

# Robbie Ewen Fellowship Report

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Home Institution: University of Strathclyde

Visit Locations: Zurich, Lausanne and Cambridge

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## Contents

Aim and Objectives .....	4
Choice of Locations and Planning .....	5
École Polytechnique Fédérale de Lausanne (EPFL) .....	6
Sustainability in Practice .....	7
Community and Stakeholder Engagement .....	7
Utility Monitoring and Targeting .....	9
ETH Zurich .....	10
Sustainability in Practice .....	11
Community and Stakeholder Engagement .....	12
Utility Monitoring and Targeting .....	12
University of Cambridge .....	14
Sustainability in Practice .....	15
Community and Stakeholder Engagement .....	15
Utility Monitoring and Targeting .....	16
Anglia Ruskin University .....	17
Sustainability in Practice .....	18
Community and Stakeholder Engagement .....	18
Utility Monitoring and Targeting .....	19
Conclusions and Key Recommendations .....	20
Key Recommendations: .....	21

## Aim and Objectives

The aim of my trip was twofold. At an individual level it was to observe and learn best practice in sustainable development, carbon management and energy efficiency at other world leading higher education institutions.

At an institutional level the aim of my trip was to observe examples of good practice in policy, strategy and operational excellence that would better aid the University of Strathclyde in achieving its ambition of becoming a leading technological university and sustaining it.

From these two aims three main objectives were identified:

1. Observe **sustainable practices** in technological universities and how to encourage it.
2. Identify good practice in **community and stakeholder engagement** from an operational perspective and how to do it successfully and sustain it.
3. Identify exemplary use of **utility monitoring and targeting** for reporting and engagement purposes.

## Choice of Locations and Planning

The process of choosing which locations to visit during my trip started by consulting existing networks that incentivise and encourage sustainable development in the higher education sector. The three networks that proved to be most useful in selecting the institutions chosen to visit were the International Sustainable Campus Network (ISCN)<sup>1</sup>; The Environmental Association of Universities and Colleges (EAUC)<sup>2</sup> and the Association of University Engineers (AUE)<sup>3</sup>.

At the end of the selection process contact was made with the following institutions:

- École polytechnique fédérale de Lausanne (EPFL)
- ETH Zurich
- University of Cambridge
- Anglia Ruskin University

In order to gain insight into the sustainable development of operations and Estates at each of the four institutions contact was made through the sustainability office or equivalent. This proved to be successful and once confirmation of the possibility of my visit was established an itinerary was developed with each institution based upon the three aforementioned objectives. An agenda was then developed in liaison with each institution around the aims and objectives of the visit.

In addition to the four institutions listed I was advised to meet with Antonio Pita, co-chair of the Sustainable Campus Initiative of the European Consortia of Innovative Universities (ECIU). It was evident from our meeting that the ECIU network of institutions were committed to Sustainability and had signed a Charter to actively promote this effort and the work that had been undertaken had allowed the member institutions to compare their efforts and gain from their shared experiences.

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<sup>1</sup> <http://www.international-sustainable-campus-network.org/>, Accessed September 2013

<sup>2</sup> <http://www.eauc.org.uk/home>, Accessed September 2013

<sup>3</sup> <http://www.aue.ac.uk/home/>, Accessed September 2013

## École Polytechnique Fédérale de Lausanne (EPFL)



Figure 1 - Rolex Learning Centre (RLC)

École polytechnique fédérale de Lausanne (EPFL) is based in Lausanne, on the North shore of Lake Geneva, and is one of two federal, higher education institutes in Switzerland. The campus itself is situated in the West of Lausanne and overlooks the picturesque scene of Lake Geneva. Construction of the current campus started in 1978 and it has grown steadily since. The relatively new age of the campus coupled with the design intent of building sustainable infrastructure laid the foundation for sustainable growth and development at EPFL. This is evidenced by its exponential numerical growth in students and staff of 260% since 1990. The University currently employs over 4,000 staff and annually teaches over 9,000 students, which are still sustained by the original campus infrastructure.

Within EPFL sits the Vice-presidency for planning and logistics. It is within this department that the sustainable campus team belongs. This consists of two members of staff: Aurore Nembrini and Philippe Vollichard. Under Planning and Logistics also sits the Facilities department, who install and maintain the estate facilities. Christopher Roberts is a project manager in this team and manages the energy management team at EPFL. It was Aurore, Philippe and Christopher who welcomed me to the University and kindly organised the itinerary for the day.

EPFL is a member of the International Sustainable Campus Network (ISCN) and is a signatory of the ISCN-GULF sustainable campus charter. EPFL also received the first ever ISCN sustainable construction award in 2009 for its forty years of endeavours to create a sustainable campus.

“The jury was convinced in particular by the pioneering spirit of EPFL, whose initial buildings erected almost forty years ago were equipped with a heating system using lake water, considered revolutionary for the time. Among the criteria which tipped the balance in favour of EPFL in gaining this distinction were the wide use of natural light and ventilation, landscaping fixtures certified as from 2003, the availability of effective metro transport, the promotion of eco-mobility, an environmental programme certified in 2006 and, finally, the plan for a photovoltaic power station presented this year.”<sup>4</sup>

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<sup>4</sup> <http://actus.epfl.ch/news/forty-years-of-sustainable-campus/>, Accessed December 2013

## Sustainability in Practice

Mr Vollichard kindly presented the wider context of sustainable development at EPFL. This included a historical look at the origins of the campus and the direction in which it was headed.

The strategic direction of EPFL changed in the 1970's to moving the campus out of town, into the countryside. The idea was to build a day campus.

In the early 2000's, EPFL decided to transform the campus into a livelier one, by developing new functionalities like students housing, restaurants and hotels.

In terms of sustainability, the campus was very well planned from its conception, at a time where the concept of sustainable development was not far advanced.

Financial sustainability, through majority federal funding, has enabled EPFL to invest heavily in infrastructure and facilities. A consistent surpassing of building standards ensured that the campus buildings met the Universities targets of low energy consumption and high thermal comfort all year round. Infrastructure investment has included building a district heating and cooling network using Lake Geneva water from a depth of seventy metres. Heat is provided by two 4.5MW heat pumps and two oil turbines providing 10MW of heat and 6MW of electricity - used to supply the heat pumps. These are both located at a centralised energy centre on the outskirts of the campus. Underground building services' tunnels with a cross sectional area of over fifteen square metres are then used to transport water for heating, cooling and process use around campus. The district heating network supplies the campus with the majority of its heat demand every year. Until recently this was over 90% of the campus demand but in recent years it has reached its capacity so new buildings are heated by other means.

As a result, for a very long time, more than 90% of EPFL heating energy was from a renewable energy. Now the percentage is lower because the infrastructures have reached their limitations.

From an architectural point of view a strong commitment at the very beginning was also to build sustainable buildings with high standards.

These strategic decisions allowed the university to save a lot of money and energy. The main challenge now is to maintain this high level of energy and environmental management.

The other main challenges that the University has faced in recent years have been the exponential growth, both numerically and geographically. The campus floor area has increased by 25% in the last 10 years and student numbers by 67%. Despite this rapid growth building standards have been maintained and in fact energy consumption can be seen to increase in direct proportion to the floor area of the campus (both have increased by 40% between 2006 and 2012.)

EPFL has also maintained the highest levels in the world of science productivity and collaboration since 1990.

## Community and Stakeholder Engagement

EPFL has a number of projects that are ongoing across campus and that engage the university community in its sustainability objectives. It was obvious from touring the campus that they are committed to sustainable development. Partnerships with local utilities companies mean that a large number of buildings house solar panels on their roofs, which contributes to the electricity generation mix. Moreover it makes a bold statement that EPFL are committed to electricity generation through renewable sources.

The first stop on my tour of the EPFL campus was to meet Professor Maher Kayal. Professor Kayal is director of the "Energy Management and Sustainability" section of the Electronics Laboratory (ELAB) at EPFL and specialises in mixed-mode circuits design for applications in Smart grid technology. Professor Kayal presented

the recent developments in Smart Grid technology and especially the developments within mixed-mode electronics that have enabled real time power system state estimation and emulation. This advance in technology has allowed for cheap implementation of demand side management within the context of low voltage supplies in buildings. The next steps are to work in collaboration with grid operators and ICT providers to develop supply-demand matching on a large scale in HV networks. The ELAB team at EPFL were already using the campus as a living laboratory to test their microelectronics within offices and plan to roll it out on a larger scale across campus with the cooperation of the operational staff at EPFL. For further reading on this interesting and topical subject Professor Kayal referenced the white paper “A smarter grid with the Internet of Things.”<sup>5</sup>

This presentation and discussion opened my eyes to the power of data and how it could be used for more intelligent utility management when used wisely. It also demonstrated a great example of collaboration between the academic and operational staff at the university to develop and test new technologies that would not only benefit the University but have a global impact on sustainability.

It was also obvious from the amount of bike storage facilities available around the campus that cycling is an attractive transport option at EPFL. In the majority of cases these were being used to their capacity. In addition to the use of bikes for commuting, transport around campus via bicycle was encouraged by the introduction of Switzerland’s first self-service rent-a-bike at EPFL. A dedicated “Campus Bike Centre” had also been setup to facilitate the maintenance and repairing of bikes on campus. The combination of these improved facilities for cyclists has made cycling an attractive option for EPFL staff and students, while raising awareness of the importance of a modal shift in transportation toward cycling to aid congestion during commuter hours and reduce carbon emissions from transport.<sup>6</sup>



Figure 2 - EPFL Campus Bike Centre

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<sup>5</sup> Monnier, Olivier, Texas Instruments (2013), A Smarter grid with the Internet of Things [White Paper] - <http://www.ti.com/lit/ml/slyb214/slyb214.pdf>

<sup>6</sup> <http://developpement-durable.epfl.ch/transport>



## Utility Monitoring and Targeting

The second half of my day at EPFL was spent with Christopher Roberts and Aurore Nembrini observing the energy centre and energy efficiency measures being undertaken at the University. It was evident that EPFL monitored energy use at an institutional level but did not have a good knowledge of the individual building consumptions for all of their buildings. They were in the process of procuring a monitoring and targeting software platform to allow them to consolidate their energy data. Despite no monitoring and targeting (M&T) software at EPFL there were some good examples of decentralised M&T taking place across campus. ELAB's research into smart grid technologies was the first of these.

Another example was the use of plug load and temperature monitoring at one of the universities newest data centres. The data centre housed a combination of high performance computing and server racks. The data centre utilised lake water cooling through the district cooling network and for the majority of the racks this was accomplished via the server rack doors, although one of the units utilised circuit cooling by piping cooling water directly onto the motherboard to cool the circuit components. Each server rack door contained three temperature sensors at the bottom, middle and top of the door. The individual computing units within the racks were powered via power sockets with built-in metering of parameters such as current, voltage power and energy. These parameter readings were then fed back to software, developed by the University, to allow observation of trends of the metered parameters. This enabled the power consumption of individual servers and high performance computer processing units as well as the total energy consumption of the data centre. The installation specification was driven by Aristide Boisseau, from EPFL's Information Systems department.

Another interesting example of energy management at EPFL was the appointment of a team of controls engineers to develop and improve the building management systems (BMS) used at the University. This involved the replacing of existing control panels with Siemens hardware and actuators, which integrated with Siemens BMS systems. The controls engineers were then able to configure the BMS components and system schematics to mirror any changes made to the system. One of the main energy saving measures implemented at EPFL was closed loop control of air handling units by monitoring system pressure and temperature against ambient conditions using various sensors to better match supply and demand of air supplied to spaces. Energy consumption was also monitored by the BMS and showed significant savings already through this improved controls strategy.

All of these examples of monitoring and targeting energy aim to deliver significant improvements in energy efficiency and reduction in scope two carbon emissions sustained from the consumption of electricity. In parallel the University have recently changed their electricity contract to one that is predominately hydroelectric generation, which has almost halved their annual carbon emissions.

Future targets set by EPFL include a 10% reduction in greenhouse gas (GHG) emissions relative to a 2006 baseline.<sup>7</sup>

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<sup>7</sup> [http://issuu.com/campusdurable/docs/epfl\\_sustainability\\_report\\_2010\\_201/21?e=12551912/8772966](http://issuu.com/campusdurable/docs/epfl_sustainability_report_2010_201/21?e=12551912/8772966), Accessed September 2013.

## ETH Zurich



Figure 3- 'Science City' - ETH Campus Höggerberg, Zurich (rytc, 2007)<sup>8</sup>

ETH Zurich is the other Federal, higher education institution in Switzerland and consists of two campuses in West and Central Zurich. The Zentrum campus in the city centre is where ETH originated and was established in 1855. The university was founded as a national, polytechnic institution following the founding of the Swiss Federal State in 1848. The first of its kind in Switzerland, the federal polytechnic was intended to generate the knowledge required to build up a national infrastructure for the future.<sup>9</sup>

Throughout the late eighteenth and early nineteenth centuries ETH attracted students and staff from all over Europe and became a centre of academic research. Its rapid expansion during this era meant it reached its limits of growth in the middle of the 20<sup>th</sup> century. The West end Höggerberg Campus was built in the 1960s and '70s to accommodate further expansion. Alike EPFL, Höggerberg used the design philosophy of sustainable infrastructure and development.

When the Höggerberg campus was constructed it was decided to supply heating and cooling from a centralised energy centre on the edge of campus and distributed throughout campus using service tunnels. The intelligent design of the campus has enabled scope for further development of the Estate in an efficient and cost-effective manner. It was on the Höggerberg campus that I met Dominik Brem from the Safety, Security, Health and Environment (SSHE) department at ETH.

ETH currently employs over 10,000 staff and provides education for over 17,000 students annually.

In collaboration with EPFL, ETH directs and supports the ISCN and is a signatory of the ISCN-GULF Sustainable Campus Charter. ETH won an ISCN award in 2012 for its sustainable campus "Anergy" project, which is bringing renewable heating and cooling to the Höggerberg campus. The Anergy project was of particular interest, given the University of Strathclyde's current ambitions for a combined heat and power district energy scheme.

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<sup>8</sup> 'Science City' - ETH Campus Höggerberg, Zurich (rytc, 2007) @:

<https://m.flickr.com/#/photos/rytc/395537928/>; ©<https://creativecommons.org/licenses/by-nc-nd/2.0/legalcode>

<sup>9</sup> <https://www.ethz.ch/en/the-eth-zurich/portrait/history/epochs/1848-1855.html>, Accessed June 2014

## Sustainability in Practice

“Sustainability at ETH Zurich is integrated into research, teaching, and operations and is a substantial element of university life.”<sup>10</sup>

At a strategic level sustainability exists at ETH in the Sustainability Office, which reports directly to the President of ETH Zurich, and is led by a steering committee. The steering committee consists of the President himself and a number of professors researching in sustainability-related fields. During my visit I met with Dr Christine Bratrich of the Sustainability Office to talk about Sustainability within ETH.

Our conversation centred on the initiatives currently being implemented at ETH to better integrate sustainability into everyday life at ETH. The implementation strategy of ETH Sustainability takes into account the needs of both external and internal partners and focuses on four key activities: research and knowledge transfer; education; outreach; and campus/corporate sustainability. Within each of these fields of activities, five key global sustainability themes were explored:

1. urban development
2. resources
3. world food system
4. energy
5. climate change

ETH Sustainability have developed a number of initiatives to address these key themes across the aforementioned activities. A consolidated summary of these initiatives can be found in the ETH Sustainability Report<sup>11</sup>. A significant portion of which was compiled by Dr Bratrich. ETH Zurich endorsed the ISCN-GULF-Charter at the World Economic Forum 2010 and their commitment to transparent and measurable goal setting and public reporting of achievements.

At a purely operational level, sustainability sits in the Safety, Security, Health and Environment (SSHE) section of the Human Resources and Infrastructure Vice-Presidency. I met with Deputy Head of SSHE, Dr. Dominik Brem, who contributed to the 2011-2012 Sustainability Report and deals with Sustainability at more of an operational level.

Dominik and I met at the Hönggerberg campus to observe the Anergy grid geothermal project and other campus developments. The first phase of the Anergy project had just reached completion whereby four buildings were being provided with low grade heating and cooling by the geothermal storage. The remainder of the buildings were currently being heated by conventional gas boilers.

Other examples of sustainable energy initiatives on campus included photovoltaic panel installations on multiple building roofs and low carbon building designs. The most impressive example of low carbon buildings was the recently completed MINERGIE<sup>12</sup> accredited HPL lab building on campus, which achieved the MINERGIE-ECO standard. The incorporation of advanced, adaptable building controls and heating and cooling systems that were designed to integrate into the Anergy Grid made for a highly energy efficient building.

The long-term commitment to sustainable development with regards to capital investment on ETH's Hönggerberg campus left a lasting impression on me.

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<sup>10</sup> <https://www.ethz.ch/en/the-eth-zurich/sustainability.html>, Accessed September 2013

<sup>11</sup> <https://www.ethz.ch/en/the-eth-zurich/sustainability/sustainability-report.html>, Accessed September 2013

<sup>12</sup> [http://www.minergie.ch/home\\_en.html](http://www.minergie.ch/home_en.html), Accessed December 2014

## Community and Stakeholder Engagement

ETH have developed several programmes and policies designed to engage both internal and external communities.

Whilst I was visiting ETH Dr Dominik Brem gave me a copy of their Energy Concept document.

“ETH Zurich has laid out in its energy concept how it intends to move towards a new energy future. The concept was developed in 2012 by a working group made up of students, professors, administrative staff and operational representatives, under the leadership of ETH Zurich Environmental Officer Dominik Brem.<sup>13</sup>”

The Energy Concept document outlines seven themes and specific measures designed to ensure sustainable energy supply and a prosperous national economy. The seven themes chosen by the working group were: research; education; increasing awareness among members of ETH Zurich; new buildings and renovations; operating the infrastructure; mobility; and reporting and communication.

Under each of these themes the key successes that have already been achieved at ETH Zurich are highlighted. Various commitments to further sustainable development in each theme are also made. An example of one of the commitments under new buildings and renovations theme is:

“ETH Zurich aims to achieve a rapid reduction of CO<sub>2</sub> emissions and an increasing share of renewables in the energy usage of its infrastructure. ETH Zurich achieves this through specific requirements concerning the energy technology used in its refurbishment concepts and standards for new buildings.<sup>14</sup>”

The same working group also defined specific developmental trajectories for ETH Zurich spanning to 2035. These developmental trajectories are to be achieved through the successful implementation of the commitments in the energy concept.

Milestone targets are defined for 2020 and 2035 for energy consumed and carbon emitted at ETH Zurich. These are normalised by the number of full-time equivalent (FTE) staff and students to allow comparison to Swiss national targets. In summary ETHZ have set themselves institutional targets of 30% reduction in total energy consumption and a 50% reduction in carbon emissions.<sup>15</sup>

## Utility Monitoring and Targeting

At an institution level ETHZ monitors total demand for heat and electricity as well as how much is generated from renewable sources and how much ETHZ generate on site. This, together with quantification of carbon emissions, are demonstrated by the Environmental Statistics section of the ETH Zurich Sustainability Report 2011-2012.<sup>16</sup>

At a building level energy monitoring differs from building to building. Buildings on the Hönggerberg campus are well monitored under the requirements of the MINERGIE standard. In conjunction with this the advent of the Energy grid on campus has improved monitoring of heat flow. Whilst walking around the campus I noticed that electricity generated by photovoltaic (PV) panels on building roofs was monitored and displayed on a purpose

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<sup>13</sup> <https://www.ethz.ch/en/the-eth-zurich/sustainability/context/energy-concept.html>, Accessed December 2014

<sup>14</sup> [https://www.ethz.ch/content/dam/ethz/common/docs/publications/Energieleitbild/eth\\_energy\\_concept\\_en.pdf](https://www.ethz.ch/content/dam/ethz/common/docs/publications/Energieleitbild/eth_energy_concept_en.pdf), Accessed December 2014

<sup>15</sup> [https://www.ethz.ch/content/dam/ethz/common/docs/publications/Energieleitbild/eth\\_entwicklungspfade\\_en.pdf](https://www.ethz.ch/content/dam/ethz/common/docs/publications/Energieleitbild/eth_entwicklungspfade_en.pdf), Accessed December 2014

<sup>16</sup> [https://www.ethz.ch/content/dam/ethz/common/docs/publications/sustainability/ETH\\_Zurich\\_Sustainability\\_Report\\_2011\\_2012.pdf](https://www.ethz.ch/content/dam/ethz/common/docs/publications/sustainability/ETH_Zurich_Sustainability_Report_2011_2012.pdf) (p.51), Accessed September 2013

made outdoor display on campus. The display showed how much power was being generated from PV at any one time.

On the Zentrum campus energy monitoring and efficiency is a bigger challenge with ageing infrastructure and dispersed buildings. Large users, such as datacentres, have been targeted for energy efficiency improvements on this campus.

ETHZ have set themselves ambitious energy and carbon targets including power from 100% renewable sources by 2035 and a 50% reduction in direct CO<sub>2</sub> emissions of the Science City campus by 2020.<sup>17</sup>

## University of Cambridge



Figure 4 - Kings College (cdemo, 2007)<sup>18</sup>

The University of Cambridge consists of 31 colleges and 150 departments sparsely located across central and West Cambridge. These house 18,000 students and 9,000 staff and each college is self-governing. This means that most of the administration is done at a college level, with strategic decisions made at a senior administrative level.

A central Estate Management team is responsible for the development, management and maintenance of the University estate. Estate Management has separate strategy and operations directorates which both report to an Environmental Strategy Committee. Reporting directly to the Director of Estate Strategy is the Head of Environment and Energy, Joanna Chamberlain. It was Joanna's team whom warmly welcomed me to the University of Cambridge and put together an itinerary for the day.

Quoted from the University of Cambridge Environment and Energy website: "The Environment and Energy Section works closely with staff and students to share best practice, support behaviour change and strategies, and hear what you need to reduce the University's environmental impact. We implement and support the University in reducing its energy use and carbon emissions."

Cambridge is a participant of the GULF initiative and a supporter of ISCN and published an ISCN-GULF charter report in 2011.<sup>19</sup>

<sup>18</sup> Kings College (cdemo, 2007) @: <https://www.flickr.com/photos/cdemo/1374876846/>; © <https://creativecommons.org/licenses/by-nd/2.0/legalcode>

<sup>19</sup> <http://www.environment.admin.cam.ac.uk/files/carbon-management-plan.pdf>, Accessed October 2013

## Sustainability in Practice

The Environmental Strategy Committee exists at a strategic level at Cambridge to oversee the implementation of the University's Environmental Policy. The committee is chaired by the Pro-Vice-Chancellor for Institutional Affairs and includes representatives from across the University.

During my visit to the University of Cambridge I met with the Energy and Environment team at the University's Estates Management offices. In the unique Estates Management structure at Cambridge the Energy and Environment team dealt with both operations and strategy and policy elements of sustainability and reported to the Environmental Strategy Committee. It was obvious that the growing team were making progress in both institutional and departmental sustainability issues.

The expanding number of roles within the Energy and Environment team encompasses 10 posts. During my visit I met with the Energy Manager, Building Energy Manager, Environmental Coordinator and the Living Laboratory for Sustainability Coordinator.

These various roles support multiple streams of sustainable development including academic activity, buildings and grounds, carbon, energy, green procurement, recycling and waste, travel and water.

## Community and Stakeholder Engagement

In recent months the University of Cambridge have had several successes when it comes to engaging the University community.

The level of engagement with students at the University has been greatly aided by the appointment of a Living Laboratory for Sustainability Coordinator, Claire Hopkins. I met with Claire during my visit and was impressed with the degree of success achieved in just one year since she started in post.

Ways in which students are engaged in Sustainability on campus include: collaboration on academic projects; small-scale extra-curricular projects; living lab internships and affiliated projects. The post is funded by Santander and on the back of the achieved successes the University hope to make a case to secure further funding to keep the post going.

One way in which the team engage academic and technical staff is through project identification and funding. This is aided by the University's award-winning Electricity Incentivisation Scheme (EIS), which rewards departments for reducing their electricity consumption and charges them for any excess relative to a baseline target.

I met with the team's Building Energy Manager, Xiang Cheng, who identifies potential energy saving projects on campus. One of the most successful projects to date has been at the Gurdon Institute where an energy and carbon behaviour change campaign was piloted. The project was part of the University's Energy and Carbon Reduction Project (ECRP) and resulted in a 19% reduction in lab electrical energy usage.

Xiang introduced me to the Building Facilities Manager, Kathy Hilton, at the Gurdon Institute and it was obvious from our meeting that her enthusiasm was key in the success of the pilot. She also stated that the success was aided by the competitive element, increased awareness of wasted energy through real time data visualisation and financial incentivisation.

## Utility Monitoring and Targeting

The University of Cambridge adopted a Carbon Management Plan in 2010 as part of the Higher Education Funding Council for England's (HEFCE) drive to reduce carbon emissions. This commits the university to achieving a 34% reduction in energy-related carbon emissions by 2020 against a 2005-06 baseline.<sup>20</sup>

The ECRP has been the main carbon emission reduction scheme at the university as well as being the main driver for developing utility monitoring and targeting systems. The pilot projects, such as the one at the Gurdon Institute, have resulted in partnerships with consultancies such as Building Sustainability Ltd. Building Sustainability have developed their Workplace Footprint Tracker (WFT) software in collaboration with the University to enable them to better identify wasted energy and display meaningful information to engage students and staff.

Building Sustainability also won the tender for installing Smart metering in the Gurdon institute to enable them to monitor energy at an individual lab level. This in turn gave the opportunity to run a building-wide behaviour change program that resulted in significant savings across 90% of the labs in the building. The ongoing savings achieved are being displayed on multiple platforms in the Gurdon Institute including an iPad at the building entrance. The advent of web based platforms such as Workplace Footprint Tracker have allowed much wider engagement opportunities within organisations.

In addition to using the dashboard and project tool elements of WFT Cambridge are also using Systems Link M&T software to process supplier invoices and report on financial spend at both an institution and building level. The Energy and Environment team have also made available a series of web reports to departments so that they can see their energy usage and spend.<sup>21</sup>

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<sup>20</sup> <http://www.environment.admin.cam.ac.uk/what-are-we-doing/carbon/carbon-management-plan-targets>, Accessed December 2014

<sup>21</sup> <http://www.environment.admin.cam.ac.uk/energy-dashboards>, Accessed December 2014



## Anglia Ruskin University



Figure 5 - Anglia Ruskin University, Cambridge (Kake, 2005)<sup>22</sup>

Anglia Ruskin University (ARU) is spread over two campuses located in Cambridge and Chelmsford. The origins of ARU lie in Cambridge and go back to 1858 when John Ruskin opened a School of Art in Sidney Street to “teach the citizens of Cambridge to apply practical skills with a sense of beauty.”<sup>23</sup> The current location of the Cambridge campus at East Road is built on the site of the originally named Institute for Technical Education. ARU was granted university status by the Privy Council in 1992 and adopted its current name in 2005.

The Estates and Facilities team sit separately from the other faculties and departments of the university and oversee the facilities management of both Cambridge and Chelmsford campuses. Under the Director of Estates and Facilities sit two Assistant Directors – one for Building Services and one for Projects. It was the Assistant Director for Building Services, Andy Lefley, whom I met upon arriving at Anglia Ruskin. Andy introduced me to some of his team members including the contracts manager, Mark Rogers, and environmental manager, Simon Chubb, who kindly gave of their time to show me current sustainability initiatives at ARU.

During my visit I also met with Dr Alison Greig who sits in the Global Sustainability Institute (GSI)<sup>24</sup> at ARU to discuss their work to engage the wider university community on sustainability issues.

<sup>22</sup> Anglia Ruskin University, Cambridge (Kake, 2005) @: [https://www.flickr.com/photos/kake\\_pugh/977263406/](https://www.flickr.com/photos/kake_pugh/977263406/); © <https://creativecommons.org/licenses/by-nc-sa/2.0/legalcode>

<sup>23</sup> [http://ww2.anglia.ac.uk/ruskin/en/home/central/alumassoc/history\\_of\\_anglia.html](http://ww2.anglia.ac.uk/ruskin/en/home/central/alumassoc/history_of_anglia.html), Accessed June 2014

<sup>24</sup> [http://www.anglia.ac.uk/ruskin/en/home/microsites/global\\_sustainability\\_institute.html](http://www.anglia.ac.uk/ruskin/en/home/microsites/global_sustainability_institute.html), Accessed December 2013

ARU are a signatory of the ISCN-GULF charter and were the recipient of the ISCN Excellence in Integration award in 2013 for their “fully-integrated commitment to sustainability.”<sup>25</sup>

## Sustainability in Practice

Sustainability at ARU exists historically on the operations side with Estates & Facilities Services Environment team leading on environmental policy and strategy<sup>26</sup>. In 2011 the GSI was formed in alignment with ARU’s 2012-2014 Corporate Plan.

Dr Alison Grieg from the GSI shared with me the commitment made by the university to truly integrate sustainability into university life. This included:

- a commitment to internationally recognised research in sustainability
- a commitment to making sustainability a part of the student experience
- striving to exceed national and sector benchmarks for the sustainability of our buildings and processes.

The GSI works towards sustainable development primarily on the academic and curriculum side but works closely with the estates team to “make sure our approach to sustainability delivers world-leading knowledge, future leaders in sustainability and practical action on the ground.”<sup>27</sup>

Estates and Facilities Services at ARU look after the Cambridge Estate including the Environmental Management of it. The environmental management of the university includes environmental policy and strategy, ISO 14001 accredited EMS, engaging students and staff and working with the rest of the Estates and facilities team to deliver sustainable projects with a low degree of environmental impact.

While I was on campus I was given an overview of the EMS and taken to see some examples of projects designed to reduce the environmental impact of the university. These included: fitting thermal wheels to air-handling units to recover heat; small-scale CHP for supplying electricity and domestic hot water to a building; PV panels on a building roof and Monodraught<sup>28</sup> cool phase<sup>29</sup> technology for low energy ventilation.

I was particularly impacted by the cool phase technology and the energy savings of up to 90% that ARU were experiencing compared to conventional cooling that was used in lecture theatre and teaching space.

## Community and Stakeholder Engagement

With the advent of the GSI, ARU have somewhat increased their engagement with the academic community on sustainability issues in curriculum and promoting the use of the campus as a living laboratory. The “Education for Sustainability” set of values is the vehicle by which ARU intend to embed sustainability across the curricula. Dr Grieg has found the UNESCO definition of sustainability a useful tool when engaging staff and students.<sup>30</sup>

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<sup>25</sup> <http://www.international-sustainable-campus-network.org/awards/2013-award-winners.html>, Accessed September 2013

<sup>26</sup> <http://web.anglia.ac.uk/estates/environment/>, Accessed December 2013

<sup>27</sup> [http://ww2.anglia.ac.uk/ruskin/en/home/microsites/global\\_sustainability\\_institute.html](http://ww2.anglia.ac.uk/ruskin/en/home/microsites/global_sustainability_institute.html), Accessed November 2013

<sup>28</sup> <http://www.monodraught.com/>, Accessed December 2014

<sup>29</sup> <http://www.cool-phase.net/>, Accessed December 2014

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[http://ww2.anglia.ac.uk/ruskin/en/home/microsites/global\\_sustainability\\_institute/education\\_for\\_sustainability/what\\_is\\_efs.html](http://ww2.anglia.ac.uk/ruskin/en/home/microsites/global_sustainability_institute/education_for_sustainability/what_is_efs.html), Accessed December 2014

Dr Greig is also undertaking research in parallel to the Education for Sustainability program that aims to “uncover if and how sustainability literacy fosters a just society of innovation, opportunity and wellbeing able to manage the full diversity of environmental risks.”<sup>31</sup>

In conjunction with the work that the GSI is undertaking, the Estates and Facilities team undertake engagement activities such as an annual Green Staff Competition<sup>32</sup> that rewards staff for their degree of engagement with green activities around campus. Students are engaged through the Green Society; research collaborations; “The Green Pitch” green idea competition and a halls of residence energy saving competition known as Eco Residents.

The University Environmental Strategy 2011-2015 contains targets for engagement performance and progress against target is monitored annually. The targets were set at 2000 engaged staff and 10% year on year increase for number of students engaged.<sup>33</sup> The target was exceeded for both staff and students for the 2013/14 academic year.<sup>34</sup>

## Utility Monitoring and Targeting

ARU have developed a Carbon & Energy Management Plan 2010-15, in line with HEFCE requirements, that outlines CO<sub>2</sub> reductions against a 2005-06 baseline of 27% by 2014-15, 43% by 2020-21 and 83% by 2050-51.

Several of the goals of the Carbon and Energy Management Plan relate to improving building scale energy monitoring and targeting. As part of this the university use a number of systems working together to monitor progress against target. They currently use TEAM M&T software<sup>35</sup> for reporting on energy and financial data relating to utilities across all sites.

In conjunction with the TEAM software ARU have effectively utilised their BMS system to collect half hourly energy data. The recent appointment of a BMS engineer, working with the TREND engineer who externally maintains the BMS, has meant that the Estates and Facilities teams are now equipped to upgrade the BMS controls on campus. It is anticipated that this will result in significant energy and carbon savings.

Progress against carbon savings targets are displayed on the Environmental Management webpages.<sup>36</sup> Current progress shows that absolute carbon emissions are increasing due to an increasing footprint of the Cambridge estate and the recent acquisition of an estate in Peterborough. However, carbon emissions normalised by floor area, FTE and financial income have all shown a decrease from the baseline year and have stabilised over the last year. The Carbon Management Plan financial savings target has also been exceeded year on year due to extensive energy procurement savings from flexible purchasing contracts.

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<sup>31</sup> [http://ww2.anglia.ac.uk/ruskin/en/home/microsites/global\\_sustainability\\_institute/our\\_research/education\\_for\\_sustainability.html](http://ww2.anglia.ac.uk/ruskin/en/home/microsites/global_sustainability_institute/our_research/education_for_sustainability.html), Accessed December 2013

<sup>32</sup> [http://web.anglia.ac.uk/estates/environment/getinvolved/greenlove.php?utm\\_source=greenlove&utm\\_medium=url&utm\\_campaign=redirect&utm\\_content=greenlove.VCO.NOV11](http://web.anglia.ac.uk/estates/environment/getinvolved/greenlove.php?utm_source=greenlove&utm_medium=url&utm_campaign=redirect&utm_content=greenlove.VCO.NOV11), Accessed December 2014

<sup>33</sup> <http://web.anglia.ac.uk/estates/environment/management/strategy.php>, Accessed December 2013

<sup>34</sup> <http://web.anglia.ac.uk/estates/environment/getinvolved/engagement.php>, Accessed December 2013

<sup>35</sup> <http://www.teamenergy.com/products-and-services/energy-and-carbon-management-software/>, Accessed December 2013

<sup>36</sup> <http://web.anglia.ac.uk/estates/environment/energy/performance.php>, Accessed December 2014

## Conclusions and Key Recommendations

In general it was noted during my visit that there has been a significant rise in the profile of sustainability in higher education (HE). Not only that but sustainability policy setting and strategy now exist at more than one level in a growing amount of HE institutions.

At the Swiss institutions sustainability was firmly embedded in the fabric of the institution and existed across all levels of management. There was a general awareness of the requirement for a more sustainable way of living and this had been the case for decades. EPFL's Lausanne campus and ETHZ's Hönggerberg campus were both built with sustainable development in mind.

Comparatively the English institutions were earlier in the journey of sustainable development. However, progress in recent years had been swift and investment unprecedented compared to the recent past. The strong foundations built decades ago in the Swiss institutions were paralleled by the ambition shown by the English institutions.

One thing that was obvious was the government support in Switzerland. ETHZ and EPFL are both federal institutions that are heavily funded and subsidised by government funding. The fact that the government sees the investment in sustainable development as a high priority on both campuses shows how important funding bodies are in the equation.

In England HEFCE are beginning to lead by example and the carbon management plan support provided has seen a substantial increase in funding from institutions in resources dedicated to sustainability.

Other themes that I picked up was the consolidation of reporting of sustainability criteria, indices and targets at each institution. Both Swiss institutions report their sustainability performance under the ISCN/GULF charter guidelines. Both English institutions already report their scope 1,2 and 3 carbon emissions using the HEFCE carbon management plan guidelines and therefore only produce brief ISCN/GULF charter reports to supplement these. For internal reporting purposes the EMS systems implemented at both English institutions cover any, otherwise additional, metrics reported in the Swiss sustainability reports.

Both methods of reporting appear to have been successful in raising awareness and increasing commitment to meeting targets set out in the reports. The main advantage of the Sustainability Reports that the Swiss institutions produce is the fully comprehensive, consolidated nature that only requires update every couple of years.

Equally the carbon management plan produced by the English institutions outlines their commitment to carbon reduction and a five year strategy to meet set targets. Once the initial plan is completed it only requires update every few years and ongoing progress is closely monitored through energy monitoring and targeting systems and the environmental management systems at the universities.

Ongoing monitoring and targeting at building and sub-building levels was done much more comprehensively and consistently at the English institutions and this allowed much greater visibility of areas of waste and opportunities for energy efficiency improvements and reductions in environmental impact.

In short the reporting and awareness raising mechanisms adopted by each institution are suited to the relative organisation structure and estate of each institution. Institutions which consist of a majority of shared facilities and a unified estate may opt for a more consolidated reporting methodology similar to that of the Swiss institutions. Conversely, those that exhibit a more decentralised system may opt for the carbon management, EMS and energy M&T approach that enables more granular reporting.

Finally, I was struck by the direct correlation between level of engagement with a member of staff, student or department and the success of projects involving that party. This is not a surprise given the intrinsic nature of

relationship and willingness to collaborate. It was a helpful reminder of the importance of relationships and the fundamental nature of human beings that leads to us working much better in collaboration than in isolation.

### **Key Recommendations:**

1. That sustainable development responsibilities should be dispersed across management and departmental structures at institutions.
2. That a consistent and bespoke reporting format be adopted by HE institutions to raise awareness and build familiarity with sustainability.
3. That cross-institutional networking opportunities be utilised to learn from best practice across the sector.
4. Priority should be given to the effective use of resources currently available so as not to delay the implementation of the institutions sustainable development plans.
5. There is no one shape fits all approach to sustainable development so do what is possible and suitable for your institution.
6. Key relationships should be fostered and prioritised because so much more can be achieved through collaboration than it can be through individual effort.