Annual Environmental Report 2019 / 2020

Board for Energy and Environment

October 2020

Contents

Statement

Professor Phil Hart, 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 and our core values. This includes making the world a better place. Here, the Board for Energy and Environment (BEE) reports progress on our environmental objectives.

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 for the on-going support of our contractors who help with the efficient running of the estate. I am grateful to my predecessor as chair, Professor Leon Terry, who has steered the improvement of our environmental performance in the previous four years up to April 2020.

Key performance indicators

Issue	Description	Progress	Target	By when
Carbon	Scope 1 & 2 emissions[1]	43%	50% reduction	2020[2]
Waste	Total weight produced	20%	10% reduction	2020
Recycling	Segregated on-site	53%	75% of total waste	2020
Travel	Single occupancy car use	59%	53% of commuters	2023
Water	Consumption volume	17%	30% reduction	2020
Discharges	Ammonia	59%	50% below consent levels	2020
Discharges	Biochemical Oxygen Demand	27%	50% below consent levels	2020
Discharges	Suspended Solids	82%	50% below consent levels	2020

Key

Indicates that progress is well behind trend to meet target in time

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

Indicates that progress is on trend to meet 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.

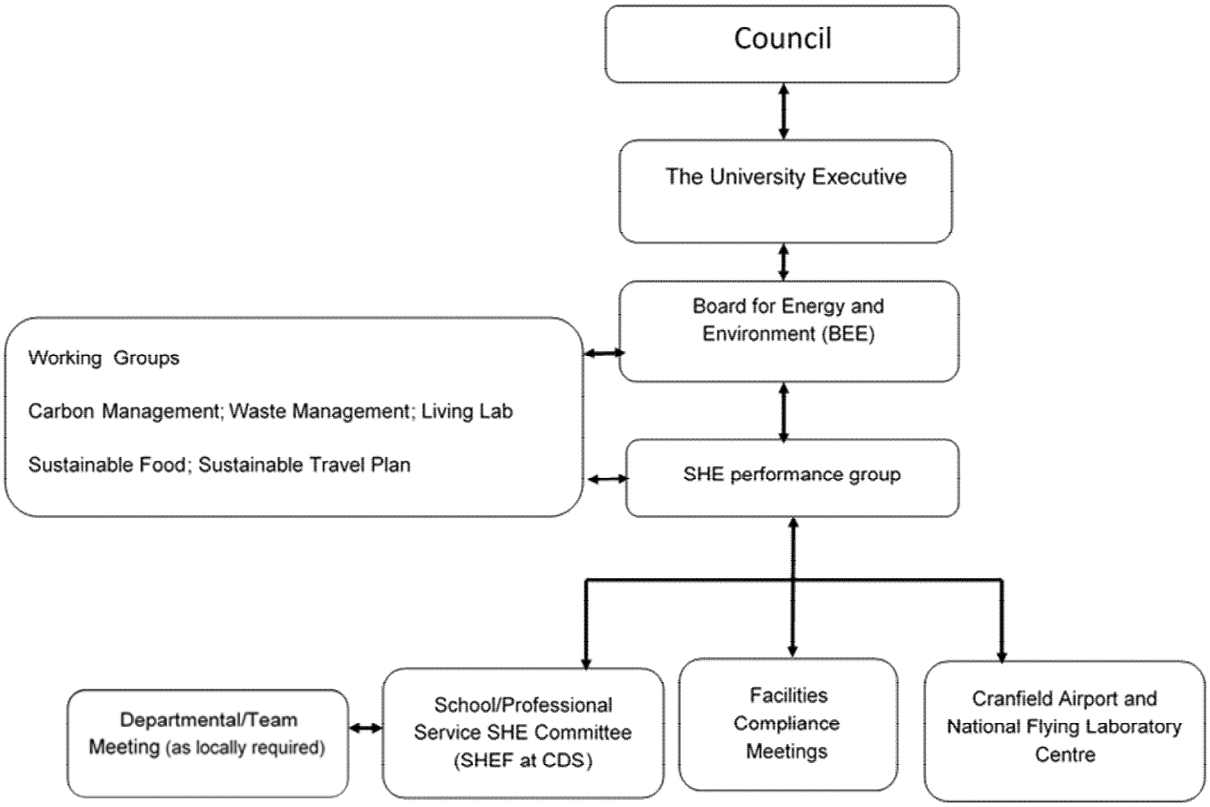
Environmental objectives

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 commuting in a single occupancy car to 53% by 2023	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.
Sustainable Procurement	To complete Level 1 of DEFRA’s flexible framework	See: https://www.gov.uk/government/publications/sustainable-procurement-in-government-guidance-to-the-flexible-framework

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 targets 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 covers all University operations including Cranfield Defence and Security at the Shrivenham and COTEC sites.

Successful surveillance audits were carried out by BSI in May 2020.

In a climate of continuous improvement, the reporting of all environmental incidents and near misses is encouraged. Two environmental notifications were received by the Energy and Environment Team this year. These included: a leak of potassium dichromate into the foul

drain; and a vehicle fire on College Road. Both were dealt with promptly and there was no significant harm to the environment. Both were reported to the Environment Agency, though the former was the responsibility of a tenant and the latter occurred on the Highway and the University's' only involvement was to assist with limiting any spill into the brook and the clear up.

ISO 50001

Cranfield University operates a university wide Energy Management System, which provides a framework for managing our energy use. The scope of the certification covers all University operations on the Cranfield campus, and Cranfield Defence and Security at the COTEC site. Certification was achieved in August 2018 and the second annual surveillance visit was completed by Lloyds in July 2020. There were no major or minor non-conformities. In August 2020 a further audit was undertaken by Lloyds to transition from ISO 50001:2011 to ISO 50001:2018 and that was also successfully completed with no non-conformities.

Scope of reporting for this report

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 do not contribute to the key performance indicators such as carbon emission 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. Under the new Streamlined Energy and Carbon Reporting (SECR) rules, which replaced the Carbon Reduction Commitment (CRC) Energy Efficiency scheme in 2020, the University reports its annual carbon emissions in the University's annual Finance report. That data includes all primary energy use by the University Group, all imported electricity use and all fuel put into University owned vehicles or private or hire vehicles used for Business Travel. . 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).*

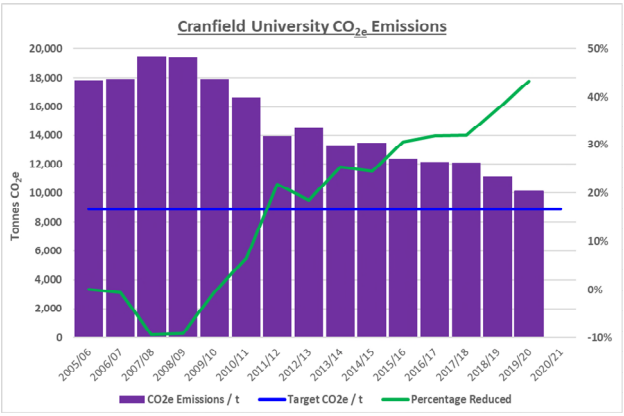
Carbon and energy

Reduce absolute Scope 1 & 2 carbon emissions by 30% in 2015 and 50% in 2020/2021 from a 2005 baseline

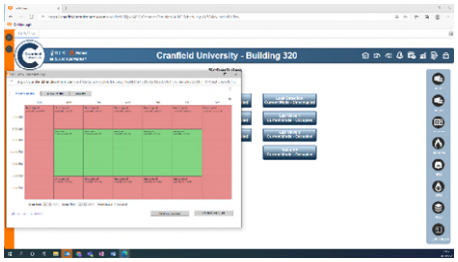
- Largest monthly solar farm output
- Building 111 added to the district heating
- Larger investment in Salix projects
- Improvements to Building Control interface

Checking data – Solar Farm

Five energy efficiency projects using Salix funding were completed in 2019/20 at a combined total cost of £218,607 and forecast to give annual savings of 151 tCO_{2e}. The five projects included two led lighting upgrades, adding B111 to the District Heating, an upgraded Air Compressor and draught proofing of doors and windows in two buildings. An improved interface to the Trend BMS called IQVision is being trialled with the aim to make building management and control more accessible.



Carbon emissions reduced by 9.2% compared with the previous year. There was a record output from the solar farm in May. However the overall reduction in emissions was in large part due to the Covid-19 lockdown. There has been a recalculation of the 2005 baseline figures excluding certain tenants and aligning the footprint with EMR (Estates Management Records) reporting meaning that overall carbon savings now stand at 43.2%.



Trend IQVision BMS

Plans for 2020/21

- Improved BMS
- Further improvements to District Heating
- Further develop opportunities for energy storage
- Expansion of solar farm
- Continued migration of computing to the Cloud

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.

- Surveys of water taps and cisterns in office buildings identified a number of leaks.
- Increased monitoring of meters

Zonal Water Meter

Increased monitoring of meters on site and improved AMR has allowed suspect areas for leaks to be identified. But further meters are required to help better identify those leaks. A small team of students were trained to survey areas for water leakages and energy wastage. This identified a number of leaking taps and toilets. There are plans to work with SWEE researchers to look at behaviour change and the use of showers in halls of residence and also apply learning to other areas.

Water use	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Water use '000 m^3	185	183	180	164	167	163	168	170	164	154
Water use reduction	0%	1%	3%	11%	10%	12%	9%	8%	11%	17%

The University's sewage treatment works encompasses a leading edge pilot hall research facility used by staff and students on campus. The sewage works itself has performed better this year. An experimental multimedia filtration system seems to have had an impact on suspended solids. A review of the capacity of the works is needed with new accommodation planned.

Discharges (average % below permit level)	2013	2014	2015	2016	2017	2018	2019
Ammoniacal nitrogen	87%	88%	86%	64%	52%	55%	59%
Biochemical oxygen demand (BOD)	57%	46%	48%	45%	60%	48%	27%
Suspended solids	22%	2%	15%	10%	33%	24%	82%

(see note 5, page 15)

Plans for 2020/21

- Review capacity of sewage works
- Water conservation awareness raising campaign
- Continue water leakage campaign

Chicheley Brook

Waste and recycling

Reduce absolute total waste by 5% in 2017 and 10% in 2020/2021 against a 2010 baseline

Increase segregated waste for reuse or recycling to 50% of waste in 2015 and 75% in 2020/2021

- Food collected for food banks as well as clothes and household items sent to charity for re-use as part of the 'Great Cranfield Donate' campaign for students moving out.
- Further food recycling established in offices

Waste Compound Stringfellow Halls

The proportion of waste segregated for recycling on site was 53%. The residual general waste is sorted off site in a materials recycling facility which picks up a further 135 tonnes to be recycled and therefore in total 67% of waste was recycled. The total amount of waste generated reduced by 20% compared to the 2010 baseline year. Clearly quantities of both total waste and waste segregated for recycling have been affected by Covid. Where feasible the campaign to reduce single use plastics continues. However there is an increase in single use waste associated with masks, paper towels and takeaway food.

Waste Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total waste (tonnes)	1181	1130	1134	1206	1233	1199	1176	1014	1021	949
Total waste reduction from 2010 baseline	0%	4%	4%	-2%	-4%	-2%	0%	14%	14%	20%
Segregated on site to recycle (tonnes)	323	397	423	509	613	628	641	551	562	500
% segregated on site for recycling	27%	35%	37%	42%	50%	52%	55%	54%	55%	53%
Total recycled overall (tonnes)	498	796	803	865	772	776	793	820	695	635
% recycled overall	42%	70%	71%	72%	63%	65%	67%	81%	68%	67%

(see note 6, page 15)

Plans for 2020/21

- Scope and implement onsite composting project
- Further reduction of single use plastics
- Introduce monitoring of recycling capture rates for different materials

Food Waste Options

Travel

Reduce commuting in a single occupancy car to 53% by 2023

- New fast service to MK railway station established
- New bus shelter and improved main campus bus stop

New Bus Shelter

The Uno bus service continues to grow in popularity with a 30% increase in passenger journeys in 2019 compared with the previous year. From March 2020 this was dramatically impacted by the Covid virus restrictions with reduced services and 20% capacity on buses. As this report is being produced services have returned to normal and capacity increased on buses in readiness for new students arriving in October. However with capacity not yet at normal it is anticipated that more staff and students will be looking for alternative mods for travel and cycling in particular has seen an increase all over the country. In readiness for this plans are being made to improve accessibility to bikes, increase bike parking infrastructure and to secure better routes to campus.

Objective	2012	2014	2016	2018
Single occupancy car use (All commuters)	70%	58%	59%	59%

Plans for 2020/21

- Improved cycle management including refurbishment of used bikes
- More cycle parking facilities
- More electric charging points.

Cycle shelter at Chilver Hall

Sustainable procurement and Fairtrade

To complete Level 1 of DEFRA's flexible framework by 2020/2021

- Fair Trade Fortnight
- Reducing single use plastics campaign

Fair Trade event

The University is committed to following the Fairtrade principals of better prices, decent working conditions, local sustainability, and fair terms of trade for farmers and workers in the developing world. To raise awareness of Fairtrade, the University hosted Fairtrade Fortnight in February. The University continues to support Fairtrade products and awareness raising events.

This year's Fairtrade Fortnight took place between the 24th February and the 8th March, events included an exhibit from Ben and Jerry's ice cream, promotions on Fairtrade products on campus including porridge and coffee, and Fairtrade wine tasting at the CSA.

As part of a campaign to reduce single use plastics all new students receive branded reusable water bottles. CSA have removed plastic cups, and have switched from plastic straws to paper straws. Campus services continue to use Vegware products, and have reduced use of disposable cups. Stickers and posters have been distributed to encourage the use of reusable bottles.

Fair Trade products

Plans for 2020/21

- Review progress towards the flexible framework
- Further develop sustainable food and beverage strategy.

Biodiversity

- Meet the bees event
- Bat house constructed
- Allotments moved to main campus

Bat House

BAM the HVAC contractor for the site donated six specimen trees which were planted by Martell House and by Prince Philip Avenue. As part of the works for new Residential Halls a number of ancient fruit trees and were moved and transplanted to create a new orchard behind the Crescent. As part of the same works a new bat house has been built to compensate for loss of habitat when houses were demolished to make way for the new halls. The allotments were also moved to a location nearer to the Student Union Building.

The honey harvesting was repeated with great success in Green Week. Three new hives have been provided this summer, making six in total. Biodiversity walks continued to be a regular feature until Covid shut down activities. A tree planting plan for the campus is being developed.

Plans for 2020/21

- Develop habitat management plans
- Further develop GIS mapping of biodiversity on campus.

Orchard trees being moved

Community involvement

- Woodland Trail opened
- Tree planting in the Community Forest
- Finalist at Green Gown Award for ‘Benefiting Society’ category

Woodland walk

There was an official opening of the Woodland Trail on the 20th of September 2019. This brought together Cranfield Parish Council, the Forest of Marston Vale, The Green Business Network, Nurture and staff and students from the University to celebrate this new community resource.

Official opening of the Woodland Trail

In November Green Week encompassed a volunteering event for Wildlife Trust, a talk from the Sustainability Network on ‘2020, a decade of radical sustainable disruption’, a bicycle repair shop and presentations from Bedfordshire Climate Change Forum on ‘A Climate Change Solution where all sides win’, Dr Rosina Watson on ‘Is sustainability the business of business’, Dr Caitriona Shannon on ‘Every drop counts; water saving in the UK’ and finally a presentation by Gareth Ellis on ‘Cranfield University Objectives and Targets beyond 2020’.

A volunteering event was organised to support the Wildlife Trust with scrub clearance and also to support a tree planting with the Community Forest of Marston Vale. A Cranfield Sustainability Challenge photo contest was organised for students, where the winner was presented with a CSA voucher.

Plans for 2020/21

- Staff and student Energy saving campaign
- Supporting student Green Team on individual projects
- More virtual based meetings and events
- Ongoing events such as green week, walks and interactive events

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

New cycle shelter for Water Sciences

The UKCRIC Water Sciences building has achieved BREEAM Excellent pre construction and is on target to achieve excellent post construction. The DARTEC building is on target to meet BREEAM Excellent both pre and post construction.

The installation of sensors has begun for the Living Lab “Urban Observatory”. Air sensors have been installed along with water quality sensors in the local water course. University Design Standards continue to develop and are proving a useful tool to ensure energy and environmental standards are incorporated into new buildings and refurbishments.

Recent examples of student projects applied to the estate include:

Design of a Wildlife Corridor for Campus
Modelling the Biomass Boiler

Plans for 2020/21

- Install further sensors for Urban Observatory
- Continue to develop Design Standards

Water Sciences Building

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 is 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; SECR Streamlined Energy & Carbon Reporting, 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 Phil Hart, Director of Energy*
- Ian Sibbald, Director of Finance
- John Street, Director of Facilities
- Gareth Ellis, Energy and Environment Manager
- Ginny Ford, Environment Advisor
- Angus Murchie, Energy Advisor
- Zixin Wan, Student Green Officer
- Gio Lusignani, Director of Information Services
- Geoff Say, Director of Finance and Operations CDS
- Stewart Elsmore, Director of Campus Services
- Rosina Watson, Head of Sustainability Group
- Becky Shepherd, Environment Officer
- Zoe Payne, PA to Director of Environment & Agrifood (Board Secretary)

*Professor Leon Terry was Chair until April 2020

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.