

SUSTAINABLE WAYS – ENERGY AND CARBON



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CARBON VISION STATEMENT

UEA's campus has embodied bold confidence and innovation since our beginnings in the 1960s, growing and changing to reflect the evolution of the UK Higher Education system.

In 2015 we continued to pioneer the future of education and research by opening the Enterprise Centre, Britain's greenest commercial building. I am determined that this aspirational project be an inspiration for our future buildings as well as for the entrepreneurs and low carbon organisations that have found a workspace there.

At UEA we motivate our students and staff to challenge, ask questions and think beyond boundaries and conventions to solve all kinds of problems. Research-embedded teaching is key – how can we embed technical, methodological and critical analysis skills into the teaching at UEA, skills needed in future working lives even for individuals who do not choose to pursue research further? Our Living Laboratory programme is one way that we aim to support students in becoming global citizens and sustainability ambassadors. Connecting our low carbon campus with our research, through new thinking and student-driven projects, we aspire to enable all members of the University to support our carbon reduction and energy efficiency agenda.

Our purpose at UEA is to continue to build and develop our reputation as a leading UK university, delivering excellent research and teaching, and making a positive impact on the wider world. We need to be trailblazers; to innovate, adapt and meet constantly changing needs; to follow new, Sustainable Ways. The energy and carbon reduction programme speaks to our ongoing commitment to reduce the environmental impacts associated with our processes, activities and operations. Through infrastructure improvements and with help from our community of staff, researchers and students, we can look forward to the University of East Anglia continuing to inspire future generations of staff and students to step up to the carbon challenge.



PROFESSOR DAVID RICHARDSON
VICE-CHANCELLOR,
UNIVERSITY OF EAST ANGLIA

*Left:
UEA's first building-integrated solar PV system,
ZICER building (see page 5)*

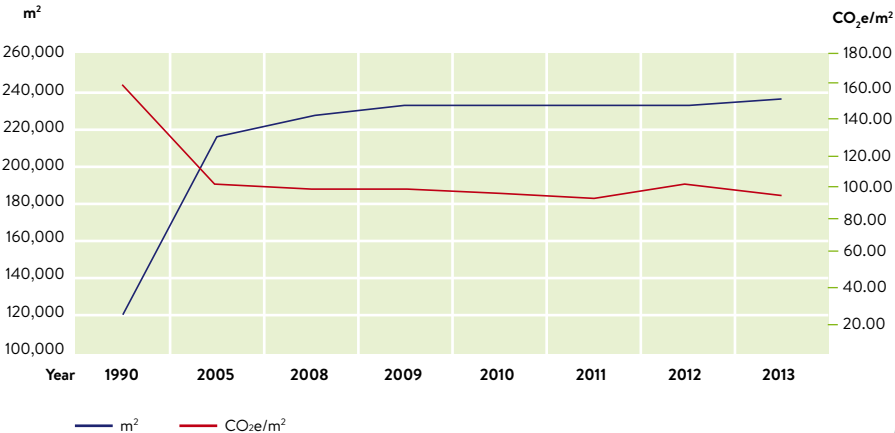
CARBON INTENSITY

UEA is investing in its infrastructure and personnel to reduce negative environmental impacts and capitalise on internal expertise, and is continuing to reduce its carbon intensity despite a growing estate.

UEA's absolute Scope 1 and 2 carbon emissions have levelled out, despite an expanding campus: the carbon intensity of UEA's operations has reduced. In 2013/14, we emitted 23,023 tonnes of carbon – a year-on-year reduction of 3%. This shows the success of various energy reduction initiatives that have made our campus more efficient.

UEA'S ENERGY AND CARBON REDUCTION PROGRAMME

The Energy and Carbon Reduction Programme, or ECRP, sets out UEA's carbon reduction targets and the work areas aiming to achieve these. The ECRP will be broken down into a series of five-year frameworks, the first of which is summarised in this leaflet. See page 12 for a list of the documentation that supports this framework.



TARGETS

UEA shares the UK's goal of reducing carbon emissions by 80% from 1990 levels by 2050, taking account of the need to continue to adapt to the ever-changing needs of our students, researchers and funding mechanisms.

UEA's reduction targets:

- Reduce our campus carbon emissions by 35% by 2020, against a 1990 baseline
- Reduce our energy consumption by 25% by 2020, against a 2013/14 baseline.

UEA's total utilities cost is over £4 million per year. A proactive approach to energy management for the past 25 years has helped to keep these costs as low as possible. For example, our use of combined heat and power (CHP) engines saves around £1 million per year, reducing UEA's carbon footprint by around 5,000 tonnes per year.

A 25% reduction in energy consumption from 2013/14 energy consumption and prices will save over £1 million and contribute to an ongoing efficiencies drive for reinvestment in the estate.

Right:
External view of the Enterprise Centre's timber frame, which has both sequestered carbon and created opportunities for locally-grown timber

“THROUGH THE ENERGY AND CARBON REDUCTION PROGRAMME, UEA WILL WORK TO DELIVER A LOW CARBON CAMPUS BY 2030, WHILST ENSURING THE UNIVERSITY REMAINS A FINANCIALLY, ENVIRONMENTALLY AND SOCIALLY SUSTAINABLE INSTITUTION.”

RICHARD BETTLE,
HEAD OF ENERGY AND UTILITIES, UEA

UEA'S LOW CARBON CAMPUS

Although the need to reduce CO₂ emissions primarily became a focus for the HE sector after 2005, running an efficient and low energy estate has been a long-standing goal of UEA. The challenges of operating a 1960s estate with poor thermal performance led UEA to develop a series of highly thermally efficient buildings, both to counter the original building stock and to ensure the estate as a whole was cost effective to operate. UEA was an early adopter of the low energy/carbon agenda, with our low carbon campus journey beginning in the early 1990s.

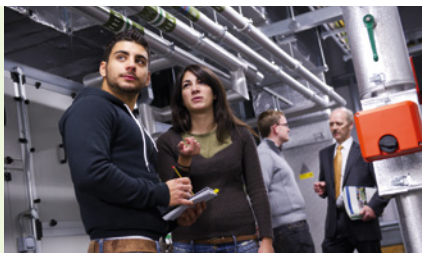
1990 – 1995



ELIZABETH FRY BUILDING (1995)

- “Best building ever”, Building Services Journal (1998)
- High thermal mass, highly insulated triple glazing
- Low energy structural ceiling slab system, Termodeck, provides very consistent conditions throughout the year
- After 20 years, still exceeds current building regulations for thermal performance and is one of our most energy efficient buildings on campus.

1995 – 2000



CHP AND DISTRICT HEATING (1999)

- Three combined heat and power (CHP) engines installed (1000kW each)
- Provide electricity and heating, via existing district heating scheme
- Use natural gas to generate electricity; waste heat captured and used to heat buildings. Overall efficiency is around 80%
- Through the CHP system, UEA regularly generates over 60% of its own, low carbon, electricity, reducing our carbon footprint by around 20%, or 5000tCO₂e (compared to traditional boilers and grid electricity)
- Regularly reduces costs by over £1 million per year.

2000 – 2005



ZICER (THE ZUCKERMAN INSTITUTE FOR CONNECTIVE ENVIRONMENTAL RESEARCH) AND INTEGRATED PV (2002)

- Second low energy building using the Termodeck system
- Thermal performance improved over the Elizabeth Fry Building
- UEA's first building-integrated PV system. The 34kW system demonstrates potential of building integrated PV
- Over 240,000kWh of zero-carbon electricity generated (the amount required to power the average house for 72 years).

2005 – 2010



DISTRICT COOLING SYSTEM (2006)

- Project uses waste heat from the CHP engines, not electrical energy, to generate the power to create cold water. An absorption chiller unit replaced electrically-driven compression refrigeration
- District pipe network provides cooling to laboratory equipment and areas prone to overheating.



THOMAS PAINE STUDY CENTRE (2009)

- 360-seat lecture theatre, seminar rooms and offices
- Termodeck system, with similar performance to Elizabeth Fry and ZICER buildings
- Learnt from other buildings: installed displacement ventilation and more zone controls to improve occupant comfort.

UEA'S LOW CARBON CAMPUS

Continued

2010 – 2015



JULIAN STUDY CENTRE (2013)

- The beginning of replacing concrete with cross-laminated timber (CLT) in UEA's low energy buildings
- Termodeck heating and cooling system, with hollow concrete floors, still used
- CLT structure reduced the amount of concrete used (saving 'embodied carbon') and speeding up construction
- Achieved an air tightness far exceeding current building regulations, meaning that it loses heat much more slowly in the winter
- LED lighting; 22kW of PV roof-mounted PV; received the highest-rated Energy Performance Certificate (A, out of G)
- A building that used less energy in construction, but is also more efficient during use.



CROME COURT (2014)

- Our most environmental and energy-efficient accommodation block
- Cross-laminated timber superstructure completely replaces concrete in the frame
- Around 21kW of PV; external green wall; greywater recycling system; energy display screens per flat, helping residents understand their energy use and flat performance
- 'BREEAM Excellent', a top rank in the world's foremost environmental assessment method and rating system for buildings
- First building on campus to fully embrace Building Information Modelling, or BIM: one of the first projects in the UK to achieve a fully-integrated BIM Level 2 (ahead of government schedule).

2015



ENTERPRISE CENTRE (JUNE 2015)

- UEA and Norfolk's showcase low carbon building, aspiring to be the UK's greenest commercial building
- Targeted the challenging and internationally-recognised Passivhaus standard, the world's leading 'fabric first' approach to low energy buildings
- Expected to achieve a 'BREEAM Outstanding' rating, the world's leading design and assessment method for sustainable buildings
- An exemplar of sustainable procurement, and low embodied energy and carbon construction technologies, through natural and bio-renewable materials sourced through local supply chains.



BOILER REPLACEMENT (SPRING 2015)

- Replacement of the 50-year-old boilers used to back up the CHP engines and provide extra mid-winter heat
- Replaced with three 6MW natural gas Bosch boilers
- Boiler efficiency improved from 75% to over 90%, saving over £50,000 per year
- Saves over 300tCO₂e per year.

DRIVERS OF A LOW CARBON CAMPUS

The cost of UK electricity could rise between 20% and 50% by 2020 (Department for Energy and Climate Change, 2014), potentially adding £300,000 – £750,000 to UEA’s annual electricity bill. The impact of these rising costs to UEA can be mitigated by reducing our energy consumption, generating electricity on site and by continuing to invest in appropriate renewable technologies.

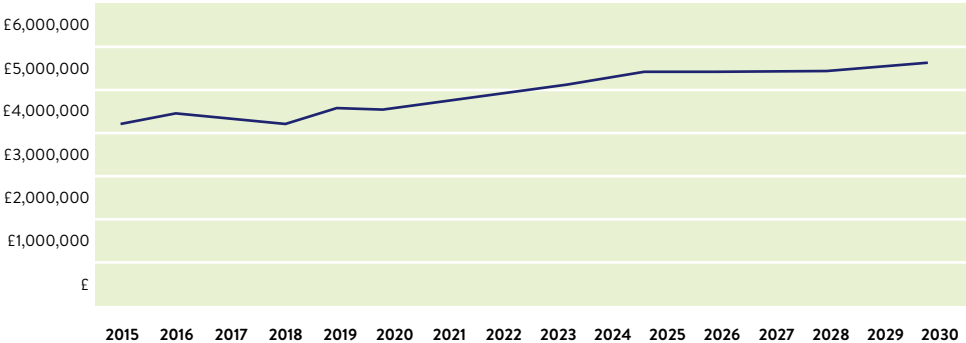
At UEA we are working to create a university now that will be even better in the future. At a basic level, sustainable development at UEA means that we try to balance the ‘three pillars’ of environmental, economic and social elements. We challenge our environmental impact through reducing our reliance on grid electricity and therefore fossil fuels, as well as promoting recycled and ‘eco’ products such as biological cleaning materials.

We champion local suppliers and ethical causes, including Fairtrade and vegan products. Alongside the central Procurement Team, the Risk and Sustainability Team seeks to ensure value for money in a holistic, whole-life costing sense, and also looks to promote alternatives to international business travel.

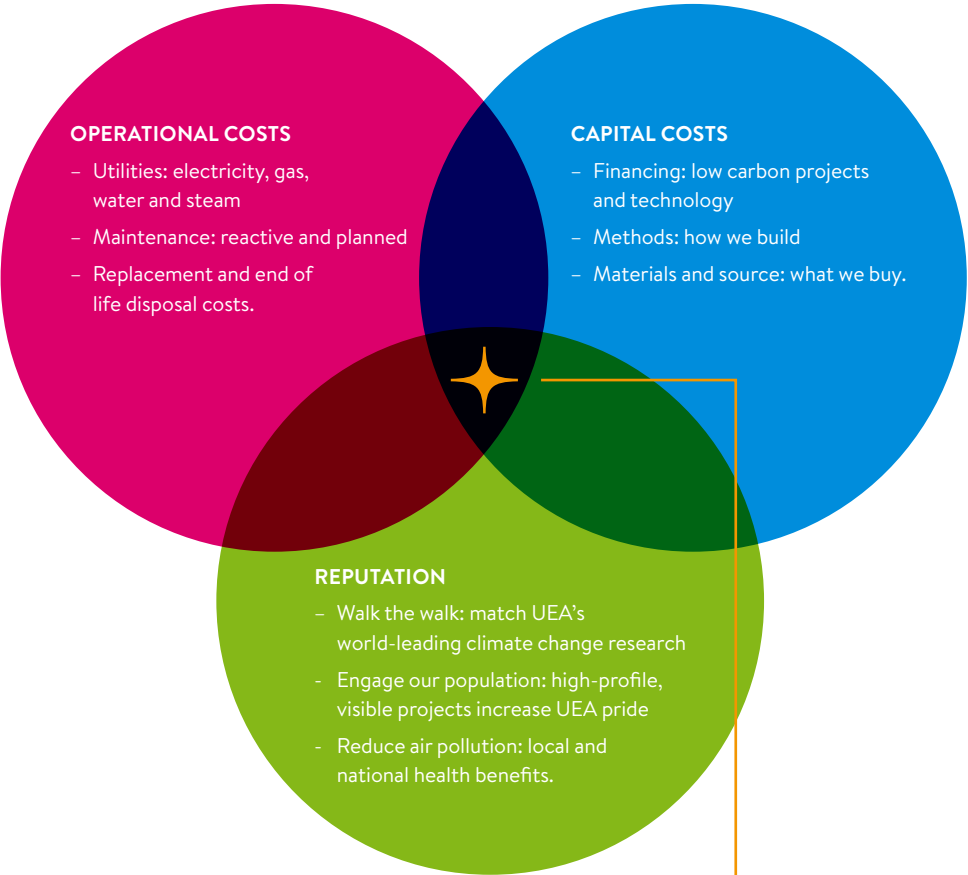
Our students and staff are vocal in their call for a campus that embodies the environmental and social sustainability principles taught in our internationally-renowned School of Environmental Sciences and School of International Development. ‘Sustainability’ was a key theme to emerge from the ‘UEA 2030 Vision’ communications consultation in 2015, which sought feedback from the UEA community on the University’s journey over the following 15 years.

In carbon reduction terms, we work to balance the three sustainable development principles alongside three energy-specific themes: Reputation, Capital Cost, and Operational Cost.

UEA MAIN CAMPUS ENERGY COST PROJECTIONS



THE UEA CARBON SUSTAINABILITY BALANCE



UEA LOW CARBON CAMPUS

- On-site, low carbon energy production
- Low energy buildings, in design and use
- Refurbishment projects consider estate strategy alongside carbon sustainability balance
- A centre of excellence for UEA and local community engagement.

ENERGY AND CARBON REDUCTION DELIVERY

Five work areas are contributing to UEA's targeted £1 million energy saving between 2015–2020. These will be led by key managers within the Estates and Buildings Division. Each work area will also be supported by colleagues from across UEA and the Estates Senior Management Team.

UEA'S ENERGY AND CARBON REDUCTION PROGRAMME (ECRP) GOVERNANCE



ECRP WORK AREAS EXPLAINED

Capital investment

These are existing projects to refurbish or replace end of life equipment and facilities, which will deliver energy savings. This work area will be led by the Head of Engineering and Infrastructure, with support from Head of Projects and Campus Development.

Energy-saving projects

These are new projects that will achieve payback from energy savings in five years or less. From 2015, an Energy Saving Company (ESCo) will guarantee that each of these projects meets stated energy savings. The funding of these projects will come from an existing, internal Revolving Green Fund, a new invest-to-save fund or via the ESCo. This work area will be led by the Energy Officer with Support from Head of Energy and Utilities.

Sustainability Network

The Sustainability Network supports every member of the UEA community in making a difference through small changes in their actions around the University. An early pilot engagement campaign held in the Registry building delivered an 11% energy saving – around 15,000kg CO₂e, and £2000. Staff and students' efforts to support the Energy and Carbon Reduction Programme can deliver real change. This work area will be delivered by the Environmental Officer.

Building recommissioning

Over the past 50 years many of UEA's buildings have been repeatedly modified and it is likely that many of the building services are no longer performing at their optimum or being controlled in the most efficient way. This work area will aim to improve the comfort of occupants and reduce energy, by ensuring building services and controls are as effective as possible. This work area will be led by the Head of Energy and Utilities.

Enhanced maintenance

In summer 2015, UEA embarked on an exciting new relationship with external contractor CBRE (an outsourced Facilities Management company) to deliver planned maintenance across the campus. With experience of working with universities, they are confident of being able to deliver significant energy savings through their maintenance practices. This work area will be led by the Head of Maintenance.



ENERGY AND CARBON STRATEGY

WHERE NEXT?

Key infrastructure solutions under consideration include:

- New, more efficient CHP engines
- An increase in low carbon energy generation: 1MW of new PV. In 2015, on-site PV systems produced around 20,000kWh per year, saving around £2,000
- Installation of a 1MW woodchip boiler
- Installation of thermal stores on district heating system, enabling more efficient use of CHP by using excess heat as needed, for example heat generated in the afternoon being reserved for use the following morning rather than using boilers
- Engage with refurbishment projects, balancing energy efficiency with longer-term estate strategy.

CONCRETE CAMPUS REFURBISHMENT

A major component of the next phase of the Energy and Carbon Reduction Programme (2020 to 2025) is likely to be the refurbishment of the 1960s campus buildings, with energy reduction in mind alongside improving environmental conditions.



THE BIGGER PICTURE

The Energy and Carbon Reduction Programme is a new format for carbon management planning at UEA.

An ongoing programme of projects within the five work areas (see pages 10–11) will run from 2015–2020. The Programme will be revised and re-released every five years, incorporating a wider framework of documentation within this.

DOCUMENTATION FRAMEWORK

- UEA Plan (five yearly, UEA Executive Team)
- UEA Works Programme (annual, Estates)
- Annual Performance Report (annual, Risk and Sustainability Team)
- UEA Environmental Management System (certificated to ISO 14001, May 2015; annual audit programme).



GET INVOLVED

The UEA Sustainable Ways banner covers a diverse range of sustainability actions and issues at UEA. The Sustainable Ways vision is one of a resilient university – where consumption is efficient and self-generated energy supports low carbon goals, supported by a vibrant community of world-leading researchers and inspired graduates.



SUSTAINABILITY NETWORK

Sustainability Champions work with the Estates Division to support environmental initiatives across the campus. With ongoing Estates support, staff and student members become part of an active network who share knowledge and best practice. They provide a local focus for environmental and energy issues, and help encourage friends and colleagues to make small changes to everyday practices that will collectively make a difference across UEA.

LIVING LAB

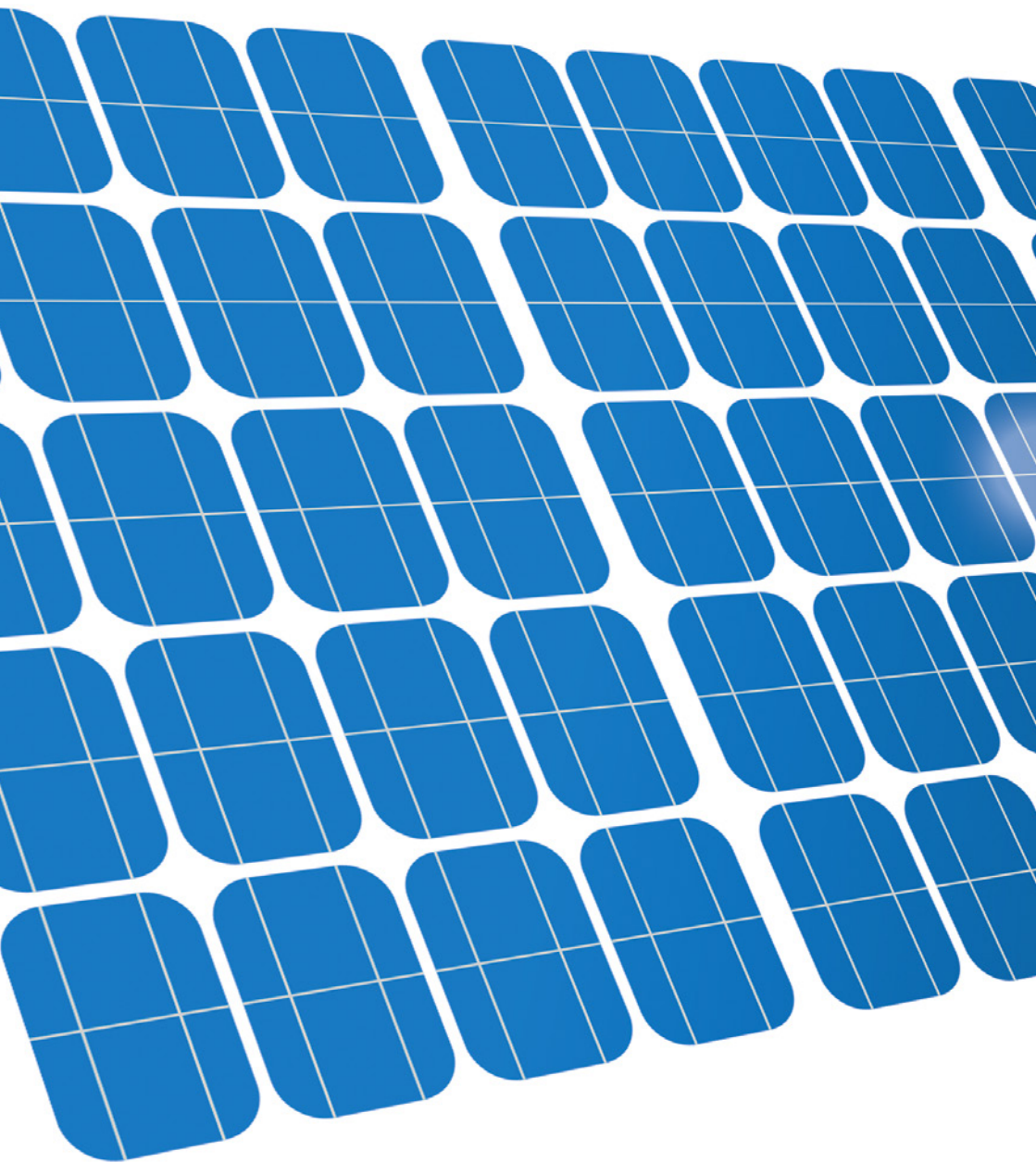
The UEA Living Lab is developing the University of East Anglia campus as a site for applied teaching and research around sustainability and low carbon. This programme provides a platform for collaboration between researchers, students, and the Estates and Buildings Division to develop and monitor innovative, sustainable practices and technologies through student projects in real world settings.

GREEN IMPACT

The Green Impact programme sees teams from across UEA challenge their School or Department to improve its sustainable credentials. An online toolkit guides teams through a range of actions to an end of year celebration of achievements and the resulting awards. Central campaigns, such as holiday shut-downs or awareness day events, support a whole university approach to energy saving and other initiatives.

Interested in finding out more?

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