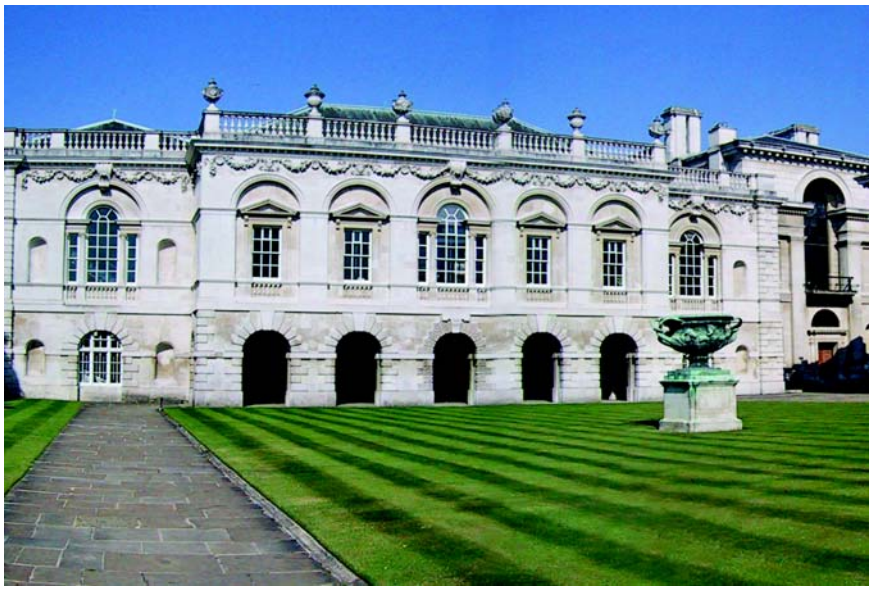
At a time when academic institutions across the UK are facing budget restrictions, increased energy efficiency across Cambridge University's estate will help counter the impact of rising prices on its budgets.

University identifies portfolio of carbon projects to qualify for structured loan from Salix Finance



Outstanding college architecture on the banks of the Cam, quite possibly the Christmas Eve carol service from Kings College Chapel; two popular if somewhat limited images of Cambridge University. The colleges are the visible tip of a university iceberg that encompasses libraries, administration buildings, museums, laboratories and teaching facilities. That complex infrastructure spends £12 million a year on electricity, gas and water, a figure which does not include direct purchases by the colleges, which are autonomous, self-administering institutions.

Energy management in the University has taken on a much more strategic role in the past decade, stimulated both by the burgeoning cost of utilities, and the overriding requirement on all public sector institutions to reduce carbon emissions dramatically.

Paul Hasley, who heads the Energy Management Unit at Cambridge, and who has been with the University for four years, can recall when the total utilities bill was a third of its present figure. At a time when academic institutions across the UK are facing budget restrictions, increased energy efficiency across the University's estate will help counter the impact of rising prices on its budgets.

That 'estate' is no high street office block or a Victorian town hall in need of improved insulation, of course. Founded in 1209, Cambridge University has been part of the academic landscape for eight centuries, and has a legacy of fine buildings to chart its history. Some of the properties within Mr Hasley's portfolio serve as a reminder of that: the Old Schools next to King's College (above), for example, dates back to 1360.

Above: The Old Schools, Cambridge, is one of the oldest surviving buildings in the University and foms part of its estate when considering energy consumption.

Cambridge University has to maintain a large number of buildings, all of which contribute to its total energy consumption and are therefore subject to scrutiny:

Right: The Zoology Department

Lower right: The Gates Building

Opposite page: The English Department

As the Energy Manager explained, the very old premises may be inefficient and difficult to upgrade. Most are listed buildings and subject to strict rules on modifications, but they are fortunately not significant users of utilities. "In practice, it is the modern teaching and research laboratories which consume larger amounts of electricity and water, in ways that private consumers and businesses would probably not encounter."

Customer requirements

Closer examination of laboratory activities reveals that chilled water is constantly supplied for experiments, for example, while other facilities require humidity control, fume cupboards or autoclaves.

Some of the buildings operate with a negative pressure differential, which means a large number of air changes with much of the energy involved being exhausted. "Energy consumption in all university facilities is a centralised responsibility. Our role is to see that energy is being used efficiently without compromising the operational needs of the building users in any way.

The Energy Management Unit works with those users to see if there are better ways of meeting their requirements. Collaboration on that front is increasing steadily, as the subject of energy usage moves up the University agenda."

A glance through the University's consumption data would show that there has been a progressive reduction in water consumption, though that is not perhaps the huge benefit it might seem.

"It is true that water usage has reduced by more than a half over the past twenty years, even though the total estate has increased by about a third.

"Much of that reduction has been achieved by changing the way that water is being used in the Departments, however, with water towers being replaced over time by chillers in laboratories."

The cost of utilities for the 'infrastructure' premises has traditionally been treated as an overhead of the University, funded by the Estates Department and delivered without charge to the end users. When prices were relatively low, and the question of climate change had not appeared on the cultural radar, that arrangement worked well.

The situation has now turned round 180 degrees and the same central administration is keen to identify opportunities to accommodate

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both the demands on its budgets and a tangible reduction in carbon emissions attributed to the University. Its current carbon footprint stands at just under 70,000 tonnes of CO_2.

Widespread acceptance

Fortunately for Paul Hasley and his team, there is no uphill struggle when it comes to conserving energy within the University estate. "We have good relationships with departmental administrators who are keen to receive information on how their operations are performing - and advice on how to improve the situation.

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Quality information is one of the EMU's most powerful tools in its campaign to reduce energy consumption. The more modern buildings in its portfolio have some form of building management system which can help control heating and lighting.

That technology is being rationalised to provide easier access to usage information: those systems are now being linked into the University's data network so that the energy team can monitor performance centrally through a web browser.

Basis for positive actions

The higher quality information emerging from the Cambridge University estate has helped provide the basis for taking actions that will reduce energy consumption wherever it can be shown that the cost will be justified directly by the savings achieved.

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Salix had been operating a similar funding programme for local authorities, so the route

to be followed by Cambridge and three other universities in the pilot scheme was well understood. In essence, a long term, interest free ring-fenced fund would be established for each institution, with the University's contribution being matched by a loan to the same value by Salix Finance.

To be accepted into the programme, Cambridge had to demonstrate that it had a portfolio of projects which could be financed under the strict criteria which applied to Salix-backed projects across the public sector. Any individual project investment from the fund must be capable of being repaid within five years, and the cost of carbon saved must come in at under £100 per tonne during its lifetime.

A theoretical justification on those grounds is not sufficient to merit a loan from Salix, however. The universities had to demonstrate that they had the operational and management infrastructure capable of taking a succession of such projects through to completion.

This ability to recycle the fund over time within the university is one of the key criteria of being accepted by Salix. Each individual project supported by the university's fund is repaid by the energy savings it makes. On this basis the cost effectiveness of the fund is increased as the original capital remains the same throughout the life of the fund.

Long-term programme of investments

Cambridge University was able to present a long-term schedule of investment opportunities from across its estate, and the fund was set at £600,000, with the University and Salix each contributing half of that sum. For an institution whose energy costs were at that time 10 times the value of the fund there was a clear economic case for the University to proceed. What the Salix Finance contribution has achieved is to increase the speed at which the highlighted projects could be brought on stream.

The evidence would suggest that there has been a significant boost to energy saving at Cambridge. The Energy Management Unit is currently managing twelve projects worth £182,000. The annual financial savings are running at £89,000, and the CO2 reduction has been calculated at 790 tonnes per year, or 6,475 tonnes over the lifetime of the projects. All of those figures will change, as further projects are rolled out for financing under the scheme. §