

Annual Environmental Report 2016 / 2017

Board for Energy and Environment

23 August 2017



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Statement



Professor Leon Terry, Chair Board for Energy and Environment

Cranfield University is a global leader for education and transformational research in technology and management. Key to our mission is delivery of a sustainable estate that reflects our aspirations. Here, the Board for Energy and Environment (BEE) reports progress on our environmental objectives. An exciting new inclusion this year is the Living Lab, which seeks to harness more formally our academic expertise to the benefit of the operation and management of the estate. Highlights for 2016/17 are:

- The extension of ISO 14001 to all University sites with the inclusion of Shrivenham
- Wildlife Trust award for best employee engagement
- Further improvements in recycling, with successful trials of food waste collection
- The formation of a Sustainable Food Working Group to expand on the good work with Fair Trade
- The development of the Living Lab concept with a number of projects and the setting up of the Living Lab Working Group

We remain indebted to our staff and students that contribute to our on-going improvements and to our Energy and Environment Team and BEE working group members who lead and coordinate our combined efforts. We are grateful to the on-going support of our contractors.

Key performance indicators

Issue	Description	Progress	Target	By when
Carbon	Scope 1 & 2 emissions ¹	32%	50% reduction	2020 ²
Waste	Total weight produced	-0%	10% reduction	2020
Recycling	Segregated on-site	55%	75% of total waste	2020
Travel	Single occupancy car use	9%	10% reduction	2017
Water	Consumption volume	9%	30% reduction	2020
Discharges	Ammonia	64%	50% below consent levels	2020
Discharges	Biochemical Oxygen Demand	45%	50% below consent levels	2020
Discharges	Suspended Solids	10%	50% below consent levels	2020

¹Scope 1 emissions are direct emissions from owned or controlled sources relating to energy and fuel use. Scope 2 emissions are indirect emissions from the generation of purchased energy.

²In this report, the year refers to the University's financial year e.g. 2020 is from August 2020 to July 2021.

Environmental objectives

Focus	Objectives	Rationale for action
Carbon & energy	Reduce absolute Scope 1 & 2 carbon emissions by 30% in 2015 and 50% in 2020 from a 2005 baseline.	Contributes to the HEFCE sector carbon reduction target; supports Plan 415i, reducing operating costs.
Waste & recycling	Reduce absolute total waste by 5% in 2017 and 10% in 2020 against a 2010 baseline.	Improves resource efficiency; demonstrates best practice to staff
	Increase segregated waste reused or recycled to 50% of waste produced in 2015 and 75% in 2020.	and students; supports Plan 415i, reducing costs.
ISO 14001	Extend University certification to Cranfield Defence and Security, including at Cranfield Ordnance Test and Evaluation Centre, by December 2015.	Primary means for continuous improvement; supports commercial bidding and Plan 415i, demonstrating best practice to staff and students.
Travel	Reduce staff commuting in a single occupancy car by 10% in 2017 from a 2012 baseline.	Reduces local road congestion; travel emissions and supports Plan 415i.
Water	Reduce Cranfield campus water consumption by 30% by 2020 from a 2009 baseline.	Maintains legal compliance and
Water, emissions & discharges	Discharge treated effluent from the sewage works, which is on average 50% below permitted consent levels for ammonia, biochemical oxygen demand and suspended solids by 2017.	supports Plan 415i, reducing operating costs and demonstrates best practice to staff and students.
Fairtrade & sustainable procurement	Incorporate sustainability considerations within scoring criteria for all tenders over £250,000 in value by 2015. ACHIEVED	Contributes towards ethical procurement and Plan 415i, reducing operating costs and demonstrating best practice to staff and students.
Sustainable buildings & infrastructure	Achieve BREEAM Excellent for new buildings and all major refurbishments from 2012. Develop "zero carbon" standard for University Buildings by 2014	Supports carbon reduction and resource efficiency and Plan 415i, reducing operating costs and demonstrating best practice to staff and students.
Biodiversity	Increase area set aside on University grounds for conservation by 50% by 2015 from 2013 baseline. ACHIEVED	Supports Plan 415i, improving the wellbeing of staff and students. Improving habitats and encouraging pollinators.
Community involvement	Ensure that at least 90% of staff complete the environmental awareness e-learning module by 2014. ACHIEVED To encourage environmental volunteering with 10% of staff and students participating in 2015. ACHIEVED	Supports Plan 415i, encourages collaborative working and ensures base level of knowledge amongst staff & students.

Quality assurance Governance

The Board for Energy and Environment (BEE) was established in 2011 to report to the Cranfield Executive and Council on energy and environmental issues. The priority of the Board is to ensure Cranfield University demonstrates a leading capability in environmental performance by providing oversight and direction. The Board is a sub-committee of the Executive and consists of senior managers from across the University along with student representation. The Board has working groups, with members drawn from operational and academic staff and students, to progress key environmental targets. A dedicated Energy and Environment team facilitates delivery of the objectives and reports progress to the Board on a regular basis. The Board has the ambition of ensuring a close relationship between BEE's environmental activities across the University and the teaching, learning and research taking place within the Themes on environmental best practice. The Governance structure is outlined below:



ISO 14001

Cranfield University operates a university wide environmental management system on the Cranfield campus. The system provides a framework for managing our environmental impacts, risks, and opportunities, for setting environmental objectives and establishing programmes to achieve them. In June 2017 the scope of the certification was successfully extended to include Cranfield Defence and Security at the Shrivenham and COTEC sites and now covers all University operations. Our target for 2017-18 is to meet the new requirements stipulated in the new 2015 version of the standard.

In a climate of continuous improvement, the reporting of all environmental incidents and near misses is encouraged. Twenty-six environmental incidents were reported this year. An improvement on the Twenty-eight encountered last year. These included: two incidents related to inappropriate waste storage or disposal; seven spills/leaks – (one reported to Environment Agency), three associated with airside fuel spills, one due to vehicle failure, and three foul water leaks; four discharges to drains (one reported to Environment Agency) associated with construction and maintenance activity; eleven internal reports of nuisance odours, predominantly associated with aviation activities. The two incidents reported to Environment Agency relate to minor discharges to Chicheley Brook, which resulted in no further action.

Scope of reporting

The environmental objectives on page 4 encompass activities taking place on the Cranfield Campus, including subsidiary companies and tenants on site (see note 1, page 15). The University's operation at the Cranfield Ordnance Test & Evaluation Centre (COTEC) is included. The University is not directly involved in the management of Shrivenham Campus, so the University activities there are not included in this report (see note 1, page 15).

Other reporting

In line with the Higher Education Statistics Association (HESA) requirements, the University submits environmental data as part of the annual estate management reporting statistics. This data attempts to exclude tenant data and differs slightly from the data that appears in this report. As part of the Carbon Reduction Commitment (CRC) Energy Efficiency scheme requirements, the University provides energy data to the Environment Agency on an annual basis. The scope of CRC reporting is slightly different to that of this report and the HESA return. Data submitted to HESA is also used by the '*Green League*' (a student-led, People and Planet voluntary league table of University environmental performance). In the Green League able comparisons are made per student or per m². Cranfield is a wholly Postgraduate University undertaking industrial scale research. This makes environmental impacts per student or per m² appear high. This annual report focuses on how the environmental performance of the University is improving over time. The University is also participating with an alternative metric for the environmental performance of Universities, devised by the Association of University Directors of Estates (AUDE) called the Green Scorecard.

Base year recalculation policy

Our base year figures for reporting are reviewed from time to time to ensure like for like reporting. In 2013, the University sold Sudbury House Hotel prompting a recalculation of the base-year carbon emissions data and subsequent years to remove reference to this asset *(see notes 2 and 3, page 15).*

Carbon and energy



Reduce absolute Scope 1 & 2 carbon emissions by 30% in 2015 and 50% in 2020 from a 2005 baseline

- New buildings adding to load on site
- Successful funding bid for large Solar PV array
- Major new LED lighting project
- Living lab projects investigating renewable energy options



This year the gas supplies to the student's houses have been brought into the main University energy supply contract. This was necessary because of the poor performance of the existing supplier and subsequent issues for students. New systems introduced to manage this are being extended to other end users improving our recharging and monitoring of consumption. This will help with the ongoing preparations for ISO 50001. Because of this change, the carbon footprint scope has been amended and historic figures revised accordingly (see Note 3, page 15).

Carbon	2005*	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
'000 tCO2e	18.7	18.8	20.4	20.4	18.7	17.6	15.3	16.1	14.5	14.9	13.4	12.8
(1												

(*HEFCE require a carbon reduction target against a 2005 baseline year. (see note 4, page 15)

Electricity consumption reduced slightly in spite of an increased floor area with new buildings constructed. However, gas usage for the district heating increased. Overall, the effect was a small reduction in carbon emissions, helped by the reduction in national grid carbon factor. A larger reduction is now required next year in order to achieve the overall target. This will be possible with a successful installation of the Solar PV project and LED lighting upgrades combined with an improved performance of the District Heating.



New LED lighting with daylight control

- Roll out of ISO 50001
- Improvement of the District Heating
- More campaigns to improve energy efficient behaviour
- Progress large energy projects (Solar PV and District Heating)

Water, emissions and discharges



Reduce Cranfield campus water consumption by 30% by end of 2020/21 from a 2009 baseline

Discharge treated effluent from the sewage works, which is on average, 50% below permitted consent levels for ammonia, biochemical oxygen demand and suspended solids by end of 2017/18.

- Further investment in the sewage works to prevent effluent discharge above permit levels.
- On-going review of water management with Anglian Water.



Further investigations into historic water data using on site water meters has allowed a better estimate of past and current water consumption in the absence of accurate data from Anglian Water. Work is ongoing to establish a more robust metering system to understand water usage across the campus.

Water use	2009	2010	2011	2012	2013	2014	2015	2016
Water use '000 m ³	185	185	183	180	164	167	163	168

The University's sewage treatment works encompasses a leading edge pilot hall research facility used by staff and students on campus. Improvements continue to be made to the sewage works to ensure discharges are kept below consent level.

88%	86%	64%
46%	48%	45%
s 2%	15%	10%
, , , ,	88% 46% 2%	88% 86% 46% 48% 2% 15%

(see note 5, page 15)

This year we have also monitored water BOD at strategic sampling points in the Chicheley Brook to monitor surface water drainage associated with the airfield. A SUDS strategy has been developed as part of the Masterplan.



- Develop water metering across campus
- Installation of equipment linked to research work to reduce suspended solids

Waste and recycling



Reduce absolute total waste by 5% in 2017 and 10% in 2020 against a 2010 baseline

Increase segregated waste for reuse or recycling to 50% of waste in 2015 and 75% in 2020

- Improved waste reporting
- Further investment in recycling bins and signage
- Food waste collections in family houses and offices
- Introduced reusable coffee cups at coffee outlets
- 1.6 tonnes of clothes and household items sent to charity for re-use.
- Supported student projects on waste management



The University is leading thinking in the circular economy through research and teaching. These principles are also being applied in the way resources are managed on campus. Over the last few years there has been a significant improvement in the proportion of waste segregated for recycling on site. General waste is also further sorted off site in a materials recycling facility. The total amount of waste generated is now going down having increased previously.

Waste Indicators	2010	2011	2012	2013	2014	2015	2016
Total waste (tonnes)	1181	1130	1134	1206	1233	1199	1176
Segregated on site to recycle (tonnes)	323	397	423	509	613	628	641
Total recycled overall (tonnes)	498	796	803	865	772	776	793
% segregated on site for recycling	27%	35%	37%	42%	50%	52%	55%

(see note 6, page 15)

Trials with food waste collection have been successful and will soon be rolled out to other family houses and kitchens in office buildings across campus.

- Continue waste awareness campaigns
- Extending food waste collection facilities
- Reduce food waste at catering outlets
- Further ideas for Living Lab student projects
- Developing plans for composting green waste
- Focus on actions to move up the waste hierarchy with the most significant waste streams



Travel



Reduce staff commuting in a single occupancy car by 10% in 2017 from 2012 baseline

- New phone app for bus service
- New bus shelters installed
- Bike registration scheme implemented
- Finalists in Santander Cycle Competition



The cycle registration scheme is combating "bike litter" with abandoned bikes more easy to identify, and providing a route to promote cycling safety. Cycle use on campus is popular and will become more so as the campus expands. A survey identified that a significant number of students and staff would be willing to pay for access to reliable cycle hire. As a result the University is investigating the scope for increasing cycling options for students and staff.

Bus shelters have been installed at the main bus stop and the Technology Park stop. Improvement to services have been planned which will come into effect in September. There will be a new bus route to Ridgmont and a link with Bourne End.

Objective	2006	2012	2013	2015
Single occupancy car use	86%	76%	73%	69%

The statistics for car commuting are based on surveys of staff and students, which take place every two years. In between spot checks are taken of modes of travel. Inevitably, not enough data is captured. Options for automatic data capture of traffic pedestrian and cycle as well as vehicle are being investigated.

- New bus service to Ridgmont
- Improve monitoring of progress.
- More electric charging points.
- Pursue cycle hire scheme.



Fairtrade and sustainable procurement



Incorporate sustainability considerations within scoring criteria for all tenders over £250,000 in value by 2015

- Fairtrade Fornight events included a popular talk from Fairtrade Foundation on 'Choose Fairtrade' and from Zaytoun, Fairtrade breakfasts, Bake sales, and exhibits from Eye2Eye Fairtrade
- Increased awareness raising of Fairtrade on campus including with posters and leaflets.



Fairtrade products are still provided in all internal catering outlets on campus and should be available for all meetings and events.

Fairtrade status was renewed in February 2017.

Fairtrade working group became the 'Sustainable Food Working Group' in January 2017. This now encompasses sustainable food initiatives as well as Fairtrade. As a product of this working group, Campus Services are looking to develop a 'Sustainable Food and Beverage Strategy'

Environmental considerations are now more widely used in procurement decisions.



- Widen Fairtrade product offering.
- Look to develop a 'Sustainable Food and beverage Strategy' and gain accrediation from bodies such a 'Soils Association Food for Life' and 'Marine Stewardship Council'
- Fairtrade to be promoted during freshers week

Biodiversity

- More wildflower plantings
- Allotments installed for students
- Bee hives increased
- Staff engaged in a spring/summer watch campaign.
- Regular biodiversity walks, including off campus.



The Biodiversity Action Areas were reassessed, based on the experience of the previous year. Some areas were developed further with wildflower plantings and other areas returned to more traditional grass management or taken off the list if no actions were taking place. The overall area assigned for action remained roughly the same as the previous year. Work on mapping biodiversity assets across the campus using GIS has started.

The University was awarded a Gardening at Work award for "Best Employee Engagement" by The Wildlife Trust for work promoting biodiversity. This was the outcome of an internally promoted Springwatch campaign earlier in the year, which encouraged staff and students to forward photos of wildlife on campus. A successful application to the local Green Infrastructure Fund will provide funding to create better access including a trail though the woodland.

Links between Biodiversity Action Areas need to be further explored both for human and wildlife benefit. A Living Lab student project on the benefits of green paces on campus has given some useful insights and a tool, which will help prioritise future development. The Landscape Strategy for the Campus Masterplan proposes the development of a wildlife corridor along the western flank of the campus. This will further focus future work on the connectivity of Biodiversity Action Areas.

- Install woodland trail
- Review and further develop Biodiversity Action Areas.
- Develop GIS mapping of biodiversity on campus.



Community involvement

- Successful Green Week
- Very pro-active student green team
- University Green Team now well established
- Green Gown Award finalist



This has been a very good year for student engagement. The student green team were very active assisting with recycling and energy audits in buildings, and attending community volunteering events with the Wildlife Trust and the Forest of Marston Vale. With their efforts, they have helped to bring positive change to the University. An application by Energy & Environment Team to the EAUC Green Gown Awards was rewarded with being selected as finalists for student engagement. The finals take place in the Autumn.

The staff green team is now well established with good attendance at quarterly meetings, and support for recycling initiatives and food waste trials. A Springwatch campaign proved very popular with both staff and students. Green Week launched with a talk from Professor Jim Harris on 'The Living Lab'. The week included a talk from 'Bedfordshire Climate Change Forum', Green Vehicles 'The next generation', a popular talk on 'Solar Energy- power heating, and a trip to Cawleys.

Overall, the numbers staff and students engaged in environmental volunteering and events has remained high.



- Launch a new carbon savings campaign
- Monthly newsletters for Green Teams
- Green Week 2017 in collaboration with OU
- Increased engagement in recycling

Sustainable buildings, infrastructure and Living Lab



Achieve BREEAM Excellent for new buildings and all major refurbishments from 2012

Develop 'zero carbon' standard for University buildings

- Major construction works in progress
- BREEAM assessments are ongoing
- Living Lab Working Group established
- Number of student projects and thesis applied to University infrastructure



Major construction works have been ongoing with AIRC, IMEC and a new Glasshouse facility all being erected in the last year. Post construction BREEAM assessments are still in progress.

Living Lab

The University owns a diverse and interesting estate. From airport to sewage works; from hotels to family houses; offices, industrial scale workshops, lecture rooms and laboratories. There are also shops, a bus depot and technology park on site. A stream runs through the centre of campus, there is a woodland and acres of green space. All of this provides the perfect opportunity for applied research and learning. Recent examples of student projects applied to the estate include:

Investigating Geothermal energy on campus; investigating energy display monitoring on campus; the benefits of green space on campus; surface water management strategy; energy efficiency of Martell House; heat storage for district heating; renewable energy options for campus; energy from waste opportunities; composting options; waste water treatment of suspended solids.

- Investigate sensor and instrumentation options for campus
- Revisit zero carbon options for new build.
- Further development of the district heating scheme.
- Extension of campus electricity grid.



Green Spaces Decision Wheel

Notes

- <u>Objectives</u>: Baseline and target years refers to the financial/academic year August to July (for example, for the Carbon target, the baseline year 2005 is financial year 2005/2006 and the 50% target is to be achieved in year 2020, which is academic year 2020/2021).
- 2. Scope: Tenants are included because it is often not possible to distinguish between what is and is not a direct impact to the University as opposed to an impact of others operating on site. Examples include waste, car travel, some aspects of energy and water consumption and sewage discharges. As measurements and monitoring on site improve, this may become easier to distinguish. Additionally, the University is providing utility and other services to tenants and in a position as landlord and service provider to influence their behaviour and assist in the reduction of their environmental impacts, whilst at the same time having an interest in minimising the risks to the University. The converse applies to the University's Campus at Shrivenham. Here the University is a tenant on a MOD site. It is not possible at this stage to include this Campus within the targets. However, when information becomes available this will be reviewed.
- 3. **Base Year Recalculation Policy:** Cranfield University will ensure that its greenhouse gas reporting is up to date, accurate and consistent with current Government guidance. In particular, when there are structural changes that have a significant effect on the baseline and the reported progress towards targets, the baseline and, if necessary, data for years in between will be recalculated.

Base year recalculation: It is important that progress is measured on a like for like basis. This means that any changes in calculation methodologies are applied to the previous figures as well as current figures. **Structural changes may include:** mergers, acquisitions, and divestments; outsourcing and insourcing of relevant activities; changes in calculation methods or improvements in the accuracy of factors, such as emission, factors, or activity data that result in a significant impact on the base year figures; discovery of significant errors, or a number of cumulative errors that is collectively significant. The recalculation will be triggered and reported if the structural changes would result in a change of greater than 2% in the total baseline figure. At the same time any errors in the current year reporting greater than 2% will be amended and relevant reports updated or notes attached explaining amendments.

- 4. <u>Changes to carbon data</u>: Our carbon footprint is recalculated each year for all years in order to account for errors, changes to the scope and material changes to the conversion factors provided by DEFRA for company reporting purposes. They may not therefore compare directly with previous figures reported in the University Financial Statement. See also our baseline recalculation policy above. Note the figures include emissions for tenants on Cranfield Campus, Silsoe Campus, COTEC and subsidiary companies. Sudbury House Hotel was included historically but has since its sale has been removed from the baseline and all years. The figures also include Martell House, acquired in 2011, with the recalculated accordingly. Shrivenham Campus is excluded.
- 5. <u>Water consumption and discharges figures</u>: These are for Cranfield Campus, including tenants. COTEC and Shrivenham data is not included. Discharges are taken as the average of the three consent targets.
- 6. <u>Waste figures</u>: These are for Cranfield Campus and include some, if not all, tenant waste. Note the key performance indicator for recycling is waste segregated on site. However, the waste contractor further segregates waste at their depot. This elevates our overall recycling performance and it is this figure, which is reported in the HESA Estates Management Reporting. We are working closely with local charities and organisations, collecting reusable goods from students as they leave the University and passing these on to a local homeless charity, Emmaus, to re-sell.
- 7. <u>Academic expertise</u>: Wherever possible, the University is making use of its academic expertise and facilities to enhance its response to environmental improvement. The estate is also offering opportunities for research and teaching. Examples of this include energy audits carried out by students and the University laboratories to analyse local discharges. The new CHP unit is regularly use as a real life demonstration for teaching.

Glossary

AIRC Aerospace Integration Research Centre; BEE Board for Energy & Environment; BOD Biochemical Oxygen Demand; BREEAM Building Research Establishment Environment Assessment Method; CHP Combined Heat and Power; COTEC Cranfield Ordnance Test and Evaluation Centre; CRC Carbon Reduction Commitment; DEFRA Department for Environmental Food, and Rural Affairs; EA Environment Agency; EAUC the Environmental Association for Universities and Colleges; GIS Geographical Information System; HESA Higher Education Statistics Agency; IMEC Intelligent Mobility Engineering Centre; LED Light Emitting Diode; MOD Ministry of Defence; OU Open University; PV Photovoltaic; SHE Safety Health and Environment; SHEF Safety Health Environment and Fire; SUDS Sustainable Urban Drainage System.

Key contacts

Board for Energy and Environment:

- Chair, Professor Leon Terry, Director of Environment and Agrifood
- Ian Sibbald, Director of Finance
- John Street, Director of Facilities
- Gareth Ellis, Energy and Environment Manager
- Ginny Ford, Environment Advisor
- Gio Lusignani, Director of Information Services
- Geoff Say, Director of Finance and Operations CDS
- Professor Frédéric Coulon, Professor of Environmental Chemistry & Microbiology,
- Becky Shepherd, Environment Officer
- Victor Igwemezie, Green and Residential Officer, Cranfield Students' Association
- Zoe Payne, PA to Director of Environment & Agrifood (Board Secretary)

Working groups:

- Living Lab Chair, Professor Jim Harris
- Carbon Management Chair, Dr Nazmiye Ozkan
- Fairtrade & Sustainable Food Chair, Ian Sibbald
- Sustainable Travel Plan, Gareth Ellis
- Waste Management Chair, Dr Philip Longhurst

Further information

For further information, please visit our environmental pages on the <u>University Website</u> or the <u>University Intranet</u>

If you have any questions on any other topics outlined within this report or would like to provide us with any feedback, please contact the Energy and Environment Team – E: <u>green@cranfield.ac.uk</u>.