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Greenlines

The University's *sustainability* newsletter

Inside *this* issue:

Fairtrade Status gained by University

The University of Cambridge has been awarded Fairtrade status after it signed up to source ethically and sustainably produced goods.

With more than half a million hot drinks served to students and staff a year the University catering service wanted to make sure consumers were able to support Fairtrade while enjoying what was on offer.

Nick White, Head of Operations at the University Centre said: "This is something we have worked at for a long time. The benefit is that, among other things, it gives a fair and stable price for producers that covers the costs of sustainable production.

"It also shows the University recognises its corporate responsibility in this area."

The move was a joint venture between the University's Central Catering Service, the Environment and Energy Section and Cambridge University Student Union (CUSU).

Susanna Hartland, Ethical Consumer Officer for CUSU's Ethical Affairs Team, said: "This is important as it is a commitment by both the University and CUSU. With the huge turnover the University has selling drinks this is a strong statement."

To achieve Fairtrade Status the University had to commit to various goals including creating a Fairtrade policy and serving Fairtrade products in its cafes and bars.

The achievement comes at the start of Fairtrade Fortnight which runs until 8 March. The University is marking the fortnight with a talk on 26 February at The University Centre by Louise Whitaker, an ethical marketing manager who will talk about her recent experiences with Ugandan coffee growing communities.

Generating electricity, generating ideas

Faced with a leaky roof, the Department of Engineering turned a routine maintenance job into an opportunity to generate its own electricity. Up and running since 2013, the 'energy roof' is saving money and carbon, and has become a valuable resource for research and teaching in the department.

The first new building on the Department of Engineering's current site, the Inglis is typical of its era. Built in the 1920s, its sawtooth roof with north-facing window lights lets in the sun, but it also lets out the heat and, more recently, had begun to let in the rain.

Needing to replace the leaking roof, the department also wanted to insulate it, so decided to turn a pressing but routine maintenance task into an opportunity for teaching and learning. They asked one of their undergraduates, Adam Booth, to use his summer placement to model the fabric of the building. His calculations revealed that insulation alone could deliver an energy saving of 46%.

What, then, could be achieved by adding solar photovoltaic (PV) panels at the same

time as replacing and insulating the roof? Although the orientation and elevation of the Inglis roof's south-facing slopes are ideal for solar PV, the building also has a soaring brick chimney which acts as a giant sun dial, its long shadow revolving around the roof every sunny day.

The major challenge was working out which types of PV and in which configuration would be least affected by the chimney's shadow. "Shading matters because on certain panel orientations and certain types of inverter, if a shadow clips off one or two cells of a panel, the whole panel stops generating," explains David Green, Superintendent of the Engineering Workshops. "We wanted a design that meant even if part of a panel was in shade, we could still generate some power."

This challenge fell to another Engineering student, Caston Urayai, who, after finishing a PhD in the Electrical Power Conversion Group, used commercial software to model how much energy the roof might generate depending on the weather, the performance of different panels, panel design and the type of inverter.

Determined to apply as much of what they – and other parts of the University – were learning about saving energy, the department then decided to ask Urayai to carry out further work to investigate opportunities for using the direct current (DC) the PV panels generate, rather than converting it first to AC.

"When you convert DC to AC you lose 10-20% of the power, so we are now looking at whether we can use the DC generated by the panel rather than going through an inverter," says Green. "This links us to work done in the Computer Laboratory, where Professor Ian Leslie has designed, built and installed DC light fittings that work this way."

"What's really important is the ability to accurately model the potential of these kind of projects" says David Green, Department of Engineering

Based on what they learned from their students' detailed modelling, the department opted for a PV panel produced by Viridian Solar. The decision was based on performance, but the choice also pleased Green because of the firm's close links with Cambridge. "Viridian employs some of our graduates, and they were very keen to work with us to explore opportunities for research," he says.

Installed in 2013, the energy roof has a mixture of string and micro-inverters. The micro-inverters generate slightly less power but are better at generating under shadow-cast conditions, so for parts of the roof where there is good solar gain for only part of the day, micro-inverters offered the best solution.

Like the PV panel producer's Cambridge connections, the micro-inverters, produced by Enecsys, also build on research done in Engineering. According to Green: "The micro-inverter includes thin-film technology that our Electrical Engineering Division's been involved in, so there's a nice link between our teaching and research and the commercial products that have benefited from the work we've done here."

Building on the success of phase 1 of the energy roof, the department moved on to phase 2 – a second energy roof above the new Dyson Design Centre that will be established in 2015. Based on a similar installation of insulation topped by PV and a similar process of modelling the potential energy generation, phase 2 is also feeding into the department's desire to maximise efficiency by using DC.

"We are looking at a multiplex power supply so that energy generated from the PV can meet demand for lighting etc, but if we're generating energy from the PV but don't have a need for lighting we are going to store it in batteries. Then when we need lighting we can use power from the PV, batteries or the grid," Green explains.

Going one step further, the department is working with Luxonic Lighting, a firm that manufactures commercial light fittings, to develop a DC version, which will be able to use power from phase 2 of the energy roof without conversion to AC. "If we're successful, we can look at extended use of DC, for example in the Engineering Department's new James Dyson Building, which could be a DC-lit building," he says.

In the year since it was installed in 2013, phase 1 of the energy roof on the Inglis Building generated 82,471 kWh. While it represents only a small proportion of the department's energy consumption, departmental Safety Officer Ian Slack says this needs to be set in context.

"We are a large department and we are very energy hungry," he explains. "In July 2013 the panels generated 8,658 kWh. Although this equates to only 3.1% of our energy consumption, it's a reasonable amount of energy, which in an administrative or an arts and humanities building would represent a good chunk of their energy needs."

As well as saving energy and carbon, the energy roof is providing important

Summer internships

There are three summer positions available for Cambridge students to apply for.

- **The Travel Plan Intern** will work with the University's Travel Plan Manager and create a survey to carry out travel plan audits.
- The **Carbon Management Intern** will focus on energy use of equipment, specifically in laboratory space.
- As part of the IARU Sustainability Fellowship Programme we are sending a student with the **National University of Singapore** to work on sustainability projects in their office.

Applications are due in the 1 April. Visit our website to find out how to apply: **http://bit.ly/1De2Emm**

opportunities for the department's teaching and research, which in turn are helping inform decisions about similar projects elsewhere in the University.

"What's really important is the ability to accurately model or calculate the potential of these kind of projects," says Green. "Everyone will try and sell you PV, but modelling is crucial to getting an idea of how long the payback period will be. And although the level of any future government feed-in tariff is an unknown, when you start considering using DC you can reduce that uncertainty because it's unaffected by future changes in the tariff."

Making the most of the need for modelling, the department has been able to offer several students real-world problems to solve. It is using the energy roof in teaching its renewable energy course for third year undergraduates, thanks to the University's Living Laboratory project which funded the software they needed.

"The Living Laboratory scheme means students can study Engineering's energy roof and apply what they've learned to other University buildings" says Claire Hopkins, Living Laboratory Coordinator

According to Green: "In the past students have used a mocked-up panel on the roof, but now they can model a professional installation. Linking the course directly to our energy roof means our undergraduates are learning from a real installation, not a mock up."

As well as modelling from the energy roof, by working closely with Estate Management, students have also modelled the potential gains from PV on other University buildings. "At the end of the course, each student group presented its findings to Estate Management. If their modelling showed good returns, our students could be contributing to the next generation of energy roofs at Cambridge," he says.

This article is from our case studies which can be found here: ***http://www.environment.admin.cam.ac.uk/resource-bank/case-studies .***

Meet the new Building Energy Manager

Name: Adam Fjaerem

What does this position entail? To identify potential energy saving initiatives in the University's building portfolio to help reduce the associated carbon emissions.

What is your background and how did you get here? I graduated many years ago with a BSc (Hons) in Environmental Management & Technology before moving into the BMS industry and then into Environmental Consultancy. During my consultancy years I worked on research projects with the Carbon Trust and the European Union, provided Carbon Management programmes to a wide range of organisation and completed 100's of energy audits in buildings ranging from offices, schools, hotels, factories, warehouses, farms, churches , train stations, radio stations, data centres and even Buckingham Palace!

What are you most looking forward to getting your teeth into in the coming academic year? Identifying and working with new colleagues to implement opportunities to save the University 1,000s of tonnes of CO_2 and £'s being wasted through energy wastage.

What gets you out of bed (and into work) in the morning? That the estate appears to be growing every day and with it the opportunities to save energy and carbon!

What is your favourite green gadget? I think that the rise of apps on smart phones is creating huge opportunities for people to reduce their environmental impacts by providing knowledge. For example by allowing remote operation of household heating or providing less carbon intensive travel routes and record and report of emissions saved and calories burnt through cycling or using the stairs can allow us to take control of our behaviour. All in one device! If the small issues of battery life and rare minerals used in their manufacture can be addressed then these opportunities can only get better.

Tell us one little known fact about yourself. I once rode a wheelie bin across the Humber Bridge (when it was the world's longest single-span suspension bridge).

Who is your inspirational figure? I'm a bit of a fan boy of Elon Musk and what he has already achieved with the Tesla project and am looking forward to see how this is going to continue to impact on the rest of the car industry.

Do you have any hobbies? I have children and therefore no time for hobbies! However, this year is the year I have promised to buy a family canoe and explore some of the waterways around Cambridgeshire (with children).

First impressions of Cambridge? Beautiful city with friendly people (and lots of bikes). My last role was based in Canary Wharf so Cambridge is a breath of fresh air!

Top 10 tips to keep your bicycle secure & ensure you've always got a ride home

1. LOCK IT!

It may sound obvious, but we do see bikes across the city that have not been locked up. It only takes a second for a thief to walk off with it, so always lock it!

2. Two locks are better than one

To give you maximum security and peace of mind it is best to use two locks, as it takes thieves more time to get through two. Some recommend getting two different types (e.g. D-lock and cable) but go for quality in any case.

3. Cheap lock = false economy

Cheap locks are cheap for a reason! Experiments have shown that some £3 cable locks can be breached in one second. Thieves can spot them a mile off! Save yourself time, trouble and money in the long run and buy a decent lock. The Police often have D-locks for sale at a discount.

4. Use bike stands, that's what they're there for

Always lock your bike to something solid and secure. Cambridge has many bike hoops for you to use. If this is ever not possible do NOT lock your bike a) where there is a warning sign not to lock your bike, b) to a sign post, the screws on the sign can be removed, c) to a drainpipe, these are easy to smash. When you take your bike home, try to always keep it indoors and locked to an immovable object if possible.

5. Don't hide it

When away from home, make sure you lock your bike in an open location. Locking it somewhere secluded or where there are few passers-by will give thieves the time and privacy they need to steal it. At home, do the opposite. Try to keep your bike stored out of sight so thieves can't see it's there every evening.

6. Lock it higher up

Don't allow your lock (whatever type it is) to lie on or near the floor, this will make it a lot easier for thieves to smash it.

7. Lock it tight

When securing your bike with your lock, ensure you do it so there is little room for manoeuvre within the lock. Secure the lock round the frame, spokes and bike stand. This will make it difficult for thieves to insert and utilise their tools.

8. Lock it all!

You may think popping your lock round your frame is enough, but you don't want to cycle home on a unicycle. If you've got two locks, loop each one around a wheel, the frame and a bike stand. If you've only got one, but have quick release wheels, take your front wheel off and secure it to your back wheel, frame and bike stand with the lock. Never lock your bike just by its wheels.

9. If you can't lock it, take it off

Always remove all bike accessories such as lights and panniers if they are easy to remove. If a thief can't get your bike, they may take these instead. Also, check if your saddle is quick release and if it is, take it with you when you leave your bike.

10. Extra security

Your bike will never be 100% safe so a little extra security could potentially go a long way. You can register your bike free on the **Immobilise website (https://www.immobilise.com/)** or on **Bike Register (https://www.bikeregister.com/)**. You can also pay for stickers to attach to your bike to warn thieves that this has been done. Make sure you insure your bike so that, if the worst does happen, you won't be left stranded. If your bike does go missing, taking these steps will make it much easier for the police to track down and return it to you.

Top tips taken from Southampton City Council's communications.

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