

Joined-up approach helps Cambridge make savings and offset the growth of its estate

Faced with the challenge of cutting costs and carbon across a growing property estate, with energy prices on the rise, Cambridge University turned to the Carbon Trust for help. As a result of our joint work, the university has made £476,000 annual savings.



Business focus

Founded in 1209, Cambridge University today has over 8,000 staff and more than 18,000 students from around the world study there each year. It ranks consistently among the world's top five universities.

Like many higher education establishments, Cambridge's estate has grown significantly over the last two decades, challenging its ability to make absolute carbon savings. The property portfolio now comprises over 150 teaching, research and administrative buildings around the city – this excludes the 31 colleges, which are independent institutions where the students live, eat and socialise in an academic environment which offers the educational support and benefits of a collegiate university.

Buildings range from the original 13th century constructions to state-of-the-art facilities and laboratories for its ever-growing research capability. The latter use sophisticated and energy-intensive heating, cooling and ventilation systems, while the older buildings present different issues when it comes to energy use – many still having old, inefficient heating systems and poorly insulated pipework which can be difficult to work on.

This combination means the university's energy and water bills have continued to increase over the last two decades. By 2006, these costs were approaching £9 million, at a time when energy prices were continuing to rise. This equated to just under 66,200 tonnes of CO₂. Faced with such a high and increasing energy bill, Cambridge chose to adopt a more strategic approach to energy management.

Other factors affecting this decision were stretching government targets, upcoming regulation – such as the Carbon Reduction Commitment Energy Efficiency Scheme (CRC) – and impending changes to the Higher Education Funding Council for England's (HEFCE) funding strategy. From 2011 onwards some of the funding institutions receive will link to how successfully they are reducing their carbon emissions.

As a result, in 2006, Cambridge joined our Carbon Management service and four years into that work, has reduced the amount of carbon emitted per unit of income by 17%.

The university has now been awarded the Carbon Trust Standard, which provides independent verification of its achievements around carbon management and reduction. As Energy Manager Paul Hasley says: "It is great to have the Standard to point to when prospective students, staff and other stakeholders ask about what we are doing in this area. It also means we have fulfilled one of the early action metrics for the Carbon Reduction Commitment."

17%

the reduction in
carbon emitted per unit
of income since 2006



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In order to maintain our leadership position we need to innovate, invest and grow. These aims are not without their challenges, especially around resources – and energy is a good example. Higher education as a whole spends more than £200 million every year on energy, which is typically about 2.5% of the average university’s annual budget; this is a considerable amount of money. Therefore the ability to realise savings in this area can make a real difference on many fronts. ”

Alison Richard

Vice Chancellor, University of Cambridge

Approach

We worked with Cambridge to develop an initial five-year carbon management plan that looked at energy saving measures – and how these could be funded – plus where policies, procedures and internal communications could be reshaped to better support energy management.

Better building management and monitoring

The first thing Paul did was to add his support to the ongoing initiatives being carried out by the university’s Building Management Systems (BMS) Manager to increase the level of control provided by the system. He successfully applied for Carbon Trust funding, which provided valued financial assistance to the project. The objective, targeted for the short to medium term, is to integrate the controls and energy monitoring into a unified system, populating a SQL database from which the energy usage of the university estate can be easily monitored.

According to Garry van Geete, the university’s Project Manager for the BMS development: “By moving to a common standard we are getting a clearer picture of what is happening across our properties, and a better understanding of how the building services operate. With at least one person per building looking at the BMS-collected data there is a far greater chance that we will spot causes of energy waste. Also, once the necessary sub-metering is in place and connected to the system, departments will be able to easily see how their buildings are performing – which is a pre-requisite for energy saving incentive schemes.”

The new system is integrated into the university’s intranet so that the buildings and maintenance teams can log in from wherever they are to view the plant performance and energy data from all the buildings currently covered. This has proven to be a vast improvement on the old system, which relied on telephone lines with modem interfaces and all the associated speed and functional limitations.

The number of buildings means that upgrading the BMS has been a rolling project, with significant investment from Estate Management. But with annual savings of £150,000, Cambridge has seen a return on that investment within three years. These changes are also saving 1,130 tonnes of CO₂ per year.

“Conducting research presents many issues when trying to reduce energy,” says Paul. “The laboratories must have precise temperatures and set air changes, ventilation and exhausting to avoid contaminating material. Much of the equipment, such as wind tunnels and microscopes, emits a lot of heat which then leads to an extra energy requirement for cooling. With the BMS we can immediately identify where systems are not working and correct the problem before it has an impact.”

1,130t

the amount of CO₂ saved per year as a result of upgrading buildings to BMS

Giving a financial incentive

One simple activity that has made a huge difference was giving each department a financial incentive to reduce its electricity consumption. Previously, there was no cost on a department for energy usage, and so little attention was paid to increased usage. If new equipment was installed, new wires would be fitted without any thought to the potential impact.

In 2008, each department was given its own yearly target for energy consumption, based on historic performance. Departments that were below target were refunded some of their energy costs, while those that didn't meet theirs faced a penalty. Overall, this achieved a 5% reduction across the estate.

"This was a very effective means of focusing attention," explains Paul. "The departments all began to pay close attention to energy consumption, which obviously varies depending on how buildings are used. For example, arts buildings saw savings from switching off lights and computers when not in use, whereas science labs looked at what they could do with their autoclaves and fume cupboards – both big energy users."

Energy champions were appointed within each department to act as the central contact with the energy team. The champions received tailored training from the central team, on both technical improvements they could make and how to engage others in the key issues. As these staff are the first to receive data on how the department is performing, they have also had a technical brief so that they could understand the information.

The champions promote good housekeeping within their own department, and also share examples of good practice with their counterparts elsewhere in the university. They have also been given plug-in electricity meters so they can take an active role in seeing what different appliances are using.

Shutting down and switching off

Other changes outlined in the plan we helped develop are saving an additional £147,000 and more than 900 tonnes of CO₂ per year.

Information technology is one key area where the university has made real progress. There are over 100 separate IT networks within the organisation, each run by its own department, and each having its own requirements with regard to storage and operating hours. For example, some research facilities need to leave PCs on 24/7 as they are monitoring experiments. This made it impossible to make estate-wide changes.

However, through the incentive scheme and a regular presence at the IT management meetings, Paul has engaged the different IT managers. Many have introduced automatic shutdown and power management features, while others have moved to virtual servers or thin clients, where one change to the server will make the same change to all the machines it serves. This has had a positive impact, although, as Paul explains, it has its limits: "In our case virtualisation offsets growth, but it doesn't reverse it. Users don't often decommission old machines."

“ Throughout the process the Carbon Trust has been an independent and authoritative source of expertise and has helped support and encourage us on our journey to a low carbon future. ”

Paul Hasley
Energy Manager, Cambridge University

£147k

+ 900t CO₂ cost and carbon savings achieved by introducing new IT practices and other energy saving equipment

“Engaging the IT managers has been a challenge because you have to have the same conversation many times,” acknowledges Paul. “But in many areas it has been a real success and demonstrated the benefits of effective communication – something the Carbon Trust highlighted when it helped us develop our carbon management plan.”

In addition to these IT changes, well-tested measures such as introducing variable speed drives, dimmers and motion sensors to minimise the time lights are on, and moving from T12 to T5 lamps, have also been introduced across the estate.

Exploring renewables

Under the Merton Rule (a planning policy, developed by Merton Council, which requires the use of renewable energy onsite to reduce annual CO₂ emissions in the built environment), and as part of its goal to take a pioneering approach to reducing energy consumption, the university has also been trialling renewable energy. The aim is to test different technologies in new developments, or as part of refurbishment, to get an idea of benefits and returns. As a result, it has installed one biomass boiler and has another planned. It has also introduced photovoltaic arrays and ground source heat pumps, and is looking at combined heat and power, and district heating solutions.

Paul explains: “This area is of great interest, particularly with the introduction of the feed in tariff. However, many of the technologies are new and if we were assessing them on payback alone, they might not meet our standard requirements. In terms of new buildings the university is also looking at how it can take a low carbon approach, especially when options are appraised on a life cycle cost basis.”

Supporting the strategy

Crucially, Paul and his team have had strong support from Cambridge’s Vice-Chancellor and the Pro-Vice-Chancellors – one of whom has special responsibility for energy management.

In terms of internal funding, the initial commitment of £250,000 per year for energy saving projects has increased steadily with inflation. And this has been supplemented with an extra £600,000 funding from the Salix loans scheme, which provides funding for public sector organisations who want to invest in energy saving technologies.

“The support and funding we have received for carbon management work has been crucial to our success,” acknowledges Paul. “And the Carbon Trust has been invaluable in helping us identify and validate projects in which to invest it.”

Higher Education Carbon Management (HECM)

The Carbon Trust is working with universities to help them produce carbon management plans, complete with business cases and senior management approval. Each plan contains a full carbon emissions baseline, plus a series of carbon saving projects to meet ambitious cost and carbon saving targets. Success is achieved through a structured programme which includes workshop support for staff and senior managers to improve their awareness of energy efficiency and help them to share best practice.

The HECM service helps to deliver improved energy management of academic, accommodation and leisure buildings and vehicle fleets. The scheme is supported by a series of bespoke software tools that give detailed guidance on the carbon management process as well as technical advice.

[Read more about HECM](#)

