability specialisms, and incorporate environmental and social justice issues into their teaching, including looking at representations of animals and the environment in different media, and critical exploration of awareness campaigns.

School of Politics, International Relations and the Environment

The School of Politics, International Relations and the Environment has a long history of environmental research and teaching, and many staff with specialisms in this area. Several specialist environmental modules are included in both the Politics and International Relations programmes, for example a first year module on Politics of Sustainability; 2nd year modules on Environmental Politics and Policy, and International Relations of the Environment, and third year modules on Environmentalism, Environmental Movements and Protest; Environmental Politics of the USA; and the Northern Dimension: Resources, Environment and Security in the Arctic.

School of Social Science and Public Policy

Sustainability and environmental issues play a prominent role in many of the undergraduate programmes run from the School of Social Sciences and Public Policy. Issues of consumerism and consumption are focused on in several modules, as well as issues of globalisation and social equity within Sociology. Within

the Criminology programme students have the opportunity to consider issues of crime and sustainability in a third year module on 'Environmental Crimes'. In the Education programme students can choose to explore issues relating to Education for Sustainability in a module on 'Educating for Global Citizenship'.

School of Law

Students can take part in the CLOCK (Community Legal Outreach Collaboration Keele) initiative which was founded in 2012 by Keele Law School and North Staffordshire law firms, Citizens Advice Bureau, domestic and sexual violence support groups, housing associations, and family relationship services. CLOCK provide their professional expertise working with marginalised and vulnerable people to help them gain access to justice. CLOCK established a national partnership framework in 2015 with Higher Education institutions, law firms, and third sector organisations to offer their services across the UK. Students can participate in CLOCK to provide policy work, legal research, and community legal education services to disadvantaged communities whilst developing their employability skills.

Keele Management School

We need to do business differently in order to work towards a more sustainable future. The Keele Management School has signed up to the Principles of Responsible Management Education United Nations initiative, which will help the School further embed the principles of sustainability within its programmes, and build on areas such as those that the second year module on Corporate Governance and Social Responsibility explicitly address.

Language Centre

Sustainability is a popular topic for inclusion in the different Language modules taught from Keele's Language Centre. For example, environmental change in the natural and urban environment is taught in Japanese modules. The Education for Sustainability team has also worked in partnership with staff in the Language Centre, to devise assessments to make students engage with environmental and sustainability topics, while improving their language skills, and pre-sessional English course students, can choose sustainability topics for assessments to help them develop their English skills.



Foundation Year

The Foundation Year team are collaborating with Schools to help better integrate Foundation Year students into the University community and into Schools more specifically. Through their 'Academic

Development' module, the Foundation Year are aiming to implement project themes which will include 'sustainability', especially as mixed groups of social science, natural science, and humanities students will be working on these projects.

Additional Education for Sustainability Activities

Dissertations for Good

Keele for several years has been part of the National Union of Students Dissertations for Good scheme, where students have the opportunity to carry out their dissertation project with an organisation that wants a piece of sustainability research carried out.

using the university campus as a testbed for sustainability solutions. The CALL framework seeks to maximise the potential from these projects, and Keele is leading the work on maximising the educational benefits of Living Lab projects.

Sustainability degree programmes

The breadth of coverage of sustainability in the undergraduate curriculum highlighted above, has allowed the generation of highly interdisciplinary undergraduate and postgraduate degrees: BSc/BA Environment & Sustainability, MSc Environmental Sustainability and Green Technology, both run from the School of Geography, Geology and Environment, but drawing on sustainability expertise from across the University.

Student dissertation published in Meliora journal

BSc Environment and Sustainability student Sarah Briggs applied to present at the Meliora International Symposium of Student Sustainability Research. Sarah received the joint Best Presentation award for outstanding visual presentation and her dissertation research, 'How do Environmental Publishers Use Facebook to Engage Users with Sustainability' was published in the first edition of the Meliora journal.

University-wide sustainability elective modules

Keele University was established on the principles of a breadth of education, and consequently many of our students have opportunities to take elective modules outside of their core programme of study, several of which concentrate on sustainability issues, tackled in a way that is appropriate for students from any discipline. For example, 1st year students can take a module on 'Greening Business' where they learn about ways in which businesses are engaging with sustainability, and they explore Keele University as an example of an organisation trying to become more sustainable, and work on projects devised by the core Sustainability Team, aimed at addressing particular sustainability challenges facing the University.

Keele reaccredited as an NUS Responsible Futures Institution

After being part of the pilot for the NUS Responsible Futures accreditation, Keele underwent reaccreditation in 2018 with a team of 8 student auditors trained to assess evidence uploaded in support of criteria relating to the University's achievements in embedding sustainability in the curriculum and in the student experience. The accreditation was achieved through collaboration between the University and the Students' Union, making Keele one of 30 institutions in the UK to engage with the scheme.

Student auditor quotes: "Great effort, it is easy to see how much effort is put into embedding sustainability throughout the formal, informal and hidden curriculum at Keele, with the key staff members involved in sustainability consistently going above and beyond."

Living Labs

Keele is part of a major international partnership, alongside the University of Delft, and MIT, amongst others, aimed at developing a framework for Campuses as Living Labs, to support the governance, measuring, monitoring, reporting and disseminating of Living Lab projects

"Even as a student who is engaged with forwarding the sustainability agenda at this university, I found that there was much more engagement than I realised. Their goal to embed sustainability in all that they do is certainly underway if not already exceeded."



Sarah Briggs (right) at Meliora Student Sustainability symposium





6. Research in Sustainability

Sustainability is an important theme in several major research projects at Keele. We are also a member of several national and international sustainability research networks, as well as having our own institutional network to support interdisciplinary sustainability research. Highlights of some of our sustainability research work are given below.

International Institute for Environmental Studies

Keele is a member of the International Institute for Environmental Studies, a network hosted by Trent University in Canada, which provides support for international networking, conferences, and training programmes across a number of sustainability-related research themes.

Keele University Sustainability Research Network

KUSRN, initially set up by a group of sustainability PhD students around five years ago, brings together people interested in sustainability research from across the University, and has ~90 members signed up from across every School in the University. The network hosts an interdisciplinary seminar series, networking events and writing retreats, aimed at showcasing and supporting different areas of sustainability research within the university, increasing interdisciplinary dialogue and supporting sustainability-focussed PGR students.

Institute for Sustainable Futures

In October 2018 the University will launch its new research institute, the Institute for Sustainable Futures. This institute will build on the work of KUSRN, and aims to develop major collaborative research potential around six grand challenge areas mapped onto the UN's Sustainable Development Goals, including supporting the University's fast-growing energy research agenda associated with the SEND and HyDeploy projects.



Sustainability Research highlights

Below highlights some of the recent work of staff at Keele as well as the areas of sustainability research of two new Professors at Keele.



Researchers in the School of Politics, Philosophy, International Relations and Environment (Professor Brian Doherty, Dr Phil Catney and Dr Marit Hammond) are leading two projects as part of the Centre for the Understanding of Sustainable Prosperity (CUSP) project, contributing under a theme of political and organisational dimensions of sustainable prosperity. The projects explore grassroots transitions to sustainability and the range of political institutions related to the transition to an 'ecological state'.

Dr Lydia Martens (School of Social Sciences and Public Policy) is taking a leading part in a EU Horizon 2020 funded prestigious food safety collaborative programme of research and knowledge application entitled SafeConsumE, which aims to provide effective, science-based and sustainable strategies to help reduce risk and the health burden from food-borne illness in Europe as well as



The Autumn 2017 Research Seminar series poster (above), and details (below)

Keele University's Research Network Seminar Series Autumn 2017	
Wednesdays at 1pm—2pm Tea, coffee & biscuits provided	
Laura Mansfield-Morrison International PhD on Development Co-operation	11th October 2017
Sam Poon Research Fellow, Geography, Geology and the Environment	15th October 2017
Dr Adam Moolna Lecturer in Environment and Sustainability	1st November 2017
Sarah Briggs Sustainability Project Officer	8th November 2017
Chris Briggs Software Developer, HEFCE Learner Analytics	15th November 2017
Dr Sophie Bessant Academic Developer, LFDC	22nd November 2017
Dr Zoe Robinson Director of Education for Sustainability Christa Appleton Education Project Officer	29th November 2017
Dr Simon George Green IT Module Leader	6th December 2017
Dr Sheryl MacGregor Reader in Environmental Politics University of Manchester	13th December 2017
Dr Maura Collins Lecturer in Criminology	20th December 2017



Dr William Kirk and colleagues from the UK and Brazil



Professor Chris Fogwill



Professor Marylyn Carrigan



Dr Lisa Dikomitis, (above) (School of Medicine and Health Sciences) has received Grand Challenge Research Funding through AHRC and MRC, for a project entitled 'Stories of public health through local art-based community engagement (SOLACE). SOLACE tackles issues of recruitment, development, training and retention of health workers to help manage the growing burden of non-communicable diseases in the Philippines, helping to work towards the 'health and well-being for all' Sustainable Development Goal. The inclusion of a wide range of scholarly expertise extends SOLACE beyond the disciplinary boundaries of medicine and beyond the edges of academia by co-producing knowledge with community partners.

Professor Chris Fogwill (School of Geography, Geology and the Environment), a recent recruit to Keele, is a leader in the fields of geochemistry, glaciology and climate change research with research that straddles the traditional disciplines of palaeoclimatology, glaciology and climate modelling. His research is instrumental in defining the linkages between ice, climate and sea level over timescales from centuries to millennia, improving our understanding of the global climate system, and reducing uncertainty in future climate projections.

Professor Marylyn Carrigan (Keele Management School) another new recruit to Keele works in the field of consumer ethics, social responsibility, sustainability and ethical marketing, focusing on ethical consumption, consumer behaviours and the sharing economy, as well as looking at social responsibility and sustainability in the supply chain of small businesses in the context of different industries.

enhance sustainability, through looking at longevity in foods and how freshness may be maintained without compromising on safety and carbon footprints. She also leads a project research group at Keele, called Secure Food Futures, which is funded through the Keele Institute for Social Inclusion. Dr Martens also conducts research on families and the consumption of 'nature'.

Dr William Kirk (School of Life Science) is Co-Investigator with Professor Toby Bruce and Dr Clare Hoskins on a research project funded through BBSRC and FAPESP, a funder based in Brazil. The research project, 'Chemical study of insect-plant interactions: a contribution to biorational control of crop pests' has the overall objective to explore how plant secondary metabolites, particularly flavonoids, can be delivered using nanotechnology for enhanced activity against insect pests. The project aims to develop a long-term collaboration combining the expertise of Keele University and Universidade Federal de São Carlos (UFSCar, Brazilian PI) research groups.

Dr Kirk and Professor Toby Bruce are also working on a second project funded by BBSRC/NERC Sustainable Agriculture Research and Innovation Club 3 (SARIC3), titled 'Biological crop protection: a new 'slow down/speed up' strategy for aphid management'. This project will underpin the development of a new 'slow down / speed up' approach for managing aphid pests of field crops that combines plant breeding and biological control. The approach involves slowing down the growth rate of pests while speeding up the performance of their natural enemies.



6.1 SEND and HyDeploy

Smart Energy Network Demonstrator (SEND)

2017 saw the culmination of nearly ten years work to bring the concept of a 'living laboratory' demonstrator of low-carbon energy technologies to fruition. The original concept developed in 2008 envisaged the development of the University campus to be: self-sufficient in energy, deliver carbon reduction and provide a living laboratory for research and development of alternative energy solutions.

The Keele University campus provides a unique model with its mix of 200 domestic homes, over 3000 students in Halls of Residence alongside the commercial and industrial demands of the University's own buildings and the businesses on the science park to create a 'living laboratory', at the scale of a small town, to research and develop new smart and clean energy technologies and business models and study real user interactions.

Funding for the project from the Department of Business Energy and Industrial Strategy alongside funding from the European Regional Development Fund was released at the beginning of 2017 enabling the University to commence the appointment of new staff, the procurement of a contractor to develop the SEND, the delivery of a collaborative research, development and innovation centre to work with Staffordshire SME's on new product developments and the provision of renewable energy resources on the campus.

2017 also saw the appointment of Professor Zhong Fan as the Academic Director of SEND and Professor David Healey as Professor in Practice for SEND. Additionally, the University has invested in two Research Fellows to support the research work of the SEND, Dr Peter Matthews and Dr Jun Cao.

The technical development of SEND will affect all parts of the University utilities network enhancing them from their current role of utility provision to add the 'laboratory' capability. After a detailed procurement process Siemens PLC have been appointed as the main contractor for this work which has commenced early in 2018, with the functions of the SEND to be delivered by the middle of 2019.

To support the local business community, the funding for SEND also includes provision of funding for 26 3-year Research, Development and Innovation projects working with Staffordshire SMEs to develop new products and services for the smart energy marketplace. This research will be undertaken by graduates who will also be registered for a PhD. The first researchers will start work early in 2018 with all 26 expected to be in place for the start of the 2018/19 academic year.

To be truly representative of the future energy landscape, renewable energy sources such as wind, solar and geothermal, will be needed to both provide low-carbon energy to the campus and to enable the research envisaged on the SEND. Work has commenced on the scoping of these resources with the ambition of delivering a saving of at least 4100 tonnes of carbon dioxide equivalents per annum by 2021.

Opportunities to integrate the educational mission of the university are also being explored, creating a true university living lab, integrating the estate and facilities, with business and the wider community, and the core missions of research and education.





HyDeploy

As a first practical use of the University Campus as a 'Living Laboratory' Keele University has partnered with Cadent Gas Ltd (Cadent formerly National Grid Gas Distribution), Northern Gas Networks Ltd (NGN), the Health and Safety Laboratory, ITM Power plc and Progressive Energy Ltd to utilise part of the campus gas network to trial the use of hydrogen injected into the gas network to reduce the carbon intensity of gas supplied to heat homes and commercial buildings.

The HyDeploy trial, which is funded by OFGEM, Cadent and NGN, aims to provide a practical demonstration of the injection of up to 20% by volume of hydrogen into the gas network. This will be the first use of hydrogen in the UK gas network since the move from town gas in the late 1960s and early 1970s.

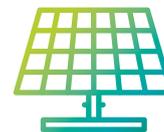
In addition to the use of the University campus as the test site, academic research is supporting the trial by examining the potential effects of hydrogen on the materials used in the gas network and on understanding how the inclusion of hydrogen in the gas supply affects the nature of the flame when the gas is burnt. There are also plans to integrate research into the social science aspects of this changing energy vector and the perceptions of the university community to the use of hydrogen in this way.

Work on the trial commenced in April 2017 with off-campus laboratory testing of gas appliances and on-campus testing in December 2017 with a programme of building-by-building safety inspections using test gases.

The HyDeploy trial will run until March 2020 with the 'live' trial of hydrogen injection planned for the period from March 2019-March 2020.

If successful and rolled out across the whole of mainland Britain the level of hydrogen being tested has the potential to save 6 million tonnes of carbon dioxide equivalents per year, equivalent to taking 2.5 million cars off the road.





7. Sustainable Operations

Sustainable Operations in Numbers

- Reduced energy consumption with 6.1% drop in electricity usage in 4-year period between 2016/17 and 2013/14 despite University growth.
- Solar PV capacity on campus now exceeds 250kWp.
- Increased carbon efficiency from 225tCO₂e/£1m in 1990 to 68tCO₂e/£1m in 2014/15
- Halls recycling rates have increased to 30%, getting closer to targets of 50%.
- £10,000 of donations were made to the British Heart Foundation in 2017, taking the total since 2013 to £50,000. 2017 donations saved 8 tonnes of CO₂ and diverted 8.2 tonnes of waste from landfill.

7.1 Energy, Water and Carbon Management

Energy, Water and Carbon in Numbers

- CO₂ emissions have decreased by 12.8% and electricity consumption has reduced by 6.1% or 892MWh. Total solar PV capacity on campus is now more than 250kWp.

One of the key challenges Keele faces is reducing its energy and water consumption whilst providing the modern services and facilities to attract students and contribute to the all-important student experience. To achieve this we are investing in building new state-of-the-art laboratories, student accommodation, commercial facilities and refurbishing existing building spaces, all to high sustainability standards.

At the same time we are continually reviewing those buildings that are already existing and assessing how we can make them more efficient using processes set out within our ISO 50001 accredited Energy Management System.

Despite all of the work that we are undertaking, growth and development of the campus will make meeting absolute carbon reduction targets challenging. To address this we are working with key partners to deliver innovative projects that will not only provide the carbon reductions we need but also create a 'living laboratory' that will employ our unique campus infrastructure as an at-scale demonstration vehicle. Two large-scale projects in particular are going to lead to significant reductions in carbon emissions - our Smart Energy Network Demonstrator (SEND) and hydrogen grid injection trial (Hydeploy). More information on these projects can be found in Section 6.1.

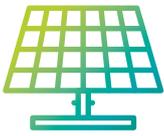
This section on campus developments looks at energy and water consumption, carbon emissions and some of the recent major developments.

Carbon Emissions



Carbon Management Plan

In 2010, the Higher Education Funding Council for England (HEFCE), Universities UK and Guild HE published a carbon reduction target and strategy for higher education in England, which set a collective 34% carbon reduction target by 2020, against a 1990 baseline for the University sector. This target is aligned with the UK Government's 2008 Climate Change Act and confirms the contribution that the sector will make to the UK's carbon reduction efforts. In the same year, Keele University published its first Carbon Management Plan which put in place a target to reduce its own emissions by 34% by 2020 and 80% by 2050 against its 1990 baseline.

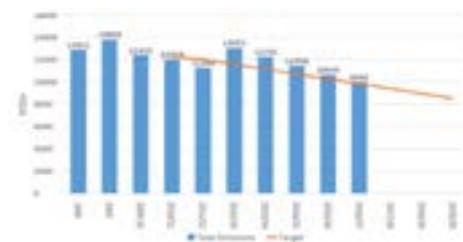


As much has changed since 2010, a significantly revised version of the Carbon Management Plan was released in 2016. This latest iteration is designed to be more concise and to ensure that it remains a relevant tool towards achieving the aims of the University's Environmental Sustainability Policy. Whilst reaffirming the 2020 target, the Plan starts looking towards what the University needs to do to achieve the long term 2050 carbon target.

The carbon targets set in the Carbon Management Plan include all scope 1 and 2 emissions that arise as a direct result of the University's activities. This is largely made up of electricity and gas for heating campus buildings but does also include some sources such as petrol and diesel used by fleet vehicles. As per the HEFCE requirements the targets are absolute however the latest version of the CMP considers annual emissions compared with budget turnover to provide some indication of changes to efficiency over time. This is important as the targets within the CMP are based entirely on the 1990 data, irrespective of growth in student numbers (now about double the 1990 numbers), longer opening hours of some buildings (e.g. 24/7 opening for the library during term-time), and a greater number of buildings being included in the University's estate (for example the inclusion of the Innovation Centres since August 2012).

Progress to date

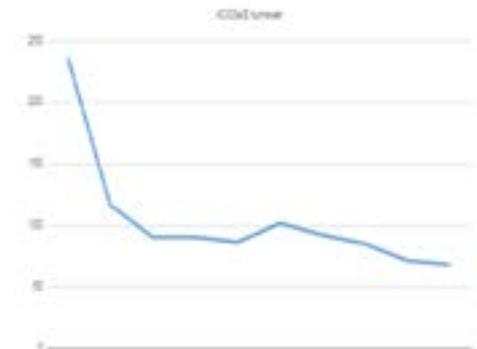
Campus carbon emissions have continued to reduce in the past two years as a consequence of lower electricity and gas consumption as well as significant reductions in national grid electricity emissions factors. Scope 1 and 2 emissions were reported as being 9,994tCO₂e in 2016/17 as shown in the graph below - a 12.8% drop since our last Sustainability Report (2016) which looked at 2014/15.



The reported emissions in 2016/17 represent a decrease in absolute terms of 22.6% from the 1990 baseline of 12,921 tCO₂e. Whilst we are still some way from our target of 34% reduction by 2020, if we

continue to drive down campus energy usage whilst offsetting increases from new buildings the target may yet be achievable.

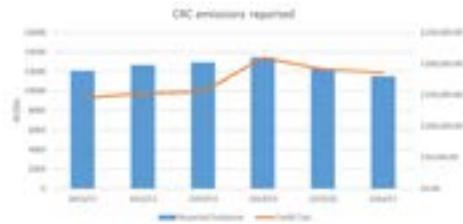
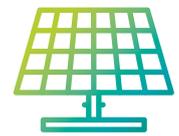
To allow a better understanding of the impact of the carbon reduction efforts to date, the University measures carbon emissions against turnover each year, as this is a good indicator of changes to activity levels on campus. This metric shows that the efficiency of the organisation (corrected for inflation) has increased markedly since 1990 from 225tCO₂e/£1m to 68tCO₂e/£1m in 2014/15 and continues to increase year on year (shown in the graph below).



Carbon Reduction Commitment

The Carbon Reduction Commitment (CRC) scheme requires the University to calculate the carbon emissions that result from gas and electricity use in campus buildings and buy allowances for each tonne emitted as a result. The reported emissions are different from those within the CMP as it includes commercial tenants and excludes all transport sources. The cost of allowances has been increasing since the scheme started and stood at £16.10 per tonne in 2016/17, up from £12.00 in 2011/12. Now in its second and final phase, organisations can purchase allowances in advance at a discount to incentivise forecasting and trading between participants where appropriate. The CRC is due to end after the 2018/19 reporting year as the National Government seeks to simplify carbon reporting across all sectors.

The progress in the CRC to date as shown in the graph below demonstrates that reportable emissions have fallen in 2016/17 to 11,530tCO₂e, the lowest point since the scheme began. Despite the cost of credits increasing, the year on year total cost is down to £185,633. Total emissions are down due to lower energy consumption, lower grid electricity factors and also improved monitoring allowing the omission of all domestic consumption.



Energy & Water

In 2017 the University implemented an Energy Management Strategy which is designed to outline how we will achieve the sustainability targets set out in both the Carbon Management Plan and the wider Environmental Sustainability Strategy. As well as providing specific energy based baselines and targets to 2022, the plan also sets out the approach for how these will be achieved, an action plan, and who is responsible for the specific parts.

The Energy Management Strategy forms a key pillar of our ISO 50001 accredited Energy Management System. The EMS ensures that the University employs a systematic approach to monitoring and managing energy in all aspects of its business. The system ensures that we are continually improving our internal processes and practices and setting objectives and targets that will ultimately result in energy savings. In 2013 Keele was one of the first universities in the UK to have its system certified to this prestigious quality standard and in 2016 was re-certified for a further three years.

Carbon Reduction Programme

The Estates & Development Directorate regularly undertake energy and water audits of all buildings on campus to identify areas of inefficiency and opportunities to reduce consumption. The results of these audits inform a master project list which contains all potential initiatives, allowing those that represent the best economic and carbon value to be brought forward. To fund the projects, the University has a dedicated fund for carbon reduction initiatives available for all projects that provide a financial payback within six years and has a maximum spend of £150 per tonne over its projected lifetime.

More than 30 significant projects have been completed in the last two years including a list of highlights in the table below.



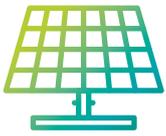
Title	Description	Annual Energy Saving	Annual Carbon Saving
Library PC Suite & office lighting	Upgrade the existing fluorescent lighting to LED panels	95MWh Electricity	38 tCO ₂ e
Chancellors Building lighting	Upgrade fluorescent lighting in various areas to LED alternatives	126MWh Electricity	54 tCO ₂ e
External lighting replacement - Phase 1	Replacement of street lighting and building mounted lights with LED alternatives	75MWh Electricity	31 tCO ₂ e
David Weatherall air handling unit	Replacement of centrifugal fans with EC fans	110MWh Electricity	53 tCO ₂ e
Claus Moser room based building controls	Installation of smart controls to limit unnecessary heating	30MWh Gas	5.5 tCO ₂ e
Huxley laboratory lighting	Upgrade fluorescent lighting in various areas to LED alternatives	15 MWh Electricity	4.4 tCO ₂ e
Lennard Jones laboratory equipment	Replacing water still with water purifier to produce distilled water	12MWh Electricity	5.5 tCO ₂ e



Energy Management System logo



LED street lighting



Overview of performance

Despite the growth on campus the grid electricity consumption has decreased by 6.1% or 892MWh in the four-year period. This is due primarily to several key factors including:

- the implementation of projects as a result of the Carbon Reduction Programme;
- the installation of significant on site low-zero carbon generation including a gas fired combined heat and power generator and more than 150kWp of Solar PV panels;
- natural efficiency gains as old equipment is replaced.

Gas consumption has increased over the period by 3.5% or 1,098MWh despite the weather having been slightly milder in 2016/17. The increase is primarily as a result of the combined heat and power unit which uses grid gas to create both heat and electricity for use in our buildings. Whilst this increases the University gas bill, the net effect is a cost decrease overall and a substantially lower carbon intensity of the whole system. As the increase in gas usage per year is around 3,300MWh, the implementation of energy saving projects as well as optimisation of the campus heating control systems has limited the increases that would have been experienced otherwise.

Water use has become a key concern and the campus has experienced a 45% increase in consumption over the four-year period representing an additional 115,000^m³ per year. The issue results from the 16km supply water pipework which the University operates, much of which dates back to the 1960s and 70s. We experience a significant number of water leaks per year and in the last year or two the number and severity has increased markedly. To combat this, we have committed to investing more than £500,000 over the next five years to replace a large portion of the most at-risk pipework and to install advanced leak monitoring equipment.

Key progress

New Developments

The University has completed several major new build or refurbishment projects since 2016, each with considerable sustainability credentials. Our new development at the Barnes Hall of Residence was completed in Autumn 2017 and has provided sufficient student bedrooms to allow the closure of the old Hawthorns part of campus. This has led to considerable efficiency gains as the old Hawthorns halls dated back to the 1970s and were poorly insulated and heated with inefficient boiler systems. The new halls have an EPC rating of B and produce more than 63MWh of zero carbon electricity each year from its roof mounted solar PV.

Both the Huxley and David Weatherall buildings have seen significant extensions completed in the past two years. Each project considered environmental sustainability from inception and despite leading to an increase in total energy and water consumption, the inclusion of systems such as advanced LED lighting and smart heating controls make them some of the most efficient work and teaching spaces on campus.

On-site electricity generation

The University has further increased the proportion of electricity generation which is produced on site by increasing both its solar PV portfolio and increasing the utilisation of its gas fired combined heat and power plant. The total generation capacity of the campus solar PV units is now more than 250kWp following the implementation of two new arrays on the new Barnes blocks and the re-commissioning of a malfunctioning system on the day nursery. The gas fired CHP at the Horwood Energy Centre has been modified to maximise the appropriate use of heat in summer which has led to an increase in the output of electricity. Now working to a utilisation factor of 75%, the 2016/17 academic year saw more electricity produced than at any point previously and plans are underway to increase the demand on the Energy Centre to allow the CHP to run throughout the year.

External lighting

One of the largest energy saving projects completed in 2017 was the completion of the first phase of replacement street lighting to low energy LED lanterns and fixtures. The long run hours and significant



maintenance costs of our external lighting means that considerable financial and carbon savings are possible through the replacement of what was previously largely sodium based lighting. The new lighting system also utilises a wireless smart control system which allows us to control and dim lighting where appropriate, allowing out of hours energy consumption to be minimised and for maintenance issues to be identified automatically.

Future Developments

To date more than 110 energy and water saving projects have been identified through our regular energy and water audits aimed at identifying further efficiency projects, these feed into the carbon and energy management plan actions for each new academic year.

There are also several larger capital projects which will contribute significantly to our carbon and energy targets:

- Smart Innovation Hub - This project will see the creation of a new gateway building at the entrance to campus that will not only provide a focal welcome point but will bring together the Keele Management School with

incubation space for innovative new and developing business. In-keeping with the University's green ethos, the facility has been planned with a focus on sustainability, resulting in a BREEAM 'Excellent' rating.

- Heat Energy Centre Extension - This project will see new heating pipework installed between the Horwood Energy Centre and the Lennard Jones building to link two of the largest heat networks on campus. This will allow for the removal of an old inefficient boiler system and for many of the main academic buildings to be heated using the low carbon heating system which is provided in part by the CHP.
- Smart Energy Network Demonstrator - As detailed in section 6.1, the creation of an energy network which is able to dynamically control demand has the potential to greatly increase campus energy efficiency. The network is intended to be driven by alternative energy sources which will form the key part of achieving our 2022 target to produce 25% of energy from low-zero carbon sources located on campus.

7.2 Reuse, Recycling and Waste

Reuse, recycling and waste in numbers

- Recycling rates in Halls of Residence increased to over 30%.
- Over 2 tonnes of CO₂ and 1 tonne of waste diverted from landfill through Warp-it in 4 months.
- More than £50k of donations collected by British Heart Foundation since 2013.
- 63% of total waste recycled or composted (excluding construction waste) in 2016/17
- Over 30 tonnes of food waste is collected from our catering outlets annually and taken to an anaerobic digester to generate green electricity

Our Policy: *To manage waste efficiently, minimising waste generated at source and increase reuse and recycling*

Whilst the first aim should be to reduce waste arising in the first place, there has been strong focus over the last two years to improve the reuse and recycling of waste with some significant improvements. Our reuse and recycling initiatives can challenge the 'throw away' culture that is, unfortunately, so prevalent in society.

Our reuse and recycling initiatives:

Warp-it is an online system for facilitating the redistribution of surplus furniture and other items within the University rather than sending the items for recycling or disposal.

Occasionally, due to refurbishments within the University, surplus furniture items are produced and it can be challenging to rehome the items within a short space of time. The introduction of Warp-it has helped raise awareness of considering reuse at an early stage and the online webpage is fantastic at facilitating the sharing of items for reuse. If items aren't reused at the University then they are offered to local charities to collect.





In 2017, donations have raised over £10,000 equivalent to 8.2 tonnes of waste diverted from disposal and 8 tonnes of CO₂ saved.



We use roller banner displays to inform staff and students about achievements and actions needed

In the first 4 months since it was launched, Warp-it has facilitated 30 surplus items to be reused elsewhere on campus saving over £5,000 in procurement costs and saving 2 tonnes of CO₂ and over 1 tonne of waste from disposal.

British Heart Foundation

Keele University joined forces with the British Heart Foundation (BHF) in 2013 to encourage students to donate unwanted clothes and bric-a-brac to help generate vital stock for BHF shops.

BHF donation banks are located at each of the Halls of Residence and an awareness campaign is run on the lead up to students leaving the Halls at the end of term to encourage donations.

In 2017, donations have raised over £10,000 equivalent to 8.2 tonnes of waste diverted from disposal and 8 tonnes of CO₂ saved.

Since 2013 total donations have reached over £50,000!

We have also been working more closely with the BHF on donating surplus furniture that would otherwise go to waste.



Above: Collection of surplus furniture items from Hawthorns Halls of Residence.

Halls move out Food Bank donations

We've been supporting the Halls of Residence 'Green Move Out' scheme for a number of years. The scheme aims to recover items that are left by students at the end of term and collect them to be reused.



In 2017 we focussed on how we could maximise the collection of non-perishable food items from the Halls of Residence at the end of term. Working closely with staff from the Trussell Trust (local food bank) and our Accommodation team we reviewed how we had previously organised the collections and planned a different approach. For the first time, we provided collection boxes within all of the Halls of Residence kitchen diners rather than asking students to donate to a local collection point. This had a big impact and increased the overall collections from under 1 tonne to 3 tonnes in 2016!

Halls of Residence Waste Recycling audits

The overall recycling rates within the Halls of Residence has improved to over 30% over the last few years. However we aim to improve the engagement and communications with students to reach our target of 50% recycling. In 2017 we introduced waste recycling audits in the Halls of Residence to improve engagement and highlight improvements needed, including working with a dissertation student to understand more about student attitudes to waste and recycling.



Management of Waste

Our main day-to-day waste and recycling include:

- Dry Mixed Recycling of paper, cardboard, plastics and cans - recycled via a material Recovery Facility (MRF)
- Mixed glass - recycled
- Food waste - disposed of as waste fuel via Anaerobic Digester
- Green waste - composted
- General waste - partly recovered for recycling and the remainder disposed as Refuse Derived Fuel (RDF) to create energy
- General waste from building and refurbishment works - partly recovered for recycling and the remainder disposed as Refuse Derived Fuel (RDF) to create energy

Our aim is to work in partnership with our waste contractor to apply the waste hierarchy efficiently to our day-to-day management of waste. We have seen a year-on-year increase in reuse and recycling levels with an increase from 55% recycling in 2013/14 to 63% in 2016/17. The total waste produced has increased but this can be accounted for by the growing size of the campus built estate.

Whilst we still have some way to go to reach our reuse and recycling potential on campus we are improving year-on-year. For a number of years we have also stipulated to our waste contractor that all general waste should be disposed of as refuse derived fuel (RDF) to create energy, eliminating the worst environmental option of landfill.

Performance

We monitor our waste consumption and recycling rates from the monthly waste consumption reports produced by our waste contractor. We now have consistent reporting of waste for a number of years which we can use to track our performance.



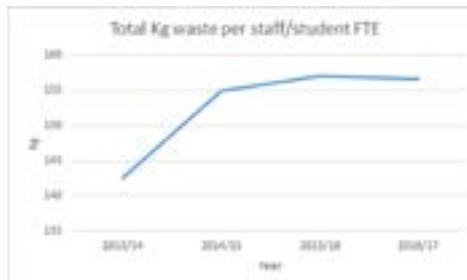
63% of total waste recycled or composted (excluding construction waste) - 2016/17

Over 30 tonnes of food waste is collected from our catering outlets annually and taken to an anaerobic digester to generate green electricity.

Tonnes of waste per £1M turnover

2013/14 = 10.58 Tonnes per £1M turnover

2016/17 = 10.64 Tonnes per £1M turnover

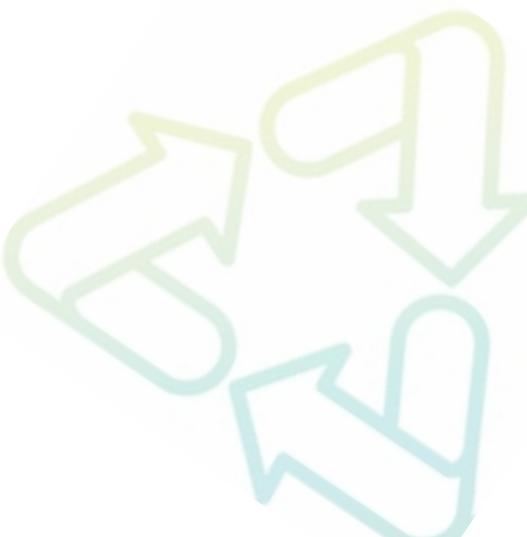


2016/17 waste consumption

- Total waste produced, 1660 Tonnes
- Total waste recycled, 770 Tonnes
- Total waste composted, 278 Tonnes

Next steps

Our immediate goal is to further increase recycling levels through improved communication and behaviour change initiatives whilst also reviewing how the waste infrastructure can be improved. We also need to review opportunities for reducing waste arising in the first place. One key area to focus on should be eliminating or reducing single use products such as coffee cups or packaging within deliveries. We will be reviewing what our medium to long term waste targets should be, and including a supporting action plan to achieve this.





7.3 Sustainable Procurement

Sustainable Procurement in Numbers (for 2016/17)

- Reduction of deliveries from 188 to 50 for desktop and laptop computers representing a saving of 9 tonnes of carbon (equivalent to 27,000 car miles), plus consolidated deliveries of office supplies and furniture.
- £1K saving in electricity costs through replacement of the Small Form Factor desktop with the Desktop Mini.
- £200K savings over five years through Managed Print (MFDs Copy/Print/Scan) efficiency savings through reduced waste, paper, energy, processing and hardware costs.

The Flexible Framework is the self-assessment mechanism that we use to measure and monitor our progress on sustainable procurement. We achieved Level 4 on the Framework in July 2017.

We have introduced a Supplier Engagement Tool enabling suppliers to complete a simple questionnaire covering sustainability, social, economic and environmental issues, which then formulates an action plan to enable suppliers to develop sustainability within their organisations. Action plans are now being incorporated into Contract Management reviews to ensure continuous improvement.

The Supplier Engagement Tool has been issued to the University's current supply base and is issued to any new suppliers that we enter into trading relationships with. To date 737 suppliers (approx. 25%), of which 84% are SMEs, have registered on the site and have started to complete action plans.

A major benefit of the tool is that it incorporates questions relating to the Modern Slavery Act 2015 resulting in compliance with our obligations under the

act as a commercial organisation. Activity in this area focuses initially on high risk sectors including catering, IT, construction and furniture.

The data obtained through the tool will be valuable not only to Procurement but across other Faculties and Directorates, allowing Procurement to produce reports from the tool identifying issues and barriers facing suppliers which the University could assist with, for instance, via work placements and projects for students.

Tackling Single-use Plastic

The Procurement team is currently investigating options to replace single-use plastic and coffee cups with a sustainable alternative. Campaigns to promote using reusable bottles and water points around the University, and bringing reusable coffee mugs are being used alongside the procurement change. Plastic straws will not be purchased going forward once current stocks are used up. The Students' Union has also passed motions on removing single-use plastics, have removed straws, and are trialling wooden forks and investigating other plastic alternatives.





7.4 Sustainable Catering

Sustainable Catering in Numbers

- Eggs and cheese sourced from suppliers less than 4 miles from the campus.
- Over 13,500 vegetarian and vegan meals served in 2017.

We have been working hard over a number of years to improve the sustainability of our on-site catering through the food that we source and provide and through how we handle our waste. Some examples are given below:

Our waste oil from catering outlets is collected and recycled by Olleco and converted into Bio-Diesel or Bio Gas.

Our food waste is collected by Biffa and sent to a central Anaerobic Digester to be converted into Bio Fuels and compost.

The food supply chain is controlled by The University Caterers Organisation so suppliers are nominated and chosen from a restricted list. All these suppliers have to complete a survey regarding their sustainability credentials before being accepted as a supplier to our sector.

At Keele we use a wide range of local suppliers:

- Hungerford Farm Eggs Madeley (<3 miles away) for the supply of Free Range Eggs
- Wells Farm Dairy, Stafford for Milk & Dairy Products including Organic Milk for the Nursery and our Food For Life Counter at the Refectory.
- Freshview Foods, Newcastle Under Lyme for Fruit & Vegetables

In 2012, Keele won a 'Good Egg' award for our commitment to using Free Range Eggs in our catering.

Local seasonal produce includes Strawberries and Asparagus from Tamworth, Micro Cress from Worcestershire, Broccoli, Leafy Vegetables from Cheshire, Local Cheese from Staffordshire Organic in Acton (~4 miles away!) & Cheddleton Cheeses.

We are currently being supported by the Soil Association in progressing to a Silver 'Food For Life' Catering Award for The Refectory and Nursery. We previously achieved the Soil Association Catering Mark Award Bronze.

Through M&J Seafood and Bidfood we ensure that any fish purchased is MSC certified.

Our main butchery supplier ensures that we buy where possible Red Tractor Meat

which makes sure we are buying from farmers that care about the welfare of their livestock.

We also have worked hard to increase our provision of vegan and vegetarian dishes and healthy food provision. In 2017 we served 705 main vegan dishes, and 4545 main vegetarian dishes. The popular self-service vegan and vegetarian Mezze bar generated 8267 servings in 2017. In January 2018, we also had a full week of vegan street food options as part of Veganuary.



Soft tacos with chilli for Veganuary served as Street Food in the Refectory



Koshari Street Food option for Veganuary



Vegan Street Food menu for Veganuary



...is collecting our waste cooking oils and converting these into Bio Fuels



Now progressed to a Silver "Food for Life" catering award



7.5 Grounds and Biodiversity

Management

Since 2016 the Grounds team have continued to review and improve their methods for managing the biodiversity of the campus grounds. Following the *Phytophthora ramorum* removal in 2015 there was an increase in the Himalayan Balsam population in the now, very open woodlands. The Grounds team have worked hard to get on top of this and it is planned that there will be groups of staff, locals and students to help hand pull it.

Last year the Campus Green Team was set up with the support of the Students' Union which helped putting paths and planting trees in the now well established Memorial Garden. This is now being used as a teaching resource, as well as being a popular lunch spot and area for dog walkers on campus.

The Natural Estates Advisory Group is now running smoothly and advises on key issues affecting the overall strategic management of the Grounds on campus, including new mowing patterns leaving some areas of grass to grow long.

Over the next year the Woodland Management Plan will start to impact on the work we do on our trees. Our Arboriculturalist consultant is currently assessing the condition of the trees that form our National Cherry Tree Collection so that they can have their own management plan to ensure they are healthy and well cared for.

Teaching

The grounds continue to be used in Biology modules in all years plus final year research projects. Projects include looking at the future of the grounds in terms of biodiversity conservation through to long-term impacts of diseases, including new diseases such as ash dieback.

BSc Environmental Science and Geography student Sam Bacon completed his dissertation on *Phytophthora ramorum* control.

Modules in environmental and geography programmes also use the grounds to explore the impact of humans on the landscape, both in the past and in the future.

A specialist workshop for the Forestry Commission on tree biology was run in November using the campus as a teaching resource. Their experience helped highlight

where additional management measures could enhance the sustainability of the campus.

Recreation and gentle education

The woodland walk leaflet and cherry collection leaflet have been recently updated. These are given away free to visitors, conference delegates, staff and students to encourage them to explore and appreciate the natural campus.

A series of approximately monthly lunchtime walks continue to be run by David Emley and Peter Thomas. Open to anyone, they are designed to educate people about the natural campus. In addition, walks for external visiting groups such as alumni and gardening/wildlife societies from neighbouring communities are also regularly run showcasing the campus grounds.



Campus Green Team volunteer helping establish the Memorial Garden



Sam Bacon with his dissertation



Campus Tree walk for Green Week 2018



Cherry Tree Walk with Dave Emley and Peter Thomas



Wildflower Walk with Dave Emley and Peter Thomas

University Arboretum

The arboretum website has been updated to include new trees, the loss of some trees and changes in plant names. New, more professional labels have been added around the campus.

The National Collection of cherries has been extended by 15 new trees, bringing the collection to over 280 varieties.



Donations from alumni have allowed the building of paths through the Memorial Garden below Keele Hall and the installation of picnic tables. This is now available as a place of tranquillity and peace, easily reached by staff and students without fear of getting muddy.



7.6 Travel and Transport

Travel and Transport in Numbers

- More than 20% of our vehicle fleet is now electric including vehicles used by Estates, Security and the Vice-Chancellor
- Nearly 10,000 miles worth of electricity provided through EV charging points in 2016/17

Keele's semi-rural location and position on top of a hill make sustainable travel a challenge. The University has worked with partners to improve the promotion and accessibility of sustainable travel such as developing the local bus routes and tickets available. However, single occupied car use is still seen as more convenient and economical by the majority of campus users. The University's proposed Green Travel and Transport Plan (GTTP) aims to make sustainable travel more convenient for users, incentivising sustainable travel use and making single occupied car use a less attractive option. The plan will take a short, medium and long term view, responding to the Strategic Plan and the future shape of the campus.

Sustainable Travel is an integral part of the University's aims for environmental sustainability and health and wellbeing, and there is also a practical need to reduce the number of vehicles travelling to and from the campus as car parking capacity will not be able to keep pace with the aspirations for growth outlined within our Strategic Plan. Also, as the campus develops we have aspirations to pedestrianise areas within the heart of the campus.

Some of the proposed Green Travel and Transport Plan will look at:

- Variable charging for parking permits that rewards the use of environmentally friendly vehicles
- Off-site park and ride facility
- Relieving congestion at peak times (reducing air pollution)
- Further funding to improve the public bus services, providing additional direct bus routes
- Further improving cycling facilities including storage and access to e-bikes
- Reviewing the potential to introduce further restrictions on parking permits
- Developing the car share scheme

Cycling initiatives

We have continued to support cyclists and the Bicycle Users Group by funding the monthly Dr Bike maintenance sessions and bike hire scheme, provided by local company Velo-M, which were previously funded through the Local Sustainable Transport Fund (LSTF).

The cycle hire scheme is aimed at students but staff can also take advantage of the scheme if they aren't sure about committing to the staff cycle to work scheme. 25 cycles have been hired out each term and the scheme has been really useful in providing an accessible low cost option for students to access bikes.

University staff can access the Government supported 'cycle to work scheme' which is now open 3 times per year rather than once to give more flexibility. We are looking to expand the scheme to a higher value and longer payment terms, primarily so that electric bikes can fit into the scheme. We are also hoping to introduce a trial of electric pool bikes that can be used by staff to travel to work, making the journey up Keele bank a little easier!



Velo-M Dr Bike and cycle hire scheme



Electric Vehicles (EV)

To encourage all campus users to choose to travel to and from campus in a sustainable way, we have introduced Electric Vehicle (EV) charging points across campus which are available to use by all staff, students and visitors. The charging points are currently free and in 2016/17 we provided enough electricity for electric vehicles to travel almost 100,000 miles.

The network of charging points has been steadily growing and we now have nine public points at five different locations on campus. The use of these has been gradually increasing to the point that on some of the busier campus days all chargers are in use. As a result we are now looking at options to improve availability and to ensure that campus users have access as required.



University owned Electric vehicle used by the Estates teams:



The BMW i3



Pod Point EV charging station:

In addition to the public charging points, we have now installed six private chargers which provide power to our electric fleet vehicles. Electric vehicles have been part of our fleet since 2013 but in the last 18 months we have invested significantly in replacing University owned diesel vehicles with electric vehicles to cut our carbon emissions and reduce air emissions (NOx and Particulate Matter).

Our Vice Chancellor and senior management are leading by example and have recently purchased a BMW i3 electric car to attend external events and meetings. In total more than 20% of our vehicle fleet is now electric and we are looking to increase this in the near future.

In recognition of our commitment to be at the forefront of the electric motoring revolution we have received 'Go Ultra Low Company' status.

Keele has demonstrated its commitment to becoming a living laboratory as part of its Smart Energy Network Demonstrator (Section 6.1). This will entail researching and developing new technologies and processes and includes an entire work package dedicated to electric vehicles and charging.

The work package will see the roll-out and testing of a system comprised of a large number of vehicle to grid (V2G) points which will not only allow for charging cars and vans but will also mean that the vehicles can provide electricity back to our network at peak times. This is helpful as each car can act as its own mini power station which can help balance our network demand. At a national scale, a large network of interconnected electric cars capable of V2G could create a 'virtual power plant' that may well play a vital role in helping to avoid running peak power plants which tend to be driven by the most polluting fossil fuels.



8. Green IT

Creating a Smart Energy Network

To enable us to deliver a truly Smart energy network it is essential that we ensure that we are capturing high frequency and accurate energy data from all points of campus. To enable this, we have begun a programme which, when complete, will see the installation of 1,500 smart electric and gas meters on campus along with the software system which will allow such large quantities of data to be analysed effectively. This information will then be used to determine what the network needs to do to ensure a balanced system which employs the most advantageous energy source and interacts with end users to turn equipment off or down where possible. This user interaction is one of the most significant areas of research within the SEND project, as the linking of domestic devices, such as white goods or heating systems, into one system can provide significant energy savings if deployed and managed effectively.

Energy data visualisation

We have been investing in the tools that we use to convey energy and water consumption information to all campus users to improve the feedback mechanisms that have been proven to lead to significant reductions in energy and water consumption. The use of IT systems is key within this and we have adapted our system in the last 12 months to ensure that we are delivering very clear and concise information to dedicated energy display screens throughout campus. As we want all campus users to have access in the most appropriate format, we are now looking at how we can display this information through our Green Keele website and are also looking into other more dynamic formats including mobile applications.

Green IT in the Curriculum

IT service staff also support the Green IT module on the MSc in Environmental Sustainability and Green Technology, and have provided privileged access to students through tours of networking facilities giving learners direct behind-the-scenes access to information, including how standardisation enables both more efficient and reuse of equipment. Power consumption is a key area for IT, and technical staff have provided insights into how PCs are provisioned to reduce energy use using remote management to ensure hardware does not continue to operate whilst not in use.

Recycling IT equipment

Keele works with CDL, a company based in Manchester, who reuse and recycle electronics and white goods, to recycle old electrical equipment including computers and monitors. CDL make items which are usable available for resale, with unusable items being broken down into component parts for recycling.





9. Health and Wellbeing

Promoting mental and physical health and wellbeing not only aligns with one of the UN's Sustainable Development Goals, but also enables a wider audience to engage with sustainability themes. We recognise that good health and wellbeing is essential to being able to achieve sustainability aims and objectives.

Keele joined the Healthy University Network in September 2016 and has a Healthy University Group (HUG) who are committed to improving staff and student health and wellbeing. Keele's priority areas include mental health, healthy and sustainable food, and active lifestyles.

The Keele campus lends itself to promoting wellbeing, with way-posted walks around the lakes and woodland, and plenty of green and open space to enjoy. The Sports Centre offers staff and student rates for their diverse range of classes and extensive sports facilities and gym.

Activities and events for students and staff have focused on health and wellbeing over the past 12 months, including through Exam Plus, in support of World Mental Health Day, and through building biodiversity themes into walks around the campus grounds.

Healthy Keele Week

From 26th February-2nd March 2018, Keele hosted its first Healthy Keele Week. A series of events and activities for staff and students promoted positive mental health, including campus walks which took place despite the snow, pottery sessions, relaxation and meditation sessions, the 'couch to 5k running challenge', and pet-assisted therapy with Lola the dog and other animals!



Healthy Keele Week campus walk despite the snow!



Animal assisted therapy in the Students' Union





Wellbeing Wednesdays

Following a campaign for promoting wellbeing and mental health by the Welfare and Internationalisation Sabbatical Officer, Aysha Panter, Wellbeing Ambassador roles were created and Wellbeing Wednesdays were launched. Wellbeing events and activities have taken place on Wednesday afternoons ranging from d’jembe drumming sessions to film screenings.



Keele vs Bangor Plogging

A plogging competition was also organised between Keele students and Bangor University students. Fourteen Keele students largely from the mens and womens rugby teams collected 11 bags of litter from around the campus, drawing with Bangor students who collected 11 bags of litter from around the community.

PG Wellbeing Week

Keele Postgraduate Association organised a week-long series of events in May including a clothes swap and customisation event, a ‘zine making workshop, and talks to promote wellbeing for postgraduate students.



Postgraduate Wellbeing Week clothes swap event

Sports Centre Events

The student engagement team at the Sports Centre have introduced a number of activities and events with a focus on mental health and the positive impacts that exercise can have. During exam periods, Exam Plus sessions such as free glow Zumba attracted around 40 students. Sport Anywhere Boxes have also been introduced to provide portable items such as frisbees and boules to encourage students to enjoy the green campus.





10. Equality and Diversity

Equality and diversity are seen as key aspects in achieving a sustainable future, as demonstrated by the UN's Sustainable Development Goals. At Keele, there are a number of policies and schemes in place which demonstrate the University's commitment to embedding equality and diversity into the Keele community.

Athena Swan

The Athena Swan Charter demonstrates commitment to advancing women's careers in STEMM subjects (science, technology, engineering, maths and medicine). Keele has achieved the University Bronze award as an institution, whilst IPCHS and Life Sciences have received silver awards, and bronze awards have been achieved by Computing & Maths, Psychology, Pharmacy, Law, ISTM & Medicine, Humanities, Health & Rehabilitation, CPS & GGE (as SPGS).



International Women's Day

International Women's Day 2017 celebrated the contribution that inspirational women have made to their academic fields. A series of talks were organised to reflect steps taken by the University to increase gender equality in the workplace. A Keele Women Staff Network Lunch was also held at Keele Hall.

The campaign theme for International Women's Day 2018 was #PressforProgress, emphasising the work needed to accelerate progress towards equality. Events on campus included film screenings of 'Playing a Part: the Story of Claude Cahun', and 'Embrace' – a documentary which was created to redefine beauty ideals, along with a Q and A from Dr Ceri Morgan and Professor Dominic Janes.

Keele is Global

The Keele student and staff community is made up of students from over 120 countries. The University has partnerships with institutions around the world which provide opportunities for staff and students to travel to other countries through Study Abroad, ERASMUS and research collaborations. Keele is Global recognises and celebrates the exciting contributions that the diverse community at Keele provides through culture, internationalisation on campus, and beyond.

The Global Festival included various events from food tasting and a Global Dinner to drama and music 'give it a go' sessions, opportunities to learn languages, and a lecture series.





11. Outreach

Sustainability Outreach in Numbers

- 800 unique visitors to the Sustainability Hub each month until January 2018
- Over 10,000 students, school pupils and members of the community engaged from February 2016-May 2018.

Students at the Heart of the Sustainability Hub

Since the last Sustainability Report in 2016 the Sustainability Hub has continued to host visiting schools, colleges and community groups with programmes themed around energy and sustainability. Community events continued to attract record numbers with Family Fun Day numbers exceeding 90, and the annual Spooktacular event attracting over 200 visitors.



Students have been central to the design and delivery of many of our engagement events. The Masters in Environmental Sustainability and Green Technology 2016 cohort, based at the Hub, held a year-end conference funded by the Keele Postgraduate Association (KPA) presenting research to industry partners demonstrating the role and impact of research-led teaching. The event featured an inspirational talk "Be the Change" by Jonathan Porritt.



Collaborative links have flourished with partnerships in knowledge transfer making a positive impact to society. Recent activity includes work with Newcastle Borough Council to improve recycling rates and to reduce food waste. This partnership was awarded £43K in 2017 from the Sainsburys Waste Less Save More campaign to continue this work to April 2018.

Check the Tech

Students on the MSc in Environmental Sustainability and Green Technology delivered an event this winter for a group of 20 home-schooled learners to showcase principles behind green technology. The students used interactive demonstrations and models to explain principles behind wind, solar and hydropower, how lightning works and how crystal dendrites grow in batteries and can make them explode. The learners got a unique and memorable experience and in return the learners gave valuable feedback to the students on the effectiveness of their communication and demonstration.



The Hub has rolled out a new set of innovative workshops and activities based around sustainability science called "Eco-detectives". These adaptable and interactive, hands-on activities on the impacts of pollution from oil spills, microplastics, salinity from road salt, river contamination and sunscreens in oceans



Student MSc conference with industry representatives



Learning the principles behind green technology



and coral areas, have proven popular with schools and colleges. This activity has been supported with the purchase of a new film "Dynamic Earth" for the immersive Stardome facility with funding provided by the Keele Key Fund. This new film showcases issues around some of our key teaching and research areas in climate change, carbon cycles and the balance of life on our planet. The activity and tours of the Sustainability Hub facility, showcasing green technologies, delivered by the team at the Sustainability Hub and our students have continued to be very popular with visiting groups locally and internationally.

The Ogden Trust activity based from the Hub went from strength to strength with the appointment of Scott Walker as the Ogden Science Officer. Recent highlights have included the establishment of the Staffordshire Primary Partnership and a trebuchet building day at Warwick Castle.



(Above) A visiting class of Polish college students visiting the Hub looking at the biomass burner following a lecture on bioenergy by Sharon George.



12. Conferencing and Events

- Held Green Tourism Silver since 2015
- Delivered a bespoke menu with locally sourced vegetarian and vegan food, and specific sustainability requirements for the EAUC conference in June 2018.
- Supported students to host the 2016 WSEN Global Summit with bespoke vegan menu.

Keele Hall provides a unique conference venue with stunning views over the grounds from many rooms within the building and heritage and history that rival many venues. The campus buildings offer flexible spaces to host conferences and events with technology and support from the Events and Conferencing team who provide a full event management service to ensure that every event is a success and every guest has an exceptional experience.

The Events and Conferencing 2018 - 2023 Strategic Plan (July 18) includes its own strategic aim 'to undertake environmental



sustainability in all we do', reiterating the wider commitment by the University as a whole. The team aspires to achieve ISO 20121 and Green Tourism Gold through partnership with the Sustainability Team, and through involvement in Keele's sustainability network.

EAUC Conference

The Events and Conferencing team proactively sought to host the EAUC conference, being mindful of its strategic alignment with the Keele's wider commitments to embedding sustainability and education for sustainability. The



team also wanted to embrace the potential that hosting this flagship event would provide as a catalyst for further developing sustainability within Events and Conferencing operations. The team has worked with the Sustainability Team to make the changes and processes implemented for the EAUC conference permanent aspects of conference and event operations.

Events and Conferencing also work closely with the Catering Team, and have recently developed improved conference catering using more local, fair trade, organic, vegan and vegetarian produce.



Embracing Root and Branch

The team's commitment to embedding sustainability is in line with the University's Root and Branch campaign, where the sustainability operations on the campus itself represent the roots, whilst the branches go beyond, and include suppliers, businesses they work with, and visitors to the campus. The Conferencing and Events team is embracing this ethos with its aims to 'educate' Event Organisers, delegates and visitors who come to events at Keele by sharing case studies and advice to make their events more sustainable.

The team also promotes the green credentials of Keele University through marketing collateral including their brochure (<https://joom.ag/BHaY>) and through additional content in their new website (under development at time of publication).

Accommodation

The commitment to embedding sustainability is reinforced through the accommodation that conference delegates stay in. Keele's Halls of Residence are available during the conferencing season for delegates, offering a convenient location that removes the need to travel between hotels and the campus during events and conferences. Guests can also take advantage of gym access before conference sessions start, promoting health and wellbeing, or enjoy a morning run or walk along the many trails through Keele woods and in the grounds of Keele Hall.

Accommodation in Barnes Halls and Lindsay Court have solar panels on the roofs supplying energy, recycling bins in kitchen areas, and sensors in some ensuite accommodation avoid lights being left on. The toilet tissue is a Begreen product, whilst the toiletries supplied are sourced just a few miles from Keele. A local company based a small distance from Keele is also used to launder all linen.

Communications in each of the flats include energy efficiency requests, notes about towel usage to save on laundering emissions, and messaging to celebrate Keele's key achievements and progress in embedding sustainability in all we do.



13. Sustainability Cameos

Listening for Sustainability

In November 2016 Keele was awarded £50,000 by the Higher Education Funding Council for England for a project entitled 'Unmaking Single Perspectives: a Listening Project.' Higher education communication skills training tends to focus on presenting and debating skills, in contrast this project aimed to encourage a shift in communication to thinking about what we can learn from others if we allow ourselves to listen. This is essential for partnership and collaborative working, for listening to often hidden voices necessary for participatory decision making, and for being able to work with others in respectful ways. These skills underpin the final two United Nations Sustainable Development Goals, Peace Justice and Strong Institutions, and Partnerships for Change the Goals. The project included a series of workshop activities, developed by Project Lead Dr Zoe Robinson and Education Project Officer Christa Appleton, to explore the barriers we experience when trying to listen, why our perspectives differ, and strategies to ensure that we are *actually* listening.

Dr Dave - Awards for Natural History Education

Dave Emley, Senior Technician in the School of Geography, Geology and Environment, retired in 2016. Throughout Dave's 40-year career at Keele he published several books relating to the natural history of the Keele campus, created the Keele arboretum, tagging over 3000 trees, and creating waymarked trails, leaflets and website, as well as conducting regular campus biodiversity walks for the campus community. Dave's great dedication to the natural history education of the campus as well as wider region has been recognised through several awards, including Staff Sustainability Champion in the EAUC Green Gown Awards in 2016; a British Empire Medal in the New Years' Honours List in 2017, and an Honorary Doctorate awarded by Keele in January 2018.

Green Gown Awards 2016 Success



David Emley - in his green gown

Keele had a successful year at the Green Gown awards in November 2016, with Dave Emley's Staff Sustainability Champion award, and Ulrich Pohanka's Highly Commended in the Student Sustainability Champion category for his work in developing the student-led Keele Food Co-Op amongst other projects. Keele was also awarded Highly Commended in the highly competitive Learning and Skills category for our holistic approach to Education for Sustainability, 'The Trojan Mouse of Sustainability: 'Dropping' sustainability into all that we do', demonstrating success in embedding sustainability throughout our university-wide curriculum.

Enterprising Student's 'Utter Rubbish' App



Elliott Lancaster, a third year Accounting and Finance student, created his own innovative waste and recycling app. 'Utter Rubbish' is a start-up business which was incorporated by Elliott using support from the "Environment Now" scheme funded by the National Lottery and O2 as well as the Belinspired at Staffs business support



Activity cards created for the Listening Project.



Dr Zoe Robinson with Dr David Emley at the January 2018 degree ceremony

and skills sessions. In total, Utter Rubbish has received £35,900 in funding which has enabled Elliott to develop the app and employ interns through the enterprise. The business has environmental and social benefits to the community and aims to improve rates and the quality of recycling and waste management. It displays information for household waste services, advertises and reviews skip hire companies and includes a national fly-tipping prevention online reporting service.



The app was announced as a finalist in the Staffordshire Chamber of Commerce Awards for the Environment/Low Carbon category. Utter Rubbish also featured as a case study in the United Nations PRiME report produced by Keele to demonstrate what the best practices are for management education, and collaborated with Keele's Smart Energy Network Demonstrator (SEND) project to produce a report on the levels and types of waste produced in Staffordshire, to explore the implementation of low carbon energy sources including biomass.

Promoting Plastic Reduction



Materials scientist and lecturer in environmental sustainability, Sharon George, has participated in local, national and international interviews on radio and television about single-use plastic, plastic pollution, and what we can do to tackle these complex social and environmental problems. In collaboration with Deirdre McKay, an article in The Conversation also highlighted sources of stealth microplastics that affect our oceans.

Students Involved with Community Projects

PhD student Greenie Mine was awarded the Malcolm Clark Volunteer of the Year Award for her exceptional volunteering work in the local community. Greenie has run a Farmers Market stall selling produce baked by 'Bread in Common', a real bread bakery run by B:Arts, a group of artists and producers based in North Staffordshire. Bread in Common also run baking courses and school and community projects to encourage people to learn the skill of baking. Greenie also assists with baking the bread and was invited to become a member of the B:Arts following her extensive volunteering and involvement with the company.



PhD Student Greenie Mine running the Bread in Common stall



Bread in Common stall outside the Students' Union



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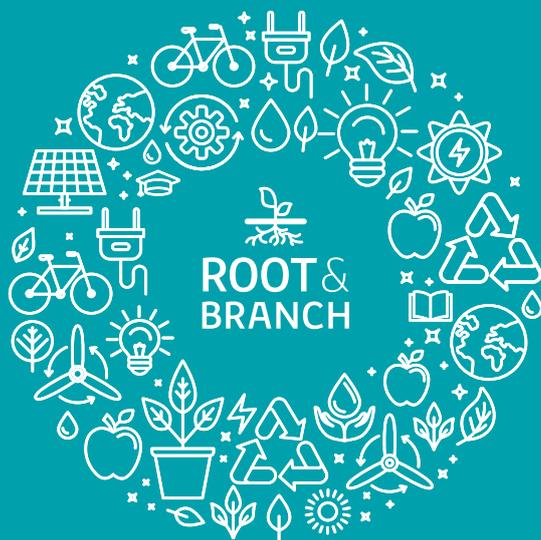
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