Annual Environmental Report 2017 / 2018

Board for Energy and Environment

September 2018

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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 2017/18 are:

- Certification of our energy management system to the ISO 50001:2011 standard
- Certification of our environmental management system to the updated ISO 14001:2015 standard
- Two Wildlife Trust awards for our wildlife gardening
- The installation of a 1 MW solar farm providing 5% of the University's electricity

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]	34%	50% reduction	2020[2]
Waste	Total weight produced	6%	10% reduction	2020
Recycling	Segregated on-site	54%	75% of total waste	2020
Travel	Single occupancy car use	4%	10% reduction	2017
Water	Consumption volume	8%	30% reduction	2020
Discharges	Ammonia	52%	50% below consent levels	2020
Discharges	Biochemical Oxygen Demand	60%	50% below consent levels	2020
Discharges	Suspended Solids	33%	50% below consent levels	2020

Key

Indicates that progress is well behind trend to meet 2020 target
Indicates that progress is behind trend but can still recover to meet 2020 target
Indicates that progress is on trend to meet 2020 target

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

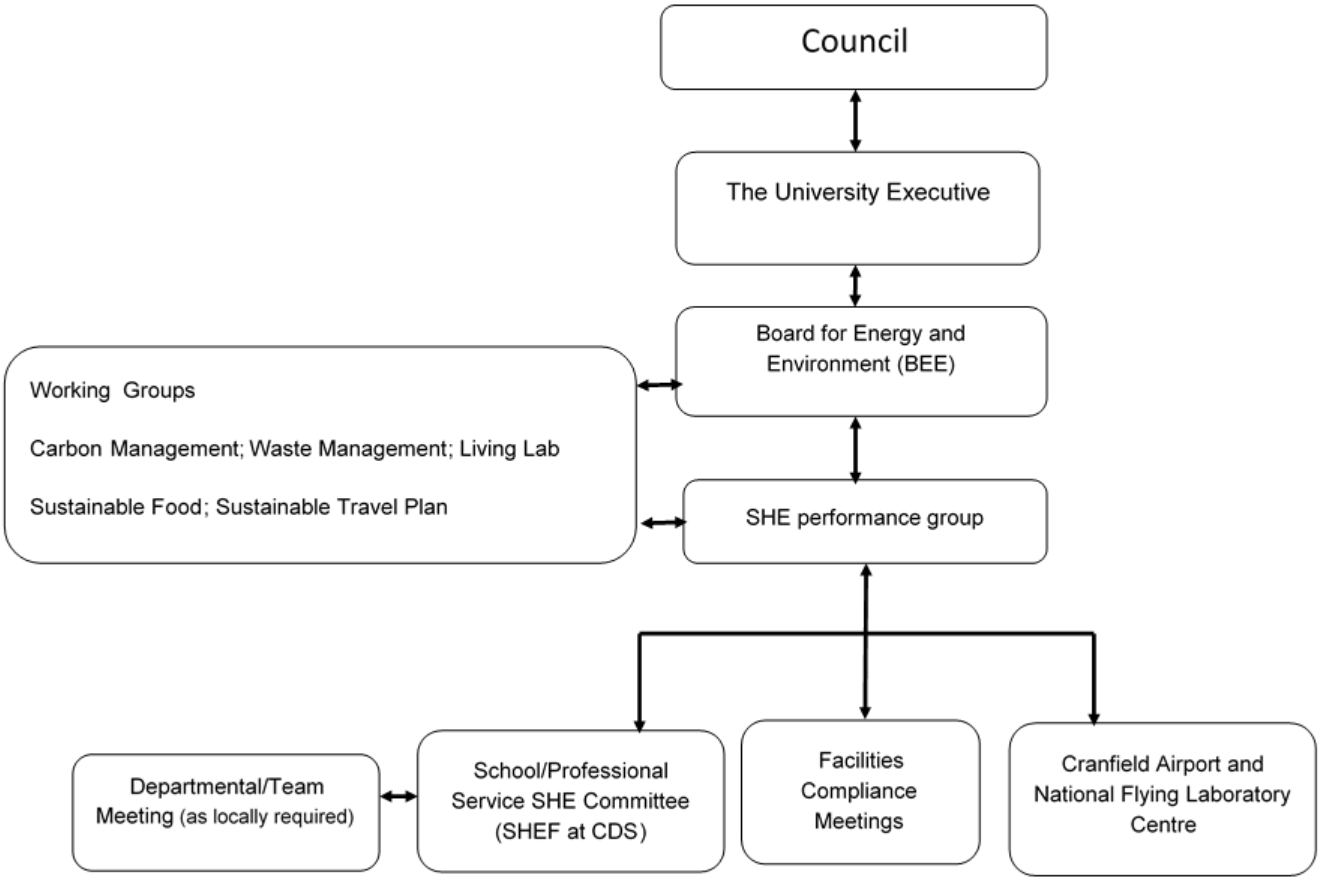
Environmental objectives

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 and students; supports Plan 415i, reducing costs.
	Increase segregated waste reused or recycled to 50% of waste produced in 2015 and 75% in 2020.	
Travel	Reduce staff commuting in a single occupancy car by 10% in 2017 from a 2012 baseline. ACHIEVED for “All Commuters” but not for Staff	Reduces local road congestion; travel emissions and supports Plan 415i.
Water, emissions & discharges	Reduce Cranfield campus water consumption by 30% by 2020 from a 2009 baseline.	Maintains legal compliance and supports Plan 415i, reducing operating costs and demonstrates best practice to staff and students.
	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.	
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.

Quality assurance

Governance

The Board for Energy and Environment (BEE) reports to the Cranfield Executive and Council on energy and environmental management 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 objectives. A dedicated Energy and Environment team facilitates delivery of the objectives and reports progress towards target to the Board on a regular basis. The Board aims to ensure 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. The system provides a framework for managing our environmental impacts, risks, and opportunities, for setting environmental objectives and establishing programmes to achieve them. The scope of the certification now covers all University operations including Cranfield Defence and Security at the Shrivenham and COTEC sites.

In June 2018 we successfully achieved certification to the new 2015 version of the standard.

In a climate of continuous improvement, the reporting of all environmental incidents and near misses is encouraged. Thirty five environmental notifications were received by the Energy and Environment Team this year. These included:

- 23 internal reports of nuisance odours, predominantly associated with aviation activities.
- 3 incidents related to inappropriate waste storage or disposal and
- 6 spills/leaks. These were all relatively minor and not reportable.
- 3 non- compliance events related to our waste water discharge consent (twice for suspended solids and once for ammonia).

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 comparisons are made per student or per m^2. Cranfield is a wholly Postgraduate University undertaking industrial scale research. This makes environmental impacts per student or per m^2 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

- Solar farm installed providing 5% of electricity demand for campus
- Certification of energy management to ISO 50001
- LED lighting replacements

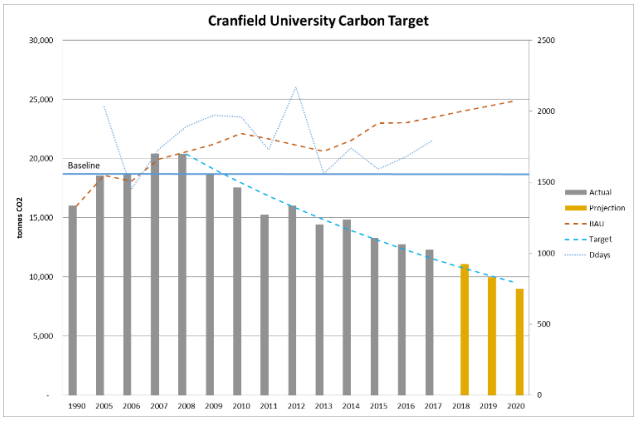
The energy management system is now certified to ISO 50001. This will assist with driving down energy consumption, identifying waste and prioritising energy saving actions. A Solar Farm was installed in April with a capacity of 1 MWe. This will generate around 5% of the University's electrical needs over a year. LED lighting was also installed as part of the same project funded with a Salix loan. This will accrue savings equivalent to a further 3% of electricity consumption.

Carbon emissions Year	2005*	2006	2007	2008	2009	2010	2011
'000 tCO2e	18.6	18.7	20.4	20.4	18.7	17.6	15.3

Year	2012	2013	2014	2015	2016	2017
'000 tCO2e	16	14.4	14.9	13.3	12.8	12.3

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

Carbon emissions reduced by 4% compared with the previous year. This was not as high as planned, partly because of a very cold winter combined with a failure of the biomass boiler in the coldest month. Electricity consumption is down slightly helped by the LED project and solar but counter to that an exceptionally hot summer has led to increased air conditioning use.



Carbon emissions and target

Plans for 2018

- Improved monitoring and targeting
- Further improvements to District Heating
- Develop case for energy storage
- Increased Salix fund for more energy saving projects

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.

- Continued investment in the sewage works to prevent effluent discharge above permit levels.
- An additional connection to the University network was discovered

Water usage has gone up slightly this year. There was a significant increase of water use at Martell House in July with pond being topped up during very hot dry summer. The University supplies others with water from its network and charges for this use. Investigations revealed that a supply which Anglian Water had assumed was on its network was actually connected to the University network. In effect they had installed a meter on a water main which takes water from the University supply. Negotiations are ongoing to resolve this.

Water use	2010	2011	2012	2013	2014	2015	2016	2017
Water use '000 m^3	185	183	180	164	167	163	168	170

The University's sewage treatment works encompasses a leading edge pilot hall research facility used by staff and students on campus. The performance of the works was affected by a period of extremely cold weather in March. Plans are being made to increase resilience to low temperatures in the future.

Discharges (average % below permit level)	2013	2014	2015	2016	2017
Ammoniacal nitrogen	87%	88%	86%	64%	52%
Biochemical oxygen demand (BOD)	57%	46%	48%	45%	60%
Suspended solids	22%	2%	15%	10%	33%

(see note 5, page 15)

Plans for 2018

- Climate adaptation awareness focusing on water management
- Improvements to Martell House Pond
- Improvements to the Sewage works to make them more resilient to low temperatures
- Water conservation awareness raising campaign
- Investigate opportunities for water savings and explore funding options

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

- Segregated food collections across campus offices and residences.
- 1 tonne of clothes and household items sent to charity for re-use as part of 'Give As You Go' campaign for students moving out.
- Supported student projects on waste management

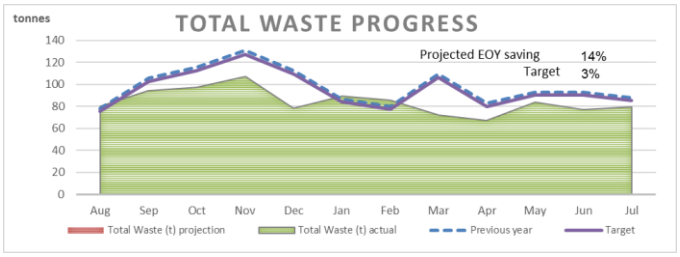
The proportion of waste segregated for recycling on site has remained at just over half. The residual general waste is sorted off site in a materials recycling facility and therefore in total 81% of waste was recycled.
The total amount of waste generated reduced by 13% compared to the 2010 baseline year.

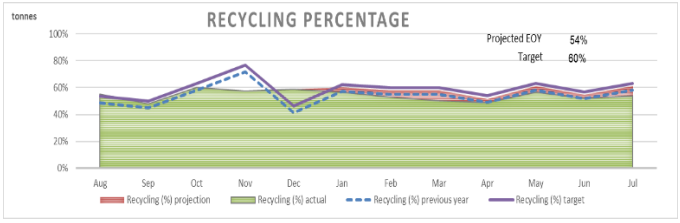
Waste Indicators	2010	2011	2012	2013	2014	2015	2016	2017
Total waste (tonnes)	1181	1130	1134	1206	1233	1199	1176	1013
Segregated on site to recycle (tonnes)	323	397	423	509	613	628	641	551
Total recycled overall (tonnes)	498	796	803	865	772	776	793	820
% segregated on site for recycling	27%	35%	37%	42%	50%	52%	55%	54%

(see note 6, page 15)

Plans for 2018

- Simplify mixed recycling waste stream
- Improve signage and labelling across campus
- Continuing to extend food waste collection facilities
- Develop quarterly awareness roadshows with our waste management partners
- Further ideas for Living Lab student projects
- Focus on actions to reduce waste plastic





Travel

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

- New travel plan being developed
- Car parking changes on campus
- Extension to Uno bus contract
- New bus service to Ridgmont

A new travel plan is being developed for the next 5 years. The previous plan oversaw the installation of a cycle way to the village and the establishment of the bus service operated by Uno. The contract with Uno has now been extended and further improvements planned. This year a new service was set up which links the University with Ridgmont rail station. There are plans to link latter with a fast train service to Oxford.

Objective	2006	2011	2013	2015	2017
Single occupancy car use (Staff)	86%	77%	73%	69%	74%
Single occupancy car use (All commuters)		70%	58%	59%	59%

The target was set for the staff commute largely because there was greater confidence in the figures from staff rather than students in the early surveys. However it would be more appropriate to use the overall commute including students and others working campus. These figures are now reported here and may form the basis for the target in the new travel plan.

Plans for 2018

- New buses being delivered in October
- Real time bus information
- More electric charging points.
- Beyond 2018 new cycle path to village planned for north of airfield as part of Air Park development

Fairtrade and sustainable procurement

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

- Fairtrade fortnight included a presentation from the Fairtrade Foundation
- MSc Group Project developed recommendations for a Sustainable Food & Beverage Strategy for the University

Fairtrade Fortnight was celebrated this year 26th February – 9th March. Events included: Eye2Eye Fairtrade, a presentation from the Fairtrade Foundation, offers for Fairtrade coffee and biscuits, a Fairtrade Fortnight quiz with a prize of a Fairtrade Hamper, a popular Ben and Jerrys ice-cream tasting event, and a Fairtrade CSA breakfast.

Fairtrade is still widely available on widely on campus. Campus Services are now providing locally made confectionary as part of an effort to increase the availability of sustainable and locally produced food.

'Development of a sustainable food and beverage procurement strategy' project was completed by MSc student group. The report provided recommendations for creating a 'Sustainable Food and Beverage Strategy'.

Plans for 2018

- Expand communication network for Fairtrade awareness. Incorporate messages into e-bulletin or in leaflet form
- Further develop our sustainable food and beverage strategy.

Biodiversity

- More annual flower plantings to attract pollinators
- Honey harvesting event
- Staff engaged in a spring/summer biodiversity watch campaign.
- Regular biodiversity walks, including off campus.

Biodiversity Action Areas were increased with more annual ‘urban meadow’ flower plantings to attract pollinators. Some plantings were more successful than others due to the challenges of a very wet spring followed by a very dry summer.

The University was presented with two Wildlife Trust awards this year: ‘Best Employee Engagement in a Wildlife Garden’ and ‘Overall Winner – Best Wildlife Garden’. Grounds contractor Nurture were also winners of the Horticulture Week Custodian Award for the management of the University’s Cranfield campus grounds. Nurture organised a honey harvesting practical event in which staff and students learnt to extract and process honey from the campus beehives.

Work is ongoing to develop a Tree Plan for the campus and to develop the wildlife corridor identified in the Landscape Strategy.

Plans for 2018

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

Community involvement

- Green Week took place 13-17 November
- Successful honey harvesting event
- Two Wildlife Trust practical volunteering events, tree planting and litter picking events
- Emmaus Charity shop October

This academic year has been a good year for engagement. A number of exciting events have taken place including our first honey harvesting experience event in which 40 staff and students took part. Green Week included a talk on MUEAVI (Multi User Environment for Autonomous Vehicle Innovation), two Wildlife Trust volunteering events which were attended by 12 students and an Emmaus charity pop-up shop.

Events that took place during Green Week included: a talk from Gareth Ellis on ‘The future of renewable energy on campus’, ‘open doors’ talk and tour of ‘Agrifood facilities’, tour of the sewage treatment works, a presentation from ‘Bedfordshire Climate Change Forum’, a trip to Cawleys Materials Recycling Facility, and a very popular talk introducing the ‘MUEAVI’ (Multi User Environment for Autonomous Vehicle Innovation) project. All events had a good attendance rate.

Both staff and student Green Teams remained active, attending a series of events and initiatives throughout the year.

Plans for 2018

- Recycling and waste management awareness campaign with Cawleys
- Develop biodiversity volunteering with Nurture and Wildlife Trust
- Energy saving campaign

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
- Number of student projects and thesis applied to University infrastructure

Major construction works have been ongoing with preparations for UKCRIC Pilot Hall, and Water Sciences building, DARTeC building and AgriTech building. Post construction BREEAM assessments are still in progress.

Plans for 2018

- Further develop Design Standards
- Review BREEAM target

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:
Sustainable food strategy for the University; composting of green waste and food on site; Energy storage for the campus; Designing a Sustainability Garden for campus

Plans for 2018

- Implement Urban Observatory

Notes

1. **Objectives:** 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. **Changes to carbon data**: 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. **Water consumption and discharges figures**: 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. **Waste figures:** 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. **Academic expertise:** 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
- Angus Murchie, Energy 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
- Alessandro Pontillo, Green 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 Stuart Wagland

Further information

For further information, please visit our environmental pages on the University Website: https://www.cranfield.ac.uk/about/environmental-credentials

or the University Intranet: https://intranet.cranfield.ac.uk/EnergyEnvironment/Pages/default.aspx

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 at green@cranfield.ac.uk.