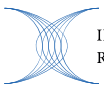


GREEN GUIDE FOR UNIVERSITIES

IARU PATHWAYS TOWARDS
SUSTAINABILITY



INTERNATIONAL ALLIANCE OF
RESEARCH UNIVERSITIES



THE INTERNATIONAL ALLIANCE OF RESEARCH UNIVERSITIES (IARU)

The International Alliance of Research Universities (IARU) was established in 2007 and is a collaboration between ten of the world's leading research-intensive universities. IARU jointly addresses grand challenges facing humanity. The Alliance has identified sustainable solutions on climate change as one of its key initiatives. As a demonstration of its commitment to promote sustainability, IARU has sought to lead by example through establishing the Campus Sustainability Program, which aims to reduce the environmental impact of our campus activities. It also organises international scientific congresses on sustainability and climate challenges.

GREEN GUIDE FOR UNIVERSITIES

IARU PATHWAYS TOWARDS
SUSTAINABILITY

READERS' GUIDE

This guide consists of nine chapters that address key areas for sustainability at universities – these range from laboratory design to managerial and organisational aspects. Each chapter consists of five elements:


- 1 **Introduction**, outlining why the theme is important.
- 2 **Challenges and opportunities**, presenting some of the key factors to address and giving suggestions for important approaches and tools.
- 3 **Hurdles and solutions**, outlining suggestions and providing inspiration for key questions about the area.
- 4 **Cases**, showcasing actual examples from IARU universities, and rated in difficulty from 1 (very easy) to 5 (very difficult).
- 5 **Quick tips, further reading**, and links for where to find more information.

The guide can either be read comprehensively from beginning to end – which will give the reader an integrated picture of how to work with sustainability at universities – or the reader can choose to focus on specific areas and individual chapters.


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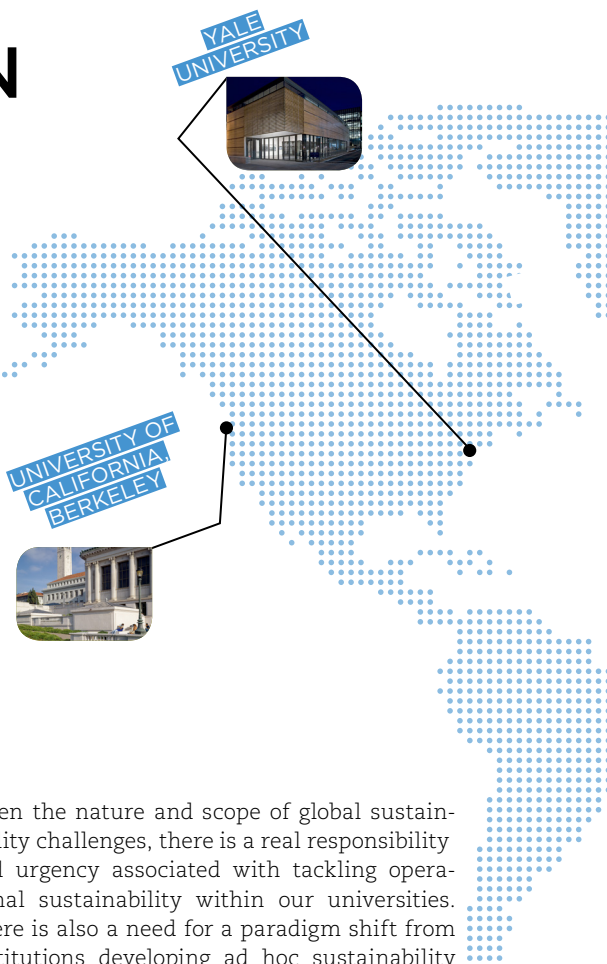
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INTRODUCTION

»» We have the opportunity to create cultures of sustainability for today's students, and to set their expectations for how the world should be

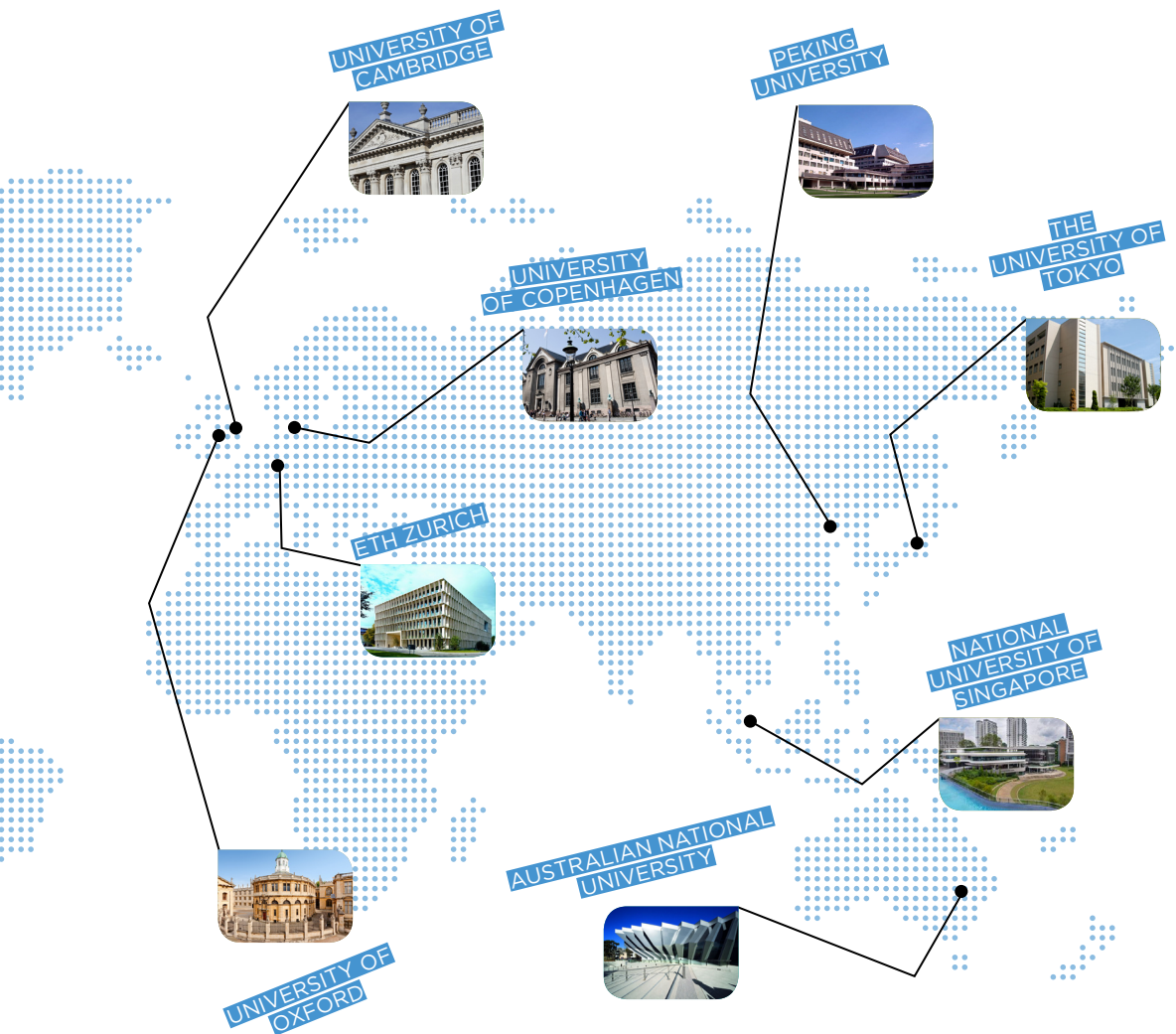
Universities can play a significant role in forging the path to a sustainable future. By their nature, universities are focused on research, teaching and service and as institutions, they are tasked with training the world's future leaders. As universities' mission and activities are not directly tied to financial or political gain, they have the capacity to test systems and technologies, and to advance innovative solutions to global challenges in ways that companies and municipalities cannot.

Universities manifest sustainability in two ways that should be complementary, but are often seen as distinct – curriculum and operations. Academic staff members are generally considered authorities and have the capacity to actively contribute to solutions at various stages and levels. As we demonstrate to the public, staff, and students that we are responsible and willing to take the lead in creating a more sustainable tomorrow, we are doing so in a way that benefits from the credibility of the university voice. In other words, we have the ability to manifest sustainability – not only in theory, but in practice in everyday life on university campuses.



Given the nature and scope of global sustainability challenges, there is a real responsibility and urgency associated with tackling operational sustainability within our universities. There is also a need for a paradigm shift from institutions developing ad hoc sustainability programmes autonomously to a more collaborative effort to unite voices and learn from each other's experiences. For this reason, the International Alliance of Research Universities (IARU) have taken on the challenge to work together to promote and share our joint best experiences on the road to sustainability.


Universities face particular challenges: energy-intensive laboratories and the use of hazardous substances; internationalisation and increasingly collaborative research leading to increased international flights; high student turnover; and very diverse, often old, buildings that can be difficult to make more energy- and water-efficient.



Universities are training tomorrow's leaders.

We have the opportunity to create cultures of sustainability for today's students, and to set their expectations for how the world should be. At the same time, we are creating healthier, cleaner, safer, and more productive workplaces for university employees and students. In providing real-world examples of environmental, financial, and social successes, we hope to inspire innovation and creative action in universities around the globe.

This guide reflects both the challenges and opportunities of campus sustainability, with a particular focus on the environmental aspects of sustainability, and it offers key tactics and lessons learned by IARU universities. The guide is not intended to be all-inclusive, but is instead a set of examples, tools, and anecdotes to inform and inspire sustainability professionals – particularly if you are just embarking on the journey.



>> *There is no set way to organise campus sustainability, but how such an initiative is structured will shape the university's capacity for results and success*

SUSTAINABLE CAMPUS ORGANISATION

Universities are complex organisations that house a range of buildings and spaces, such as libraries and laboratories, as well as services – from teaching and research to housing and catering. Challenges to sustainability programming and engagement include that campuses are often geographically spread out and that various academic and administrative departments tend to have distinct identities and cultures. Additionally, since the 2008 recession, many universities have had to cut back on funding for activities that are not considered core to the mission.

There is no set way to organise campus sustainability, but how such an initiative is structured will shape the university's capacity for results and success. By establishing mechanisms to set goals, implementing activities to support those goals, and regularly reporting on progress, universities can lead by example while they are training tomorrow's leaders.

No matter what the context of the campus, or how far along its sustainability efforts are, it is critical for 'green' planning and implementation to reflect the three pillars of sustainability: ecosystem vitality, financial viability, and human well-being. The more that environmental benefits can be associated with positive financial and social outcomes, the more engaged members of the community will be.

Challenges and Opportunities

Strategic planning

Although sustainability initiatives can and do happen without top-level support, sustainability has to be an institutional priority if 'green' projects are to compete with other demands for time and funding. The transition from individual ideas to a comprehensive, university-wide programme requires perseverance, leadership and championship at various levels – regardless of top management's commitment.

However, involving campus leadership will afford the various projects legitimacy and encourage buy-in from key stakeholders, which in turn will increase the readiness to implement more ambitious tools, such as energy-management systems and standards (see box).

To develop a management system or a strategic sustainability plan, the ideal scenario is to convene a campus-wide committee of top officials to agree on and take ownership of sustainability initiatives, as exemplified by the Campus Steering Committee at the University of Copenhagen, which includes all the Deans, the Rector and Pro-rectors. These administrators decide on overall targets and priorities, which then form the basis of the Green Campus projects.

Once some top-leadership support has been secured, the next step is conducting a 'landscape review' to see how other organisations have structured their efforts. This exercise should yield valuable lessons regarding both what to do and what not to do, and these results can



There are several steps to institutionalising sustainability management systems. Foundationally, there are four steps: Plan, Do, Check, Act. As sustainability programmes mature, this cycle should also include Report and Adjust. Reporting will strengthen the sense of accountability and providing leeway to adjust programmes will allow for more ambitious goal-setting.

then be used to develop templates to assist with information-gathering and ultimately goal-setting.

In order to keep the institution on-task and to coordinate between key actors, there will need to be an allocation of financial and human resources. Ideally, this will take the form of a dedicated office or department that is responsible for the overall management of sustainability activities with full-time resources, responsibilities, and budgets.

»» As goals are being set, it is also critical to establish baselines and tactics for collecting metrics

Setting goals

Once the basic elements of a plan have been established – i.e., categories for goals, timeline, likely desirable outcomes etc. – it is critical to identify ‘delegates’ who will support the development and implementation of the plan and who will subsequently be held accountable for specific projects and goals. The goals included in the plan should be ambitious but realistic, measurable and time-bound. During the planning process, it is imperative to establish systems to measure results and to hold groups and individuals accountable. If, for example, the university opts to commit to reducing greenhouse-gas emissions by 10%, how is that to be measured? By whom? With what frequency? And what programmes will support the transition to solutions that are more energy-efficient and will reduce carbon emissions?

As goals are being set, it is also critical to establish baselines and tactics for collecting metrics. Some might consider this a first step, but to start with what you can measure may also be limiting and might preclude some of the most environmentally impactful themes. If, instead, the process is structured to identify what should be managed and then determine how to quantify those factors, the plan can be more inclusive and effective.

Cases in which there should be mechanisms to quantify outcomes but the data is weak or missing will highlight the need for data collection and analysis. For targets or projects that do not lend themselves well to quantification, such as behaviour-change campaigns, it is often possible to identify proxy indicators; for instance, tallying the number of clicks for a particular link, assessing staff commitment by collecting pledges, or tallying participants in green workplace programmes.

Finally, it is important to continually explore and communicate about best practices and ways for various members of the community to get involved. It is crucial that regular progress reports reference the environmental, financial, and social benefits of sustainability programmes.

HURDLES AND SOLUTIONS

QUESTIONS FOR SUSTAINABLE CAMPUS ORGANISATION



What if a leadership transition results in shifting institutional priorities?

Get a sense of the new leader's style and values. **Tailor the approach and activities** to that perspective.



What if individuals or groups on campus do not feel compelled to support initiatives?

Determine what matters to people and use those values as a means to communicate with them. For example, if environmental concerns will not inspire custodians to use green cleaning products, talk to them about their own health. Prioritise collaboration with people who demonstrate support.



What if the financial rationale is difficult to estimate?

Ensure that the full perspective is being considered. With energy systems, for instance, **conduct a return-on-investment analysis for maintaining a building with a less expensive but more inefficient system.** If the financials do not add up, consider whether there may be other benefits that will justify a commitment, such as better or healthier conditions for working and studying.





What if we lack support from top management?

Identify and engage with other key internal stakeholders who can contribute to management awareness and support. You should also build a portfolio of successful programmes and then use metrics from those successes to revisit the subject with top management.



How do we decide which of the many environmental issues to deal with?

Set priorities - you will not be able to address all issues simultaneously. Identify the areas of biggest impact and then start with projects that offer low-hanging fruit and easily relate to financial and social drivers. Energy efficiency (and, consequently, the reduction of CO₂ emissions) is usually a good place to start.



What if a goal is not being met?

Monitor performance along the way to ensure that the responsible parties and management are aware of the project's (lack of) progress. Call attention to the behaviours and systems that should be updated, and use this as an opportunity to 'rally the troops' around the issue.

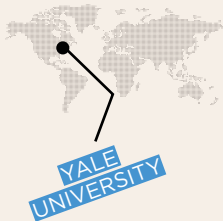


How do we set a goal when there is no existing data?

Rather than setting a goal for the entire focus area, start by setting a goal for establishing a baseline by a given time. For example, if an institution wants to introduce composting but does not know what percentage of its waste stream is composed of organic materials, it will be difficult to set realistic targets. The first step in this instance would be to conduct a waste audit and then use that data to set goals.

CASE 1

DEPARTMENT-LEVEL PLANNING



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DIFFICULTY OF IMPLEMENTATION

In 2010, Yale launched its first Sustainability Strategic Plan. While it was a major milestone in sustainability efforts on campus, it was not well suited to inspire individual actions among the employees and students. For example, the average person could not really do anything to support the renewable-energy targets, and few employees or students could relate their own daily choices (in terms of purchasing, energy use, etc.) to the goals of the plan.

In an attempt to address this disconnect, the Yale Office of Sustainability piloted a programme to establish Sustainability Action Plans for three of its ten professional schools and, over the course of one year, the Sustainability group worked with teams of students and employees to develop documents that were tailored to the unique culture of each of these Schools. In each case, this resulted in sustained efforts over the course of the plan. Based on this pilot, the 2013-2016 Yale Sustainability Strategic Plan includes a commitment to develop a Sustainability Action Plan for each of the professional schools. These plans have three aims:

- 1 Highlighting **specific goals** from the university-wide plan where a particular school can support success
- 2 **Spelling out particular actions** that will help green the physical presence of a particular school (for example, recycling signage or reducing paper)
- 3 **Emphasising the links between sustainability and the particular discipline** of each school.

ACTION PLAN



ENERGY



PROCUREMENT



WAST
MANAGEMENT

The main challenge to this initiative has been gaining support from department administrators. To address this, the Yale team presented the financial rationale of particular suggestions, then asked if there was another member of their community who might be a champion and take the lead on developing a plan. In addition, the sustainability team used Pinterest to create a set of boards for the various schools; these contain news items, images, blog posts, and websites that clearly illustrate the connections between each discipline and sustainability. Examples include:

www.pinterest.com/mbgoodall/music-sustainability

www.pinterest.com/mbgoodall/nursing-sustainability

www.pinterest.com/mbgoodall/art-sustainability

As each plan is completed and announced by its dean or director, a summary is posted to the Office of Sustainability's website. The plans are considered to be living documents, so the sustainability team remains in communication with each school about its successes and challenges, and fosters dialogue between the various communities.

sustainability.yale.edu/planning-progress/department-level-plans



CASE 2

ESTABLISHING THE GREEN CAMPUS OFFICE



In 2008, the University of Copenhagen (UCPH) established the Green Campus Office to develop strategies for sustainability activities and within the first six months, two key targets for energy efficiency and CO₂ reduction were approved by management. These became the office's main focus in the following years, with the goal of a 20% reduction of CO₂ emissions and energy consumption per full-time equivalent in 2013 compared to 2006 levels.

This gave UCPH just five years to set up the organisation and identify the necessary activities and investments. Retrofitting laboratory buildings is particularly challenging as these projects are usually quite complicated and need to be coordinated closely with research activities that must not be jeopardised. However, this short timeline also created a sense of urgency, which enabled a strict focus on activities that contribute to bottom-line results on energy-savings and CO₂ reduction.

The Green Campus Office develops strategies, action plans and policies which are then approved by the Campus Steering Committee along with decisions on investment/funding of the activities. From 2009-2013, management allocated approximately USD 25 million in energy efficiency and CO₂ reduction activities, resulting in savings of approximately USD 7 million annually, as well as additional major decisions on district cooling and energy efficiency in new buildings.

The Green Campus Office publishes an annual report on progress toward achieving its stated sustainability targets. The target was achieved in 2013: CO₂ emissions were reduced by 28.8% and energy consumption by 20.4% per full time equivalent employee and student.



3

DIFFICULTY OF
IMPLEMENTATION



GREEN LIGHTHOUSE
Green Lighthouse (UCPH) is Denmark's first public carbon-neutral building. The Green Lighthouse is a one-stop shop where students can get advice on their studies, exams, etc.

The Green Campus Office is organisationally located within the Campus Services department, which deals with overall campus planning, campus economy, and campus building. One major advantage of this location is that it becomes possible to integrate sustainability efforts into strategies and decisions regarding campus development, as well as into new buildings and programmes for retrofitting/maintaining existing buildings. Furthermore, the Office is in close proximity to Facilities Management, which is crucial in developing an energy and environmental management system.



QUICK TIPS

- Create a portfolio of easy-to-access tools. This can include certifications (workplace, labs, events), games, presentations, posters, a library of videos, etc.
- Establish the ‘brand’ and a set of identity guidelines so that all materials are consistent and coordinated.
- Different people require different messaging, so be dynamic in your outreach approach. Focus your communication so as not to dilute the message.
- Business managers are often champions, as they link systems and the bottom-line in ways that lend themselves well to sustainability policies.
- Hire students to support the work, which provides an affordable workforce and offers a learning experience.
- Don’t reinvent the wheel. When you have a project idea, look to see what other universities are doing to gain inspiration.

A Closer Look

Annual environmental reporting

Annual reports with compelling graphics are an excellent way to tell success stories and call attention to issues that need to be addressed. To develop these reports, establish baselines and systems for collecting metrics. Then identify which employee is accountable for each metric. The process of collecting and analysing data, and then writing and formatting the report, can be very time-consuming. So keep it simple, as the target group is limited but important.



FURTHER READING

LITERATURE

Hitchcock, Darcy, and Marsha Willard. *The Business Guide to Sustainability: Practical Strategies and Tools for Organizations*. 2 edition. Routledge, 2009

Werbach, Adam. *Strategy for Sustainability: a Business Manifesto*. Boston, Mass.: Harvard Business Press, 2009

Winston, Andrew S. *Green Recovery: Get Lean, Get Smart, and Emerge from the Downturn on Top*. Boston, Mass: Harvard Business Review Press, 2009

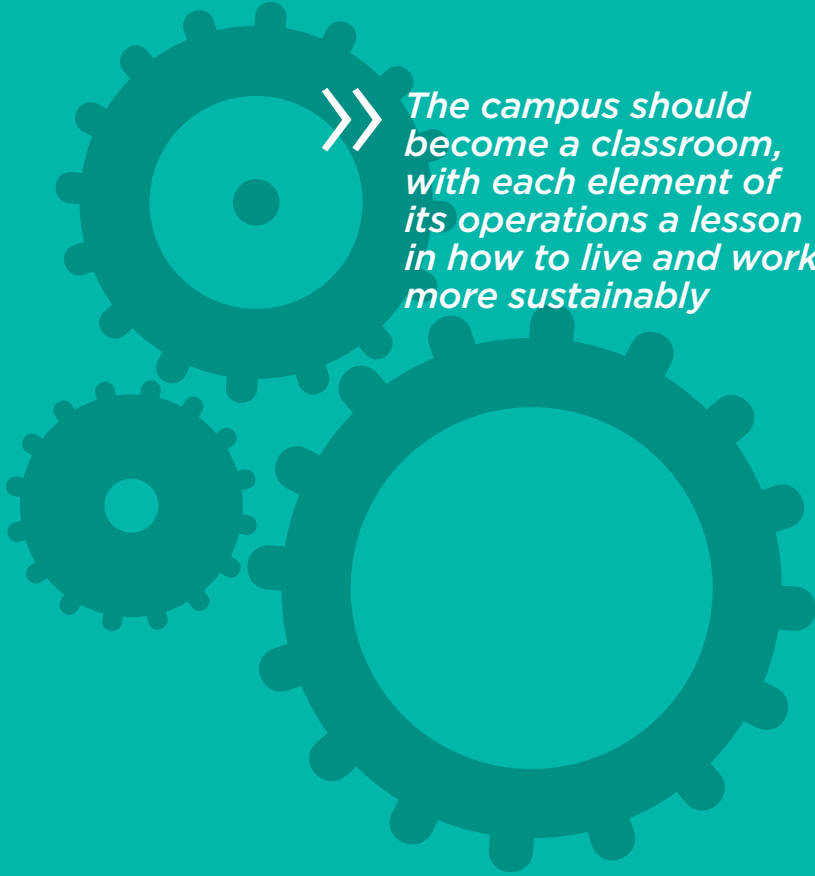
LINKS

Sustainability Planning Toolkit for Cities
www.icleiusa.org/sustainability-toolkit
Green Campus, University of Copenhagen: http://climate.ku.dk/green_campus

International Sustainable Campus Network
www.international-sustainable-campus-network.org



The campus should become a classroom, with each element of its operations a lesson in how to live and work more sustainably



CAMPUS- WIDE OPERATIONS

University campuses are unique, and their designs and activities reflect specific institutional and community needs. However, most share similar challenges when trying to establish environmentally sustainable campus operations.

Any university's environmental performance is directly influenced by the interconnectivity between the physical environment, campus operations and organisational/community activities; thus, integrated strategies need to be developed. For example, sustainable landscape management may include planning for water conservation, biodiversity protection, and community-sensitive design that facilitates social engagement.

The campus itself should be considered a classroom, with each element of its operations a lesson in how to live and work more sustainably. This could include placing energy/water dashboards in public areas that detail real-time consumption, producing regular formal reports that detail performance against goals, or establishing 'sustainability in action' designs for all new infrastructure (i.e., prominently displaying photovoltaic cells that generate renewable energy for buildings, or establishing campus landscape designs that highlight water conservation or biodiversity).

Anonymous sustainability operations must also become a thing of the past and, whenever possible, new developments should make an organisational statement about sustainability, with visual cues reminding the community of the institution's commitment.

» Installing effective metering technology will help identify infrastructure failure

Challenges and Opportunities

The first critical step in establishing sustainable campus operations is to fully understand their environmental impacts, a process that includes:

- Establishing environmental measures for all key activities.
- Assessing the way policy and process drive organisational decision-making and how that may influence the sustainability of operations.
- Measuring the effectiveness of campus design and technology on environmental outcomes.
- Assessing the sustainability skill levels of the employees operating and maintaining the campus.
- Measuring the impact of community behaviour.

Once these have been mapped, an approach can be established, based on the principles of technological efficiency and corporate conservation, that will synchronise operations with the sustainability goals that have been established by the university.

Energy management

In the absence of renewable technologies, energy consumption can be the main source of greenhouse gas emissions on a campus. Whether it is maintaining environment control in buildings or the growth of information and communications technology (from the desktop to the campus data centre), power demand is trending up in a sector that is getting bigger every year.

The first step in reducing energy consumption is to understand the optimal performance of infrastructure systems (both old and new), and to achieve and maintain it with regular and targeted maintenance by employees with sufficient training and technological skills.

Long-term approaches include investments in large scale plants and equipment, such as solar-energy systems and building management systems to establish energy-efficient controls for lighting and air-conditioning, as well as large-scale power-generation strategies, including co (or tri) generation, which has the added benefit of providing district heating and/or cooling.

Installing effective metering technology will help to identify infrastructure failures that are effectively wasting energy, including thermal leakage through poor insulation or external lighting that fails to switch off.

GENERATING ENERGY FOR STUDENT
ACCOMMODATION



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» Facility Managers should have access to data that allows analysis of the infrastructure's performance to identify any system failures, such as pipe or tap leakage

Water management

Although universities in some regions may not face water shortages, water conservation should nonetheless constitute a founding principle in all environmental programmes, as natural resources should never be wasted.

Facility Managers should know how and when water is being used, and be able to access data that allows analysis of the infrastructure's performance in order to identify any system failures, such as pipe or tap leakage. Again, maintenance by employees with sufficient training and technological skills is paramount.


Wherever possible, alternatives to potable water should be used, such as harvesting rainwater or on-site recycling of water, which can then be used in operational activities, such as irrigation (see also landscape management) or toilet flushing.

Programmes that promote behaviour changes, such as taking shorter showers in the student accommodation or running the dishwasher in the staff kitchens only once a day, constitute effective and relatively low-cost conservation strategies.

Landscape management

Contrary to popular belief, the quality of open spaces and the landscape itself is of equal importance to internal spaces and the built environment, as natural landscapes can reduce energy demand for air-conditioning in the summer through effective shading. Tree plantings can be used to create breeze corridors that make the external environment more pleasant for community use, while also having the practical effect of sequestering carbon emissions generated by campus activities.

However, poor design or management can mean that irrigation, for example, becomes a large part of the university's water consumption, and it can also be a major contributor to the waste streams, particularly where there is inadequate bin infrastructure to capture material that could be recycled or composted for reuse (see waste management).



SUSTAINABLE LANDSCAPE DESIGN SHOULD IDEALLY INCLUDE THE FOLLOWING CHARACTERISTICS:

- Regional/indigenous vegetation that is better able to cope with seasonal changes and thus does not need artificial irrigation.
- Where irrigation is needed, infrastructure to harvest and channel rainwater.
- Space that supports social interaction and community engagement with natural surroundings.
- Land use and maintenance regimes that protect and enhance biodiversity.

Biodiversity is sometimes the forgotten element of sustainable campus operations

Biodiversity protection

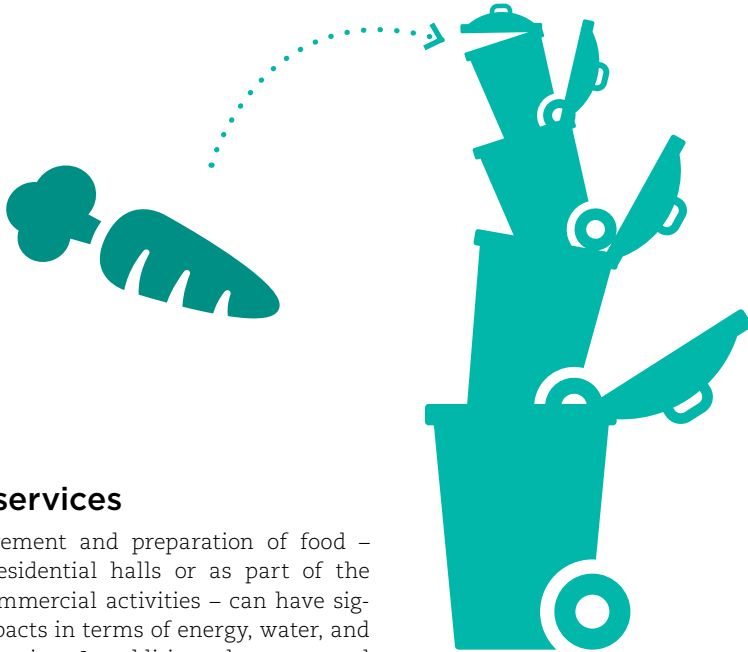
Biodiversity is sometimes the forgotten element of sustainable campus operations as it is often seen as having little to do with the activities of a university. However, as evidenced time and again, the disruption or destruction of key ecosystems can have wider impacts on the health of a regional environment. For example, the loss of natural balance can cause an increase in pest species that then have an adverse effect on the community.

The challenge for most universities is to identify biodiversity on their campuses. Only when that is done can they establish protection strategies that allow ecosystems and campus activities to co-exist harmoniously.

Several methods can be employed to measure biodiversity:

- Formal eco-audits of the campus and its surrounding region.
- Engaging the community – train people to identify local species, and then establish a process for them to report sightings or problems¹.
- Research what is already known – look at what academic research has been done on the biodiversity of the region and/or use the knowledge of long-term residents and (where appropriate) the indigenous community.

¹Yale University: www.sustainability.yale.edu/research-education/citizen-science



Dining services

The procurement and preparation of food – either in residential halls or as part of the campus' commercial activities – can have significant impacts in terms of energy, water, and waste generation. In addition, there are real environmental impacts associated with certain food choices. There are several ways to introduce sustainability into dining and catering services:

- Reduce 'food miles' by buying from local producers.
- Plan the menu based on what is naturally in season to reduce the energy needed to produce, transport, and store food.
- Emphasise quality over quantity in order to reduce overall waste.
- Check to be sure vendors are using minimal chemicals.
- Collect food waste for compost.

FOOD MILES

Food miles describe the distance that food is transported as it travels from producer to consumer. Choosing food that is local and in season means that it does not have to travel so far. Reducing food miles can have a dramatic effect on reducing CO₂ emissions.

Waste management

Universities need to establish an effective process that minimises the amount of waste that goes to landfill. This can be supported by a bin infrastructure that efficiently streams waste that can be recycled or reused. The bin infrastructure should allow easy access by the community members directly involved in disposal; e.g., cleaners, gardeners, kitchen and maintenance employees, and bins should be clearly marked to reduce incidents of cross-contamination. They should be placed in areas both convenient and close to the waste source; e.g., paper-recycling bins under desks and food-recycling bins in kitchens and common areas.

All sustainable waste management programmes should include strategies for re-using materials, including furniture, books, and computer and lab equipment. If equipment can no longer be used on campus but is still functional, there may be opportunities to donate to charitable groups in the community. Garden waste can also be collected and turned into compost to be re-used on campus.

THE BIN INFRASTRUCTURE SHOULD ALLOW EASY ACCESS BY THE COMMUNITY MEMBERS **DIRECTLY INVOLVED** IN DISPOSAL; E.G., CLEANERS, GARDENERS, KITCHEN AND MAINTENANCE EMPLOYEES.

HURDLES AND SOLUTIONS

QUESTIONS FOR CAMPUS-WIDE OPERATIONS



How do we promote accountability and ownership?

Embed sustainability into organisational policies, procedures, and processes.

Establish useful benchmarks and reporting initiatives and designate areas of responsibility.



How do we combat resource restraints (both financial and human)?

Partner with relevant stakeholders; e.g. local government, to provide outside funding and link with local initiatives seeking similar goals.



How do we reduce water consumption cost-effectively?

Engage your community by having them report water waste, such as leaking taps, ruptured pipes, or malfunctioning irrigation systems. Promote the principle of active water conservation by encouraging shorter showers, and minimal use of potable water in research activities and campus operations.



How do we reduce the amount of campus waste going to landfill?

Conduct audits to understand your waste streams. Minimise waste by maximising resource values and applying a waste hierarchy across all resource streams. That is, waste avoidance, reduction, re-use, recycling, and disposal - in that order.



How do we protect biodiversity?

Begin by linking with local research and conservation groups to [map biodiversity on campus](#), and then measure the impact of operational/community activities and development. Once you have this information, establish strategies to minimise any threat to sensitive ecosystems, including setting up protection zones.



How can we make refrigeration in the kitchen more energy-efficient?

Establish a [regular programme of checking and replacing seals](#) on refrigerator and cold-room doors to minimise leakage.



How should we handle the disposal of IT waste?

Where possible, [set up cradle-to-grave contracts with vendors](#), making them responsible for the sustainable disposal of everything from packaging to equipment at the end of life. Where that is not an option, see if equipment can be re-used by the community or other groups. Often, charitable organisations will have systems for re-distributing functional equipment, provided it is not too old. Otherwise, ensure companies hired to recycle IT waste do so in a socially and environmentally responsible manner.

CASE 3

ENERGY

NETWORK



There is no doubt that there is a need to dramatically reduce consumption of fossil fuels. **The aim of ETH Zurich's new energy concept is to radically reduce the specific energy density in the area and thus also the CO₂ emissions.** In doing so, the energy flows in the individual buildings will be connected to efficient heat-recovery systems, for instance (technical and structural reduction scale).

With its dynamic underground storage system, ETH Zurich's campus Höggerberg, will minimise consumption of fossil-generated energy. Höggerberg should become fossil-free for heating by 2025. The underground storage fields will be laid on an area of around ten football pitches, and between 100 and 200 geothermal probes per field will be arranged on a 5x5-metre grid at depths of 200 metres into the ground. This depth offers the optimal combination of energy storage and use for the system.

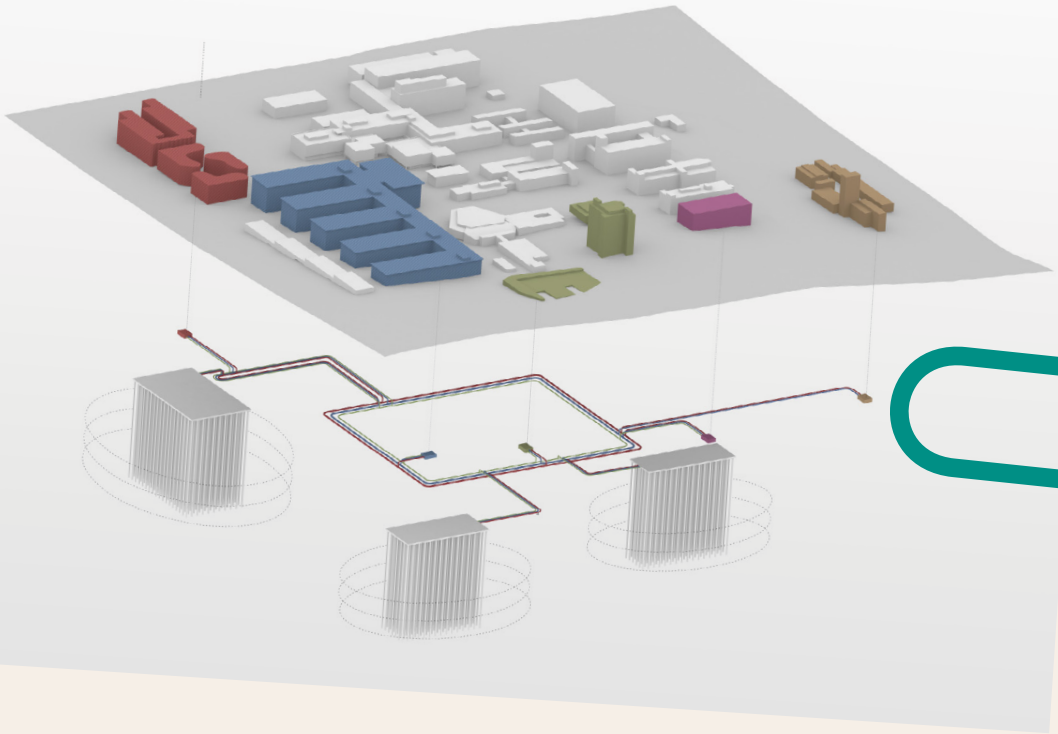


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The underground storage systems will be subdivided into geothermal probe groups in order to be able to respond to different heating and cooling needs, especially in the transition periods. A ring-line network will connect the building and the underground storage fields.

Individual buildings or building groups will be supplied with energy via the centres, which are connected to the ring-line network.



The heat pumps for processing low-temperature heat are located in these centres. When designing new buildings, the maximum supply temperature permitted for heating is 30°C, and for renovations a maximum of 35°C. In peak periods (winter/summer), the conventional energy production from the energy centre serves as redundancy for the heat and cooling supply. Another component of the energy concept is the dynamic free-cooling system (re-cooling system), which is intended to support the cooling cycle.

CASE 4

ORGANIC WASTE RECYCLING



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2

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Established in 2007, the ANU organic waste recycling programme diverts approximately 136 tonnes of food and biological waste from landfill each year, and instead converts it into a high-grade compost, which is used in the students' vegetable gardens and the campus landscape.

The activity is a collaboration between the university's Facilities & Services Division and the Student Residential Halls, which collect a significant portion of the food waste from dining halls. A smaller portion of uncontaminated organic matter is also collected from research areas. This material is then put through a large in-vessel composting unit that uses an aerobic process to convert it into a rich compost within two to three weeks.

This is a far more sustainable method of disposing of organic waste, which, if left to rot in landfill, would release large volumes of methane and other greenhouse gases.

Other benefits of turning food waste into compost include:

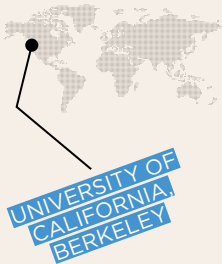
- **Reduced fossil fuel consumption** and tail-pipe emissions from transporting food-waste off-campus to landfill.
- **Production of organic rich soil** conditioner and compost, reducing the need to purchase in-organic fertilizers and additional soils.
- **Reduced build-up and concentration of hazardous compounds** and run-off at landfill sites which can contaminate both soil and waterways.

The project has also provided a number of educational and research opportunities for undergraduate and postgraduate students.



CASE 5

ENERGY- MANAGEMENT INITIATIVE (EMI)



5

DIFFICULTY OF
IMPLEMENTATION

The University of California, Berkeley, is working to incentivise energy-savings efforts across several programmatic areas. Its new Energy Management Initiative and Incentive Program offers the chance for departments to directly benefit from their conservation efforts by giving financial savings back to the users.

Prior to Berkeley's Energy Management Initiative, units around campus were not provided with a statement of their energy use. And although the campus was spending around USD 17 million per year on electricity costs alone, this meant that energy was generally treated as a free commodity.

In its first year, the EMI Program built momentum towards establishing energy efficiency as a social norm and part of the day-to-day operations of the university. Since the launch of EMI in April 2012, the project has **achieved savings of almost USD 2.0 million** – surpassing the planning estimates – and did so while remaining 12% under budget. These savings represent a 1,500 tonne reduction in greenhouse gases and fulfill part of the campus Energy Management Initiative's mission to not only save energy but also to return those funds to teaching and research.

For access to detailed programme information and resources provided to the campus community, see:

www.mypower.berkeley.edu



UC BERKELEY'S EMI INCORPORATES SEVERAL BEST PRACTICES AND INNOVATIONS:

- Makes explicit the connection between individual and institutional actions.
- Innovates with comprehensive, complementary, and coordinated components.
- Targets the programme design for UC Berkeley audiences and their circumstances.





QUICK TIPS

- Establish environmental measures for all key activities.
- Install effective metering technology to identify infrastructure failures.
- Assess and enhance the sustainability skill levels of the employees who are operating and maintaining the campus.
- Look at what academic research has already been done on the biodiversity of the region.
- Include IT waste, lab equipment and organics in waste management programmes.

A Closer Look

The University of Tokyo – Energy Management

The University of Tokyo is the largest energy user in the Tokyo metropolitan area, and it has taken the lead in innovative energy systems and sustainability related research. The Todai Sustainable Campus Project (TSCP) was established to facilitate university-wide engagement towards the goal of reducing greenhouse gas emissions, and to apply organisational capacity and funding for efforts that will reduce carbon intensity on campus. The management established the TSCP fund by collecting an 'internal tax' from all graduate schools and institutes, which was equivalent to 4% of expenditures for energy use in each school and institute. The TSCP fund provides a subsidy to give each graduate school and institute incentive to invest in energy-conserving opportunities.

www.tscp.u-tokyo.ac.jp/en

FURTHER READING

LITERATURE

'Designing a sustainable campus precinct: ANU Green Precinct Project Final Report'

'Regenerative Sustainable Development of Universities and Cities: Role of Living Laboratories'. Ariane Konig (editor). The book collects a wide range of case studies, including several on sustainable campus design and operations.

www.e-elgar.co.uk/bookentry_main.lasso?id=14845

LINKS

'International Sustainable Campus Network: Members reports on campus environmental performance'.

www.international-sustainable-campus-network.org/index.php?option=com_docman&Itemid=34





>> *On average we spend
approximately 70% of
our lives inside*

BUILDINGS

Though we may love the outdoors, on average, we spend approximately 70% of our lives inside. Buildings have become our natural habitat and have a profound impact on our lives and a great impact on the environment, both locally and globally. Buildings account for nearly 40% of total energy use, and our resource consumption and the waste generation attributed to construction of buildings is also very significant. So campus buildings offer one of the greatest opportunities for improvement when it comes to making universities more sustainable.

University building portfolios generally have a varied selection of new and old buildings. Some of these are heritage listed buildings – judged to be of national importance in terms of architectural or historic interest – which can make upgrades difficult to implement. Retrofitting an existing building can often be more cost-effective than building a new facility, though with existing buildings there are opportunities to retrofit windows, roof, and heating systems all of which often have shorter lifespans than the buildings themselves.

Clever design can greatly influence the operational costs once a building has been erected or retrofitted. Energy and water consumption are obvious areas of focus and monitoring and auditing these will further reduce consumption and create even more monetary savings. Informing building users how to use the building optimally is fundamental to ensuring that buildings operate to their peak performance abilities.

The real challenge lies in convincing university management to invest in more sustainable buildings which reduce long term costs. It is important to understand and effectively communicate the benefits, which include greater resource efficiency and associated cost savings, as well as better health and productivity for employees and students.

Challenges and Opportunities



Life Cycle Cost (LCC) Analysis

Building and renovating sustainably involves planning and taking into consideration the full life-cycle perspective on buildings. This means assessing both the environmental impact and economic value of a building over its entire lifetime – from extraction of resources to demolition and recycling.

LCC is a tool for determining the economic costs and benefits of specific systems, for example, heating over the lifetime of the building. It is a valuable tool when attempting to improve an operational feature of a building that is related to how that building was designed.

It is important to note that construction costs are often not the largest part of the total cost of owning and running a building. The costs associated with maintenance and operations are often higher than construction, so investing in energy efficiency as well as waste and water management can bring significant savings. Other notable benefits, such as significantly improved indoor air quality, can lead to increased productivity and higher work attendance, which can justify an investment in sustainable construction or retrofitting.

² To learn more about the difference between Life Cycle Cost (LCC) Analysis and Life Cycle Assessment (LCA), see Case 7 on page 45.



»» Reducing energy consumption as well as waste and water management can produce significant monetary savings

Certification schemes

Green-building certification schemes are used across several IARU campuses. Designing, building and renovating according to external certification standards for buildings is advantageous for environmental and financial reasons – from energy and water efficiencies that lead to monetary savings, to demonstrating best practice and enhanced image and reputation for the campus and the university as a whole.

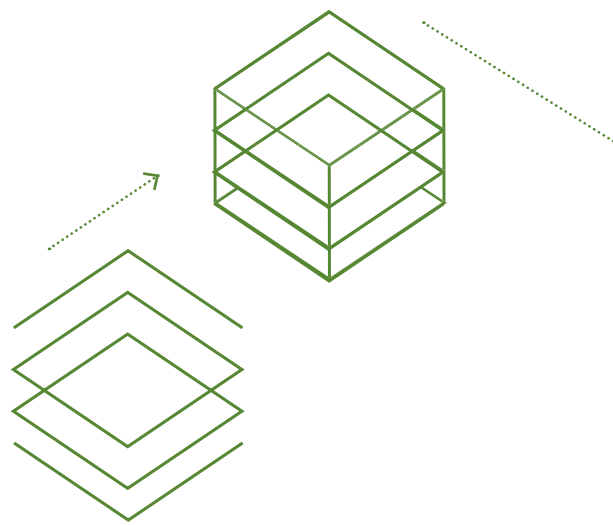
The age of campus buildings need not be a deterrent. Older campuses can also see results by placing emphasis on major renovations and by conducting these according to the benchmarks set by certification awards, as most certification schemes also include assessments of major refurbishments.

External certification schemes also provide for adherence to pre-determined and verifiable benchmarks for the environmental performance of a building, as well as offering a process and methodology for ensuring that these benchmarks are met in design, construction and actual performance upon completion.

It is important to involve the university's sustainability office in the design stage in order to challenge consultants and to push for higher environmental performance standards. Conducting an 'eco-charrette' is a good way to start and involves bringing various stakeholders together, from students and faculty to employees and administrators to engineers and architects (see A Closer Look).

IMPORTANT TO REMEMBER

- Develop partnerships with service providers in the building supply-chain – architects, consultants, builders, material suppliers, and campus regulatory bodies like the Fire Marshal and Environmental Health & Safety in order to get them involved at an early stage.



Building energy and emissions

A building's energy use, whether electrical or thermal, remains one of the largest sources of CO₂ emissions in any given university and thus requires significant attention. Identifying key stakeholders who have the greatest level of influence over building design and operations, and getting their buy-in, is critical to making significant reductions to planned and ongoing energy consumption. Defining minimum standards for buildings and technology is a good place to start.

Engaging building occupants is also critical. The full potential of energy-efficient design and technology can only be realised if the occupants and operators are informed and committed.

Energy efficiency should be embedded in buildings from the very start, and planners should insist that sustainability initiatives are not value-managed out of building projects. A small upfront cost can generate significant financial savings and emission reductions over the lifetime of the building. Good thermal and lighting design can also improve the work/study environment and boost performance and well-being.

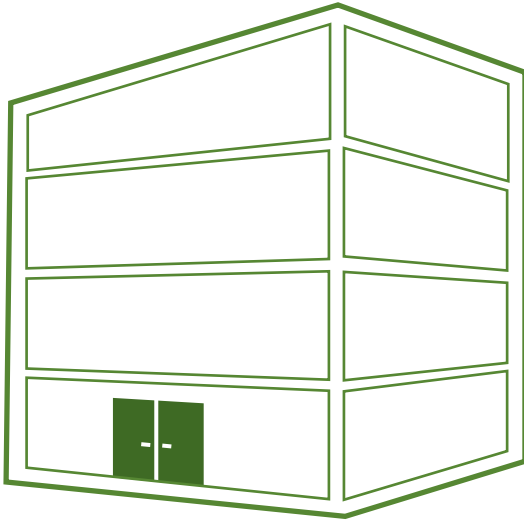
Heating, cooling, and ICT (data centres, computer labs, etc.) contribute to a significant portion of a university's carbon footprint, so addressing these will have a significant impact in reducing the energy footprint.

Finally, it is important to monitor progress on energy savings and CO₂ emissions, and communicate this internally to management, staff, students and external stakeholders.

IMPORTANT TO REMEMBER

- Establish low carbon standards for new buildings, retrofits and existing buildings and develop strategies to achieve them.
- Set carbon emissions targets for all buildings according to best practice standards for relevant building types. Buildings from outside the university sector can provide ideas for relevant benchmarks.

Thinking ahead when designing and setting clear goals is of great importance. Good research regarding all parameters including siting, occupant behaviour and building regulations helps to set the boundaries and provide information about the design limitations. An integrated approach reduces emissions, minimises the building footprint and reduces the impact on the surroundings. Minimising impervious surfaces will reduce flooding and overheating in the microclimate. Use of energy efficient equipment and eco-friendly products within the building can also serve to enhance performance and reduce the overall footprint.



Occupancy patterns

Understanding and optimising a building's occupancy patterns can often lead to solutions that will save energy and improve thermal comfort. For example, a single university building may include offices, computer rooms, libraries and lecture rooms. Lecture rooms and offices are predominantly used in the daytime, hence they should be situated to take full advantage of natural light and passive heat gains. Computer rooms and libraries are occupied from morning to late at night, therefore the focus should be on optimising artificial lighting and reducing cooling needs (due to higher heat loads from people and computers).

A smartly oriented building can minimise energy usage. Therefore, it is important to understand occupant behaviour and the requirements of different segments of a building in order to optimise building performance.

>> Understanding occupant behaviour and the unique requirements of different segments of a building will serve to optimise performance

HURDLES AND SOLUTIONS

QUESTIONS FOR BUILDINGS



How do we convince senior managers and project managers (or planners and designers) to implement high standards, despite a perception of higher associated costs?

The actual costs of green certification schemes are approximately 2% of the overall project costs, yet measures to reduce energy consumption can mean **the initial investment will be repaid four to six times over a period of 20 years.**



How can we show that a certification scheme could be beneficial?

Critically assess the outcomes of implementing a certification and whether or not they guarantee the vital features of the buildings, such as low carbon emissions and low energy usage.



Apart from energy and water efficiency, what other economic benefits can building sustainably provide?

Greater comfort and benefits to health are perhaps the most important economic effects of building sustainably – as research shows, it raises productivity.





What are the benefits of an integrated design process?

An integrated design process (IDP) involves a holistic approach to high performance building design and construction. It relies upon every member of the project team sharing a vision of sustainability, and working collaboratively to implement sustainability goals. **This process enables the team to optimise systems, reduce operating and maintenance costs, and minimise the need for incremental capital.**



How can we make sure we get the most out of our initial investment?

Following up with and **informing building occupants how to use the building optimally is fundamental** to ensuring that you are maximising the initial investment.



Is it worth investing in a certification scheme that is only valid for three years?

Even though assessments of existing buildings by some certifications can be expensive and only valid for three years, the investment is still worth it. **The short validity of the assessment is beneficial in that it ensures constant upkeep of a building's high performance**, and external parties know that the assessment is up to date.

CASE 6

BREEAM AND THE UNIVERSITY OF OXFORD'S SUSTAINABLE BUILDING POLICY



4

DIFFICULTY OF IMPLEMENTATION

In February 2009, the University of Oxford's Buildings and Estates Sub-Committee agreed that all new university buildings and major refurbishments should aim for a rating of BREEAM (Building Research Establishment Assessment Method) 'Excellent' for a trial of one year, which was then extended yearly. Nineteen major projects are currently undergoing or have undergone BREEAM assessments, including three refurbishments and four projects that commenced prior to February 2009, and which subsequently adopted the BREEAM 'Excellent' target.

Evidence suggests, however, that a BREEAM 'Excellent' rating does not guarantee that the given building will be a low energy or low carbon building. In response to this shortcoming, [University of Oxford's Environmental Sustainability Team created the Sustainable Buildings Philosophy in 2011 to complement the guidelines in BREEAM certification](#). This is a set of documents that aim to help the university's Estates Services deliver sustainable buildings with a particular focus on low carbon outcomes.

For universities with a key focus on reducing carbon emissions, a BREEAM 'Excellent' target (or equivalent) for broad sustainability gain coupled with a focus on carbon emissions through mechanisms, such as the Sustainable Buildings Philosophy serves to tailor the BREEAM standards to the university.

[Year after year, the methodology has become more embedded in the university's design process](#), and now design teams, project managers, and Project Sponsor Groups consider sustainability in building design.



External recognition of these certifications means that external parties can see the university as an environmentally aware institution that cares about sustainability.

Whilst meeting the BREEAM 'Excellent' benchmark comes with many challenges, especially in the case of refurbishments and highly specialist buildings, the BREEAM framework promotes a rigorous approach to broader sustainable-design issues. Even projects falling short of the 'Excellent' rating have nonetheless achieved a higher standard than they might otherwise have reached if the BREEAM 'Excellent' standard was not adopted; that way, the sustainability aspirations are set out from the outset.

Sustainable Buildings Philosophy:

www.admin.ox.ac.uk/media/global/wwwadminoxacuk/localsites/estatesdirectorator/documents/capitalprojectsforms/Supplementary_Documentation_v3.pdf

CASE 7

DESIGNING TO ACHIEVE A SIX- STAR GREEN RATING



5

DIFFICULTY OF
IMPLEMENTATION

The Frank Fenner Building, which houses the Fenner School of Environment and Society at the Australian National University, was designed and built to achieve a six star Green Star rating in both 'design' and 'as built'. **In order to achieve the impressive zero net kg production of CO₂ per annum, a range of energy and water saving initiatives were incorporated into its design:**

- 80% of the demolition and construction waste was recycled
- a 40kw solar photovoltaic array capable of generating over 65000 kWh a year, where excess is fed back into the grid
- a hybrid air-conditioning unit
- passive ventilation systems aided by a traffic light system and operable windows
- high-grade insulation, including double-glazed windows
- external shading
- an external stairwell
- rainwater collection tanks
- a recycled black-water system
- efficient plumbing



The major challenges involved building a six-star facility on the chosen site on a limited budget with a variety of site constraints and user requirements. The size of the site and the orientation made it difficult to situate the building, especially with protected trees on the landscape. Most of these challenges were overcome by good building design and value management sessions intended to align scope and budget. **The main thing that made this project a success was that the consultants/clients and builder were all working together,** and kept a 'keep it simple' approach - using basic building principles and uncomplicated technology to achieve the result.

The Frank Fenner Building guarantees a comfortable interior temperature, thanks to passive ventilation and control of heating and cooling. It supplies 150% more outside fresh air than what the current Australian standards dictate, minimises off-gassing of pollutants into the office space from building materials and products, and maximises natural lighting and external views.

www.fennerschool.anu.edu.au/about-us

CASE 8

LIFE CYCLE COST ANALYSIS



The Building and Construction Infrastructure Division of ETH Zurich thinks about its buildings' sustainability holistically. Hence, the 'Triple Bottom Line' - incorporating all three dimensions of environment, society, and economy - must be addressed during planning, construction, and operation of the buildings.

Life Cycle Cost (LCC) Analysis is a method for assessing the total cost of ownership of a building, and LCC is also an integral part of some certification schemes. LCC should not be confused with Life Cycle Assessments (LCA).

LCAs are used to evaluate the environmental costs associated with a product, process, structure, or activity. They identify energy and materials used, as well as wastes released to the environment.

LCC is a cost-based analysis tool; it aims to identify the most cost-efficient building design and construction strategies over the life of a building. ETH Zurich developed the LCC tool as a quality assurance tool. It conducts economic analyses by evaluating the relative cost-effectiveness of alternative buildings and building-related systems or components. LCC takes into account all the costs of acquiring, owning, and disposing of a building or building system.

Research buildings have to be very flexible during their life cycle, as they have to meet the requirements of an ever-changing research focus. LCC is based upon assumptions that multiple building-design options can meet programmatic needs and achieve acceptable performance, and that these options have differing initial costs, operating costs, maintenance costs, and possibly different life cycles. By considering all the costs associated with all aspects of building and maintaining a facility over its lifetime, planners are able to make more environmentally sound and cost effective decisions from the outset.





The following cost parameters are included in the LCC calculation:

- Investment costs (e.g., construction costs)
- Operation costs (e.g., energy costs)
- Maintenance (e.g., cleaning costs)
- Replacement costs (e.g., costs for a new HVAC system)
- Finance charges (e.g., interest payments)
- Residual values (e.g., disposal costs or residual lifetime)
- Repair costs



QUICK TIPS

- Start the design process by organising an eco-charette with different stakeholders at the university and continue the process.
- Develop guidelines highlighting sustainability aspirations for the university, and how these relate to new build and refurbishment projects.
- Remain flexible in the initial design process in order to enable building spaces that are easily modified and serve a variety of purposes for a diverse group of users over the lifetime of the building.
- Aim for the highest standards when designing a new building or a retrofit of an existing one. Get advice from the national green building council in your area.
- Choose which green-building certification scheme you will use – the best known include: BREEAM, LEED, GREEN STAR and DGNB.
- Decide which existing buildings on campus have the potential to be retrofitted to a green-building standard, and start with those.
- Remember to follow up. Measuring and auditing are fundamental to ensuring you get the most from your investment in sustainability.

A Closer Look

Eco-charettes, formerly called 'Integrated Design Workshops', aim to foster the opportunity for the design team to thoroughly brainstorm energy-performance options with various experts and stakeholders before constructing the building. The eco-charette conducted during the design of the Li Ka-Shing Center at UC Berkeley was supported by the Berkeley National Lab (LBNL), in addition to the project design team.

As a result, an exhaustive matrix of more than 50 energy-efficiency options were developed. The input of the participants along with the employment of LBNL's 'Labs21' ratings system helped to reinforce and guide decisions toward higher energy performance in the building. Such a collaborative effort is most effective when all the players are invited to participate from the very beginning of the building process.

For more information, see:

www.facilities.berkeley.edu/greenbuildings/LiKaShing/Details.htm



FURTHER READING

LITERATURE

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Chen, Hua and Lee, W.L., *'Energy assessment of office buildings in China using LEED 2.2 and BEAM Plus 1.1'*. Energy & Buildings, Vol.63, pp.129-137, 2013

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Mumovic, Dejan and Santamouris, Mat, eds. *A 'Handbook of Sustainable Building Design and Engineering: An Integrated Approach to Energy, Health and Operational Performance'*. Earthscan, 2009

LINKS

World Green Building Council
www.worldgbc.org

Sustainia. *'Sustainia Sector Guide Buildings: Exploring the sustainable buildings of tomorrow'*. 2012
www.sustainia.me/guides

'University of Oxford Sustainable Buildings Philosophy' AECOM Ltd.
www.admin.ox.ac.uk/media/global/wwwadminoxacuk/localsites/estatesdirectorates/documents/capitalprojectsforms/Supplementary_Documentation_v3.pdf



>> *Providing knowledge about the total energy costs of running laboratories can build motivation for more energy-efficient behaviour in those who use them*

LABORATORIES

Fume hoods, ventilation systems, chemical waste, and equipment make laboratories one of the biggest challenges for universities striving to become more sustainable. The challenge lies in balancing the requirements for research and safety with the technical management of equipment, including Heating Ventilation and Air Conditioning (HVAC) systems, user needs and behaviours.

Reducing energy consumption is one of the most important aspects of making laboratories more sustainable because energy consumption is generally four to six times higher than in ordinary office buildings (electricity consumption per m² is often five to six times higher, and heating four to five times higher). Fortunately, it is possible to get substantial results from fairly minor adjustments, such as switching off equipment not in use.

Users constitute another important focus area, though they are often neglected or deemed less relevant. However, it is absolutely vital that those who use labs are made aware that sustainability and high-quality research are not mutually exclusive; it is indeed possible to accommodate sustainability and high standards simultaneously.

Naturally, all laboratories are not directly comparable. Working in a biological, chemical, or physics lab will entail different challenges and possibilities for the implementation of a green approach in terms of cost reductions, the improvement of health and safety, and the optimisation of workflows. However, providing knowledge about the total energy costs of running laboratories can increase the motivation for more energy-efficient behaviour in those who use them.

Challenges and Opportunities

» Managing laboratories according to actual use is key

Energy consumption

Several studies show that roughly half the energy consumption within laboratories is related to ventilation, including general laboratory ventilation, fume boards, Laminar Down Flow (LAF) benches, and suction hoods.

Managing laboratories according to actual use is key, and while they may frequently be used outside of 'office hours', keeping everything operational 24/7/365 is unnecessary. Implementing time controls for ventilation systems, including demand-responsive ventilation, is one way to regulate use. Implementing a default setting at OFF for ventilation equipment at night may also prove an effective way to saving energy and thus reduce costs. However, it is vital that information about ventilation shutdowns is systematised to circumvent the risk of researchers breathing toxic fumes in labs that have not been sufficiently ventilated.

For physics laboratories in particular, storing secondary equipment, such as vacuum pumps that produce a lot of excess heat, in a specially designated room is highly recommended. This will reduce the heat load in the labs themselves, and it will also allow for a more energy-efficient cooling of rooms where the equipment is stored (for example, allowing for higher room temperatures, using water loops as cooling media, etc.). This will not merely help green the laboratories, it will also save universities money, and it will improve health and safety for the users.



As labs use a wide range of energy intensive equipment/systems, retrofitting existing systems and equipment, as well as investing in new and more energy-efficient systems/equipment will also allow for significant reductions in energy use and offer long-term savings.

2/3 OF THE OVERALL
ENERGY CONSUMPTION
AT THE UNIVERSITY
OF COPENHAGEN IS IN
LABORATORIES.

SEVERAL STUDIES
SHOW THAT ROUGHLY
HALF THE ENERGY
CONSUMPTION WITHIN
LABORATORIES
IS RELATED TO
VENTILATION.

Purchases

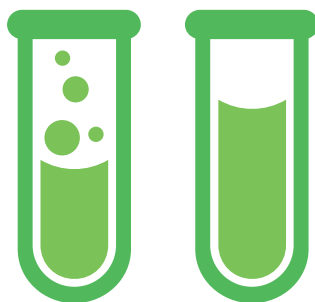
Buying the cheapest lamps, chillers, freezers, ovens, and pumps on offer does not necessarily constitute the most sustainable approach to purchasing. Calculating the life-cycle cost over three to five years may very well reveal that energy-efficient equipment, while possibly more expensive at purchase, will prove cheaper in the long run.

Also, ordering in huge quantities is often considered a price-conscious tactic, yet health and safety should be a constituent consideration when buying chemicals, which is why buying in smaller amounts can often be a greater benefit. This will also tie up less money in stocks, and thus universities gain on several levels (for further information, see Chapter 7. Green Purchasing).



Usage and storage

As a general rule, carrying out regular maintenance work on any lab infrastructure is one way to ensure optimal usage of the equipment.



Chemicals

As many laboratories hold large quantities of surplus chemicals, often disposed of as waste at considerable cost, knowing precisely which chemicals are stocked becomes vital for the optimisation of usage. While precise labelling of chemicals may sound like the obvious thing to do, it is not necessarily common practice. Setting up a communal storage facility with the possibility for internal exchange will diminish waste, reduce costs in relation to procurement from outside suppliers, and will help researchers with not having to wait for materials to be delivered, which in turn will improve performance efficiency. If and when possible, substitution with less hazardous alternatives will also reduce health and safety risks, as well as environmental impacts and costs (e.g., by avoiding special waste costs).

Water

Water is a valuable and increasingly expensive resource, so reducing its use should be considered whenever applicable. For instance, researchers should not use water-jet vacuum pumps because they use huge amounts of precious drinking water, and they should only use closed-circuit cooling water loops for cooling equipment/experiments. Minimising the use of deionised water is also important, as it is very costly to produce (both in terms of energy consumption and the use of chemicals for purification).

>> Knowing precisely which chemicals are stocked is vital for optimising usage



Waste

Waste tends to be much more expensive than it immediately appears, as costs are usually split into different budgets; hence, no one is fully aware of the total figures. Getting rid of broken, obsolete, or surplus equipment – often sitting idle for years, taking up space that could be better utilised for productive research – is one way to reduce waste. Another is optimising recycling rates and procedures, such as:

- Providing convenient recycling facilities (consumables and packaging waste).
- Implementing careful separation of clinical/hazardous waste.
- Ensuring that suppliers collect containers/packaging.
- Implementing charts, reuse tables, or similar mechanisms to ensure that unwanted equipment, materials, etc., can be donated, exchanged, sold or disposed of safely.

HURDLES AND SOLUTIONS

QUESTIONS FOR LABORATORIES



How do we know if freezers contain unwanted or obsolete samples?

Have researchers and lab personnel **register their samples, complete with a use-by date**. All samples that are not recorded in the register should be discarded by lab personnel after a certain time, which is made known to all relevant parties.



Which fume cupboards can be shut off without jeopardising safety?

All empty cupboards without chemicals or spills should be shut off. Even cupboards with a permanent experimental setup for student exercises can be shut off, provided they do not contain chemicals or evaporative fluids/materials, and if accepted by the Health and Safety Department.





How do we know what equipment to focus on?

Have students help with a **general inventory of energy consumption** by using the numerous manual or wireless metering solutions that are already available.



How do we make sure that new lab users comply with the given instructions?

Whenever someone new starts using a lab, make sure they are **carefully instructed in environmentally sound behaviour** and safety regulations. Lab managers should be diligent about monitoring use and providing feedback when an individual's procedures require alteration.



How do we know which chemicals can be discarded?

Have researchers and lab personnel label the chemicals they use. Products claimed after a couple of weeks (or whenever everybody has been given sufficient time to label them) can then be discarded.



How do we get students, lab personnel, and researchers to turn off equipment not in use?

Drawing **attention to the overall energy consumption** of a given apparatus can prove an important point of departure. This can be done either by simply stating its annual energy cost or by displaying graphs of energy consumption on a computer/tablet in the lab or communal spaces (see Case 9).

CASE 9

LOWER THE SASH CAMPAIGN



Implementing behavioural campaigns is a relatively easy way to achieve energy savings in laboratories. Key activities include engaging local green ambassadors, producing campaign materials, and possibly hiring students.

In the 2009 Green Action campaign, one key action for the green ambassadors was to encourage their colleagues to pull down the sash when not using the fume hood.

An analysis of the campaign showed that **26% of the fume hoods were left fully or partially open before the campaign, while only 8% of the fume hoods were left open after the campaign.** The entire campaign, of which the sticker initiative was one aspect, saved the university an estimated 2.7 million kWh per year or approximately USD 800,000 per year. The total campaign cost was around USD 100,000.

Continually addressing energy awareness and behaviour is vital if results are to be sustained and further developed, and this is also one of the most cost-effective ways to reduce energy consumption.

Read more about the behaviour campaigns at UCPH:

www.groengerning.ku.dk/info-eng



2

DIFFICULTY OF IMPLEMENTATION



The stickers (3 x 65 cm) were placed directly on the fume hoods, right beside the sash. The top was red with an unhappy smiley and the words "24,200 kWh/year" while the bottom was green with a happy smiley and the words "4,500 kWh/year".



Green ambassadors/volunteers distributed folders amongst employees and student teams.

CASE 10

ENERGY

VISUALISA-

TION



The Gurdon Institute at the University of Cambridge embarked on an energy-awareness initiative in 2012. A gentle approach was adopted, asking people to think about energy rather than telling them what to do.

THE CAMPAIGN FEATURED:

- Posters with facts and figures of specific relevance to the researchers at the Gurdon Institute.
- An inter-lab competition with a GBP 1,000 prize.
- A 'Gurdon Energy Pledge': 75% of all institute members signed up, promising to think about saving energy, and were rewarded with coffee and cake.
- A real-time sub-metering system, the 'Tracker', was put in place as an energy-visualisation tool to help make staff more aware of the impact of their actions on energy use.
- A league table was produced, and researchers competed with each other to save the most energy and win the prize. By the end of the campaign's first year, the labs had reduced their electricity usage by 19%, saving GBP 20,000 per annum.



R248
BRAND LAB



electricity
reduced by

52.8%

The most successful lab reduced their electricity usage by over 50%, from 600 kWh to 300 kWh per month, saving GBP 350 per annum. The league table is calculated every 30 minutes and is available for all staff to view online.

R312
GURDON &
JACKSON LAB



electricity
reduced by

23.3%

R335
AHRINGER LAB



electricity
reduced by

22.8%

R210
RAWLIN &
LIVESEY LABS



electricity
reduced by

17.7%

R218
MZG LABS



electricity
reduced by

7.7%

R148
MINSKA & BORROWERS



electricity
reduced by

5.7%



QUICK TIPS

- Make inventories of lab equipment including energy consumption/costs.
- Perform night audits to identify what equipment is left switched on overnight, and make sure to distribute this information to everyone using the laboratory.
- Develop inventories of stored chemicals, and implement use-by dates.
- Register all samples in freezers, with owners and use-by dates noted.
- Store secondary equipment, such as vacuum pumps that produce a lot of excess heat, in a specially designated room.

A Closer Look

Through the newsletters from S-Labs, you will find the latest examples of good practice within green laboratories, which can point you in the direction of deciding which practices you may want to more closely examine in your own lab. These include:

- Running events to profile good practice, discuss key issues, and develop networks.
- Developing case studies of best practice and briefing papers on key lab sustainability issues.
- Conducting Laboratory Energy Audits – detailed audits help show where the energy in labs is going and identify improvement opportunities.
- Implementing a Laboratory Assessment Framework to gauge environmental performance and its associated Environmental Good Practice Guide.

www.goodcampus.org

FURTHER READING

LITERATURE

'S-Lab Laboratory Assessment Framework'.
Version 1.3, S-Lab, September 2011

www.goodcampus.org

'S-Lab Environmental Good Practice Guide for Laboratories'. Version 1.0,
S-Lab, October 2011

www.goodcampus.org

'Midnight Oil Phase I Report'. University of
Oxford. Environmental
Change Institute.
December 2010

'Green Labs @ Penn

www.upenn.edu

LINKS

S-lab:

www.goodcampus.org
www.upenn.edu/sustainability/programs/green-labs

EGNATON:

www.egnaton.com/en/Home.aspx

Labs21:

www.labs21century.gov



>> *'Green purchasing' affords an opportunity to demonstrate environmental leadership*



GREEN PURCHASING

Universities procure a remarkable array of goods and services. Universities that house highly technical and laboratory-based research are faced with particularly impactful commodities, including lab equipment, chemicals, and IT systems. Other commodities to be considered include stationary, office supplies, vehicles, and food. Finally, universities are frequently constructing and renovating buildings, which requires choices about materials, building management systems, furniture etc. All of this means that there are ample opportunities to integrate sustainable procurement standards into campus projects and policies.

Goods and services can make up a substantial portion of an institution's annual budget. At ETH Zurich, for instance, the annual expenditure in this category is roughly 40% (see page 69). Therefore, 'green purchasing' affords an opportunity to demonstrate environmental leadership, while stimulating a part of universities' demand for environmentally preferred goods and services. This is why it should be an integral part of the commitment to sustainability.

However, purchasing is far from an unproblematic subject to address, as it deals with the potential conflicts between short-term budget savings for the university and long-term environmental 'gains' for society at large. Green purchasing must be considered in terms of both supply chain and disposal; i.e., including a product's entire lifecycle, rather than merely short-term savings because, while buying a green product may at first appear expensive, it could in fact turn out to be cheaper in the long run.

>> Green purchasing in particular encourages the evaluation of multiple environmental impacts of every product throughout its lifecycle

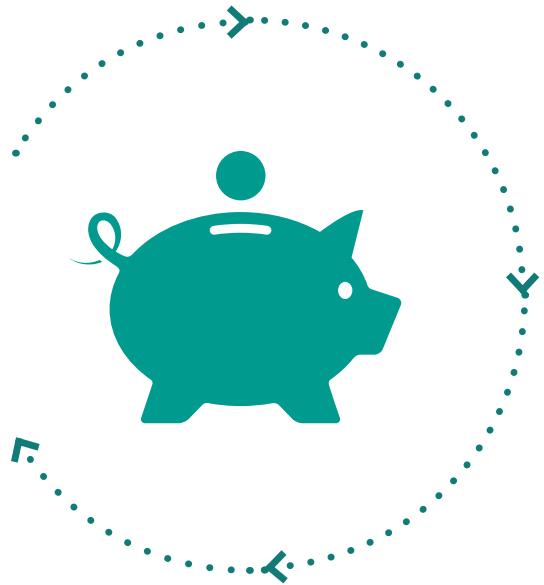
Challenges and Opportunities

Lifecycle perspective

To the greatest extent possible, universities should identify opportunities to save money and streamline systems by purchasing less. There is no single definition of sustainable procurement or green purchasing, and applications vary across organisational hierarchy and sector. One definition could be that a lifecycle perspective, a service, or a product has a significantly reduced environmental impact compared to the average product or service.

All stages in the lifecycle of a product offer the potential for optimisation/minimisation of the product's environmental footprint. Buying green means to prefer an environmentally beneficial alternative – this supports innovation in the supply chain of the product which ensures further progress in the development of environmentally sound solutions.

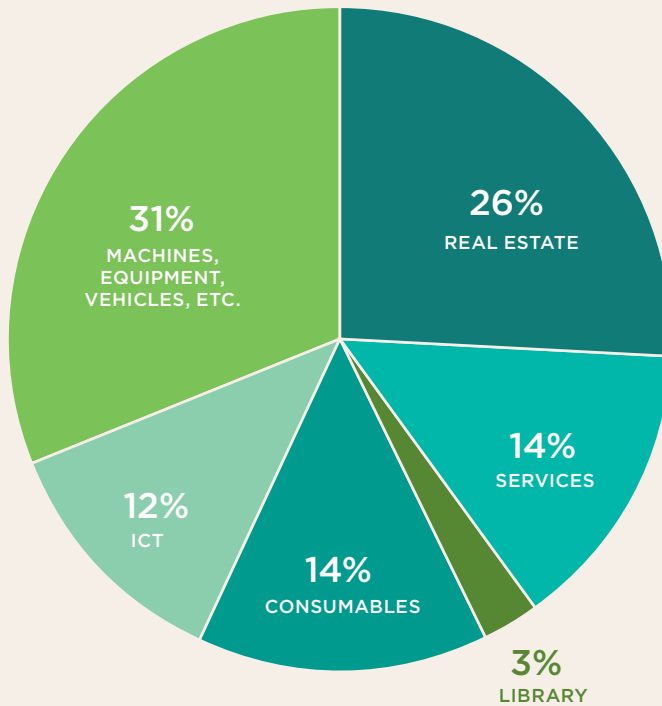
Organisations practicing sustainable procurement meet their needs for goods, services, and utilities. They work not on a private cost-benefit analysis, but with a view to maximising net benefits for themselves and the wider world. Green purchasing in particular encourages the evaluation of multiple environmental impacts of every product throughout its lifecycle.



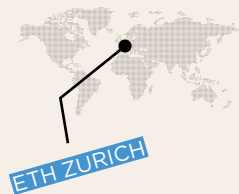
Procurement

There are numerous practical considerations for each of the procurement phases – planning, acquisition, use, maintenance, and disposal – to ensure that environmental considerations are included in procurement decisions. And, as purchasing at universities is often controlled by the individual institutes – i.e., organised in a decentralised fashion with limited pooling – know-how about green purchasing is scattered, as there is no central accessibility.

ETH ZURICH'S YEARLY PURCHASING ACTIVITIES FOR GOODS AND SERVICES (TOTAL OF USD 600 MILLION/YEAR³).



³ The figures relate to data from 2011.



Reduce, Reuse, Recycle => Circular Economy

Grounded in the study of non-linear, particular living systems, circular economy is an industrial economy that is restorative by intention, and which aims to rely on renewable energy; minimising, tracking, and hopefully eliminating the use of toxic chemicals, as well as eradicating waste through careful design.

Manufacturers and retailers must increasingly retain the ownership of their products and, where possible, act as service providers

– selling the use of products and not one-way consumption, while consumers must redefine themselves anew as users.

Circular economy involves careful management of materials flows: biological nutrients, designed to re-enter the biosphere safely and build natural capital, and technical nutrients, which are designed to circulate at high quality without entering the biosphere.



Bidding procedure

If a university has to procure goods in large amounts, an open competitive bidding process is often conducted. This is a great opportunity to inject transparency into the call-for-proposals in terms of requirements and specifications, including the environmental criteria. But avoid requirements that result in vague wording.



Purchasing behaviour

Green purchasing is best promoted through a mix of policies and best practices. Central efforts to identify and clarify preferred practice will offer a good foundation. This should be complemented by communications and tools aimed at informing daily purchasing choices.

CONSIDER IMPLEMENTING THE FOLLOWING REQUIREMENTS IN YOUR NEXT CALL-FOR-PROPOSALS:

- Set technical specifications and incorporate certain minimum environmental requirements.
- For eco-relevant procurements, include environmental suitability criteria (e.g., specific ecological know-how that can be backed up with the relevant certificates or documentation).
- The criteria must allow for green procurement (e.g., environmental impact, emissions, energy efficiency).

These might include:

- Suggested structures for communal stock rooms and shared purchasing.
- Checklists to minimise the number of deliveries to campus.
- Shopping lists for high-volume purchase areas, such as labs and break-rooms.
- A portal for re-use or material exchange.



Training

It is key to inform employees generally about sustainable procurement standards. Staff members oversee purchasing and vendor negotiation, and individuals whose jobs require that they make frequent, large-volume purchases may benefit from training or green supply-chain certification. Making these community members aware of the impacts of their choices has the potential to create cultural shifts.

Naturally, one should always be aware of certain departments' need for specialised products, where centralised procurement and green alternatives are simply not viable options. However, when possible, coordination of purchases will save money and reduce waste.

HURDLES AND SOLUTIONS

QUESTIONS FOR GREEN PURCHASING



How do we implement an overall purchasing strategy?

Begin by implementing a charter or strategy on sustainable procurement in your purchasing department. This is a transparent way to show your providers the requirements and processes for their next orders.



How important is the initial price vs. lifecycle costs?

There is a perception that green products are more expensive than conventional alternatives. However, 'green' products often have lower lifecycle costs. For example, a non-toxic alternative to a toxic product will cost less to transport, store, handle, and discard. It will require fewer permits, less training of personnel, and the consequences of an accident will be greatly reduced.



How do we achieve a significant impact through green purchasing?

Estimate the overall importance of green purchasing in various areas; buying electricity from renewable sources, for instance, will have a dramatic impact on overall ecological footprint, whereas using recycled paper may constitute a tangible but not a highly significant effort.





How do we choose the best products and services?

Set up sustainable purchasing guidelines that will simplify choices for employees and ensure that end-users do not have to do all the research. Also, make sure that these guidelines are adhered to within the entire department and, whenever possible, cross-departmentally as well.



Is bundling purchases a good idea?

As with all other purchases, buying in bulk can be advantageous, as you can **obtain better prices and apply greater pressure to provide 'green' options.**



How do we get outside vendors to comply with the need for green products?

Identify at least one vendor in each major commodity group who has demonstrated a commitment to sustainable practices. This demand-side approach will put pressure on vendors seeking preferred status at your university.

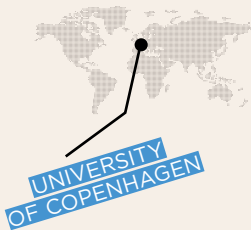


Should we focus on a short-term or long-term strategy?

Changing behaviour is never easy, and while it may appear tempting to get rid of old products in favour of new 'green' products it is better to **aim for long-term roadmaps for 'green purchasing' of two to five years in order to allow people to adjust to new products,** and to ensure that the market has been thoroughly researched. It may also be more beneficial to use up some products rather than dispose of them.

CASE 11

PURCHASING ULTRA-LOW TEMPERATURE FREEZERS



4

DIFFICULTY OF
IMPLEMENTATION

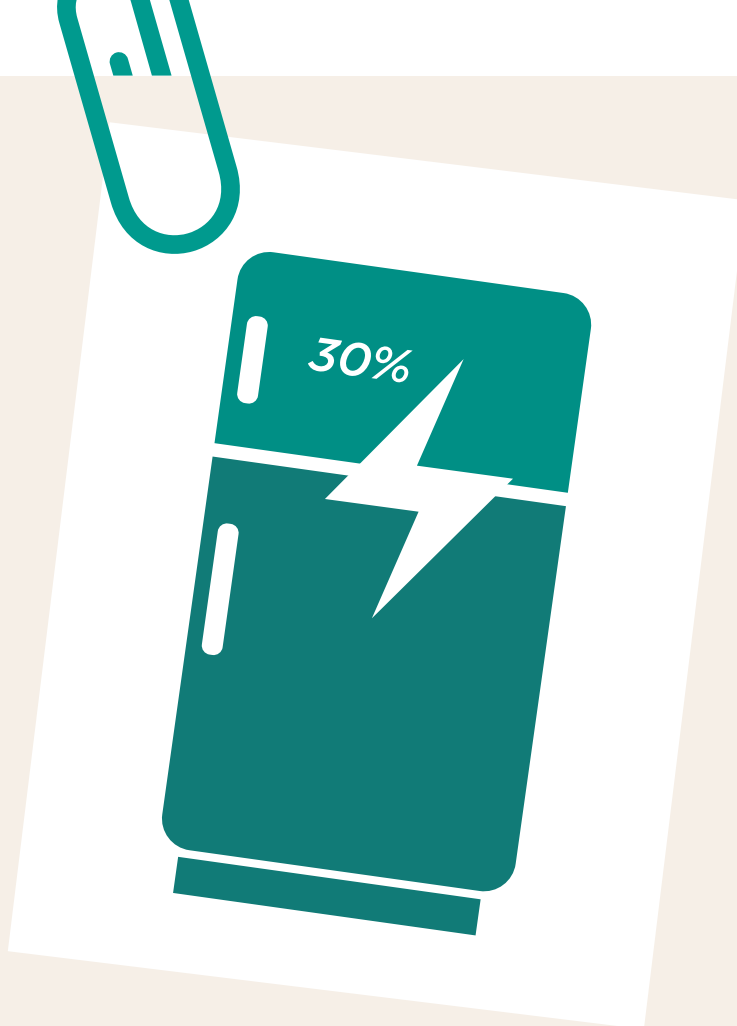
In 2013, the first supply contract that integrated environmental considerations was signed by the University of Copenhagen (UCPH) and two vendors of Ultra-Low Temperature (ULT) freezers (-80 Celsius/-112 Fahrenheit).

The contract was conducted through a bidding process: the winners offered the lowest unit price, calculated via Total Cost of Ownership (TCO) including energy consumption, making energy consumption 2/3 of the total price. The outcome was a win-win-win: The cheapest possible prices for the researcher, lowest energy cost for the university, and reduced CO₂ emissions for the global climate.

The supply contract on ULT freezers entails purchasing 50-100 freezers annually in four size categories, totalling 200-400 freezers in the four years the agreement runs at present; this means a calculated energy savings of 30% compared to other freezers on the market.

The potential environmental effect is a reduced energy consumption of 5,000-10,000 MWh, corresponding to approximately 3,000-6,000 tonnes of CO₂ annually. These energy savings will result in monetary savings of approximately USD 2.5 million over 15 years.

In addition to reduced energy consumption, the contract also stipulates that the vendor, when delivering a new freezer, is required to dispose of the replaced freezer in an environmentally sustainable manner.



A project group comprised of representatives from UCPH, the procurement section, Green Campus, and users worked on the initial tender in order to ensure that the products and services in the final agreement would reflect the requirements. Combining users' requests with environmental considerations proved a challenge in the bidding process, as it also had to respect the principles of transparency in order to secure a competitive price.

As there was no standard for monitoring -80 C freezers, UCPH carried out a range of energy-consumption tests under similar conditions, and the results were used for evaluation. Hopefully, UCPH can put pressure on the industry to set its own standards for measuring energy consumption, which can then become a competitive parameter. Test procedures and further information are available from UCPH.

CASE 12

CENTRAL PURCHASING OFFICE



Yale has a central purchasing office that manages most of the university's vendor negotiations and contracts. This unit sets policies and offers guidance to employees throughout the university vis-à-vis procurement.



4

DIFFICULTY OF IMPLEMENTATION

In an effort to inform and empower the core purchasing group and the high-volume purchasers, the Yale Sustainability Strategic Plan commits to two types of training programmes: the central procurement managers are asked to complete training with an external entity that will certify them as 'green procurement professionals'. **After this, the high-volume purchasing employees are asked to complete a Yale-specific training module, which is offered by the on-campus learning centre.**

A final component will be the development of a set of preferred product sheets by commodity type. These will be available to all employees with purchasing power, and they will effectively be sustainable purchasing guides for key areas, such as break-rooms, events, and labs.



With this programme, the university will benefit from better-informed professionals who will receive an additional line item on their CVs. The establishment of checklists will also encourage assessment of current practices and products, and hopefully inspire new approaches. Furthermore, Yale's new procurement strategies are being developed in coordination with Yale's waste-management team, which means that the university will be setting standards for prioritising less waste-intensive products.



QUICK TIPS

- Start with energy consuming products, as this will result in cost savings and reduced CO₂ emissions.
- Use existing purchasing structures and partner with existing organisations.
- Go for products that are very visible, thereby promoting and inspiring environmental considerations.
- Start with products that promote win-win situations.
- Start green purchasing products that have a considerable and well-developed market.
- Go for products that have been awarded a well-regarded certification label.

A Closer Look

A recent study of a Technical University in Norway has shown that the largest share of CO₂ emissions (75%) attributed to the university are emissions related to purchasing products and services. The climate footprint for the Technical University in Norway is:

- 25% energy consumption (use of oil/gas/coal and purchased heat/electricity)
- 75% indirect emissions, which includes:
 - 23% transport (incl. flights)
 - 6 % services
 - 18% consumables
 - 15% equipment and furniture
 - 13% buildings, construction, and facilities

FURTHER READING

LITERATURE

'Buying Green!'. A handbook on environmental public procurement, European Commission, DG Environment

'Recommendations for the federal procurement of offices', Federal Department of Finance FDF, CH

'How Our Obsession with Stuff Is Trashing the Planet, Our Communities, and Our Health - and a Vision for Change'. New York. Free Press, 2010

McDonough, William, and Michael Braungart. *'Cradle to Cradle: Remaking the Way We Make Things'*. New York: North Point Press, 2002

Emmett, Stuart, and Vivek Sood. *'Green Supply Chains'*. An Action Manifesto. 1 edition. Wiley, 2010

Berners-Lee, Mike. *'How Bad Are Bananas? The Carbon Footprint of Everything'*. Vancouver: Greystone Books, 2011

'Green Public Procurement Training Toolkit, European Commission, DG Environment'



LINKS

'The Story of Stuff'
www.youtube.com/watch?v=9GorqroiqqM

'Environmentally Preferable Purchasing (EPP)'
www.epa.gov/epp/pubs/greenguides.htm

'The EU Ecolabel catalogue'
www.ec.europa.eu/environment/ecolabel/

'UNEP Sustainable Public Procurement'
www.unep.fr/scp/procurement/docsres/index.htm

'Centre for Sustainable Procurement'
www.bsr.org/en/our-work/3080/center-for-sustainable-procurement

'Green Public Procurement Training Toolkit, European Commission'
http://ec.europa.eu/environment/gpp/index_en.htm

'International Green Purchasing Network (IGPN)'
www.igpn.org



*»» Transport accounts
for a significant and
growing share of
a university's carbon
footprint*

TRANSPORT

Transport accounts for a significant and growing share of a university's carbon footprint. An increasing demand for international collaboration and knowledge sharing has led to rising CO₂ emissions, with international flights being by far the biggest contributor to CO₂ emissions from transport at universities.

Road transport is also a major contributor, due to commuting to work or study, daily goods deliveries, and fleet vehicles, which present additional local environmental problems, including air pollution, noise, and congestion. Additionally, car parking takes up considerable and valuable campus space that has the potential to be used for other purposes.

Influencing entrenched, routine travel behaviours is very challenging. Promoting green modes of transport by influencing positive attitudes and perceptions is crucial to change behaviour. Offering sustainable transport modes as the norm rather than an alternative to the conventional reliance on cars can help influence people's transport choices. One of the best opportunities to establish greener behaviour is when employees and students are new and have yet to settle into a routine.

To create healthier options, an overall campus plan needs to include transportation, and conflicts of overall objectives have to be taken into account, critically analysed, and communicated transparently. Working alongside local government and planning authorities is also crucial to optimise local public transport solutions.

>> Cycling and walking should be strongly encouraged

Challenges and Opportunities

Internal campus transport

Many universities cover large areas and often have more than one campus, so transport to and from and between campuses is unavoidable. However, the method of transport is a choice and, rather than only thinking of the quickest way, universities need to consider the greenest way. While cars can sometimes prove necessary, cycling and walking should be strongly encouraged.

To offer people an alternative to using their cars:

- Facilitate bicycle use by installing bike racks/safe storage next to entrances, as well as safe paths.
- Offer access to free/cheap bikes, provide bike hire, etc.
- Offer interest-free loans to purchase public transport season tickets.

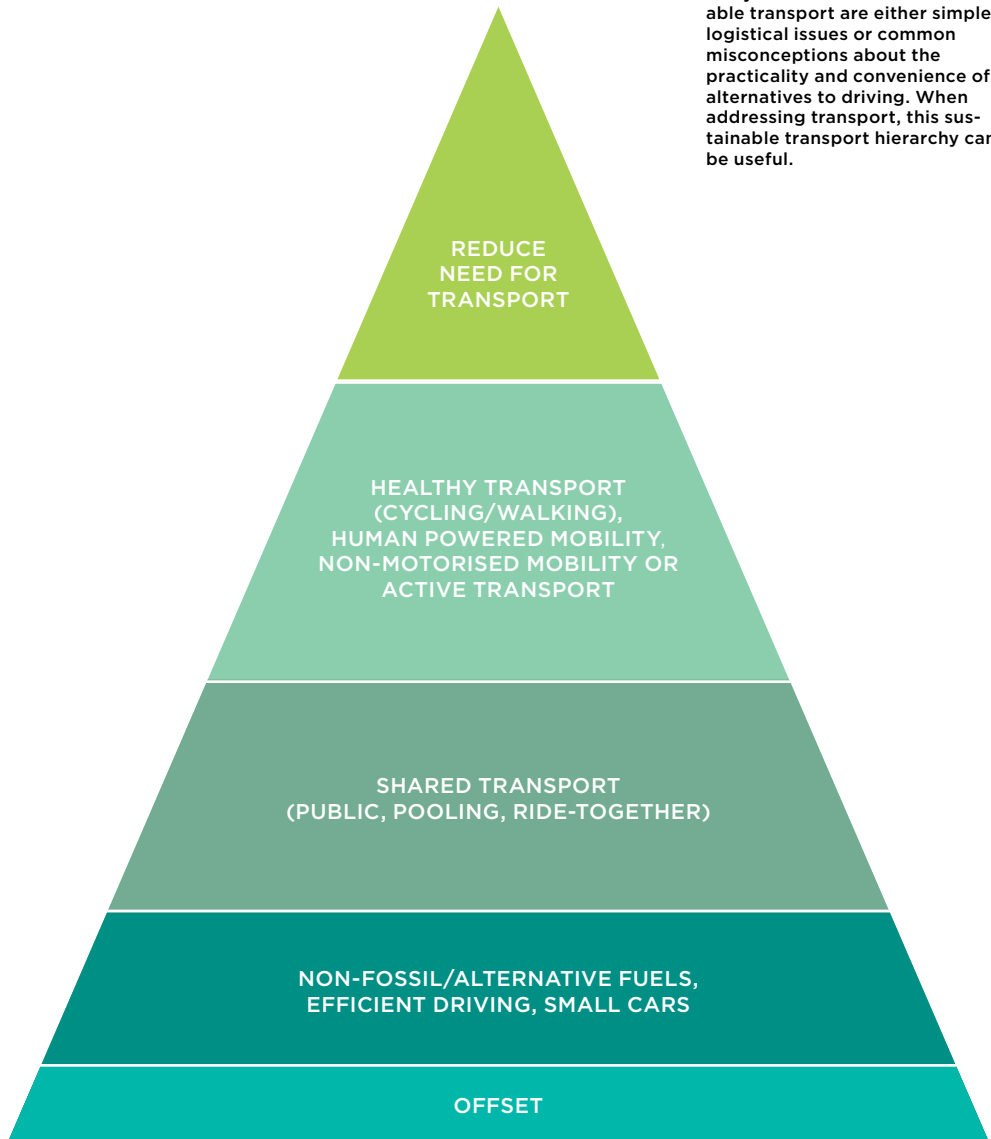


HOW MUCH DO COPENHAGEN RESIDENTS CYCLE?

- 52% of all Copenhagensers cycle to their place of work or education every day.
- Four out of five Copenhagensers have access to a bike.
- There are 650,000 bicycles in Copenhagen and approx. 550,000 inhabitants.

SUSTAINABLE TRANSPORT HIERARCHY

Many of the barriers to sustainable transport are either simple, logistical issues or common misconceptions about the practicality and convenience of alternatives to driving. When addressing transport, this sustainable transport hierarchy can be useful.





Commuting

An increase in car transport is leading to more and more time spent in traffic congestion on motorways. Fortunately, promoting greener internal campus transport options can contribute to improved commuting choices outside of the university. A simple way to reduce transport is by offering flexible working conditions that enable employees to occasionally work from home.

To offer people an alternative to cars:

- Collaborate with local authorities to establish direct and safe bicycle paths between housing areas and campus.
- Offer access to lockers and showers for bicycle commuters.
- Involve and collaborate with local public-transport providers/authorities to organise optimal public transport solutions.
- Make buses a viable option by providing real-time schedules and subsidising passes for staff and students.
- Create a carpooling programme that includes an online matching system to assist drivers in finding ride-sharing companions.

Long distance travel and video conferencing

The focus on increasing cross-collaboration between universities and the internationalisation of researchers and students has led to an increase in long distance travel – mainly from air travel. One way to combat this is to promote video conferencing (VC) as an alternative option. Advantages of VC include saving time and money while reducing CO₂ emissions.

GREENER CARS

- Green the fleet – phase in hybrid and electric vehicles and set fleet vehicle emissions and efficiency standards.
- Courses on efficient driving have shown that 5-10% savings in fuel consumption is achieved on average.





»» One way to combat an increase in air travel is to promote and support video conferencing

Effective deployment of VC requires management to prioritise and clearly allocate responsibility within the organisation. It needs an organisational setup that includes IT and communication resources. To ensure a successful first-hand experiences with VC, it is recommended to have IT staff on hand for at least the first two VC meetings.

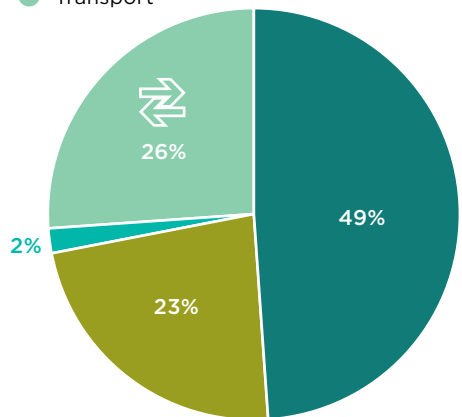
Including VC in a staff induction module is a good way to introduce the benefits, and make new employees aware that such technologies exist. Other information efforts are needed to ensure existing employees know the options and facilities that are available.

OFFSETTING

Carbon offsets are typically credits for reductions in greenhouse gas emissions made at another location, such as wind farms, which create renewable energy and reduce the need for fossil fuel powered energy.

UNIVERSITY OF COPENHAGEN, CO₂ EMISSIONS IN 2012:

- Electricity
- District heating
- Natural gas
- Transport



At UCPH, international flights make up approximately 90% of the work-related CO₂ emissions from transport. The work-related transport share of total emissions (transport and energy consumption) has grown from 16% in 2008 to 26% in 2012.

Source: Green Accounts 2012, Green Campus, University of Copenhagen.

HURDLES AND SOLUTIONS

QUESTIONS FOR GREEN TRANSPORT



How do we promote the use of public transport?

Offer free/subsidised bus and train passes, for specific university bus routes.



How do we create more environmentally friendly transportation on campus?

Install bike racks and safe storage, and provide shower facilities and onsite cycle maintenance. Offer access to free/cheap bikes on campus.



How do we break the perception that driving a car is quicker and cheaper?

Emphasise the cost efficiencies of cycling and walking. Provide tools for staff and students to calculate the real cost of motoring. You can also set parking charges at a point that makes using public transport more attractive. Redirect income from these charges to support sustainable transport options.



How important is it to partner with local organisations?

The campus represents only the tail-end of most commuter trips so working alongside a variety of stakeholders, including local government and NGOs will help to optimise local public transport solutions.



How can we establish greener transport behaviour?

Promoting green modes of transport by encouraging positive attitudes and perceptions is crucial to change behaviour. Offering sustainable transport modes as the norm rather than an alternative to the conventional reliance on cars can help influence people's transport choices.



What are the benefits of carbon offsetting?

Carbon offsetting presents the possibility of 100% reductions - achieved cost-effectively and immediately. At the same time, the money paid to carbon offsetting projects helps communities globally to get on a low carbon path. In order to ensure the quality and integrity of carbon offsets, a robust programme of standards, verification processes, and registries must be in place.

CASE 13

SUSTAINABLE TRANSPORT MANAGEMENT PLAN



The Australian National University (ANU) has actively promoted and supported a greater uptake of more sustainable transport modes since the 1990s. This has been coordinated through a variety of initiatives, such as the university's carpooling programme, an increase in on campus accommodation, the construction of bicycle infrastructure across campus, and the establishment of Australia's largest corporate bicycle fleet.



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DIFFICULTY OF
IMPLEMENTATION

The ANU Environmental Management Plan (EMP) seeks to maximise sustainable transport and has set the following targets:

1. Increasing green commuting to 80% by 2015, and minimising single-occupant vehicles.
2. Reducing fleet vehicle emissions 20% by 2015, and continuing to offset 100% of fleet emissions.
3. Offsetting 100% of the carbon dioxide equivalent load from air travel by 2015.



The Timely Tredlies departmental bicycle programme

Established in 2006, the Timely Tredly campus bike fleet is one of the largest corporate bike fleets in Australia. More than 100 bikes are situated in buildings around campus, available for staff and research students to get around campus and surrounds during the day. The popularity of the fleet has steadily increased over the years and monitoring of bike usage indicates that **some of the bikes travel more than 2,000 km per year** and are preferred alternatives to fleet vehicles for many users. Feedback from users also indicates that, for users who are unaccustomed to cycling, the bikes increase their familiarity, comfort, and confidence in riding.

<http://facilities.anu.edu.au/services/transport/timley-tredlies>



Offsetting air travel

The establishment of the ANU Carbon Reduction Fund in 2011 created a transparent means for ANU business units to offset business-related air travel. Contributing business units pay a tariff on flight costs, which **contributes to funding carbon reduction initiatives** on ANU properties and bulk purchases of Gold Standard or VCS-accredited offsets.

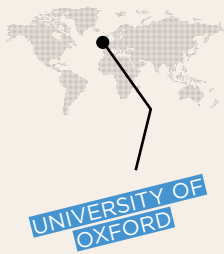


University vehicle fleet

Emissions for the vehicle fleet have been steadily and consistently decreasing each year since 2006. While there has been some marginal improvement in the overall fuel efficiency of the fleet and fuel substitution in favour of LPG over this period, **the primary contributing factor has been an overall reduction in mileage**. This suggests that the strategy of providing non-polluting alternatives, such as the campus bike fleet, have been very successful but also that there is significant room to further reduce emissions through greater efforts to improve vehicle efficiency and introduce low/zero emission vehicles.

CASE 14

BUSINESS-TRAVEL TOOLKIT



In 2012, the University of Oxford produced a **practical guide** that gives advice to staff planning a business trip to help them choose the most appropriate travel mode, while also promoting alternative non-travel arrangements for staff wanting to save time and money.

The guide acknowledges that, for many, travel is an invaluable and enjoyable experience. Video conferencing would never, and should not, completely replace air travel. Face-to-face interaction is important from time to time in any ongoing project. For this reason, the guide recommends that **it is important to begin by targeting frequent flyers as the best avenue to reduce air travel.**

The travel toolkit also **promotes trains whenever possible.** There is often a misconception that flying saves time, but once getting to and from the airport, check-in queues, security checks, etc., are taken into consideration, the time difference can be minimal.

www.admin.ox.ac.uk/media/global/wwwadminoxacuk/localsites/estatesdirectorates/documents/travel/business_travel_toolkit_FINAL.pdf



2

DIFFICULTY OF IMPLEMENTATION



CASE 15

CAMPUS GREEN TRANSPORTATION SYSTEM



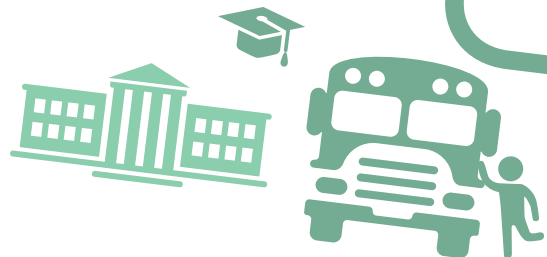
With an overall road-planning strategy that clearly **separates pedestrians from motor vehicles**, Peking University actively encourages walking and cycling by **placing cars outside of the campus**. In 2008, with cooperation from the local government, car-parking spaces were constructed in the surrounding area, helping to reduce the frequency that motor vehicles enter the campus. At the same time, a **shuttle-bus service was introduced** to offer staff and students an alternative way of getting around the different campus sites.

To reduce the frequency of vehicles entering the campus, the shuttle-bus service encourages mobility between the main faculty residential community and campus. While it has provided convenience for university staff and alleviated the pressure of campus traffic, it has also helped reduce energy consumption, pollution and emissions.



5

DIFFICULTY OF IMPLEMENTATION





QUICK TIPS

- Promote green transport behaviours when employees and students are new and have yet to settle into a routine.
- Facilitate bicycle use by installing bike racks/safe storage next to entrances, and by providing safe paths.
- Provide access to lockers and showers for bicycle commuters.
- Collaborate with local authorities to establish direct and safe bicycle paths between housing areas and campus.
- Support staff using alternative transport – provide bus passes and promote Ride To Work Days.
- Create a campus shuttle system that runs on hybrid or electric power, or switch existing fleet to a hybrid or electric vehicles.
- Replace older vehicle fleets with newer, fuel-efficient vehicles.

A Closer Look

The University of Oxford conducted a survey of staff who were identified as frequent flyers in order to investigate their potential to reduce air travel by an increased adoption of videoconferencing.

Key findings of the survey included:

The top reasons for air travel were to: (1) attend conferences, (2) attend meetings, and (3) give lectures.

- 71.2% of overseas meetings/conferences involved 10 or more people, 17.3% were one-to-one meetings.
- The majority of respondents (67.2%) feel that overseas business travel is a stressful experience.
- The majority of respondents (63.9%) feel that lost productivity is a drawback of travel.
- The majority of respondents (57.4%) feel that video conferencing can be a good alternative to business travel.



FURTHER READING

LINK

'Copenhagen - city of cyclists'

www.subsite.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/Subsite-Frontpage/LivingInCopenhagen/City-AndTraffic/CityOfCyclists.aspx

'ANU Sustainable transport'

<http://sustainability.anu.edu.au/themes/transport>

'YALE Transportation Options'

<http://to.yale.edu/>

'The City Fix'

<http://thecityfix.com/>

'IARU Sustainability Fellowship reports'

<http://www.iaruni.org/sustainability/fellowships/reports>



»» *Strong communication
and effective dialogue
among all parties is
essential*

COMMUNICATION

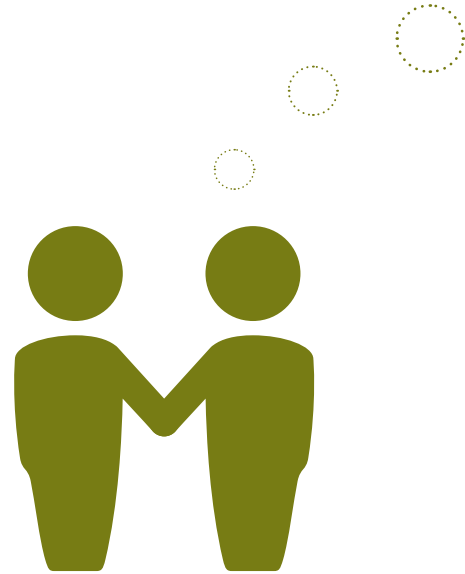
Effective communication is a fundamental part of building a sustainable campus as it can lead to greater awareness of environmental issues and better adoption of sustainable practices. It also promotes the commitment of a university to the cause, all of which are vital to encouraging positive environmental behaviour and embedding a cultural shift at every level.

Universities have diverse and fragmented audiences, democratic management structures, and fierce academic independence, so implementation of change from above is not likely to succeed on its own. Strong communication and effective dialogue among all parties is essential, reinforcing the vision of a 'sustainable university', and thereby stimulating structural changes and collective development.

To create institutional change, the many individual projects and pockets of activity that are taking place unknown to most must be brought into the mainstream and communicated more widely to both internal and external stakeholders. In doing so, results can be showcased, commitment conveyed, and ideas can be shared and further action inspired.

Campus sustainability practitioners need to send empowering messages to bring about changes in attitude and behaviour. Communicating with an authentic, clear, and consistent voice will help build trust, and create teams and networks, which will in turn generate greater influence among colleagues and students. When communicating the university's sustainability performance to an external audience, transparency and accountability are crucial.

Challenges and Opportunities



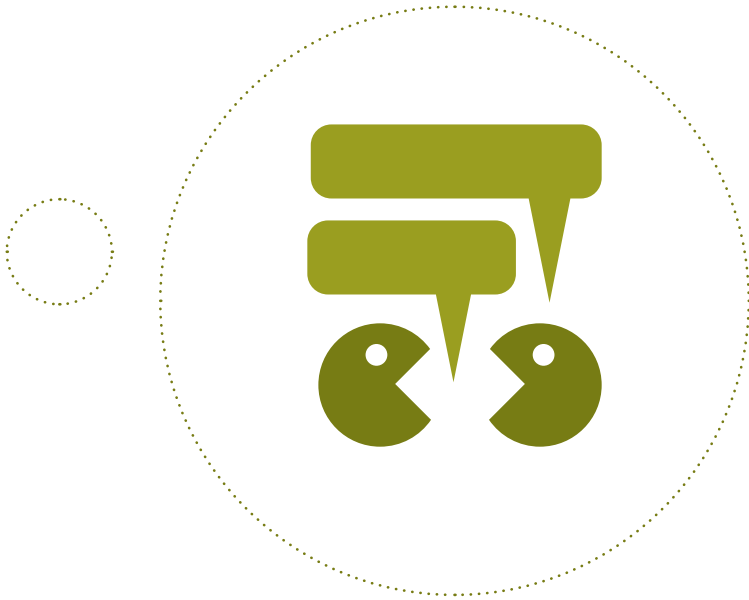
Collaboration

Whether the goal is to reduce electricity use, increase recycling rates, or enhance student engagement across the university, the sustainability office cannot do this alone. It needs employees and students to clearly understand what they should do and why before they will act in a positive way. It is all too common that staff and students may only hear from the sustainability office when asked to do something that could be seen as an inconvenience, so the sustainability agenda is often perceived as negative and sometimes patronising.

Collaboration between sustainability and communications officers is a vital starting point to help highlight what a sustainability office is doing to create a sustainable campus.

This can be a mutually beneficial relationship, as the sustainability office can provide the internal communications office with regular and engaging news stories. Once this collaboration has been formulated, it is important to ensure that any actions or campaigns have sufficient resources to communicate outcomes and successes.

Proactively highlighting the university's commitment to sustainability can then help motivate individual behaviour. Finding opportunities to showcase proposed positive actions or campaigns on noticeboards and internal newsletters, the university website, or campus newspapers can play an important part in helping spread information and change behaviours.



Common Identity

It is not uncommon to find different environmental posters and messages within a building on campus, put up by different departments, administration offices or student groups, due to the democratic management structure of the university. This is why it is important to have a strategic goal in mind and to develop an integrated communications plan whereby the mix of media, tools, and messages is aligned with the intended outcomes. It is also crucial that this communications plan is developed before launching any sustainability initiative, rather than as an afterthought. Having an integrated communications plan, anchored by a common identity driven by the sustainability office, and supported by other collaborating offices and student groups, will mean that the target audience is more likely to be drawn to the messages rather than be confused by the multiple exhortations.

>> It is important to have a strategic goal in mind, and to develop an integrated communications plan

Some campaigns, such as awareness of recycling schemes, will try to target every member of the university. However, there are other messages that need to be more targeted. Therefore, when developing these campaigns, it is important to work with the target audience; otherwise, there is a risk that the message will not connect with them.

>> The effects of successful sustainability communication on campus can go far beyond university boundaries

Keeping it fresh

A student population is renewed every three to five years, so much information and knowledge disappears. Yet the effects of successful sustainability communication on campus can go far beyond university boundaries. Universities are more than just educators; in addition to formal education, they also have the capacity to raise environmental awareness about the role each person has to play in finding solutions. Giving them the right tools will enable them to acquire this knowledge and implement it throughout their lives.

Universities also face the challenge of having to reinforce sustainability messages without sounding repetitive. For messages to be inspiring and persuasive, they have to offer a fresh perspective on a persistent environmental challenge. The language used should aspire to shift mindsets, and to advertise an improved quality of life. Messages have to go beyond emails to more face-to-face interactions. And while posters do have a purpose in reminding target audiences of the actions they need to take, one too many could lead to “poster fatigue”.

SIX PRINCIPLES OF COMMUNICATION

1. USE **INSPIRING** WORDS.
2. PUT FORWARD A **POSITIVE AND DESIRABLE** VISION - THEN MAKE IT RELEVANT, CONCRETE, AND ACHIEVABLE.
3. **KNOW THE PEOPLE** YOU ARE TALKING TO AND TALK TO THEM - NOT AT THEM.
4. BE **HONEST, OPEN AND TRANSPARENT** - NEVER TELL HALF THE STORY. BE HONEST ABOUT YOUR SITUATION.
5. STRESS THE **ADVANTAGES AND BENEFITS** OF SUSTAINABILITY.
6. REMEMBER TO TALK ABOUT **SUCCESSSES SO FAR.**

HURDLES AND SOLUTIONS

QUESTIONS FOR COMMUNICATION



How do we reach different, fragmented audiences?

Assign an internal 'green champion' within individual departments who can provide a local focus, understands the culture of the department, and can adapt a targeted message to the audience.



How can we simplify calls-to-action?

The complexity of sustainability issues needs to be reduced and simplified – boiled down to what really matters to people when they are making changes to their lifestyles – what will be the personal benefits?





How can we catch people's attention?

By purposely staying away from the narrative of doom-and-gloom and **instead creating an attractive and appealing vision** for people to move towards. Give them a vision of the future.



Why are we losing people's attention?

Neglecting to communicate your work and successes to the university community and **always asking them to do something more** will lead to fatigue and a lack of interest in your goals.



How important is a sustainability report?

A regularly updated report shows commitment and progress towards sustainability goals and is a **positive branding and recruitment opportunity for potential future students and employees**.

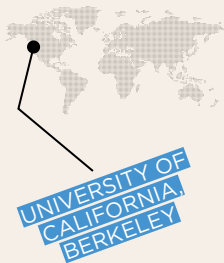


How can we raise the profile of the sustainability office?

By having **clear and consistent branding, which can then be used in all communications and engagement material** – from posters to stickers to merchandise.

CASE 16

INVOLVING STUDENTS AS MESSENGERS



2

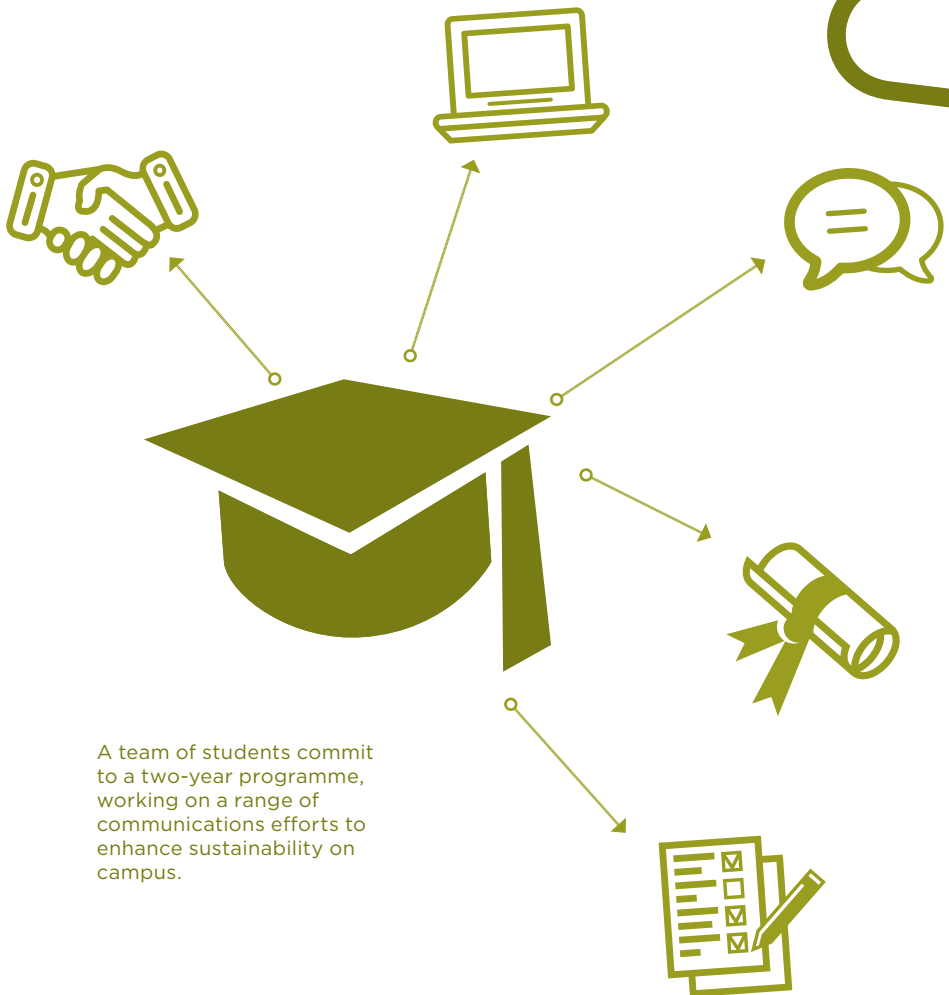
DIFFICULTY OF IMPLEMENTATION

To tackle the challenges of communications on a large, decentralised campus, UC Berkeley built a team of student 'Communications Associates'. Directed by the Office of Sustainability, the team of three to five undergraduates leads a range of campus-wide communications efforts aimed at achieving their long-term sustainability goals. This is an ongoing effort, which requires around USD 4,000-5,000 in funding annually.

The student team works on a range of activities each year, executing a comprehensive marketing and outreach campaign to encourage programme participation and behaviour changes, while expanding the culture of sustainability at UC Berkeley. Each student communications team mentors and trains the next generation of outreach coordinators, who will take full reign in the second year.

The key to this initiative has been taking the time upfront to involve students with the right skillset, and who can commit to working with the Office for at least two years.

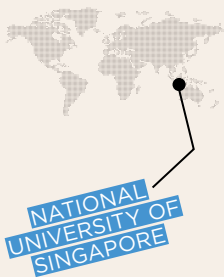
This continuity is critical to the success of the programme. It is also important to find the right balance between training the students and providing them with guidance, while encouraging their creativity and helping them to find their own voices. Finally, even the small cost of the programme can be difficult to fund. However, it is important not to rely on student volunteers, as this can hinder both continuity and commitment.



A team of students commit to a two-year programme, working on a range of communications efforts to enhance sustainability on campus.

CASE 17

SOCIAL MEDIA FOR SUSTAINABILITY COMMUNICATIONS



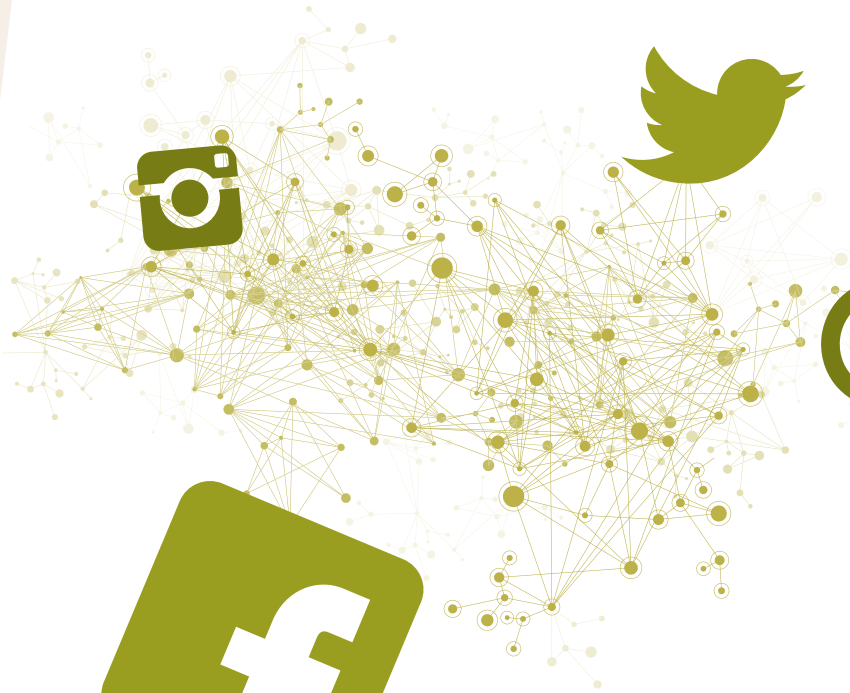
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DIFFICULTY OF IMPLEMENTATION

A key strategy of the National University of Singapore (NUS)'s Office of Environmental Sustainability (OES) is to engage students and staff on social media platforms, such as Facebook, Twitter, and the university website. To establish an effective online presence, the OES team applies consistent branding across all communications channels based on its 'sustainABLE NUS' campaign. Among the social media platforms, OES mainly uses Facebook, as it is highly popular among students and is the most useful tool for sharing content.

Using social media allows the OES to tap into existing networks to spread sustainability-related messages. Bearing in mind that social media space is dominated by peer-to-peer interactions, response to the content published by OES is not guaranteed, as it could be interpreted as coming from a formal, authoritative source.

The team actively listens to its stakeholders in the digital space to gain insight into their concerns and interests, which translates into a more careful selection of content and writing styles. **To retain a captive audience amidst competition from numerous social media sites, OES manages the conversation calendar on its Facebook page by selecting and trending wide-ranging topics, and posting fresh and appealing content to establish a visual connection with its users.**



NUS' Facebook page is used to engage students and staff in campus sustainability initiatives and activities.

www.facebook.com/nusoes

CASE 18

TRANSPARENT SUSTAINABILITY REPORTING



ETH Zurich's first Sustainability Report was published in the 2011 Global Reporting Initiative (GRI). The GRI sets the highest quality standards for sustainability reporting among the business community. To date 5,500 organisations worldwide in various industries (including approximately 100 universities) have already created sustainability reports according to GRI guidelines.

Sustainability reporting has a long tradition at ETH Zurich. Reporting began in 2003/2004 with energy reports and the reporting has since progressed into the university's first environmental reports (2005-2010) leading to far more comprehensive sustainability reports in 2011-2013.



2-3

DIFFICULTY OF
IMPLEMENTATION

The sustainability report is a key element of ETH Zurich's strategic sustainability plan to engage all stakeholders, including employees, the public, the Swiss parliament (as the main funding body), peers, NGOs, and sustainability leaders from the private sector. In addition to a great deal of positive feedback, there has also been press coverage in major Swiss newspapers, critically discussing ETH Zurich's approach to a sustainable university. This facilitated a more in-depth discussion on the university's role as a pioneer in sustainability, and also presented some further fields for action. **Therefore, it is crucial to demonstrate what sustainability really means to the organisation, set realistic targets, and promote the achievements towards reaching those goals.**



ETH ZURICH'S THREE PRINCIPLES FOR SUSTAINABILITY:

1. **IMPACT:** MAKE SURE IT'S
TRANSPARENT AND REAL.
2. **LEADERSHIP:** SHOW TRUE
COMMITMENT WITH BOTH
INTERNAL AND EXTERNAL
SUPPORT.
3. **COMMUNICATION:**
COMMUNICATE ACCURATELY,
AS IS EXPECTED FROM A
UNIVERSITY.



QUICK TIPS

- › Keep the message clear and simple.
- › Make sustainability fun and desirable.
- › Use visual elements to communicate numbers, figures and percentages.
- › Collaboration between the sustainability office and the internal communications office is crucial.
- › A communication plan needs to be developed before launching any initiative.
- › Make sure any actions or campaigns have sufficient resources to communicate outcomes and successes.

A Closer Look

Making Sustainability Fun – ‘The Penguin Makes a Difference’

Over the past five years, the Green Action Campaign at the University of Copenhagen has promoted energy-efficient behaviour. As part of their campaign, a friendly yet resolute stuffed toy penguin was used to help reduce energy waste in offices and laboratories around campus. Over time, more than 300 penguins were distributed among the university’s 250 Green Ambassadors, who volunteer to promote more sustainable behaviour among their colleagues.

The penguins travel from desk to desk, cheerfully reminding forgetful colleagues of good energy habits, such as turning off computer screens while having lunch or turning off heaters when the windows are open. The little stuffed animal works as a nudge; a cheerful reminder that encourages greener behavior without the finger-wagging and negativity often associated with this kind of campaign.



FURTHER READING

LITERATURE

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>> *Leaders need to locate passionate individuals in a variety of campus positions, and then engage them*

EMPLOYEE AND STUDENT ENGAGEMENT

Vibrant and engaged communities of students, supported by equally engaged academic and operational employees, provide a rich resource for envisioning and instigating changes on – and beyond – campuses. When students leave university, they bring not only their education but also their behaviour into the outside world.

The consistent and predictable turnover of students, the departments' academic and research focuses, and the generally cautious nature of campus operations personnel, however, challenge the community's ability to fluidly respond to new sustainability initiatives. In contrast, engagement within the academic setting allows for expansive, horizontal communication with and to a diverse and inherently curious campus community.

Fostering a culture of environmental awareness is imperative, and it should saturate the entire campus community, which is why sustainability programme leaders need to locate passionate individuals in a variety of campus positions, and then engage them in projects, policies, and operational initiatives that can range from more encompassing educational outreach to more specific and local projects, such as establishing water-refill stations and ecological restoration.

Both student and employee motivation can be stimulated by operating certification programmes and implementing sustainability awards, as well as arranging sustainability summits and meaningful events that offer recognition across the entire campus community.

Challenges and Opportunities



Students and employees

Students are typically idealistic, motivated, and creative. However, they are inherently a transient population, generally only at universities for two to six years. Yet the huge influx of new energy also provides great potential for new ideas and perspectives on how sustainable solutions can be implemented, as well as what areas should be targeted.

Permanent employees (both academic and non-academic), on the other hand, offer stability and continuity in the incubation and implementation of new programmes on campus. The challenge here lies in creating an environment that supports employees who may not be inclined to initiate and implement changes to take on new ways of doing things within a context of limited resources and habitual behaviours. For academic employees, the expansive and far-reaching goals of global research initiatives, which often transcend application in the immediate and local setting of campus operations, provide an additional obstacle.

Funding

Having access to financial assets in relation to the development and implementation of new ideas is one of the main challenges to getting anything done. Establishing a green fund supported by students' fees, and to which any member of the campus community can apply, is a highly effective way of both involving and enabling all community members.

Engagement

Student engagement

Between classes, jobs, clubs, and social priorities, students often find allocating time to explore a role in some kind of larger activism difficult, so universities have to provide attractive entry points and education opportunities to show students that getting involved in campus sustainability initiatives has powerful impacts and long-term benefits – both personally and for the university. These could include student internships, education offered through classes, and giving incentives for saving energy in residential dormitories. Allowing the students a certain amount of autonomy and creativity is vital to sustain interest. Tasking students with identifying and recruiting future leaders also assures smooth transitions and succession planning.

>> Fostering a culture of environmental awareness is imperative



Employee engagement

Many employees will have a direct interest in implementing sustainability practices, but they often lack information and the resources to become more active. What is needed is relevant support and allocated time to focus on making significant changes in their departments, as well as visible leadership that empowers employees to take on initiatives and implement new practices into their jobs.

This can be achieved by establishing a sustainability office (if one is not already in place) to operate programmes tailored to staff-level engagement, such as certification programmes and events, as well as advisory committees, task forces, and work groups.

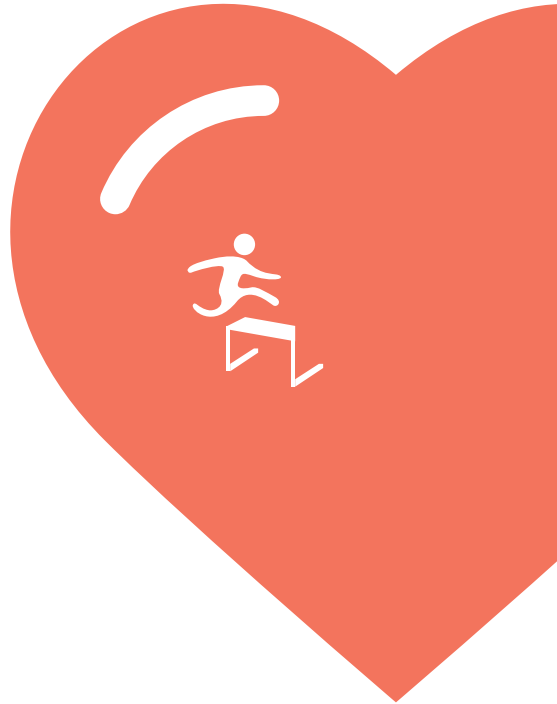
Academic engagement

For departments, it is key that sustainability initiatives align with the department's research interests and offer areas for engagement that complement areas of research. Engaging an academic community of highly motivated and focused professors, as well as teaching and research employees, presents a substantial challenge; thus, interests must be matched with opportunities.

Creating a Steering Committee consisting of campus leaders who are assigned the task of leveraging the participants' valuable time within their specific areas of expertise will afford the initiated programmes an authority that is needed to engage the non-student campus population.

HURDLES AND SOLUTIONS

QUESTIONS FOR EMPLOYEE AND STUDENT ENGAGEMENT



How do we make sustainability a high priority in research-lab environments?

Commit a cross-disciplinary team to researching the feasibility of waste reduction and energy savings

in lab settings, and hold discussions with principal researchers about how they can reduce the environmental impacts of their research. Partner with existing interest groups already engaged in lab operations, such as safety committees.



How can we combat competing priorities within research environments?

Create a **cross-disciplinary team to research green behaviour** in labs and link it to EHS/WHS.



How do we challenge the perception of behaviour-change impacts as negligible and inconvenient for individuals?

Reward and publicise efforts, and provide recognition and incentive outside of the measured success or impacts of projects. Provide visible support from top leadership for sustainability initiatives.



How do we encourage student and employee commitment and collaboration?

Incentivise student participation through paid internships, utilise online collaboration tools, clearly enumerate the hours per week expected from participants, and publicly reward efficacy with recognition and prizes. Offer students the opportunity to participate in regional and national sustainability conferences and programmes with their peers.



How do we make employees see sustainable practices as an inherent part of their job description and area of responsibility?

Hold outreach, education, and training sessions while also outlining sustainable concerns as an integral part of the job for new hires. Make sure that department leadership communicates this message to staff.

CASE 19

NUS PLASTIC BAG TAX



Students Against the Violation of the Earth (SAVE) at the National University of Singapore has been highly successful in initiating change through monetary incentives. **A plastic bag tax and a rebate for individuals who use reusable lunch boxes and water tumblers are the most recent initiatives to incentivise waste reduction.** SAVE was inspired by a student survey, which indicated widespread support (87% of students) for the reduction of plastic bag usage, and thus initiated a plastic bag tax of SGD 10 cents.

SAVE collaborated with the university's administrative offices; e.g., those overseeing retail and dining outlets, as well as environmental sustainability, to implement the tax at five canteens, several bookstores, and some retail outlets spread over two campuses.

The tax does not go to vendor profits, but instead to the NUS Sustainability Fund for student-initiated environmental projects, such as building community gardens and composting food waste. It was implemented in 2009 and remains the only control on plastic bag use in Singapore.

The tax is effective as the implementation of an overall conception of NUS: There may be general support for sustainable practices, but also a lack of awareness or incentive to modify behaviour and practices. In the words of SAVE Vice President Woon Wei Seng, "(Ten cents) might be a small barrier, but it is one that will force people to re-think: Do they really need that bag?"

The tax serves as an added incentive to create sustainable behaviour; it constitutes that small, final push that may result in individuals changing their attitudes and habits in relation to consumption.





CASE 20

SUSTAINABILITY SERVICE CORPS



Yale's Sustainability Service Corps takes a more structured approach to assessing and realising changes. Since 2011, the Corps had been organised under the Education & Outreach Manager in the [Office of Sustainability](#), and it consists of four teams:

1. Energy Squad (5 students)
2. Materials Management Team (5)
3. Green Events Consultants (5)
4. College Coordinators (12)

Each team is managed and assisted by a graduate student and student designer.

The 2013-2016 Yale Sustainability Strategic Plan and its companion document, the Sustainability Action Plan, together provide goals and initiatives that the four teams implement in collaboration with other organisations, thus configuring student-led efforts into a more cohesive approach.

The Energy Squad is currently involved in a project developed by Yale's Energy Manager. The first (and completed) phase involved a process of performing energy audits and benchmarking building-energy usage in comparison to peer building types. The second phase engages the student employees in executing a nuanced analysis of behaviour and energy use.

Focusing on energy usage during unoccupied times; i.e., nights and weekends, the Energy Squad has been conducting energy surveys to identify saving opportunities, and collecting information about plug loads and personal energy usage.

Other teams are completing parallel projects, including the creation of composting and other waste diversion programmes, and green events consulting. Yale's Sustainability Service Corps is [effective in their structured pursuit of outlined university goals, and empowered by their knowledgeable staff supervisors as productive change agents.](#)



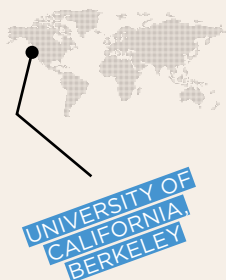


CASE 21

STAFF

SUSTAINABILITY

TRAINING



A fun and effective way to engage staff is to offer formal training on how they can help achieve campus sustainability goals. The staff sustainability training - called "WORKbright green" in which over 60 employees at UC Berkeley have participated - equips employees with tools to make informed choices that will improve sustainability in the workplace and at home, to bring green projects back to the office, and to collaborate with other campus sustainability advocates. The training is needed to spread information, and offering in-person training helps attendees make connections and build a community of sustainability.

Employees learn about campus sustainability goals and gain campus-specific competencies in:



CREATING LESS WASTE

methods to reduce, re-use, recycle, and compost



ENERGY EFFICIENCY, CONSERVATION, AND REDUCTIONS IN ELECTRICITY USE

implementing best practices in the workplace



MONEY

grants and funding available to employees for green-campus initiatives



GREENING CAMPUS BUILDINGS



GREEN PURCHASING

making sustainable buying decisions at work



USING LESS WATER

identifying ways to reduce campus use



STUDENT-LED SUSTAINABILITY INITIATIVES

finding ways to work together to green operations



CAMPUS TRANSPORTATION OPTIONS

making more environmentally-friendly choices



QUICK TIPS

- Establish a sustainability office (if one is not already in place).
- Have students and employees arrange different events, such as a ‘Celebrate Sustainability Week’, to raise awareness of your general sustainability goals.
- Brief new staff about sustainability initiatives, and follow-up with mandatory employee and student environmental-awareness training sessions.
- Visibly reward participation in sustainability initiatives.
- Create a network of communication for facilities managers to discuss best practices in relation to greening initiatives.

A Closer Look

Green Impact at the Universities of Cambridge and Oxford is an environmental accreditation scheme designed to promote, support, and recognise the achievements of departments in adopting more environmentally-sound approaches to their work practices. Departments work towards bronze, silver, or gold awards through fulfilling a variety of clear environmental criteria set out in a workbook.

The scheme is supported by students who are trained as project assistants, and it covers environmental management skills, environmental communications, group work, as well as time management. Students are also trained as auditors to conduct audits of departments, gaining invaluable experience.

www.environment.admin.cam.ac.uk/getting-involved/green-impact-staff-and-student-engagement-programme



FURTHER READING

LITERATURE

Community-based social marketing

www.cbsm.com/pages/guide/preface

Student engagement

www.aashe.org/files/documents/resources/eco-reps_guide.pdf

Employee engagement

www.nwei.org/

<https://netimpact.org/webinars/from-zero-to-impact-behind-the-scenes-of-an-innovative-employee-engagement-program>

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University of Copenhagen, Green Campus

www.climate.ku.dk/green_campus/


University of Oxford,
Environmental Sustainability team

www.admin.ox.ac.uk/estates/environment

National University of Singapore,
Office of Environmental Sustainability

www.nus.edu.sg/oes





**>> *Institutions can
act as catalysts
for a sustainable
society, offering
fresh knowledge and
leading by example***

UNIVERSITIES AS CATALYSTS FOR A SUSTAINABLE SOCIETY

Universities are often at the forefront of innovation and their academic research and teaching can contribute directly to health, well-being, and prosperity. Frequently regarded as well-established and respected organisations, universities have a unique and influential role to play in the quest for a more sustainable future. With core missions of excellence, innovation and education, universities bear a responsibility for visioning and realising a more sustainable future as they educate the future leaders of our society and economy.

To this end, many universities have developed programmes to foster applied research and education by using their campuses to test real-time sustainability solutions. This approach is commonly referred to as a 'living lab' or using the 'campus as a classroom'. Living lab projects offer the possibility for students and academics to convert theory to practice, which also leads to greater engagement with the material and a more well-rounded educational experience.

An institution represents a microcosm of the society in which it exists and by treating the campus as a laboratory for exploring the concepts of sustainability as they relate to the operation of the physical campus and to teaching, research and organisational processes, a university can model sustainability to the wider community.

Sustainability leadership is about creating a shared vision, inspiring positive change, building capacity, empowering others, leading by example, facilitating change and harnessing innovation and creativity to foster a culture of sustainability within and beyond the organisation. Universities demonstrating leadership in the realm of sustainability do more than just implement energy efficiency measures – they give substance to a sometimes murky and ill-defined concept and make sustainability part of a wider discussion. Active and more sophisticated discussion, planning, and ultimately action is what will allow communities to craft the future they desire rather than be swept along with a tide of competing policies and priorities.

» Sustainability leadership involves facilitating knowledge exchange so that others can realise their leadership potential as well

Challenges and Opportunities

The main concern about implementing the 'campus as a living lab' is whether or not the university can live up to expectations, follow through with its intentions, and reach its set goals. The opportunities that becoming a leader in sustainability promise are great, but the challenges can be just as great. Will the university's practices reflect their research into sustainability? Will the university's rigid structure allow for a change of habits? Will the university be able to ensure a strong commitment from management to circumvent political and financial constraints?

Opportunities to act as an agent of change

Universities cannot and do not act as self-contained entities; they function in the context of a local region and therefore can act as leaders in their community. By embedding sustainability into an institution's teaching, research and operations, the university creates multiple opportunities to act as a change agent.

One of the primary ways a university can act as a change agent for sustainability is to of-

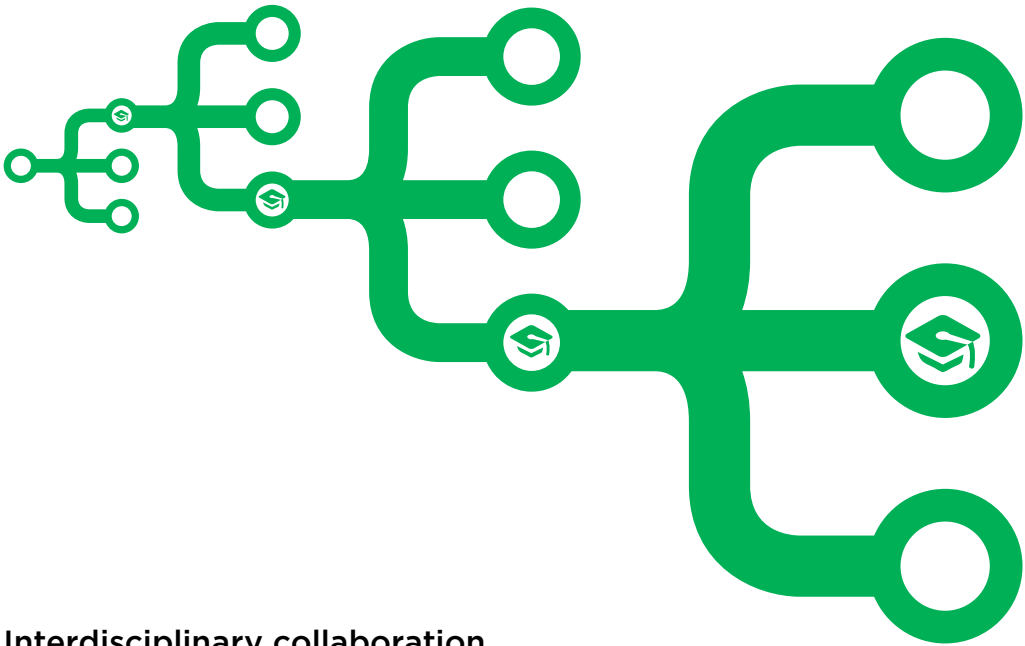
fer students of all disciplines a firm grounding in the concepts of sustainability. By doing so, graduates are prepared to be responsible citizens with broad knowledge about systems, how sustainability is applicable to their chosen field, and how their behaviours affect the world around them. Knowledge and experiences gained during their years at university can encourage students to enact positive change in their lives post-graduation as well.

Pursuing a culture of sustainability can influence staff habits, too. Organisational culture plays a critical role in a transformation towards sustainability, as the ways in which employees think and feel about their organisation shape their behaviour. Employees who identify strongly with their organisation will be more likely to align their behaviours with the needs of the organisation in order to achieve their collective (sustainability) goals.



As it relates to sustainability, leadership might include engaging with staff and students to promote environmentally-responsible behaviour, providing (compulsory) sustainability education to all students, and offering a best-practice operational model to the wider community. Going further, sustainability leadership involves facilitating knowledge exchange so that others can realise their leadership potential as well. There is no place for ‘trade secrets’ in sustainability within the higher-education sector. By freely offering information on objectives, methods, successes, and failures, we motivate other institutions and communities to set similarly ambitious goals, and we advance the dialogue on an issue of global importance.

The benefits of actively and consciously demonstrating sustainability leadership within and beyond a particular institution are many. In addition to more efficient use of resources and lower emissions, sustainability initiatives offer reputational benefits, a lower risk profile, reduced operating costs, and even the potential to attract and retain students and staff with respectable green credentials. By sharing information about the strategies and processes undertaken to realise these benefits, a university demonstrates innovation, excellence and leadership in a manner that is both concrete and of great value to society and the environment.



Interdisciplinary collaboration

Increasing collaboration around sustainability issues can lead to a greater feeling of ownership and responsibility among both employees and students, and can help to create a wider culture of sustainability at the university. Students get an opportunity to apply the knowledge acquired during their studies, and gain practical experience and skills that will help them in their future careers.

In their teaching and research, academics can benefit by having the opportunity to bring their research ideas to life and test them on their own campus. Some academics have incorporated projects into their curricula, which means that students are able to experience creative and dynamic learning.

Such interdisciplinary projects allows for direct collaboration with industry, which not only ensures applicability of the knowledge gained but can even generate extra revenue for the university.

Funding and research

Resource constraints on both finances and human capital can limit the extent to which a university can lead in sustainability, both within and beyond the institution. A strong commitment from management is needed to bypass political and financial constraints.

Academic research on the campus itself may not produce usable results for the university. Students who undertake living lab projects can lack project-management experience, particularly in terms of the costs for a project but also applicable legal restrictions. Making sure there are strong connections between the programme and facilities management will benefit the research. Before research begins, it is important to have agreed outlines of research proposals and to have completed risk assessment.

» Living labs give students an opportunity to apply knowledge acquired during their studies and gain practical experience and skills that will help them in their future careers.

Structure of a living lab

One major hurdle faced by all institutions is creating a living lab that fits with the needs and structure of the institution. The structure of a university's living lab is very much dependent on the internal structure of the university, as well as what works best for university employees and students. Some universities have created a programme that connects and unifies all of the related research activities occurring on campus while others just open the campus up to research, and projects are created more independently and organically.

Projects that have been done at living labs across the higher-education sector range in size and scope. A living lab project can be something as small as an energy audit or a biodiversity study done by students to something larger, such as piloting a new technology in a new building and assessing its effectiveness. The benefits of having a campus as a living lab are often clear for a university and its members, but the path to creating a living lab is less obvious.

LONG-TERM CHANGES:

1. INTEGRATE SUSTAINABILITY INTO **TEACHING AND RESEARCH** ACROSS ALL DISCIPLINES.
2. IMPLEMENT RESEARCH CONDUCTED ON CAMPUS INTO OPERATIONS FOR **CUTTING-EDGE INNOVATION** IN CAMPUS SUSTAINABILITY.
3. GENERATE **GUIDELINES**, POLICIES, PROCEDURES, AND UNIVERSITY-WIDE REPORTING THAT RELATE TO SUSTAINABILITY.
4. INTRODUCE SUSTAINABILITY CRITERIA INTO **WIDER AREAS**; E.G., INVESTMENTS, SUPPLY CHAINS, ETC.

5. **MEASURE, BENCHMARK, MONITOR,** REPORT, AND COMMUNICATE RESULTS USING INDUSTRY BEST PRACTICE STANDARDS; E.G., THE GLOBAL REPORTING INITIATIVE.

6. EXTEND YOUR INFLUENCE TO **THE WIDER COMMUNITY** BY HOSTING WORKSHOPS AND CONFERENCES IN CONJUNCTION WITH OTHER SECTORS.

HURDLES AND SOLUTIONS

QUESTIONS FOR UNIVERSITIES AS CATALYSTS FOR A SUSTAINABLE SOCIETY



How do we deal with a lack of funding?

Develop projects that could lead to savings for the university. **Arrange for a percentage of the savings to be allocated back into the programme.** Partner with relevant stakeholders who can provide funding, support and/or data for the project. Apply for government funding, if possible.



How do we deal with a lack of institutional support?

Create an **advisory group** of interested members of the university including staff, students and academics who can reach out to their peers to propel the programme forward.



How do we deal with unrealistic project ideas from students?

All projects should be monitored by an **internal supervisor**, who challenges the ideas, provides required know-how, and facilitates internal connections.



How can we make sure the research will produce usable results?

Begin with good data and a tightly scoped project. It is important to agree upon project outcomes and ensure that research proposals are clearly directed toward tangible results for the university.



How can we get better participation from students and student groups?

Offer incentives such as paid internships, competitions and awards, and consider offering certified training in specific areas. Utilise social media channels and use positive and fun messages. Employ student ambassadors for peer to peer education.



How do I deal with a lack of staffing and coordination?

Employ a staff member to coordinate the living lab. If that is not possible, form an inter-departmental steering group to coordinate efforts.



How do we deal with a lack of academic support in projects?

Determine which campus projects are best suited to the living lab model and approach academics in related disciplines with suggestions for project ideas.

Once there are solid examples of the effectiveness of the living lab model, use these to engage other academics.



How do we overcome a lack of accountability and ownership that prevents engagement with sustainability initiatives?

Embed sustainability into organisational policies, procedures, and practices, and develop management plans, benchmarking, and reporting structures. Incentivise and encourage community participation in order to make sustainability an element of organisational culture.

CASE 22

CREATING A LIVING LAB PROGRAMME



5

DIFFICULTY OF
IMPLEMENTATION

At the University of Cambridge, the goal of the Living Laboratory for Sustainability is to improve the environmental performance of the university by using the estate to test and research real-world environmental problems while improving the educational experience of students attending the university. The living lab seeks to involve students from diverse academic backgrounds in order to create dynamic solutions to the operational challenges of the university. It also looks to be a platform for academic faculty to suggest and guide research on the university estate, and to be a tool for management to improve the environmental practices of the university.

The Award Strand promotes innovation at the University. It allows staff and students the ability to be recognised for their work and ideas. The university benefits from the research coming out of the living lab because it provides a better understanding of the environmental issues that need to be addressed, while also providing potential solutions to these issues.

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



CASE 23

SUSTAINABILITY LEADERSHIP



In the twenty years since the launch of their Business and Sustainability Programme, the University of Cambridge Programme for Sustainability Leadership (CPSL) has focused on building strategic leadership capacity within the business and policy making communities to tackle critical global challenges.

The organisation's mission is to deepen leaders' understanding of the social, environmental, and economic context in which they operate, and to help them to respond in ways that benefit their organisations and society as a whole. As such, CISL is explicitly aligned with the university's mission to promote teaching at the highest international levels of excellence, as well as its vision and strategy for lifelong learning.

Bold and effective leadership from business, delivered in partnership with government and wider society, offers a potent means of tackling our most serious social and environmental crises. CISL works with senior executives to inform their individual leadership strategies, as well as their organisations' decision-making. It also builds on the unique resources of the University of Cambridge to define and develop more sustainable economic and political systems.



5

DIFFICULTY OF IMPLEMENTATION

Three examples of CISL'S leadership groups are outlined below to illustrate the nature of CISL'S activities:

1. The Prince of Wales's Corporate Leaders Group

The Prince of Wales's Corporate Leaders Group brings together business leaders from major UK, EU, and international companies who believe that there is an urgent need to develop new and longer-term policies for tackling climate change.

www.cisl.cam.ac.uk/Business-Platforms/The-Prince-of-Wales-Corporate-Leaders-Group.aspx.

2. ClimateWise

ClimateWise is the global insurance industry's leadership group, which drives action on climate change risk.

www.cisl.cam.ac.uk/Business-Platforms/ClimateWise.aspx.

3. Banking Environment Initiative

The Banking Environment Initiative (BEI) was established in 2010 to identify new ways in which banks can collectively stimulate the direction of capital towards environmental and socially-sustainable economic development.

www.cisl.cam.ac.uk/Business-Platforms/Banking-Environment-Initiative.aspx



QUICK TIPS

- Tap into existing knowledge and partner with academics and operational staff to build project ideas quickly.
- Offer incentives for student and staff participation, such as awards, internships and skill building workshops.
- Connect and communicate with different departments to pool resources, both financial and intellectual.
- Promote initiatives already in place and celebrate successes with campus media.
- Identify leaders within the university who have achieved positive change, find out what they have done and extrapolate to other areas of the university.

A Closer Look

Seed Sustainability is the project platform of ETH Sustainability; it acts as the link between research-related questions from business and society, and the research interests of the university. Seed Sustainability establishes contacts with partners from industry – in business, government, and other institutions – that are interested in putting theory into practice.

The Seed Sustainability team looks for qualified students and academic specialists and provides coaching that involves the participation of everyone in the programme. This also encourages student research in sustainability-related topics, promotes successful cooperation between scientific theory and practice, and unites the needs and expectations of research, education, and industry.

www.ethz.ch/en/the-eth-zurich/sustainability/education/seed-sustainability.html

FURTHER READING



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OTHER LIVING LAB EXAMPLES

University of Cambridge
www.environment.admin.cam.ac.uk/getting-involved/living-lab

Yale University
www.sustainability.yale.edu/research-education/campus-living-lab

ANU
www.sustainability.anu.edu.au/student-life/campus-as-classroom

The University of British Columbia
www.sustain.ubc.ca/our-commitment/campus-living-lab
www.youtube.com/ch?v=VbGYHX9hskQ

Cornell University
www.sustainable-campus.cornell.edu/pages/modal-living-lab

Duke University
www.sustainability.duke.edu/academics/livinglab.html

Brown University
www.brown.edu/about/brown-is-green/livinglab



» *Transport accounts for a significant and growing share of a university's carbon footprint*



» *Green purchasing affords an opportunity to demonstrate environmental leadership*



» *On average, we spend approximately 70% of our lives inside*



» *Universities demonstrating leadership in the realm of sustainability do more than just implement energy efficiency measures*



» *There is no one template for approaching campus sustainability initiatives but how these are structured will shape the university's capacity for success and the community's engagement with the programs*



»» *Communicating with an authentic, clear, and consistent voice will help build trust and create teams and networks*



»» *Leaders need to locate passionate individuals in a variety of campus positions, and offer them opportunities for meaningful engagement*



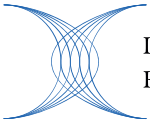
»» *Providing knowledge about the total energy costs of running laboratories can build motivation for more energy-efficient behaviour in those who use them*



»» *The campus itself should be considered a classroom, with each element of its operations a lesson in how to live and work more sustainably*

WHO'S RESPONSIBLE?

This publication is made in collaboration between the International Alliance of Research Universities (IARU) and Sustainia.



INTERNATIONAL ALLIANCE OF
RESEARCH UNIVERSITIES

THE INTERNATIONAL ALLIANCE OF RESEARCH UNIVERSITIES (IARU)

The International Alliance of Research Universities (IARU) was established in 2007 and is a collaboration between ten of the world's leading research intensive universities. IARU jointly addresses grand challenges facing humanity. The Alliance has identified sustainable solutions on climate change as one of its key initiatives. As a demonstration of its commitment to promote sustainability, IARU has sought to lead by example through establishing the Campus Sustainability Program, which aims to reduce the environmental impact of campus activities. It also organises international scientific congresses on sustainability and climate challenges.



ABOUT SUSTAINIA

Sustainia is an international sustainability initiative where companies, experts, and thought leaders come together to support and work with a tangible sustainability approach, based on readily available solutions and a motivating narrative. The work of Sustainia equips decision makers, CEOs and citizens with the solutions, arguments, visions, facts, and network needed to accelerate sustainable transformation in sectors, industries, and our everyday life.

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For more information about Sustainia, please visit Sustainia.me

HOW TO FIND MORE INFORMATION:

Australian National University: www.sustainability.anu.edu.au

ETH Zurich: www.ethz.ch/en/the-eth-zurich/sustainability.html

National University of Singapore, Office of Environmental Sustainability: www.nus.edu.sg/oes

Peking University: www.english.pku.edu.cn

University of California, Berkeley, Sustainability team: www.sustainability.berkeley.edu

University of Cambridge: www.environment.admin.cam.ac.uk

University of Copenhagen, Green Campus: www.climate.ku.dk/green_campus

University of Oxford, Environmental Sustainability team: www.admin.ox.ac.uk/estates/environment

The University of Tokyo: www.u-tokyo.ac.jp/en

Yale University: <http://sustainability.yale.edu/>

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Sustainia and IARU

ISBN (for web version): 978-87-93038-21-9



>> We have the opportunity to create cultures of sustainability for today's students, and to set their expectations for how the world should be

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