



BEST PRACTICE IN CAMPUS SUSTAINABILITY

Latest Examples from ISCN and GULF Schools

Report presented at the Global University Leaders Forum (GULF)
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ISCN
International Sustainable Campus Network

In collaboration with **GULF**, the Global
University Leaders Forum of the WEF.

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Executive Summary

Sustainability is the current frontier of our societies. Enabling us to meet our current needs and still allowing future generations to meet theirs seems the holy grail of a post-industrialist world. Recently, the focus of global attention has shifted from agonizing about how certain solutions to environmental challenges are “getting the job done,” as the label Sustainable Development Solutions Network¹ of the most recent major UN initiative in this field illustrates.

In addition to the focus on solutions, there is an emerging consensus that what is needed is integration and collaboration. Integration in the sense that both natural capital and ecosystems services on the one hand² and social capital and development on the other³ need to play a balanced role in a sustainable future. Concerning collaboration, it is clearly recognized that research and higher education have a key role to play in finding the path towards a sustainable future⁴, but that they cannot do this alone⁵. As has been clearly articulated already some time ago, partnerships between academic and private sector organizations are needed to achieve real progress⁶.

This report provides an overview of current sustainability initiatives by leading universities and colleges, particularly programs that seek to embed research and education into a “living laboratory” for sustainable development that includes the whole campus and its students, faculty and staff. These best practice cases are organized below in three sections that are aligned with the principles of the ISCN-GULF Sustainable Campus Charter, discussed at the end of this report. They have been contributed by member schools of the International Sustainable Campus Network (ISCN) and the World Economic Forum’s Global University Leaders Forum (GULF), which have partnered in developing and disseminating the ISCN-GULF Sustainable Campus Charter.

Form follows findings

Universities are achieving increasing alignment between their real estate and research findings, whether these relate to new technology or requirements for sustainable development. As a world’s first, **EPFL** is installing large scale solar windows at its new SwissTech convention center, demonstrating the potential of translucent “Graetzel solar cells” that can be deployed vertically and that are based on research at that school. And **Ball State University** expects to be able to cut its campus carbon footprint nearly in half once its campus-wide heating and cooling system currently under development is fully operational. In a project

¹ Sustainable Development Solutions Network, unsdsn.org

² David Griggs, “Sustainable development goals for people and planet”, *Nature* 495, 305–307 (21 March 2013)

³ Albert V. Norström, “Social change vital to sustainability goals”, *Nature* 498, 299 (20 June 2013)

⁴ Gisbert Glaser, “Base sustainable development goals on science”, *Nature* 491, 35 (01 November 2012)

⁵ Suraje Dessai, Stavros Afionis & James Van Alstine, “Science alone cannot shape sustainability”, *Nature* 493, 26 (03 January 2013)

⁶ Gretchen C. Daily and Brian H. Walker, “Seeking the great transition”, *Nature* 403, 243-245 (20 January 2000)

similar to a recent development at ETH Zurich, connecting all of Ball State's 47 campus buildings with a geothermal grid will allow optimization by "trading" energy needs between them.

Successful sustainable design is strongly context-dependent. The major new "UTown campus" development of **National University of Singapore** illustrates an approach suited to tropical climates that combines high-tech features with a design focus on optimizing natural ventilation. Together with behavioral incentives like pay-as-you-go student residence air-conditioning, energy use and related costs can be reduced significantly. A very different kind of context applies to campuses that include a large proportion of historic construction. Illustrating that also historic buildings are amendable to high-efficiency upgrades, **University of Oxford** cut the energy consumption of the protected building that hosts its Institute of Archaeology in half. Motion sensors, daylight sensors, and efficient wireless light switches that don't impact on the building's fabric have contributed to this balance of preservation and efficiency. Contextual challenges can also stem from a buildings function, like for **MIT's** David H. Koch Institute for Integrative Cancer Research. Focused on interdisciplinary work, the building has to accommodate the different laboratory demands of both engineers and biologist. Nevertheless, this first Leadership in Energy and Environmental Design (LEED) Gold certified research laboratory at MIT achieved significant energy use reductions for example via a cascading ventilation system where air used to cool offices is reused for the hoods in lab areas.

Finally, ambitious goals for enhanced teaching and learning spaces, public facilities, open landscape and convenient access had to be addressed on a steep and narrow hillside location for the LEED Platinum-certified Centennial Campus development at the **University of Hong Kong**. Models like this for sustainability in the built environment are essential contributions to public sustainability debates in cities and regions that are densely populated, face severe environmental stress, and still show strong dependency on coal or other fossil fuel for electricity.

Charting the course, walking the talk

For meaningful and successful campus sustainability programs, clear strategies and goals have to be set and a comprehensive approach needs to be taken that integrated the built environment but also goes beyond it and touches every aspect of learning, working, and living on campus.

The first step in the direction of comprehensive strategic planning has been a world-wide trend towards university-wide sustainability initiatives tied to overall institutional strategy. **Georgetown University** demonstrates a very deep connection between sustainability and overall strategy development by adopting Sustainability and Smart Growth as core planning principles for its long-term 2037 Master Plan, and by integrating students, faculty, staff and external partners in its development. In addition, organizations like **Yale University** are already going beyond whole-institutional strategies by recognizing that an overall strategy gives orientation, but on its own does not always translate well to daily decision-making on the ground. For that reason, the school has launched a pilot project with the very different Yale Schools of Divinity, Management, and Forestry & Environmental Studies to test department-level sustainability planning that complements and supports the overall *Yale Sustainability Strategic Plan 2013-2016*. And following the management insight that only "what gets measured gets managed," **Hokkaido University** is developing the first Japanese assessment system of campus sustainability, comprising more than 150 indicators covering issues including policy, financial resources, facilities management, curriculum, sustainability literacy, living lab, ecosystems, land use,

energy resources, Triple Helix, practical community research, and community service. Blending campus and urban strategic planning, the **University of Cambridge** is preparing to create a whole new extension of the city in the North West Cambridge development where academic and urban communities will meet. This large-scale development will include homes for employees, student spaces and research space together with a primary school, nursery, doctors' offices, and supermarket and retail units.

Carbon reduction strategies have been a core element of campus sustainability initiatives for some time, but novel approaches are emerging on how to make them feasible and successful in practice. The **University of Melbourne** has experienced the very real impacts of governance structure enhancements on sustainability performance. By establishing a high-level Sustainability Executive group, air conditioning improvements, lighting replacements, voltage optimization and installation of solar panels could be agreed on that will save 50,000 T CO₂ over the life of the projects, and \$4.7M (AUD) in electricity costs. The Todai Sustainable Campus Project (TSCP) of the **University of Tokyo** combines the demonstration of carbon reducing technologies developed at the school with organizational innovations, like an internal carbon tax levied from all graduate schools and institutes. This contributes to sustainability investments coordinated by the President's office. The program also prepares the school for peak-load reductions that might be needed in emergency situations like earthquakes, showing a similar focus on issues in the follow-up to the 2011 Great East Japan Earthquake as **Keio's** earthquake recovery aid program providing re-forestry initiatives and social support in the town of Minamisanriku, which was hit by this catastrophic quake.

Daily exposure to sustainability solutions in all aspects of campus life is a powerful teaching tool, and campus sustainability programs can contribute strongly to it. One topic of current strong attention in this regard is sustainable food on campus and for the world. **Politecnico di Milano**, and **University of Milano** are jointly exploring a "sustainability district" neighborhood, where sustainable food is one of the topics explored. This includes health aspects, environmental protection, and supporting an awareness of "connection to the land," and is supported by a survey that involves approximately 100,000 students on the campuses of the two universities. **ETH Zurich's** initiatives on food sustainability are building a strong bridge between research at its World Food Systems Center and sustainable food initiatives on campus, basing the school's sustainable catering strategy on scientific evidence. This includes studies on awareness and consumer acceptance of greenhouse gas emissions caused by food production. In addition, other aspects of daily life are amenable to enhanced sustainability experiences by students, faculty and staff. Advanced recycling strategies at student housing of the **University of British Columbia** include multi-stakeholder planning, pilot testing of actions to support its Zero Waste Action Plan, and studying the effects of increased recycling convenience on residents with support by the school's Brain Attention Research Laboratory. And the **Universidad Internacional Del Ecuador (UIDE)** has demonstrated the feasibility of sustainable mobility to its campus users by a project converting a diesel-powered bus to a solar-powered vehicle. The project has benefited from the strong solar radiation at the school's high altitude, illustrating again the importance of context for successful sustainability initiatives.

Connecting mind and matter

Conceptual and technical skills of the leaders and experts of tomorrow are a key product of universities and colleges. To enhance the "sustainability literacy" of their graduates, leading schools use innovative approaches to reach students in novel and lasting ways, and to integrate sustainability subject matters

across the curriculum. The “Green Love” program of **Anglia Ruskin University** uses a comprehensive social marketing strategy to raise awareness for environmental responsibility amongst students and staff. This program is continuously improved by being a subject of evaluation in the school’s business marketing courses, bridging social action and formal curriculum. Tight integration of sustainability topics in standard curricula is also a strong focus at the **University of Gothenburg**’s School of Business, Economics and Law, where educational objectives of sustainable development are inscribed into *all* programs as a key skill required from every student. Across all seven colleges and within 21 interdisciplinary centers, **Carnegie Mellon University** conducts groundbreaking environmental and energy research. And the Integrating Sustainability Across the Curriculum (ISAC) program by the **University of Pennsylvania** makes partnership and collaboration, essential ingredients of sustainable development, an essential part of the education program development itself. During an 8-week summer program, undergraduates team up with faculty to refine an existing course or develop a new course that incorporates sustainability as an academic topic.

A very practical aspect of the mind-matter connection is addressed by **Keio**’s program to improve an Intellectually Productive Environment While Reducing CO₂ Emissions. Recognizing the impact of temperature, humidity, light intensity, and CO₂ concentrations on cognitive functions, the school’s Cluster Energy Management System (CEMS) informs students and staff in real time about indoor environmental quality and seeks their collaboration on energy saving measures. This program’s focus on balancing environmental and social aspects also fits well with the school’s aim of developing sustainable development capacity in its Global Environmental Leader Program. Sustainable development capacity is also the overarching goal of large-scale, high-level external partnerships on sustainability that **Harvard University** is engaging in. The school’s leadership participates in the Boston Green Ribbon Commission, engaging on topics like sustainability best practice for laboratories and preparedness for climate change. Together with MIT, Harvard is also a founding signatory of the Cambridge Community Compact for a Sustainable Future. The Compact comprises partnerships between peers from higher education, health care, business and state and local government to amplify their joint impact by sharing best practices and collaborating on new sustainability solutions.

Outlook

The campus sustainability best practice compilation provided here is meant to further experience exchange between universities represented in the ISCN and GULF and beyond. It also is intended as a basis for inviting private sector corporations to join higher education leaders in working on enabling a sustainability transition, both for their organization and for society at large. The upcoming 2014 ISCN Conference, hosted by Harvard University and MIT June 1-4, and the next “Summer Davos” meeting could provide good opportunities for such an extended exchange.

Schools Contributing Best Practice Cases

| School | Member of: | |
|---|------------|------|
| | GULF | ISCN |
| <i>Carnegie Mellon University</i> | ✓ | ✓ |
| <i>Ecole Polytechnique Fédérale de Lausanne</i> | ✓ | ✓ |
| <i>ETH Zurich</i> | ✓ | ✓ |
| <i>Georgetown University</i> | ✓ | ✓ |
| <i>Harvard University</i> | ✓ | ✓ |
| <i>Keio University</i> | ✓ | ✓ |
| <i>Massachusetts Institute of Technology</i> | ✓ | ✓ |
| <i>National University of Singapore</i> | ✓ | ✓ |
| <i>University of Oxford</i> | ✓ | ✓ |
| <i>University of Cambridge</i> | ✓ | |
| <i>University of Pennsylvania</i> | ✓ | ✓ |
| <i>University of Tokyo</i> | ✓ | |
| <i>Yale University</i> | ✓ | ✓ |
| <i>Anglia Ruskin University</i> | | ✓ |
| <i>Ball State University</i> | | ✓ |
| <i>Hokkaido University</i> | | ✓ |
| <i>Politecnico di Milano</i> | | ✓ |
| <i>Universidad Internacional del Ecuador</i> | | ✓ |
| <i>The University of British Columbia</i> | | ✓ |
| <i>The University of Hong Kong</i> | | ✓ |
| <i>Università degli Studi di Milano</i> | | ✓ |
| <i>University of Gothenburg</i> | | ✓ |
| <i>University of Melbourne</i> | | ✓ |

FORM FOLLOWS FINDINGS

Ball State University



BALL STATE
UNIVERSITY.

2014 ISCN-GULF SUSTAINABLE CAMPUS CASE STUDY

Installation of a campus-wide geothermal heating and cooling system to service 47 buildings.

Purpose: Reduction of virtually all stationary-1 (Scope 1) GHG emissions; enhanced building-by-building efficiency improvements and building-to-building energy exchange; education of the campus community on the value of integrated, whole-systems thinking.

Overview: When the system is fully operational, the university will completely shut down its four coal-fired boilers, thereby cutting the campus carbon footprint nearly in half. Currently all 47 campus buildings are on the cooling loop and 22 are on the heating loop. The system will yield \$2 million in annual savings in today's dollars.



- Principle #1 Buildings and Their Sustainability Impacts: each of our 47 campus buildings will trade energy during the swing seasons.
- Principle #2 Campus-wide Planning and Target Settings: this sets the basis for achieving our ACUPCC Climate Neutrality by 2050.
- Principle #3 Integration of Research, Teaching, Facilities and Outreach: our students, faculty and facilities staff are collaborating to research system performance.

Communication: International, national and regional publication of this enterprise has increased awareness among the campus community. The use of the system as a research and education platform has become a focus of our strategic planning, academic planning and campus master planning dialog.

Lessons Learned: The value of whole-systems thinking; the positive cost-benefit of this technology; the opportunity for integrating academic affairs and business affairs in promoting the campus as a living laboratory.

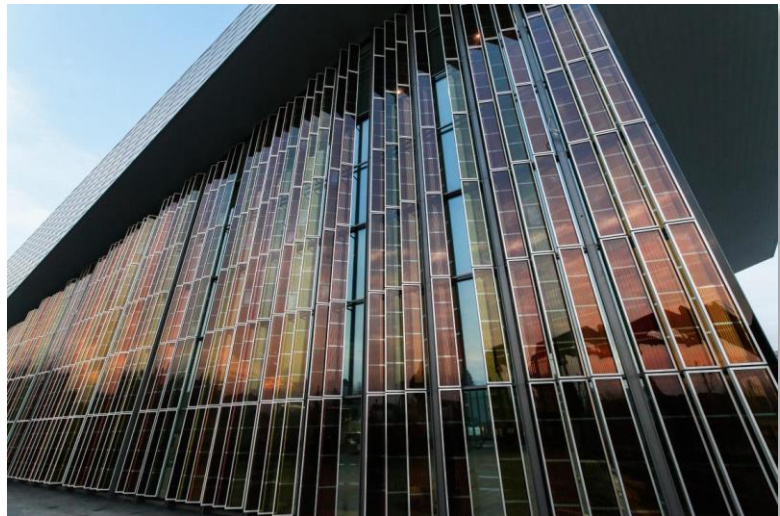
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The World's First Solar Window

EPFL's new convention center is being equipped with an impressive glass façade composed of dye solar cells. The first architectural integration of this technology in outdoors is a new step in developing a large-scale solar park and conducting research and development projects.

Project Overview: Transparent, colored solar panels, fruits of the Graetzel cell technology, have been installed on the west façade of EPFL's future SwissTech Convention Center, scheduled to open its doors in April 2014. These 1,400 solar modules, each one 35 by 50 cm in size, will combine for a total surface area of 300 m². The design, by artists Daniel Schlaepfer and Catherine Bolle, calls for 5 different shades of red, green and orange, giving the ensemble a warm, dynamic aspect.



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This exterior solar window façade is a world first. The project leverages the potential of dye-sensitive solar cells known as Graetzel cells. In addition to being translucent, they are indifferent to the angle of incidence of light that hits them; they can be deployed vertically without any loss in efficiency. They not only produce renewable energy, but they also shade the building from direct sunlight, reducing the need for air cooling. This innovative solar installation is funded by Romande Energie, and was operational in December 2013.

A first for exterior architectural integration

Dye-sensitized solar cells, invented in 1991 by EPFL professor Michael Graetzel, reproduce the principles of photosynthesis in plants. The photovoltaic glass panel covering the west façade of the SwissTech Convention Center is the world's first exterior architectural integration of this cutting-edge technology. This visually compelling 300m² installation will be a demonstration of the potential of this kind of solar technology and the first step in their large-scale production and use.

This solar façade project is the culmination of a long-standing commitment to innovation and technology transfer at EPFL. No fewer than 11 companies have secured a license to market Graetzel cells. This first architectural integration is all the more significant in that has been achieved via collaboration between Romande Energie, a key partner for EPFL in the field of energy.

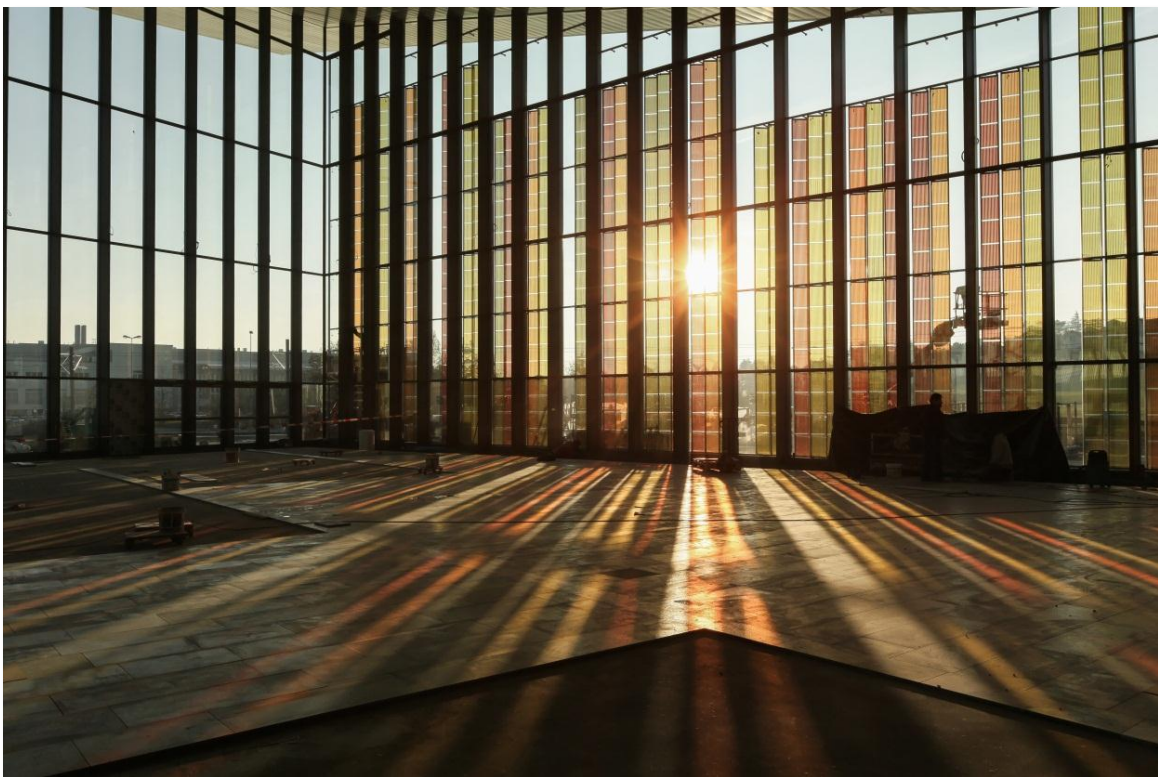
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Massachusetts Institute of Technology



2014 ISCN-GULF SUSTAINABLE CAMPUS CASE STUDY

David H. Koch Institute for Integrative Cancer Research

The David H. Koch Institute for Integrative Cancer Research is not only MIT's first shared home for Life Scientists and Biologists battling the disease, but also its first Leadership in Energy and Environmental Design (LEED) Gold certified research laboratory facility, as rated by the U.S. Green Building Council. The sustainability and engineering design team aimed to combine in a single building other next generation research and the highest possible standards for energy conservation. The building's ensemble of high-energy performance features translates into hundreds of thousands of dollars in annual savings for MIT, as well as confirmation that a collaborative approach to design and construction can yield superlative results without compromising health, safety, or productivity.



ARCHITECTS: Ellenzweig; Cambridge, Massachusetts
COMPLETION: 2010
SCOPE: 360,000 GSF
DESIGN FEATURES Six floors of research laboratories. The ground floor houses administration offices and meeting facilities, as well as Institute Core Labs

SUSTAINABLE DESIGN HIGHLIGHTS - Energy

- Integrated design process for sustainability
- Variable air volume (VAV) system and right sizing of HVAC equipment
- Heat recovery methods incorporated into HVAC systems
- Chilled beam HVAC technology in offices
- Low flow fume hoods to reduce ventilation requirements
- Low velocity duct work to reduce fan energy

AWARDS LEED-Gold certification from the **U.S. Green Building Council**, 2011

Sustainable design technologies that had significant energy performance impact included:

- Heat recovery methods incorporated into HVAC systems.
- Variable air flow (VAV) system and right sizing HVAC
- Low flow fume hoods to reduce fan energy

- Aggressive day-lighting strategies
- Chilled beam HVAC technologies in offices
- Reflective roof materials that reduce the heat island effect.

Project Challenges:

- Extremely tight design and construction timetable.
- Firm budget ceiling.
- Need to accommodate the different laboratory demands of both engineers and biologists including the use of potentially hazardous materials for life science research, as well as novel engineered nanomaterials.

Project Best Practices:

- Deploy an integrated design process to consider opportunities and impacts simultaneously across all systems.
- Set sustainability targets, model outcomes, and revisit and revise goals, before and during construction.
- Collaborate closely with environmental, health and safety (EHS) staff and sustainability engineers to optimize energy performance in HVAC and fume hood design without compromising safety.
- Prioritize and focus on a finite set of high-impact objectives. Be aggressive in thinking and focus on a limited number of strategies for sustainability.
- Seize on researchers desire for open collaborative spaces throughout core of building, which offered opportunities for new HVAC efficiency strategies.
- Conduct ample design modeling to demonstrate safety and efficacy of low fume hoods, reducing conditioned air requirements by 20%.
- Use a cascading ventilation system – a first for MIT where air used to cool offices is reused for the hoods in lab areas.
- Deploy air change rate set-backs for spaces when un-occupied.
- Challenge engineering rules-of-thumb on plug loads that otherwise would drive an oversized thumb, MIT designed for 8w/sf, and the actual load measured use was 3.85 w/sf.

Actual building Energy Performance: After completion the Koch Institute consumes dramatically less energy during peak loads than was originally specified across the board. The building reduces total energy use by approximately 35 percent as compared to a standard laboratory research building. Measured energy use after one year:

| | Design Peak Load | Actual Peak Load |
|-----------------------|------------------------------|---------------------------|
| Electrical | 14.6/8 watts per square foot | 3.8 watts per square foot |
| Steam heat | 35,000 pounds per hour | 20,000 pounds per hour |
| Cooling demand | 3,350 tons of chilled water | 2,354 tons |

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Building Design Emphasizing Natural Ventilation for the Tropics

In hot and humid Singapore, NUS' strategy for new buildings of optimizing location/orientation to minimize solar heat and leveraging natural ventilation for circulation, not only reduces energy use and environmental impact, it also provides acceptable thermal comfort. This is an effective alternative to the more prevailing approach of using wholly air-conditioning, i.e. mechanical ventilation. This strategy covers a wide spectrum of new buildings including those for teaching (Education Resource Centre), sports and recreation (Stephen Riady Centre), offices (Ventus) and staff and student residences (UTown Residence and Kent Vale 2 respectively).

Purpose: With a growing student and staff population, there is a need for additional space to accommodate the university's teaching and research needs. The associated costs of operating these new buildings, especially electricity usage mainly for air-conditioning the additional space, have also increased as a result. By relying more on natural ventilation and less on air-conditioning, together with innovative Pay-As-You-Use behavioral change schemes for residences, electricity costs can be better managed.



NUS VENTUS - ADMINISTRATION BUILDING

Project Overview: The new buildings are designed to be north-south-facing to reduce exposure to direct sunlight, and to encourage natural cross ventilation into buildings. Generally, a mixed mode of naturally ventilated and air-conditioned spaces is adopted. Many large common areas (with a major exception of large lecture theatres) are designed to be used as either naturally conditioned spaces used with low-energy features such as low-speed fans to improve thermal comfort during still air conditions associated with tropical weather. In some open circulation spaces or courtyards that are built around conserved heritage trees, the cooling effect is enhanced by these trees, which draw cool air down these courtyards. This is aligned with the ISCN-GULF Principle 1: Buildings and Their Sustainability Impacts, addressing

climate conditions associated with the tropics. It addresses energy reduction/conservation through innovative building design emphasizing natural ventilation.

Communication: The use of more natural ventilation spaces in building design was instrumental in NUS achieving GreenMark certifications of GoldPlus or Platinum, the second highest and highest awards respectively, for these new buildings. Awards aside, these buildings also contribute to the university's learning and living environment by being focal points for sustainability within the community. Studying and working in an environment-conscious setting on a daily basis, students and staff are exposed to these sustainability concepts put to practice.

Lessons Learned: Sustainable building design and operations is a continuous process. Design emphasizing natural ventilation, coupled with building location and orientation, can offer substantial benefits in terms of building costs and operations. But it needs to be carefully planned, modeled and executed. If implemented well, the cooling effect of these naturally ventilated spaces (aided with suitable low-energy features such as low-speed fans) would be felt in real time. Lessons learnt from the earlier buildings adopting a similar approach, can be incorporated into the design of future buildings. Occupant-/user-education and feedback are also important for optimized usage and future refinements.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 1, Buildings and their sustainability impacts.

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NUS STEPHEN RIADY CENTRE



34 - 36 Beaumont Street Lighting

34-36 Beaumont Street is a Grade II listed property. The building houses the Institute of Archaeology and contains offices and work space.

Opportunity: An opportunity was identified to replace all of the building’s electrical installation and renew the lighting fixtures and lamps to bring about, amongst other benefits, reduced energy consumption.

Overview: The project replaced the light fittings and the lamps within the building. The lamps were replaced with energy efficient models including LEDs; some of these new lamps are 81% more efficient than their predecessors.

These energy efficient lamps are supported further by lighting controls such as daylight sensors. These adjust the lighting level depending on the amount of natural light, further reducing the lamps’ demand for energy. Further savings were made in corridors where motion sensors were used; this allows lighting levels to drop to 10% when no movement is detected.

Due to the Grade II listing, the team also utilized wireless light switches to remove the need to impact the building fabric. This work has had a significant impact on the energy consumption of the building.

Facts and Figures: The energy consumption of 34 - 36 Beaumont Street has seen a 52% decrease since the works took place. Saving:

Additional work has taken place to control the lighting levels and this should result in further energy savings.

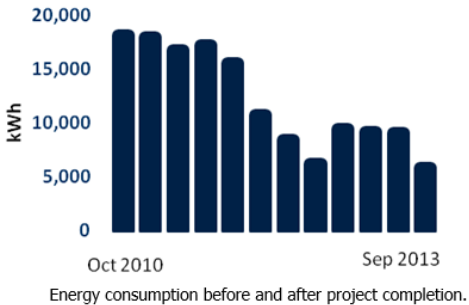
Other benefits:

- Improved usability of the building
- Improved aesthetics
- Reduced building maintenance

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- £3,658 per year*
 - 36,582 kWh per year
 - 19 tonnes of CO₂ per year
- *ESTIMATED COST SAVINGS.



Over one year the electricity savings from this project are equivalent to the annual electricity consumption of 11 three bed houses.**

** BASED ON AVERAGE ANNUAL ELECTRICITY CONSUMPTION FOR A THREE BED HOUSE OF 3,300 KWH (OFGEM, 2011).

The University of Hong Kong



2014 ISCN-GULF SUSTAINABLE CAMPUS CASE STUDY

Centennial Campus

The Centennial Campus, LEED and HK-BEAM certified in 2013, includes new buildings for the Faculties of Arts, Law, and Social Sciences, landscaped gardens and courtyards, a learning commons, theatres, restaurants, shops, and a “University of Hong Kong” MTR station, slated for completion later this year.

Purpose: Sustainability challenges have included the re-provisioning of fresh and salt water reservoirs and conservation of historic structures at the building site, development of a low-impact energy and water-efficient design for new construction, enhanced access for the university and wider community via public transport, and continuous engagement of the neighboring community.

Overview: The Centennial Campus embodies ISCN-GULF Charter Principle I: Buildings and their Sustainability Impacts. The project successfully accomplished its goals to provide enhanced teaching and learning spaces, public facilities, open landscapes, and convenient access; while overcoming the constraints of a steep, narrow hillside location. Site formation required the re-provisioning of fresh and salt water reservoirs into man-made caverns, an innovative approach not previously attempted



HKU CENTENNIAL CAMPUS

in Hong Kong that minimized tree felling while upgrading service to 120,000 people in the neighborhood. The use of recycled, regionally-sourced and FSC-certified building materials reduced the environmental impact of new construction. The unique design of the complex includes resource-efficient building systems that set a new standard for higher education in the region: Building-integrated photovoltaic and sun-shading façade systems generate electricity and reduce heat gain; a chilled-water storage tank, variable speed chillers, solar absorption cooling and heat wheel systems, displacement air-conditioning, LED lighting, and occupancy and daylight sensors improve efficiency further; while grey water and rain water recycling, low-flow fixtures, efficient irrigation systems and a food waste composter conserve water and reduce waste. The building systems and an interactive display system now in development offer a wide range of new learning opportunities for HKU students and visitors.

Communication: Developed to mark the university’s centenary and the introduction of the four-year undergraduate curriculum in 2012, the project’s unique attributes have generated considerable attention and discussion of sustainability in Hong Kong. Successful relocation of the reservoirs was praised by public and private sector groups; while green certification of the campus has sparked interest among students, staff and members of the community curious to learn the reasons for its LEED Platinum and HK-BEAM Platinum awards. Demand for more rapid improvement of the university’s older buildings and facilities is also growing, as pride in the new campus increases awareness of environmental issues.

Lessons Learned: Described early on as, “Mission Difficult, if not Impossible” by a key member of the project team, the Centennial Campus has since become one of the region’s best examples of sustainable urban campus development. Models of sustainability in the built environment are very much needed in a city and region that are at the same time densely populated, face severe environmental stress, and remain largely dependent on coal and other fossil fuels for electricity. Higher education planners, in particular, can learn from the Centennial Campus project, as demand for university places and environmental awareness continue to grow among students and families within and outside the region. The university has welcomed the high degree of interest, accommodating a steady stream of visitors to the campus including university delegations from Hong Kong, the Chinese mainland and elsewhere, professional societies of architects and engineers, prospective students and members of the general public.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 1, Buildings and their sustainability impacts.

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CHARTING THE COURSE, WALKING THE TALK

Integrating Research Education and Planning for Sustainable Food Initiatives at ETH Zurich

Leveraging the distinct competency of ETH Zurich in science, education, and cross-sectorial partnerships for sustainable food systems the World Food System Center and ETH Sustainability establish a living laboratory to pilot sustainable food initiatives at ETH Zurich campus.

Purpose: To feed the world, while considering human health, the environment, and social well-being is a major challenge of our time. The World Food System Center takes on this challenge through trans-disciplinary research, education, and new collaborations. In partnership with ETH Sustainability it also carries out sustainable food initiatives on campus.

Project Overview: The World Food System Center implements an integrated research, education, and outreach portfolio, working jointly with research institutes, government agencies and corporate partners towards a healthy world through sustainable food systems. In collaboration with the coordination office ETH Sustainability the center started the project sustainable campus catering at ETH. The project aims to establish the basis for an overall sustainable catering strategy for ETH Zurich that is based on scientific evidence. For example, to test consumers behavior and acceptance two ETH dining halls will introduce CO2 reduced menus as a scientific case study. One test case will run an awareness campaign whereas the other case study will be implemented without further information. Bachelor and Master students will study a range of measures that could increase the sustainability of campus catering, such as greenhouse gas emissions of in-house food service operations. Students will first analyze consumer acceptance of the measures and later study the tradeoffs associated with implementing changes. Being implemented through student theses the project features a strong and innovative education component. Therefore, it represents an ideal example for the ISCN principle three and its idea of a living laboratory to support integration of research, teaching facilities and outreach.

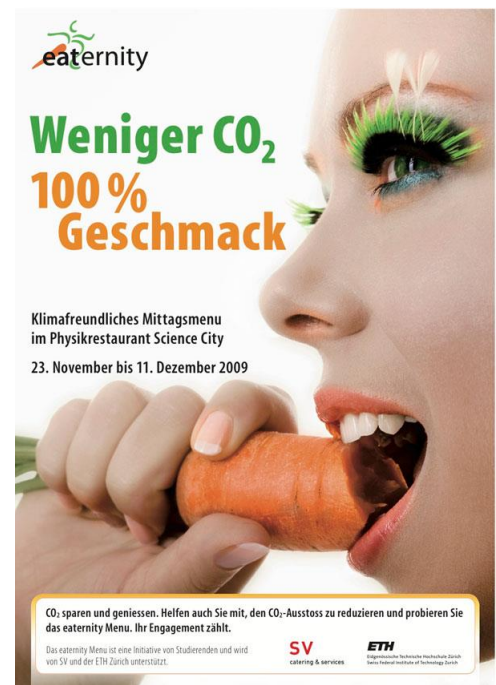


PHOTO: LESS CO₂, 100% TASTE: IN 2009, THE STUDENTS INITIATIVE “EATERINTIY” LAUNCHED THE DIALOGUE ON GREENHOUSE GAS EMISSIONS OF CAMPUS CATERING AT ETH ZURICH. AFTER A PREPARATION PHASE, THE COMMISSION ADVISING THE EXECUTIVE BOARD OF ETH ZURICH IN CATERING MATTERS DECIDED TO ESTABLISH A “LIVING LABORATORY” TO PILOT SUSTAINABLE FOOD INITIATIVES AT ETH ZURICH CAMPUS BASED ON SCIENTIFIC EVIDENCE.

Communication: In 2009, a student initiative launched a dialogue on greenhouse gas emissions of campus catering. ETH Sustainability took up the students' request, initiated a working group to define the project goals as well as a research and education program. Ever since the World Food System Center has contributed to this dialogue a food-systems-perspective and supported it by a number of outreach and education initiatives. In 2012, the commission advising the Executive Board of ETH Zurich in catering matters mandated the World Food System Center and ETH Sustainability to work together with partners and the catering company on this project.

Lessons Learned: Looking back at two-years of integrated research, education, and stakeholder and public dialogue initiatives the World Food System Center has successfully revived and created discourses on food security and food system challenges within the scientific community and in public policy. Since this year and in close collaboration with ETH Sustainability, the center has also applied its expertise and approach at the home campus. At the same time it uses its extensive network to disseminate lessons learned and to build partnerships for a food systems perspective to sustainable campus catering based on scientific evidence. The involvement of a diverse range of stakeholders in this project, including other universities, demonstrates the potential of this initiative.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 3, Integration of research, teaching facilities and outreach.

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Campus-Wide Planning and Stakeholder Engagement

Georgetown University is planning for the long-term sustainability of the campus by adopting *Sustainability and Smart Growth* as core planning principles for our 2037 Master Plan. As part of this effort, we are developing a campus-wide sustainability plan and energy master plan.

Purpose: Sustainability planning initiatives will help prioritize Georgetown’s sustainability efforts across campus, increase campus wide engagement in sustainability, and support our sustainability partnership with the District of Columbia. By aligning our sustainability plan with university Master Planning, Georgetown is laying groundwork to unify the campus’s resources around shared goals and principles.

Integrating Sustainability in Master Planning: Georgetown is engaged in a comprehensive master planning process to transform its main campus into an even more vibrant residential living and learning community, while shaping future growth off of our historic campus for long-term institutional health and sustainability. Sustainability is being integrated into this work in part through the adoption of several core planning principles that underpin the process and promote sustainability, including:

- Collaborative Planning
- Employ Smart Growth strategies
- Improve transportation
- Enhance on-campus green spaces
- Create a pedestrian-friendly campus

Stemming from these principles, specific planning strategies are being explored that will increase sustainable outcomes, such as creating walkable “complete” streets, increasing campus tree canopy, reducing impervious surface area, enhancing multi-modal transportation, and more.

Campus-Wide Sustainability Plan: In coordination with Master Planning, GU is also developing a sustainability-specific plan that will outline a vision and objectives within key sustainability topic areas. Leveraging national and international frameworks as a basis for these plans, the campus-wide sustainability plan will address topics including:

| | |
|--------------------|------------------|
| Energy and Climate | Water |
| Solid Waste | Land and Grounds |
| Buildings | Purchasing |
| Food | Transportation |

Energy Master Plan: Georgetown is also developing an Energy Master Plan, integrating the university's greenhouse gas reduction commitment into a long-term plan to satisfy GU future energy needs. Two initial steps toward this process have been completed, including interviews with over a dozen internal and external stakeholder groups regarding Georgetown's energy future, and an energy assessment encompassing Level I ASHRAE Energy Audits for over 40 campus buildings and our central power plant. These efforts will help inform future energy strategies for the campus.

Engaging Stakeholders: Georgetown believes the participation of our entire community, including students, faculty, staff, neighbors, the City of D.C. and other community members, is essential to achieving a shared vision for the future. As we pursue a collaborative, stakeholder-driven planning process, a variety of engagement opportunities focus specifically on sustainability. A participatory "eco-charrette" hosted by the Office of Planning and Facilities Management and Office of Sustainability brought together students, faculty and staff with our professional planning consultants to develop visions and strategies for energy, water, land, food systems, waste and other topics. Additionally, two online platforms, including the Master Planning Forum and GU IdeaScale, invite the campus community to propose and interact with ideas for sustainability in operations, capital projects and master planning. The input and ideas generated during these processes will be incorporated into strategies going forward.

Promoting Dialogue: These efforts are promoting and inspiring dialogue about sustainability by providing forums for students, faculty, staff, and university partners to come together to engage in dialogue, idea generation and solution development. Additionally, GU is serving as a model for other institutions seeking to develop their long-term visions for sustainability through collaborative, stakeholder-based planning efforts.

Lessons Learned: Campus-wide planning efforts play a key role in advancing an organization's sustainability leadership and impact. Through GU's two-pronged approach to sustainability planning, including integrating sustainability principles into Master Planning while also developing a sustainability-specific plan, GU is laying the groundwork to ensure that the implementation phases of these initiatives will effectively align resources around shared goals to advance sustainability.

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The first assessment system for campus sustainability in Japan

In this project, we aimed to create the first inclusive campus sustainability assessment system which covered 4 categories of management, education and research, environment, and local community.

Purpose: Our University is taking a holistic approach toward sustainable campus including all kinds of campus users. The steps are following plan, do, check, and action cycle. The assessment system is aimed at step 'check' since we already established Action Plan 2012 for Sustainable Campus, which corresponds to the step 'do'.

Overview: In July 2013, we reviewed our university by the assessment system through Environment Impact Reduction Promoter System. This system is organized by our office with one researcher and one managerial staff from each faculty who have been assigned to be the promoters. This system allowed our office to involve the promoters covering the entire university and acquire detailed information from each faculty. The



information are essential because the achievements done by faculties in bottom-up approaches should be integrated into top-down strategy of our university and used to evaluate the level of sustainability corresponding to the implementation of Action Plan 2012. Compared to the first result in January, 2013, we found our university improved in the area of Collaboration between industry, academia, and government and Community Service since our office has made a contract with City of Sapporo in urban planning and energy strategy in July, 2013 and also University Research Administrators station (URA station) has been launched. Our goal is to involve all kinds of stakeholders of our campus and to keep implementation of Action Plan 2012. The evaluation for our sustainable campus by the assessment system is a motive force for this implementation.

Communication: The result of the assessment is an information platform for the current sustainability of our campus. Our office is disseminating examples of good practice informed by the assessment results throughout the entire university. The Environment Impact Reduction Promoter System is an efficient

organization to disseminate the information and improve the activities in each faculty. This combination of the assessment and the promoters system creates opportunities to inspire dialogue.

Lessons Learned: The set of 158 indicators of the assessment system is very broad and inclusive which covers 4 categories: management, education and research, environment, and local community. For example, 158 indicators include areas of policy, financial resource, facility management, curriculum, sustainability literacy, living lab, practical community research, ecosystem, land use, energy resources, Triple Helix, community service, etc. We aim to develop an assessment system which can be applied to all universities in Japan. The assessment system still has room for improvements after we have defined the structure and the set of indicators in 2013. This point of view is our current challenge. Currently, 5 national universities and 2 private universities in Japan have finished the self-assessment by using our system. It quantitatively provides their strong points and weak points in assessment areas. Those results can be a broad memorandum to lead them to define their own strategy for sustainable campuses.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 2, Campus-wide planning and target setting.

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Minamisanriku Project as Part of Keio's Earthquake Recovery Aid

As a part of its environmental conservation activities, Keio University possesses approximately 160 hectares of forest throughout Japan where it conducts afforestation activities. The largest of these forests is located in Minamisanriku, Miyagi, which sustained extensive damage in the March 2011 tsunami following the Great East Japan Earthquake. Over many years, Keio students, faculty, and staff members have cared for this school forest, repeatedly visiting Minamisanriku to plant trees and conduct student training programs for high school students at the Shizugawa Nature Center.



Keio University began the "Minamisanriku Project" in an effort to provide earthquake recovery support for the town where Keio has historically had a large presence. Under this project, Keio organizes volunteer activities on an ongoing basis and aims to help students grow through their volunteer experience.

Each spring and summer vacation, teams of around 20 students alternately visit Minamisanriku to conduct a variety of volunteer activities; these activities include offering community life support to individuals living in temporary housing, academic support and childcare, and environmental projects such as forest protection, land reclamation, debris removal, and grass-cutting. In total, over 800 individuals have participated over the past three years.



By maintaining this forest, Keio has been able to reopen a forest road that had been cut off due to the earthquake and tsunami. Keio has also made benches for residents of the temporary housing with wood previously thinned and discarded from its school forest. Moreover, as a part of its environmental conservation activities and recovery initiatives, Keio has also used this wood to design official Keio merchandise, which include pin badges and pen trays, and entrusted the production of these goods to a local workshop where residents of Minamisanriku are employed.

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The conversion of a diesel-powered bus to a solar-powered vehicle developed at the Automotive Engineering School at our Quito Campus.

The UIDE has started several projects during 2013 to promote sustainable practices at our different schools. We have established ourselves as the green University that encourages the campus community to fund these projects. The project we would like to promote to represent us this year would be the conversion of a diesel-powered bus to a solar-powered vehicle developed at the Automotive Engineering School at our Quito Campus.

Overview: This Project aims to demonstrate the application of renewable energy as an alternative clean energy production that can replace in the near future for fossil fuels currently used. This was accomplished by applying a system of photovoltaic solar power generation installed on the bus at our Automotive Engineering School from May 2012 to March 2013.

Communication: Among the processes performed in this research, we can mention the study of the solar resource in Quito, collecting solar radiation values, load calculation, sizing the PV system component selection and various data generating installation. We were able to obtain average values of solar radiation this being useful for 5.5 hours per day; in the tests we obtained values of each panel generation ranging from 20 to 24 volts depending on the location and hours of sunshine.

Lessons Learned: We can say that solar applications are very useful and we have to take advantage of the solar resource in our region since the incidence of the sun (due to our altitude) is high, and we can apply this resource in many fields.

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2014 ISCN-GULF SUSTAINABLE CAMPUS CASE STUDY

The new TABLE FOOD and HEALTH for a sustainable Campus

The University of Milan has taken part in the project "CITTA' STUDI - Sustainable Campus" for three years with the Politecnico of Milan. The main objective of the project is to redevelop a city district (called just "Città Studi") in the light of the principles of sustainability, allowing the two Universities to experiment ideas and strategies to be disseminated to other locations (28 sites spread all over the territory of Milan by the only University of Milan).

Challenges: The project initially included four thematic roundtables: Energy, Environment, Accessibility and People, which develop themes and activities related to their names. A year ago, the City table was added, with the task of maintaining links with local institutions.

FOOD & HEALTH



The University of Milan and the Coordination Board of the project felt it was essential to develop the tables and compare them to the concepts of sustainability relating to health and food. In this regard, a roundtable was set up (Food and Health) to focus on these issues understood as crucial topics that impact the lifestyles and health of the whole campus community (faculty staff, students, Technicians, Administrative staff). The skills in the medical field and in the field of food technology at University of Milan were crucial to define the objectives that the Table intends to achieve.

Overview:

The group is responsible for:

- Developing the issues related to food (nutrition education, nutrition and healthy lifestyles, health food)
- Developing health issues (food and diseases, diet therapy, eating disorders, alcohol and diet)
- Advising on proper nutrition for athletes
- Proposing the food not only as a commodity but as a spokesman for ties with the land and nature

- Deepening the historical, social, ethno- religious and economic associated with food

The goals it seeks to achieve are:

- Improving food-related knowledge of their production and conservation
- The promotion of mental well-being through nutrition, healthy lifestyles and sport
- Health promotion and disease prevention through proper diet
- Knowledge of nutritional needs at different ages and in sport
- The enhancement of the sustainability of agro- food (energy saving, rationalization of consumption of water and other natural resources, reuse of surplus)
- The knowledge and the promotion of local and traditional products
- Knowledge of food in the aspects of ethnic, religious, social and economic
- The indication of guidelines for providers of catering within the universities and other facilities

Ongoing activities:

- Sustainability Shop for food and beverage (Bottega della Sostenibilità): in the design phase from the point of view of construction (identification of the spaces, analysis of proposed layout) and management (use of the grant to private partnership, involvement of students, etc.)
- Questionnaire on "places of food and eating habits": the text has already been defined and shared. In January it is provided to the entire university population of approximately 100,000 people.
- House of water for the distribution of cold water with or without gas: scheduled to open in March 2014.

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Sub-institutional Planning for Sustainability: Developing Community-scale Concepts and Actions

Universities around the world are developing and implementing institutional-scale sustainability strategic plans. These plans tend to emphasize the three-way balance of sustainability with a focus on measurable time-bound goals. Many also offer tactics for implementation and communications. Plans of this nature are essential mechanisms for communicating commitment and assigning accountability. At the same time, plans written for the institution don't necessarily translate well to daily decision-making or to department-level action. In addition, they may not reflect the diverse cultures and audiences that comprise a college campus.

Overview: In 2009, the Yale Office of Sustainability launched a pilot project to test the concept of department-level sustainability planning. The Office of Sustainability partnered with students and staff members in the Yale Schools of Divinity, Management, and Forestry & Environmental Studies to develop sustainability plans for each community. Each professional school team was tasked with creating a document that reflected the discipline of the school and how it connected to the university's sustainability priorities. While these plans proved imperfect in execution, they became robust foundations for the culture of sustainability within each school. They also proved to be excellent tools for fostering programmatic partnerships between the three participating schools.

Communication: In the 2010-2011 academic year, the Yale Office of Sustainability used the materials from the pilot project to develop and test a "do-it-yourself" model of department-level sustainability planning. The materials for this initiative included everything from memo templates to instructions on gathering metrics and to how to form a "green team" to support departmental initiatives. Ten departments participated in the pilot project, and by the end of the academic year five had completed plans. Feedback from the group revealed that the concept of connecting sustainability to each discipline was valuable, but the process needed more direct attention from the sustainability staff.



Lessons Learned: Based on the successes and lessons learned from the two pilot projects, in 2013 the Yale Office of Sustainability committed to developing sustainability action plans for all of Yale’s 13 professional schools, as well as its three museums. Because Yale announced the launch of the *Yale Sustainability Strategic Plan 2013-2016* in October of that year, these department-level plans were specifically targeted at supporting the university’s institutional goals. The basic template used for each of these plans is as follows:

1. Sustainability defined
2. Sustainability at Yale
3. Sustainability & (the discipline of this school or department)
4. University-level goals to support
5. Department-level actions
6. Implementation tactics

At the time of this writing, six of the professional school teams have completed plans and most of those have submitted them to their deans for review. An additional five have working drafts and are targeted to submit their proposed plans to their deans and directors by the middle of the spring 2014 semester. The final two schools and all three museums are on track to complete plans by the conclusion of the academic year. Each plan reflects operational priorities such as reducing waste and energy use, as well as language about how sustainability relates to the discipline of the school or museum. This latter component is critical both in engaging and empowering the staff, faculty, and, students of each school, and in recognizing that students have the opportunity to bring these values with them into their future careers – as faith leaders, businessmen, foresters, engineers, health care providers, musicians, and more. Examples of successes to-date that reflect the academic cultures of the schools include:

- The Divinity School hosted a food justice conference that included members of the surrounding community as well as food experts from the university
- The School of Management established protocols for “zero waste” events as well as procedures for monitoring energy efficiency in their new building
- The School of Drama reduced paper and toner use by 25% over the course of one fiscal year
- The School of Forestry & Environmental Studies is establishing mechanisms to advance multidisciplinary approaches for using the campus as a living laboratory

Challenges: One challenge has been that the connection between sustainability and a particular discipline may seem oblique. In these cases, the operational side of sustainability (energy and waste management) is still relatively straight forward, but highlighting language and programming that speaks to the culture of the school can be more difficult. The School of Music initially posed such a challenge, but upon interviewing the administration at that school the Office of Sustainability discovered that the school offers free lessons and programming for area public school students. This is included in the Sustainability Action Plan as a social sustainability action, and is considered a means of empowerment for the surrounding community. This exercise prompted the Office of Sustainability team to establish Pinterest boards to draw out these linkages. Examples of these may be seen here for music as well as other disciplines:

- Music: <http://www.pinterest.com/mbgoodall/music-sustainability/>
- Nursing: <http://www.pinterest.com/mbgoodall/nursing-sustainability/>

- Art: <http://www.pinterest.com/mbgoodall/art-sustainability/>
- Museums: <http://www.pinterest.com/mbgoodall/green-museums/>

Department-level planning has proven to be a learning experience both for the Office of Sustainability and for the students and staff of the participating departments and museums. By engaging staff, students, and faculty at this level, we are seeing a sense of empowerment and ownership of sustainability initiatives develop that would not have existed otherwise.

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Best practice sustainable campus project featuring North West Cambridge

North West Cambridge is a project to help the University maintain its global research profile through the provision of affordable and suitable accommodation for University and College staff (primarily postdoctoral researchers) and post-graduate students, as well as extensive academic and commercial research floor space, and local centre facilities to support the new community. It will also provide significant housing and facilities for the City more generally.

The University's vision for North West Cambridge is to create a new extension to the City, centred on a mixed academic and urban community: a place that is sustainable and offers a high quality of life to enhance both the City and the University. To achieve this, the University has established a number of key priorities:

- Create a mixed-use extension of the City with an urban rather than suburban grain;
- Produce a development with a unique, outstanding University character, which blends with other uses across the site and with the wider area;
- Provide for and encourage a strong sense of community, reinforced through local facilities and new public spaces;
- Use best principles and features of the existing University in the design and use of the new accommodation;
- Apply high quality design principles that do not distinguish between University and market accommodation;



STUDENT HOUSING

- Ensure extensive, high quality landscaping with high quality urban green spaces; and
- Plan for a low carbon, sustainable development that gives priority to cycling, walking and public transport and facilitates easy access to the City.

The 150 hectare site will provide 3,000 homes (50% 'key-worker' housing, available for qualifying University and Colleges employees), 2,000 student spaces, 100,000 square metres of research space, a local centre and community facilities including a primary school, nursery, doctors' surgery, supermarket and retail units, as well as all of the site-infrastructure and landscaping for the scheme. The development has been designed as an extension to the city, with an urban rather than suburban grain and will be of the highest design quality as well as being an exemplar of sustainable living.

Sustainability is central to the vision for North West Cambridge, and putting in place measures to ensure the community reflects the social and environmental aspects of sustainability has been a core part of the brief for development:

- A site-wide water recycling network is included as part of the sustainable drainage strategy, which will include the use of storm water harvested from across the site, as non-potable water to serve residential dwellings and provide water for irrigation of public spaces and flushing toilets. This will be run by a water company and will be the largest network of its kind in the UK; the scheme will be visible through a series of balancing ponds on the western boundary, as well as through a complex network of swales along most of the streets and in green corridors throughout the site.
- The residential development is being delivered to Britain's Code for Sustainable Homes Level 5, meaning that domestic energy and water use will be amongst the lowest in the United Kingdom (the Code scale measures from 1-6). Mechanisms for delivering this include commitments to high standards of accessibility, day lighting, insulation and acoustic performance. North West Cambridge will be the UK's largest Code 5 development. Non-residential development is being delivered to BREEAM Excellent standards.
- To achieve Code Level 5 and the University's renewable energy commitments the majority of roofs across the development will include photo-voltaic panels to generate renewable energy on-site.
- The site-wide commitments to sustainable methods of travel are being realised through delivery of the main cycle route through the site, extensive safe, secure and covered resident and visitor cycle parking, car club provision, and early major investment in public transport improvements.
- A Combined Heat & Power facility will provide heat to the new community in the form of a district heating network.
- An innovative waste collection strategy is also included in the scheme. Recycling is integrated, but instead of traditional UK "wheelie bins" for each property, which tend to clutter the streets, a communal underground waste system is integrated into the streetscape.

In addition to these "hard" measures, a range of other sustainability measures are incorporated in the development to ensure that sustainability for North West Cambridge is not just about environmental measures. We are seeking to provide all of the components that can enable the social development of the community from the very first stage, including:

- Open spaces and recreational amenities integrated throughout the development, including some larger scale public spaces and smaller, more semi-private areas integrated within blocks. The public spaces throughout NWC will work hard - they provide amenity, biodiversity, play space, informal recreation, and drainage functions.
- Sports pitches and pavilions, for a range of sports and to cater to a range of age groups and skill levels.
- Supermarket and local shops to provide local amenity and reduce reliance on car trips for accessing retail.
- Community Centre for use of both the new and existing adjacent communities
- Health Centre with provision for 5 general practitioners
- Police provision on site.
- Primary School and early years provision, in the form of a University Training School, which will provide teacher training opportunities as well as link to the Faculty of Education for research purposes.
- Three nurseries to provide for very young children.

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Advancing Recycling Strategies at UBC Student Housing

Multi-stakeholder planning and pilot testing of recycling strategies at UBC Student Housing.

Purpose: The project will help to increase solid waste diversion rates on campus, including source separation and diversion of food scraps for composting or other sustainable management options. Secondary sustainability goals include reducing greenhouse gas emissions associated with waste management and disposal, and keeping overall waste management costs to a minimum.

Overview: This project supports campus-wide planning and target setting. In addition to supporting UBC's overall sustainability goals, it supports the Zero Waste Action Plan currently being developed that includes campus-wide waste diversion targets, strategies and actions. The project is evaluating potential strategies at two large student residences to assess effectiveness at overcoming challenges in waste diversion in high-rise buildings. A core component of the project is scientifically examining the effects and feasibility of increasing recycling convenience to residents, with assistance from the Brain Attention Research Laboratory at UBC. Options being evaluated include proximity of recycling stations, integration of all waste streams into single drop off locations, recycling station signage and improved communications and engagement with residents. The project brings together academic and operational partners to analyze potential solutions in real-world contexts, and to apply the new knowledge in planning processes. With a first phase of evaluation complete, recycling convenience was found to be a key factor in waste diversion rates; lack of convenience appears to limit waste diversion to low levels, even when communication and engagement to residents is strengthened. Maximizing convenience to residents also entails significant challenges and constraints, dependent in part on residence design and available resources.



GAGE RESIDENCE AT UBC

Communication: This project directly involves over 1000 residents on campus, and thus has stimulated awareness of waste reduction and associated sustainability issues. Events to raise the profile of waste reduction and recycling and promote participation have been included in

the two major residences. Currently, a survey is underway to assess resident demographics, attitudes toward sustainability, and other factors as they may relate to waste diversion. Lessons learned are being incorporated, to various degrees, to each different residence location. We anticipate continued dialog and research to continue in coming months and years, leading to further progress.

Lessons learned: In terms of technical outcomes, initial results suggest that level of convenience (including proximity), visibility and ease of use are major factors in achieving high waste diversion rates in high rise residences. In terms of planning processes, a key aspect to date has been bringing together project stakeholders from the beginning of the planning process, to jointly develop and pilot test potential solutions, and to each contribute their unique set of knowledge. For example, Campus Sustainability brings forward potential “reach” goals, targets and best practice information; Student Housing staff bring their extensive experience in residence operations; and researchers bring academic rigor and experimental design expertise. Another key aspect has been the willingness of stakeholders to evaluate strategies that may or may not be immediately feasible, but rather, to explore what solutions could lead to the desired outcome, and follow that up with a planning process informed with new knowledge.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 2, Campus-wide planning and target setting, and Principle 3, Integration of research, teaching facilities and outreach.

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2013 Carbon Reduction Projects

Using University Governance Structure to support funding for carbon reduction projects: Air Conditioning Improvements, Lighting Replacements, Voltage Optimization and Installation of Solar Panels saving 50,000 T CO₂ over the life of the projects and \$4.7M (AUD) in electricity costs.

Purpose: Prior to this approach, there were no dedicated funds to enable our 2015 energy & carbon targets to be achieved. To date, the University has been able to reduce its Energy Intensity from 0.9 GJ/m² GFA to 0.69 GJ/m² GFA. The approved works will now provide a platform for embedding four separate approaches to Sustainability into infrastructure so that the University can achieve its target for Energy Intensity of 0.6 GJ/m² GFA by 2015. This was not achievable under Business as usual scenarios.

Overview: This initiative has demonstrated that the University's governance framework can be used effectively to aid the delivery of sustainability targets and to direct funds to the greatest environmental and educational benefits. Funds to pursue this project were made available as a result of the endorsement of the newly established Sustainability Executive. This group is responsible for University-wide Sustainability Governance and with its support, a proposal was accepted to trade off the short term benefits of purchasing external offsets (Green Power certificates) to deliver a program of works valued at \$1.4M to deliver greater long term benefits, including co-benefits of teaching & learning and engaging with the University community.

Communication: The projects progress our agenda of using our 'Campus as a Laboratory' - high profile and high use locations have been chosen to showcase the four technologies and approaches. Information from the Solar Array will enable greater research and analysis by staff and students. The emerging technology of voltage optimization (240v - 207v) has wider application for this University and other similar organizations. Engagement with the Sustainability Executive, Sustainability



SOLAR ARRAY AT THE ALAN GILBERT BUILDING ON GRATTAN STREET, PARKVILLE.

Forum and students influenced the approval of a funding shift from short-term external offsets to on-site projects with both longer-term operational and educational benefits.

Lessons Learned: Other organizations can gain from this experience as it has demonstrated the very practical value of establishing high-level sustainability governance at the University. Emerging technologies such as Solar and Voltage Optimization have wide applications in Higher Education and Industry. For large sites with the capacity to use on-site generation without the need to feed back into the Grid, the benefits of Solar Power are considerable. Similarly, voltage optimization has wide-scale applications.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 1, Buildings and their sustainability impacts, Principle 2, Campus-wide planning and target setting, and Principle 3, Integration of research, teaching facilities and outreach.

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Todai Sustainable Campus Project (TSCP) of the University of Tokyo

The University of Tokyo (UTokyo) is the largest user of energy in the Tokyo metropolitan area, and is playing a leadership role in innovative energy systems and sustainability-related research. In 2008, the President of UTokyo took the initiative by launching the Todai Sustainable Camus Project (TSCP) to facilitate a university-wide engagement to reduce green-house-gas emissions, using its organizational capacity for improving carbon intensity on the campuses. The President established the TSCP office within the President’s Office to focus resources on building and facilitating a holistic approach.

Financial Framework of TSCP

The management raised funds for the TSCP by collecting an “internal tax” from all graduate schools and institutes of UTokyo, which is equivalent to 4% of the energy expenditures of each graduate school and institute. The TSCP fund is used as a resource for joint investments by the President’s Office and each graduate school and institute.

Achievements

TSCP defined its goals as reducing greenhouse gas emissions generated by facility-related energy use. These are:

- TSCP 2012: 15% by 2012 on 2006 baseline
- TSCP 2017: 5% by 2017 on 2012 baseline
- TSCP 2030: 50% by 2030 on 2006 baseline

As is shown Figure 1, TSCP has achieved and satisfied TSCP 2012. Table 1 shows a list of measures implemented from 2008 through 2012.

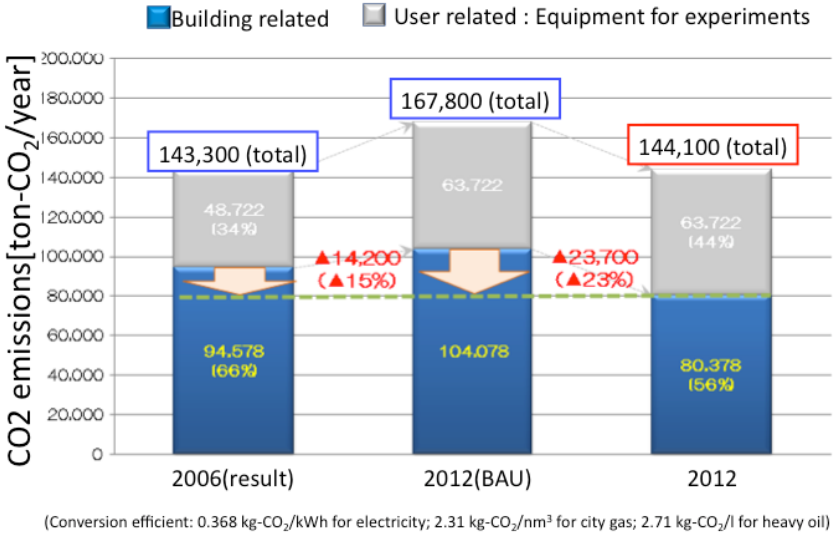


FIGURE 1: PERFORMANCE ACHIEVED BY TSCP FROM 2008 THROUGH 2012.

Benefits of TSCP

TSCP has improved the carbon intensity of UTokyo. It has also enhanced the organizational capacity for adaptation. UTokyo experienced the Great Kanto Earthquake in 2011. Destruction of electricity-generating infrastructure required considerable reductions of peak-load energy use. UTokyo successively achieved a 20% reduction of peak-load energy use due to its enhanced capacity for adaptation.

TSCP has generated and facilitated a variety of multi-stakeholder commitments to improve the carbon intensity of the campus, while also providing opportunities to demonstrate and validate technologies invented and developed within UTokyo. As a result, TSCP has become an engine for innovation in energy management.

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| | |
|---|--------------------|
| • Holistic replacement of lighting : | 1,803 ton-CO2/year |
| • High efficient cooling machine in the university hospital : | 3,011 ton-CO2/year |
| • High efficient module chiller in centralized system : | 3,466 ton-CO2/year |
| • Replacement of inefficient packaged air conditioner : | 2,297 ton-CO2/year |
| • Replacement of refrigerators: | 197 ton-CO2/year |
| • Operational improvement : | 1,106 ton-CO2/year |

TABLE 1: LIST OF MEASURES IMPLEMENTED: 2008-2012



CONNECTING MIND AND MATTER

Green Love

"Green Love" applies a social marketing approach to engaging staff and students at Anglia Ruskin University in achieving its environmental objectives.

Purpose: Green Love is the branding for our campaign to engage staff and students in achieving our environmental policy objectives related to energy and water efficiency, waste minimization, sustainable travel, biodiversity and Fairtrade.

Overview: The Green Love campaign is innovative for adopting a robust social marketing strategy to promote pro-environmental behaviours amongst our staff and students. Tailored engagement methods have been designed by identifying target audiences, key messages and desired behaviours. The Green Love campaign particularly embodies principle 3 of the ISCN-GULF Charter by linking together the environmental activities of our estates management, who designed and lead the campaign,



Students Union and formal curriculum. Uniquely amongst campaigns of this nature, Green Love has linked with the formal curriculum of business marketing courses to conduct evaluation research and guide its future development. Monthly competitions are held for each of the six Green Love themes to inform and engage staff and students with our environmental objectives, with prize draws as well as prizes for the faculty with the highest engagement rates. A key principle of the Green Love campaign is that environmental messages need to relate to desired behaviours, and facilities must be provided to enable those behaviours. For example, to encourage cycling to the campus, we provide financial support for purchasing bicycles and equipment, provide secure parking, lockers and showers, and schedule regular cycle maintenance events where Green Love messages can be promoted.

Communication: One Green Love project, which particularly generates sustainability dialogue on campus, is led by the Students' Union and titled Green Pitch. This invites students to submit practical ideas for achieving one of the six Green Love objectives. All students then vote for their favourite idea, which is then implemented with funding from the ARU Environment Team. In

2013, the winning idea entailed the rehoming and rehabilitation of hedgehogs on our Cambridge campus, contributing towards our biodiversity objectives.

Lessons Learned: We have learnt the following lessons with our Green Love campaign to date, which we believe others could learn from. Social marketing, adopting a robust approach to identifying target audiences, messages, desired behaviours and engagement activities has resulted in a more effective campaign design. Fun engagement with our environmental activities has increased by making them more fun and providing opportunities for social interaction. Clear, precise Green Love messages have been designed to be positive, and to make people feel good about doing pro-environmental behaviours, which have engaged more participants. Measureable feedback and providing quantified feedback to participants is important for sustaining the engagement of participants. Linkages with the formal curriculum and engaging our business school students in conducting market research has proved invaluable in refining the design of the Green Love campaign, but also provides a living laboratory for our students to conduct research on our own campus activities.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 3, Integration of research, teaching facilities and outreach.

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Demonstrating a Commitment to Sustainability

Carnegie Mellon University has made transitioning to an environmentally sustainable society a strategic priority. CMU signed the ISCN-GULF Sustainable Campus Charter in August of 2010, and is committed to living up to its responsibilities.

Renewable Energy Certificates

Where the university has stood out among its peers is in its commitment to purchasing 100 percent of its electricity from green sources using renewable energy certificates. In 2001, Carnegie Mellon made a commitment to purchase 5 percent of campus electricity needs from wind power, which at the time made us the largest retail purchaser of wind power in the United States. Since that time, CMU has incrementally increased this purchase to the point where in FY 2011, 100 percent of electricity purchased is offset by wind renewable energy credits. We have committed to supplying all new buildings that are following the LEED guidelines to be served with 100 percent green power. We plan to maximize the purchase of up to 100 percent renewable electricity contingent on current market prices. We also will invest in energy efficiency technologies to reduce the overall load needed to be offset.

Interdisciplinary Approach

On a broader level, the university has created a living laboratory learning environment for our students, staff, faculty and visitors. Across all seven colleges and within 21 interdisciplinary centers, Carnegie Mellon conducts groundbreaking environmental and energy research. The campus-wide Steinbrenner Institute facilitates growth of sustainability initiatives in the other research centers, promotes interdisciplinary environmental education and supports the implementation efforts of the Green Practices Committee, with the goal to enhance the university's global impact on environmental challenges. The Green Practices Committee convenes faculty, staff, students and administrators from across campus to coordinate sustainability efforts and implement environmentally progressive practices that affect facilities, campus life and transportation. The committee evaluates innovative sustainable technologies and practices (seeking to implement the most promising and cost-effective), and provides environmental and sustainability education to the entire campus community.

FAST FACTS

Carnegie Mellon has many notable accomplishments in environmental sustainability. We:

- Built the first LEED-certified university residence hall in the United States and are now home to 13 LEED-certified projects
- Launched the largest institutional purchase of wind energy
- Offered the first college course in green chemistry in the United States
- Developed a series of four courses in sustainable engineering that has served as a model for engineering programs across the country
- Increased the number of sustainability-related courses from 35 to 86

Complete information about environmental sustainability programs at Carnegie Mellon can be found at www.cmu.edu/environment.



External Partnerships

Through Harvard's leadership participation in the Boston Green Ribbon Commission and Cambridge Community Compact for a Sustainable Future (the Compact), we are partnering with peers in higher education, health care, business and state and local government to amplify our impact by sharing best practices and collaborating on new solutions.

Purpose: External partnerships allow us to expand opportunities to connect our faculty and students with real-world projects beyond our campus that can be replicated in our buildings and operations. They also allow us to deepen partnerships with surrounding communities on key areas of focus including green labs, and climate preparedness.

Overview: External partnerships allow us to explore new innovations in building efficiency and technology, collaborate on future target setting and ensure that our research and teaching is fully integrated with the surrounding community. The level of active partnership and collaboration makes these projects unique. Harvard's Executive Vice President chairs the Higher Education Working Group of the Green Ribbon Commission (GRC) and the Harvard Office for Sustainability staffs the working group. In March 2014, Harvard and the GRC are hosting a Green Labs symposium



to highlight best practices in laboratories targeted at the higher education and health care sectors. Additionally, the groups are exploring climate preparedness strategies to ensure that all sectors are deploying a consistent approach and learning from faculty experts. In 2013, Harvard hosted a regional climate preparedness summit in which higher education institutions and local, state and federal officials heard from expert speakers and participated in an emergency planning drill. Harvard President Drew Faust joined MIT's President and the Cambridge City Manager and Mayor as founding signatories of the Compact. The Compact lays out a clear framework for how to address climate change and improve quality of life and well-being by considering nine key areas of collaboration including energy efficiency, renewable

energy, climate preparedness, storm water management and green tech incubation. It aims to harness the signatories' collective capacities in research, teaching, social best practices and governance to generate new and innovative solutions. Internally, the Harvard Office for Sustainability is collaborating with Harvard Public Affairs and Communications to implement the Compact's goals.

Communication: The partnerships have by their very nature inspired a robust dialogue about challenges and solutions in the broader community surrounding our campus. A key goal of this effort to partner with our peers in state and local government agencies, local business leaders and neighboring higher educational institutions is to spark a dialogue about solutions and partnership opportunities in key sustainability areas of focus including transportation, energy and emissions, climate preparedness and greener laboratories. Through documentation, meetings and events, the efforts are dedicated to sharing best practices and solutions that will make a difference both within our campus and beyond.

Lessons Learned: We can develop stronger solutions through collaboration across sectors. A key role of the Harvard Office for Sustainability is to foster collaboration across our diffuse campus of 12 Schools and administrative departments as well as partner with community leaders to amplify our impact. Partnerships on critical issues like climate change and sustainability will help to break down silos and strengthen relationships across the government, business and higher education agencies and leaders. These stronger relationships are also an effective risk management strategy because they will lead to greater results in addressing not only those specific topics but also in addressing emerging challenges, as well as in responding to emergency situations that may occur. No one institution can effectively respond to global and regional challenges in a bubble "they must partner to take advantage of the full range of expertise, resources and best practices available across a wide range of sectors.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 2, Campus-wide planning and target setting, and Principle 3, Integration of research, teaching facilities and outreach.

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Developments on Improving an Intellectually Productive Environment While Reducing CO2 Emissions at Keio University: Introducing the Cluster Energy Management System (CEMS).

Purpose: We aim to improve the environment in all classrooms to make them more conducive to intellectual productivity while simultaneously reducing CO2 emissions. To achieve this aim, we attempt to create a total energy management system, which covers all of Keio's campuses and utilizes interactive communication with students through smartphones and Cloud Networking. The system shows the intellectual productivity evaluation index with the estimation of the number of people in the classroom, temperature, humidity, and CO2 concentration.

Project Overview: The key to establishing campus sustainability is how we create a virtuous cycle of improving campus education environment systems and how we maintain that cycle. We are currently conducting the following: (1) Sharing goals and results of energy-saving efforts with the public by disclosing total amount of power consumption on each of Keio's campuses, which automatically maintains incentives for sustainable energy-saving efforts among the university community. (2) Rather than leaving all the responsibility of energy-saving activities on the Facility Management Office, a more well-balanced approach to energy-saving activities is possible by collaborative activities among university administration, educators, and students. (3) The integrated Cluster Energy Management System (CEMS), which encompasses all Keio campuses, facilitates more effective investments in energy facility systems based on the top management judgment while reflecting reactions from individuals in the university community.

Communication: At present, the university Facility Management Office monitors and collects energy consumption data for the entire University and makes recommendations for energy saving. However, instead of leaving all the responsibility of energy saving to the facility management office, by introducing CEMS, the real time environment information collected are made available to the whole university community (administration, educators, and students) and more balanced and interactive energy-saving activities would become possible at the university as a whole.

Lessons Learned: In other settings, it would be also possible to achieve significant energy conservation without degrading the educational or office environment by introducing a total energy management system such as the Cluster Energy Management System (CEMS), which integrates the intellectual productivity environment evaluation based on environmental data (temperature, humidity, light intensity, and CO2 concentrations and the number of students in each classrooms), with the energy conservation technologies.

Keio Global Environmental System Leader Program



Our society needs individuals with knowledge and awareness of environmental issues and leaders with the potential to drive our ability to design and build the technological systems, social systems, and rules to achieve recovery and improvement. This program is aimed at developing global environmental system leaders with the knowledge, awareness, and skills to achieve

such perpetual recovery and improvement of the global environment and the initiative to drive the innovation of technological and social systems for the world's natural and social environments.

To achieve this goal, this program is operated jointly by the Graduate School of Media and Governance and that of Science and Technology. This program is a 5 year post-graduate PhD program with three pillars as following:

(1) International Academia-Industry-NPO collaborative advisory group

Three supervisors are selected for one program student; one is the member of the student's graduate school who supervises major research, the other is that of the other graduate school who supervises minor research and another is the foreign academic person who supervises global activity. These supervisors continually supervise a student until he receives PhD. For example, if the student is of Graduate School of Science and Technology, the supervisor of major research is a member of Graduate School of Science and Technology, the supervisor of minor research is of Graduate School of Media and Governance and the supervisor of global activity is a foreign professor. The student becomes expert of major research area, receiving PhD and understands decision making process of policy through minor research. In addition, the student is able to take part in an international network and will play a key role in the international field in future.

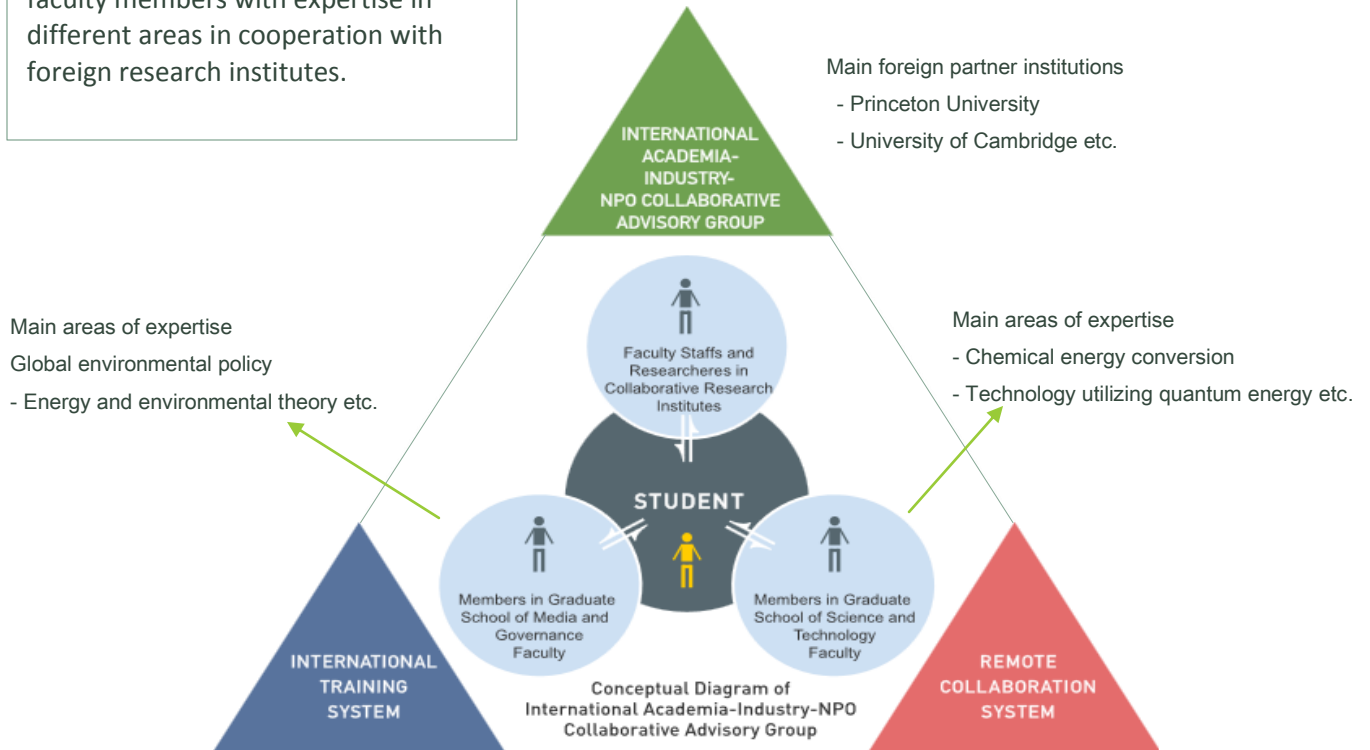
(2) International Training System

The program students have to experience three month internship or field work in two times, totally six months, until the student complete his PhD study. The internship and field work can be done in domestic and foreign company, international organization, NPO, NGO, research institute, university and so on. Internship and field work at foreign countries are strongly recommended.

(3) Remote Collaboration System

Students continuously develop their research projects by interacting with professors and researchers from Keio and international training organizations using a system that can intuitively operate and edit three-dimensional data over the Web, a remote conference system, and a system for multimedia sharing, analysis, and visualization. Students will be able to consolidate information, knowledge, and data concerning environmental research and perform joint work such as examining the results of data analysis and real-time sensor data, natural environment simulations, and the sharing and visualization of apparatus functions and assembly processes.

We aim to develop human resources who can solve environmental issues from both a specialized and a multifaceted perspective by composing a system of three or more faculty members with expertise in different areas in cooperation with foreign research institutes.



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Education for a sustainable future - a strategic initiative at the School of Business, Economics and Law, University of Gothenburg, Sweden.

The School of Business, Economics and Law is educating the next generation of decision makers. This implies a responsibility to offer study programs preparing students for the complex challenges facing society, such as resource constraints, climate change and social tensions. The new strategic plan at the School of Business, Economics and Law emphasizes sustainable development, incorporating economic, social and ecological sustainability.

The overarching goal is to ensure that when our students leave the School they are equipped with relevant tools in the form of concrete skills and insights related to key sustainability issues to address the challenges ahead.

Main sustainability challenges: The School has in several disciplines a strong tradition of sustainability related research and education, and we have offered a wide variety of electives in sustainability for a long while. However, it has in the past been possible for students to go through our educational programs without being seriously confronted with the current sustainability challenges. This was not good enough. In the current strategic sustainability initiative sustainability is no longer seen as an “optional side track”, but as key features in all our educational programs and they should therefore be compulsory to the same extent as other elements.

Learning outcomes for sustainability is introduced in all programmes, this is important as it clarifies what knowledge and understandings our students need to have before graduating. For the school sustainability revolves around a variety of areas such the following:

- Ecological stability of the key ecosystems
- Energy and climate issues
- Health aspects of emissions
- Use of natural resources



PER CRAMER,
SCHOOL OF BUSINESS, ECONOMICS, AND LAW

“Our students must learn to understand and manage the increasingly difficult moral dilemmas and complex global challenges facing our society.”

- Ethics and responsibility at individual, organizational and societal levels,
- Meaning and protection of human rights and cultural norms
- Stability of the basic structures of society, such as economic and financial system allocation of resources, including discrimination and poverty issues.

It is important to point out that sustainability-related elements should have a scientific foundation and maintain a strong link to current research to the same extent as other elements in all our study programs. We encourage students to question critically the theories and methods mediated by the teacher and this naturally applies in this context.

Key features: In 2012 the Faculty Management appointed a working group to explore ways how to comprehensively integrate sustainable development in its courses and programs. After a stakeholder engagement process the working groups' proposed aims and plans were adopted by the school's faculty board. In short the initiative employs a stakeholder perspective (students, teachers, management and campus) with respect to three knowledge areas: *challenge, accountability, and responsibility.*

"The students' future professional roles as economists, lawyers and policy makers include major responsibilities. Sustainability considerations in our programs will largely include issues relating to ethics and responsibility at the individual, organizational and societal levels."

PER CRAMER,
SCHOOL OF BUSINESS, ECONOMICS, AND LAW

A central feature of the project is that all programs have formulated objectives related to sustainable development and that learning outcomes for sustainable development are to be developed for most program courses over time. In contrast to developing new courses, our strategy is to integrate the sustainability perspective into already existing courses. This is a clear signal from the School that sustainable development requires attention from all teachers, and from course and program coordinators in particular.

Additionally, the group proposed an introduction of three yearly sustainability days, one for each of the three knowledge areas, with the purpose of facilitating student education at the same time as it implies a continuous manifestation of the School's focus on sustainable development. In order to coordinate the different initiatives, the School is recommended to form a council for sustainable development (HRHU) and to establish teacher support for integration of sustainable development in courses.

The School Council for Sustainable Development (HRHU) will provide:

- **Educational support:** Professional development of teaching staff (e.g., seminars and discussions with program and course coordinators, multi-stakeholder sustainability lunches) to increase awareness of sustainability issues and providing a knowledge base for integration into courses and programs.
- **Research Support:** To build on the strong foundation of sustainability research at the School, recruitment of international guest researchers is a priority. A continued focused on interdisciplinary research is also important.
- **Sustainability Days:** Each focused on the themes: *challenges, responsibility and solutions.* The first Sustainability Day, focused on *challenges*, was held October 10, 2013. More than 600 students participated in the very successful and appreciated event.

- **Sustainable Campus:** This is the organization to carry out university sustainability practices. Sustainable campus is also responsible for compiling the annual faculty sustainability performance. It is powered by the practical elements of ISO14001.

The process of integrating sustainable development into all courses was kick started in autumn of 2013 with mapping courses and a landscape assessment of program content to assess what is currently offered students. The next step includes identification of where there is opportunity to enhance sustainability within the various programs. A number of courses have also been selected as "pilots" and will receive special support to develop the sustainability perspective.

Communication: Sustainability is to be deeply integrated into existing courses. The focus on mandatory learning outcomes aims at ensuring that all students will repeatedly come across issues related to sustainable development throughout their studies.

Additionally, student engagement has increased and strengthens this work greatly. The student group "Handels Students for sustainability" (HaSS) arranges events, seminars and campus project. HaSS encourage student involvement and contribute to give the School a climate where sustainability issues are discussed continuously, both inside and outside the classroom.

Lessons learned: The management engagement to sustainability was and still is crucial for the process. Because of the number of measures proposed, it was key to have a coordinating body (HRHU) with representation from various stakeholder groups to assist with the planning and stakeholder engagement process.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 2, Campus-wide planning and target setting, and Principle 3, Integration of research, teaching facilities and outreach.

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Green Campus Partnership: Integrating Sustainability Across the Curriculum

The Integrating Sustainability Across the Curriculum (ISAC) program is an 8-week summer program teaming undergraduates with faculty to refine an existing course or develop a new course that incorporates sustainability as an academic theme.

Purpose: The University of Pennsylvania’s Climate Action Plan set a goal to make climate change and sustainability part of the curriculum and educational experience available to all Penn students. ISAC supports this goal by providing an avenue for Penn faculty to incorporate sustainability into new and existing courses across the University.

Overview: Integrating Sustainability Across the Curriculum embodies the ISCN-GULF Campus Charter Principle 3 - Integration of research, teaching facilities and outreach.

A key component of ISAC is the faculty workshop held at the beginning of the program. This workshop engages faculty participants in an exercise examining the concepts of environmental sustainability in many disciplines. Resources experts are invited to the workshop to discuss how sustainability has been incorporated into their field and daily work.

The collaboration between faculty members and students is one of the strongest features of this program. Each student research assistant is paired with two faculty members and works with them to enrich their existing courses or develop new ones in a meaningful way. This may involve, but is not limited to, researching material for the course, developing new assignments, and compiling course reading lists. Structuring the program to have one student work with two faculty members allows for cross-pollination of ideas between two separate courses and expands the breadth of knowledge the student is exposed to during the program.

Since the launch of ISAC in 2012, 14 faculty members and eight student research assistants have participated in the program - integrating sustainability into a range of courses from economics to engineering to urban studies.

Communication: The ISAC program concludes with a poster session where student research assistants present their course development work. ISAC faculty members, University administrators, previous ISAC participants and other guests are invited to this poster session. Additionally, many students submit their ISAC poster to an annual research poster fair hosted by Penn’s Center for Teaching and Learning.

In addition, courses that have participated in the ISAC program are highlighted in Penn's Sustainability Course Inventory, a directory of sustainability-focused and sustainability-related courses across Penn's 12 schools and centers. The promotion of this course inventory fosters dialogue among students and underscores the inherently interdisciplinary aspects of sustainability across Penn's diverse course offerings.

Lessons Learned: One of the most innovative components of the ISAC program that other higher education institutions can learn from is providing an avenue where students and faculty can work together to co-discover ways to enrich their courses with sustainability. Faculty members receive valuable feedback from student research assistants on what types of readings and assignments are stimulating and interesting. Student research assistants not only become subject matter experts while researching how to incorporate sustainability into a course, but also come to understand the complexity of developing a semester-long course. The role of faculty-student collaboration in the ISAC program has been one of the program's biggest assets.

The ISCN Sustainable Campus Charter Principle(s) reflected in this case study include: Principle 3, Integration of research, teaching facilities and outreach.

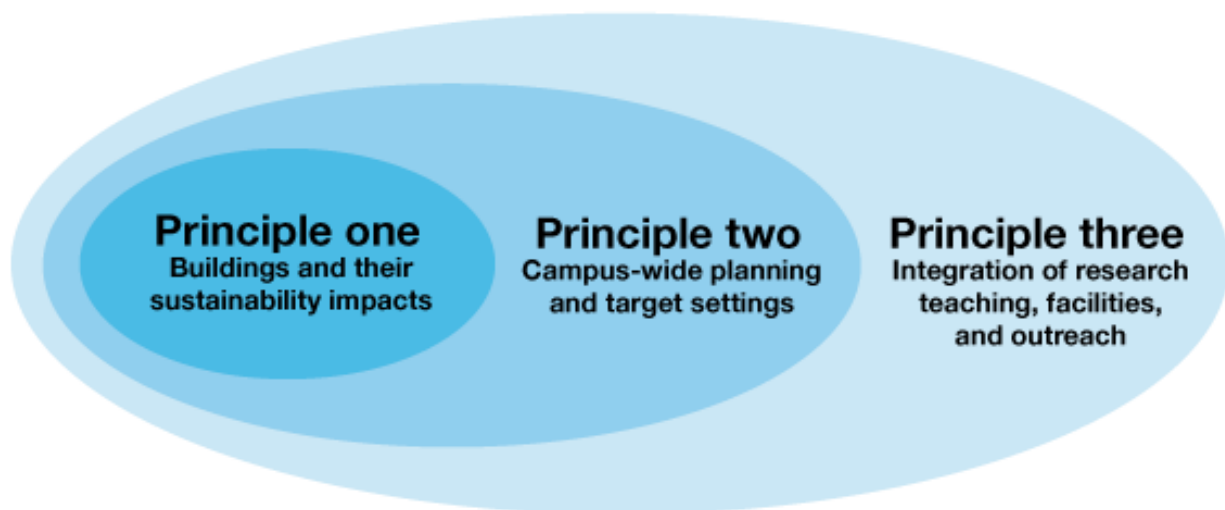
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About the ISCN-GULF Sustainable Campus Charter

The ISCN promotes continuous improvement through learning and innovation on all aspects of sustainability on campus. Key goals in this respect are summarized in the ISCN-GULF Sustainable Campus Charter, which was jointly developed and launched between the ISCN and GULF, the Global Universities Leaders Forum, convened by the World Economic Forum (WEF). In an approach inspired by the UN Global Compact program, organizations endorsing the ISCN-GULF Sustainable Campus Charter commit to setting their own concrete sustainable campus targets against shared Charter principles, and to report transparently and regularly on their progress against those targets.

For an organization to join the Charter, and by that become a formal member of the ISCN, its president, vice-chancellor, rector, or CEO has to sign the Charter document. By that, he or she is committing their organization to uphold the Charter's three principles focused on sustainability with relation to individual buildings, campus-wide programs, and an integrated "living laboratory" approach that connects facilities with education, research, and outreach.



The Charter was presented at the World Economic Forum in Davos in January 2010 to the public for the first time, and was opened for endorsement by interested organizations. Current signatories of the ISCN-GULF Sustainable Campus Charter include premier institutions from across the Americas, Europe, Asia and Australia.



The International Sustainable Campus Network (ISCN) provides a global forum to support leading colleges, universities, and corporate campuses in the exchange of information, ideas, and best practices for achieving sustainable campus operations and integrating sustainability in research and teaching.

The ISCN is managed by the network’s Secretariat, operated by SustainServ Inc., and its strategic development is guided by a Steering Committee including representatives of the five schools who generously host the ISCN:



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich



UNIVERSITY OF HONG KONG



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