The Living Laboratory for Sustainability

Annual Report 2014-15

THE CAMBRIDGE *green* CHALLENGE
· *LIVING* LABORATORY ·

Contents

Overview

The Living Laboratory for Sustainability (Living Lab) aims to improve the University of Cambridge's environmental sustainability. It does this by using the University estate (buildings and grounds) as a case study for testing and researching different aspects of sustainability. This is in order to solve problems, improve efforts and enhance the educational experience of students here at the University.

The Living Lab seeks to foster interdisciplinary working, involving students from diverse academic backgrounds in creating solutions to the operational challenges of the University. It also provides a platform for academic staff to suggest and steer research on the University estate, and is a tool for Estate Management to improve the environmental practices of the University.

Activities

The following activities are all supported by the Living Lab:

Ideas for projects can come from students, from academics or from operational staff. Depending on its nature, an idea can then be taken forward as an academic project, voluntary project (offered as an extra-curricular student opportunity), an internship with the Environment and Energy Section or as part of an annual competition or award scheme, which has a different format and focus each year.

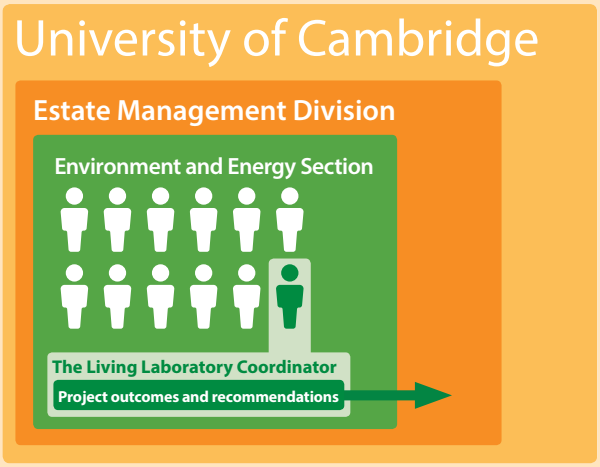
There are three necessary considerations for whether an idea can become a project:

- Is the data/information required for the project available?
- Are the relevant contacts willing to help?
- Do timescales match up?

Background

After its beginnings as part of a student internship in 2010, which was funded by Santander, the Living Lab has moved from concept to a fully-fledged programme of activities.

The ***Living Laboratory for Sustainability Coordinator*** is part of the Environment and Energy Section (a team of 12 staff), situated within the University's Estate Management Division. The Environment and Energy Section report to the Environmental Sustainability Strategy Committee. These structures enable project outcomes and recommendations from the Living Lab's main activities to be fed into relevant operations and streams of work within the University.



The Living Lab is one of the implementation mechanisms for the ***Environmental Sustainability Vision, Policy and Strategy*** (www.environment.admin.cam.ac.uk/policy) under the theme of 'Environmental sustainability in teaching and research'.

Click on the thumbnails below to see the previous annual reports.

www.environment.admin.cam.ac.uk/getting-involved/living-laboratory-sustainability/annual-report

Click on the image below to see the summary video.

www.youtube.com/watch?v=dmDoSOv85o0

Key updates

There has been a changeover in staff in 2014/15. Emily Dunning took over as Living Lab Coordinator in August 2015.

Emily is no stranger to the University of Cambridge; she studied geography here as an undergraduate, supported grassroots student projects through her job at Cambridge Hub, and worked at Cambridge Institute for Sustainability Leadership, a department within the University, before taking up this role. Emily Dunning took over as Living Lab Coordinator in August 2015.

There were fewer academic projects in 2014-15 because the suggestions put forward to engineering students as fourth year projects were not chosen by that year's cohort. Updates on previous projects can be found on pages 8-10.

The Living Lab funded software to model buildings and assess their potential for photovoltaics in 2013/14. During 2014/15 the Department of Engineering continued using this software to **model solar cells** on roofs of University buildings. This involved 20 students, led by Pritesh Hiralal.

The Living Lab provided support to a new research initiative headed up by Dr Ruchi Choudhary, which focuses on **improving energy management** in non-domestic buildings, including many across the University's estate.

This initiative will see the emergence of several **student opportunities** over the next three years. So far, three undergraduate engineering students have constructed simulation models needed for the first stage of the research.

The initiative will contribute to the University's own understanding of energy demands across the University estate. This will complement the energy work being carried out by the Environment and Energy Section and add insights to decision-making and communications about energy use to building occupants.

Two summer internships were funded through the Living Lab during the summer of 2015, focused on energy consumption and sustainable travel within the University. Further information can be found on page 6.

Internships

Through the Living Lab internship programme, two students studying at the University of Cambridge were funded to do 8-week internships, and an additional three students were given non-financial support.

Laura Briggs

Subject? Natural Sciences

Motivations? Wanted to work on sustainability issues from a non-student perspective and help to make changes within the University.

Worked on? Assessing the quantity and types of plug-in equipment across the University, as well as their energy consumption, to make recommendations for reductions in energy use.

"This project has helped me to improve my data handling and analysis skills. I also gained experience in building relationships with contacts in order to gain new ideas and data."

Elsa Durieux

Subject? Land Economy

Motivations? Interested in urban planning, contributing to the issues of congestion in Cambridge and communicating about environmental issues.

Worked on? Understanding how different departments promote sustainable travel behaviour, to share best practice on promoting sustainable travel to University staff.

"I learnt about how to be effective in communicating environmental issues and the specific challenges of giving a central call for action in a decentralised context."

Two interns, **Martha Longley** and **Christina Larkin**, also worked within the Environment and Energy Section on Living Lab projects. Martha focused on communications and engagement, proposing an engagement calendar for the year with corresponding communication material and resources. Christina assessed the viability and direction of a Green Labs programme at the University.

On a scale from 1-10, how much more knowledgeable did you feel about environmental issues in the context of your project?

Average score: 9.5 out of 10

100%

2015's summer interns would recommend an internship with the with the Environment and Energy Section to a friend or colleague.

The value of the Living Lab

During August and September 2015, the new Living Lab Coordinator consulted widely with stakeholders to understand the value that the Living Lab provides within the University. Stakeholders commented on the benefits of the processes that help generate new activities or opportunities (as shown in the grey boxes), and the outcomes from those activities, as illustrated below.

ACTIVITIES

Academic projects | **Voluntary projects** | **Internships** | **Award scheme**

Practical assistance	• Provision of data and information • Linking up with relevant contacts
Collaboration	• 'Go-to place' for information on environmental activities across the University • 'Connecting the dots' between different initiatives
Communication	• Highlights stories of success • Increases awareness of the Environment and Energy Section
Engagement	• Provides opportunities for students to get involved • Helps engage people who are not already involved in environmental action

OUTCOMES

Effects on University operations

- Enhanced links between academics and Estate Management
- Use of research to apply on the Estate
- Allows for work to be done that might not otherwise be focused upon

Environmental impacts

- Cuts resource use and reduces the University's environmental footprint
- Demonstrates that the University is acting in a sustainable way on multiple scales

Culture change across the University

- Embeds sustainability into the fabric of the University
- Fosters greater innovation
- Allows new approaches to be trialled

Teaching and research

- Contributes to the impact agenda of academic research
- Provides local and relevant examples and case studies to enhance learning
- Allows operational and administrative areas of the University to contribute to the core aims of teaching and research

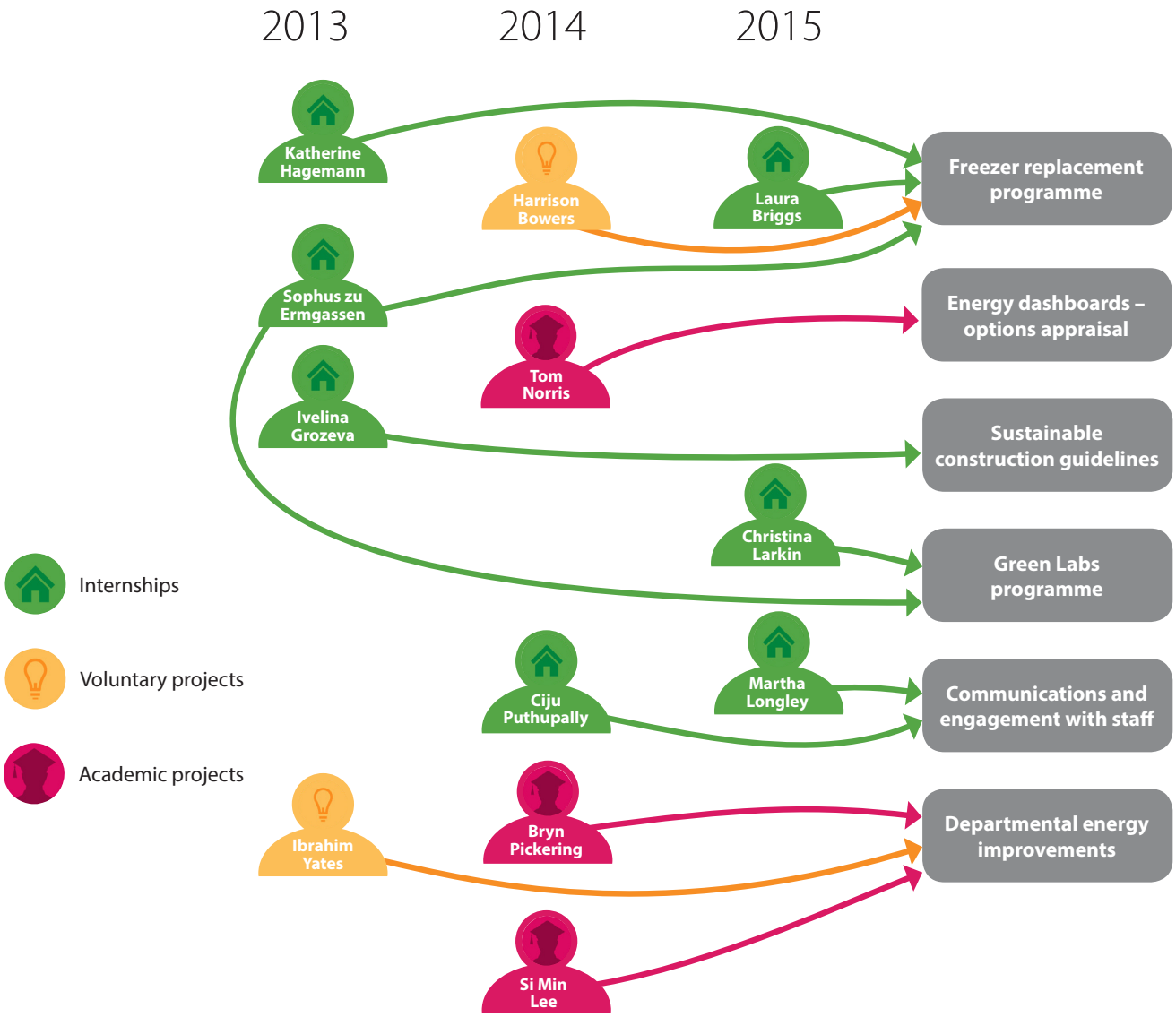
Student experience

- Students learn professional skills
- Improves students' employability
- Provides meaningful opportunities for students to contribute to improving the University's environmental sustainability

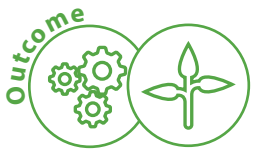
Outcomes from previous years

Living Lab projects do not always result in immediate action and outcomes, but contribute to longer-term work, feed into large-scale change, and inform future plans. Some of the people who have been involved in previous years and the projects they have undertaken are featured below, showing how their work has been taken forwards.

The graphic gives an overview of the people and types of projects over the past three years and what streams of work they have contributed towards within the Environment and Energy Section. On pages 9-10 are further details about the work of each of these students and how they have contributed to the Living Lab's outcomes.



Katherine Hagemann, Sophus zu Ermgassen, Harrison Bowers and Laura Briggs all carried out summer internships or voluntary projects between 2013 and 2015. Elements of each of their projects have informed the development of a **freezer replacement programme**. This programme will enable departments to apply for funding to replace their old and inefficient freezers with newer ones, based on criteria determined and recommendations made through these projects, to reduce their energy use. For example: Sophus carried out initial research on reducing energy consumption of freezers, Katherine produced a tool for assessing the energy use of equipment, Laura carried out work to determine which new freezers to buy, Harrison trained up other students on auditing freezers after his internship at Yale focused on this topic.



University operations, Environmental impact

Tom Norris, a third year undergraduate architecture student, carried out an internship with the Environment and Energy Section in the summer of 2013. He analysed **how building energy is monitored and reported upon** across the University estate. He then built upon this work through his final year project as part of his academic studies, presenting various findings along with making recommendations for improvement. He achieved a first class honours, and received the prize for best dissertation. His work is being used to inform the upcoming options assessment on the provision of energy data to building users (such as energy dashboards) across the University.

University operations, Teaching and research

Ivelina Grozeva produced a report on **sustainable construction** through her internship in 2013. Her report informed the development of a new approach to sustainable construction at the University.

University operations

Due to the work of **Sophus zu Ermgassen** and **Christina Larkin** through their internships in 2013 and 2015 respectively, the **Shut the Sash campaign** has been conceptualised and resourced. 'Shut the Sash' is designed to encourage behaviour change within laboratories containing fume cupboards. Since fume cupboards use fans to capture and remove air-borne hazardous substances, energy use can be reduced by shutting the hoods of each one so that they are only removing air from within that space rather than the whole room. A scheme called Green Labs is due to be launched in February 2016 within the three key departments with fume hoods (Chemistry, Biochemistry and Gurdon Institute). This will reinforce and build upon the Shut the Sash campaign to continue efforts to reduce energy use within laboratories.

Culture change

FOCUS ON EMPLOYABILITY

Christina Larkin completed an internship in 2015. She subsequently applied for and was successful in becoming the new Carbon Management Assistant, a year long graduate placement with the Environment and Energy Section.

Student experience

In 2014, **Ciju Puthuppally** created **communications** resources such as posters, factsheets and guides, for staff across the University who are attempting to improve the environmental sustainability of their departments. During her summer internship in 2015, **Martha Longley** built on this to facilitate the start of 'Spotlight On' months. This initiative provides focus on specific topics throughout the year for staff to concentrate efforts. It also creates a more effective platform for the Environment and Energy Section to provide resources and support. For example, waste was the focus of November 2015. During this month, 17 staff visited the local recycling plant on a trip organised by the Environment and Energy Section; three departments hosted 'roadshows' clarifying what can be recycled; and our communications via social media focused on waste-related topics.

Culture change

Bryn Pickering carried out his fourth year engineering project with the Living Lab in 2013/14. He assessed the effectiveness and contribution of **renewable energy sources situated on the University estate** to its carbon reduction target. He received a first class degree with distinction. He noted how the project gave him experience of project management and improved his communication skills with having to work with multiple different stakeholders, as well as giving insight into the workings of the University operationally. He started a PhD in the Department for Engineering at the University of Cambridge in October 2015.

Teaching and research, Student experience

Ibrahim Yates investigated **heat loss** in the Institute of Criminology as a voluntary project with the Cambridge University Environmental Consulting Society in 2013. The thermal imaging survey and report he produced contributed to Estate Management's subsequent action to drain the water from the roof and repair roof outlets. This should also enable adjustments to the heating balance around the building.

University operations

Si Min Lee explored the reasons for the **performance gap** at the Sainsbury Laboratory (between 'as designed' and 'as built' for electricity and gas consumption), for her final year project within the Master in Engineering degree course during 2013-14. Changes to the Building Energy Management System have subsequently been implemented to capture this lost energy. Since June 2015, there has been around a 30% reduction in the amount of energy (mainly gas) used compared to previous years where this work has been implemented, equivalent to £6,000 savings.

University operations, Environmental impacts

"It was useful to have all the data pulled together and presented in an accessible format. It has helped me win support for energy saving initiatives at the lab including a partnership with a building controls company to identify areas where energy is wasted."

Stephen Andrews, Facilities Manager, Sainsbury Laboratory

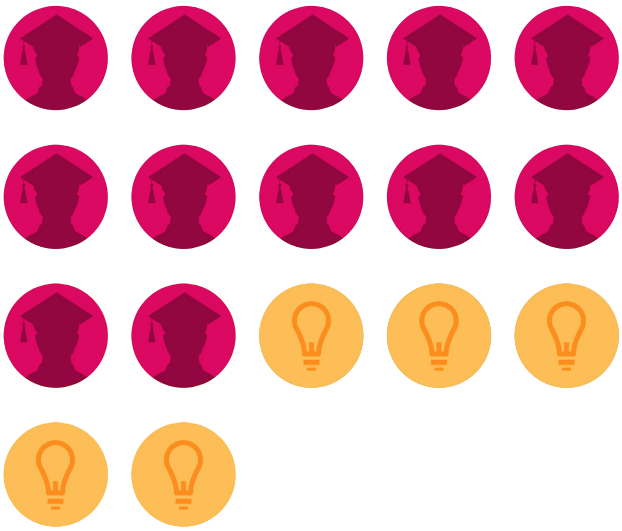
Looking to the future

There will be a greater focus on the implementation of project outcomes and their impact. Tracking specific measures will enable us to better assess performance against the Living Lab's key aims and objectives.

During 2015/16, many new avenues are being explored for a wider selection of future project topics. Conversations are being initiated across all Schools to see what is possible as part of academic courses at undergraduate, Masters and PhD levels. Greater emphasis is also being placed on identifying needs amongst operational staff to help determine future projects.

Communications are of higher priority, in line with the Environment and Energy Section more generally. This should increase awareness of the Living Laboratory for Sustainability amongst staff and students, to seek out future project ideas, collaborators and research initiatives that are aligned with the Living Lab's goals.

Current number of projects underway: 17



Projects in the pipeline: 5

Acknowledgements

Special thanks to Santander for their funding of the project.

With additional thanks to Claire Hopkins for her work establishing the Living Lab as a successful programme; to all of the students who have been involved through internships, academic and voluntary projects, and participation in previous award schemes; to all of the supervisors who have supported students' projects, especially Peter Guthrie for his encouragement since the Living Lab's start; and to the staff within relevant departments and the Estate Management Division for their support and willingness to help those students working with the Living Lab.