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Strategies for Institutionalizing Sustainability in Higher Education

Julie Newman

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Report on the Northeast Campus Sustainabliity Consortium 3rd Annual Conference and International Symposium, November 2 4, 2006

Julie Newman and Lisa Fernandez, EDITORS
Office of Sustainability, Yale University

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Many thanks to all who made possible the NECSC 2006 Conference and International Symposium and this report.

Julie Newman, Ph.D.
Director, Yale Office of Sustainability

INTRODUCTION

Julie Newman, *Director, Yale Office of Sustainability*

The *Northeast Campus Sustainability Consortium (NECSC)* was established in October 2004 to support the growing network of campus sustainability professionals from the Northeast U.S. and maritime Canada. The NECSC is committed to advancing the goals of education and action for sustainable development at colleges and universities in the region. Representing an increasing number of higher education institutions [40-plus], the NECSC has organized itself around the UN Decade of Education for Sustainable Development which spans the years 2005-2014. The following statement from the United Nations launching the commitment to sustainability education captures the intention of the designated decade and what the NECSC strives to promote:

> "Thus education is the primary agent of transformation towards sustainable development, increasing people's capacities to transform their visions for society into reality. Education not only provides scientific and technical skills, it also provides the motivation, justification, and social support for pursuing and applying them. The international community now strongly believes that we need to foster – through education – the values, behavior and lifestyles required for a sustainable future. Education for sustainable development has come to be seen as a process of learning how to make decisions that consider the long-term future of the economy, ecology and equity of all communities. Building the capacity for such futures-oriented thinking is a key task of education."

In keeping with Yale's focus on global outreach, the 2006 NECSC Conference engaged practitioners and experts from institutions of higher learning both from within and outside of the region to foster broader opportunities for exchange. After the two-day NECSC conference, a third day was devoted to an international roundtable symposium entitled "*The Role of International Alliances to Advance Sustainability Objectives on University Campuses*."

The primary goals of the NECSC are to advance sustainability on campus and in the region by providing networking opportunities, best practices exchange, professional development, and access to the region's vibrant and growing college and university sustainability practitioner community. The NECSC is committed to an annual meeting hosted by a college or university in each of the representative states

and provinces. The theme of the 2006 conference was "*Strategies for Institutionalizing Sustainability in Higher Education.*"

NECSC representatives include a growing number of small liberal arts colleges, large private research institutions, and state universities, as well as non-governmental organizations and governmental entities. The goals of the annual gathering are to:

1. Knit together our successes to work towards an overall goal of global sustainability;
2. Identify creative ways to both learn from and share our experiences in creating a sustainable campus so as to challenge each others' goals and increase our efficiency to finding solutions;
3. Invest in the development of partnerships between individuals, institutions, regions and countries.

This report is organized around and expands on themes that emerged from the workshops and plenaries that were the core of the NECSC 2006 Conference and International Symposium, both hosted by Yale University, and held November 2-4. The intention is to offer a synthesis of each session, including the very lively dialogue with the audience that many of the speakers inspired.

WELCOMING ADDRESS

Richard Levin, *President, Yale University*

I am really delighted to welcome all of you here for this third annual Conference of the NECSC. It's our pleasure to have you here on campus. I do hope that you get a chance to look around a bit while you are here.

The fabulous turnout for this conference demonstrates that commitment to sustainabililty is taking hold in educational institutions of every kind, from community colleges to small liberal arts colleges to mid-size universities like Yale to very large state universities. For the next two and a half days you will have the opportunity to interact and engage with students, staff, and administrators that represent more than 50 colleges and universities predominantly from the Northeast of the United States and Eastern Canada, but as you have just heard, from elsewhere as well, including the West coast and from abroad.

It's wonderful to have international participants in this conference, I take it for the first time. We're thrilled that all of you from the United States will have a chance to connect with colleagues who come from as far away as Tokyo, Singapore, Australia, from Europe, Sweden, Switzerland and Slovenia.

I thought I would take my few minutes of welcome to tell you what Yale is doing in this area of sustainability. I want to give just a brief summary of our institutional history, not to suggest that we're doing so great – far from it – but to share with you the trajectory of a school that has managed to come a very long way in a very short time. We haven't been at this very long but we feel we have made terrific progress, though there are many more years of hard work ahead.

At the turn of the millennium Yale was not a leader in the area of sustainability, despite Gus Speth beating up on me from time to time about that. We took the occasion of our 300th birthday in 2001 to establish a number of ambitious institutional goals. One of them was to get all of our students overseas as part of their educational experience. So internationalization was one major theme. But another one was a strength in and commitment to the environment and to making a constructive stand on issues that affect the future of the planet. So we established initially an Advisory Committee on Environmental Management known around here as ACEM by its acronym, which was an effort to bring faculty, students, staff together to have an organized dialogue about how Yale should begin to tackle the challenges of making the university sustainable.

Within a year the group proposed a comprehensive set of principles combined with a series of explicit actions to improve Yale'e environmental performance. And

based on the committee's recommendations, we've taken the following steps over the last four years.

First and foremost in terms of results, we hired an accomplished, energetic sustainability director, Julie Newman, whom many of you know, whose job was to develop a strategic plan for the campus and to oversee the coordination, development and implementation of all these emerging activities. She's done a great job at this. We built around her an Office of Sustainability now supported by 12 research assistants, and the work is disbursed throughout the campus.

We established four campus-wide sustainability committees, again drawn from students, staff, faculty and administrators, and engaged them in dialogue about four topics: energy and climate change; transportation; waste management; and building design and construction. The transportation committee developed Yale's first comprehensive demand management plan and conceived the position of director of sustainable transportation, which we are hoping to fill this year.

The integrated waste management committee completed a waste management analysis and that has provided the basis for the development of a waste minimization and procurement strategy.

The sustainable building design and construction committee is still in the process of analyzing and developing a campus-wide standard to be applied both to new construction and major renovation. But in the meantime, we have committed that with all of our new construction we are going to seek Leadership in Energy and Environmental Design (LEED) certification for every project. At the moment we have 13 buildings that are at various stages between preliminary design and completion which are going to go for LEED certification. Just last month we got our very first LEED gold certification and for an engineering laboratory building no less, which we are very pleased with. Cesar Pelli designed the magnificent engineering center that is not far from here. I hope you get a chance to go see it. It's a beautiful building as well as very efficient.

We are learning lessons with each construction project that accumulate and make the next one easier. I'm very optimistic about the prospects. We are going to be going for platinum certification with the building that will be the home of the School of Forestry & Environmental Studies. Construction on that will begin this summer.

One of the accomplishments that I'm most proud of is our Greenhouse Gas Reduction Strategy. In October 2005, at the recommendation of the energy task force, and after careful consideration by the senior leadership, we committed to the goal of reducing our greenhouse gas emissions 10 percent below 1990 levels by the year 2020. Since the university will be expanding approximately 15 percent from its current square footage over that period (at least that's the current plan) and since energy use is up substantially since 1990, this actually means we have to reduce our energy consumption by 43 percent below what it would be if we stayed on the trajectory we're on.

We are in the process of doing that. We made very substantial gains in our first year. Some of them are very much behavioral changes on the part of the students and staff using the buildings. The students had a competition across the residential

colleges to see who could save the most energy and I think they achieved something like 7 percent reduction in energy in one year, which was very, very exciting. I think this really helps raise consciousness about doing more.

As you leave, out on the registration table you can get one of these brochures which describes our strategy and actually shows some of the targets we have for the various strategies that we'll use to achieve greenhouse gas reduction, such as conservation, building design, better management, use of offsets, and use of non-conventional fuels, which we're already doing in our buses where we are using a mix of ultra low sulphur diesel and bio-fuels.

Now the challenge that's facing our university is the same as the challenge that faces the whole industrial world, indeed the developing world, and that is to reduce emissions drastically while also trying to ensure future growth, development, and continued evolution of higher standards of living for people around the world.

I think our commitment is reshaping the way we think about energy use at Yale. It's providing an impetus for all of us who are engaged in running the university, and for outside architects, to think about strategies that minimize greenhouse gas emissions. And I think it provides, of course, an extraordinary educational model for our students.

While you're on campus I hope you will have a chance to see what we've done. You could ride on one of our shuttle buses, which as I said, run on a blend of ultra low-sulphur diesel and bio-diesel fuel. Or eat at one of our dining halls which now serves 40 percent of the food from locally grown organic foods, which has been supported by another fabulous project we have going on, the Yale Sustainable Food Project. Take a look at the windows in the graduate school, which have been cleaned with non-toxic green seal products. Walk through our residential colleges, which have not only reduced their energy consumption 7 percent, but as a challenge, the university agreed if they met their goal, we would buy 10,000 megawatt hours of renewable energy certificates to offset electricity use elsewhere.

If you were to walk into a residential college some evening you might encounter students from the Student Taskforce for Environmental Partnership (STEP) engaged in peer-to-peer education in which students are teaching other students about energy conservation and are passing out compact fluorescent lights.

While you look at this, though, remember that we're not nearly so far along as we need to be. It's a lot of progress and we're very proud of it, but we've got another 38 percent or 39 percent to go in terms of reducing our greenhouse gas emissions. We're deeply committed to achieving that goal and we know we still have a lot to learn. What's so wonderful about a conference like this is that it's an opportunity for everyone to share their practices, to talk about the things that have worked and haven't worked and to learn from one another about how we can all improve.

I would like to say to the representatives of the roughly 50 universities that are here, I hope you'll find your own way to actually establish the kind of formal goal for yourself that we have. Some institutions might find it difficult to meet a standard as severe as a reduction of 10 percent below 1990 levels. But whether you can meet that particular goal or not, establish one. It would be great if institutions all across America and around the world, campuses which teach, which educate the next

generation, all made commitments of one kind or another of a concrete measurable kind that could be benchmarked, that could be used as a model in industry and government, to show that these things can be done.

I want to thank you all for being here. I ask you to expend some energy this weekend and interact with one another and learn from one another and have a terrific time while here at Yale. Thank you very much.

Northeast Campus Sustainability Consortium Conference

Keynote Address: Climate Change in Institutions of Higher Learning

J. Gustave Speth, *Dean*
Yale School of Forestry & Environmental Studies

I am most honored to have this opportunity. Thank you. Congratulations to Julie Newman and Lisa Fernandez and others who have worked hard to pull this together. And congratulations to each of you. What you are doing on campuses around the country could not be more important. I'll elaborate on that shortly!

But first I want to say that I think this will be a watershed event. Here's why: things are happening! There is more opportunity now for environmental progress than ever before — at least outside of Washington, D.C. I predict that you'll be able to get more done at your colleges and universities over the next few years than you could have imagined a year ago.

One reason is that the grave reality of our environmental challenges is sinking in. On climate change, our biggest threat, I believe we have passed through an important threshold. The science is screaming at us; it can no longer be ignored. A critical mass of leaders in all sectors has finally heard it and now knows this important fact: it's time for something different. We've had boomlets in climate awareness before – the issue was on the cover of *Time* twenty years ago! But this time it's here to stay. We have real action for the first time – the RGGI initiative here in the Northeast, California's program to reduce its GHG emissions by 25 percent by 2020, and action on campuses across the land. (And) I am so very proud of President Rick Levin and Yale and Julie Newman for their commitment to reduce Yale's GHG emissions by 43 percent by 2020.

People are beginning to face up to our environmental challenges.

That said, it is difficult to imagine how badly our past neglect has let things spin out of control. Let me summarize for you just what we're up against – this is the backdrop to your work.

First, environmental losses are already great. Half the world's tropical and temperate forests are gone. Half the wetlands and a third of the mangroves are gone. Ninety percent of the large predator fish are gone, and 75 percent of marine fisheries are now over-fished or fished to capacity. Twenty percent of the corals are gone, and another 20 percent severely threatened. Species are disappearing at rates 100 to 1000 times normal. Most agricultural land in dryer regions suffers from serious deterioration.

Persistent toxic chemicals can now be found by the dozens in essentially each and every one of us.

Consider also that human activities are now large relative to natural systems. We severely depleted the Earth's stratospheric ozone layer without knowing it. We have pushed atmospheric carbon dioxide up by one-third and started the dangerous process of warming the planet and disrupting climate. Everywhere Earth's ice fields are melting. We are fixing nitrogen at a rate equal to nature's; one result is the development of at least 150 dead zones in the oceans due to over-fertilization. We already consume or destroy each year about 40 percent of nature's photosynthetic output, leaving too little for other species. Freshwater withdrawals doubled globally between 1960 and 2000 and are now approaching a quarter of all river flow. The following rivers no longer reach the oceans in the dry season: Colorado, Yellow, Ganges and the Nile, among others. We live in a full world, dramatically unlike the world of 1900, or even that of 1950.

Consider also that all we have to do to destroy the planet's climate and its biota is to keep doing exactly what we are doing today, even with no growth in the human population or the world economy. But human activities *are* growing – dramatically. It took all of history to build the $7 trillion world economy of 1950, and today we add that amount of economic activity every 5 to 10 years. The world economy is poised to double and then double again by mid-century. This economic growth cannot resemble the growth of the past. It requires new designs and new technologies. Everything must be different – construction, manufacturing, energy production, transportation, forestry and agriculture, all very different.

Finally, consider that political, technological and social changes take time. We are now in the most important race in human history – the race to change our politics, our technology and our personal consumption choices much faster than the world economy grows. Only unprecedented action taken with a profound sense of urgency can forestall an appalling deterioration of our natural assets. This is the challenge of environmental management. It may be the biggest challenge ever.

To prepare for this race, we must build a new academic field, this inter-disciplinary field called "environment studies." It must champion the rigorous scientific study of the interactions between human societies and the natural world of the biosphere. Knowledge generated in this new field becomes the basis for environmental management. We need new leaders closely familiar with this knowledge and we also need the knowledge of environment to infuse the traditional professions – business, law, science and engineering, medicine, and so on – and to motivate a revolution in personal choice as each of us carries out daily life as student, consumer, family member, investor, joiner, manager, worshipper, teacher, and voter.

So the role of our colleges and universities must be three-fold:

- First, we must strengthen the curriculum, and our educational programs generally, in environmental studies and allied fields, so that every graduate has that core of essential knowledge and understanding needed to be good stewards of our natural heritage. All of our graduates should know what they need to know to care for our little planet. We will know when we are getting

there, for example, when all economics majors appreciate that the economy is a rather ill-mannered sub-system nested in a grander but finite system we call the biosphere.

- Second, we must strengthen the environmental performance – the sustainability – of all university operations and functions – energy, transport, water, emissions and discharges, hazardous materials. You know the agenda better than I because at last we have a new generation of environmental management professionals at our colleges and universities – you! You attend to these priorities because you know good citizenship requires it. But your work – and engaging students in it – is a vital part of the education that colleges and universities offer. What students see us doing teaches just as surely as our lectures (maybe more so!) And, even more, what students participate in with you establishes lifelong patterns of stewardship and leadership – learning by doing is lasting!
- And third, we must engage the world outside the walls of the academy in a far more profound dialogue on environmental and sustainability. Today public discourse in our country on these issues can only be said to be anemic, impoverished, elementary. It is the job of our institutions of higher education to work to change that situation – to teach beyond our walls.

Have I thanked Tony Cortese yet? I do. I thank him for seeing all this first and for teaching us all about it. And congratulations to Tony, to AASHE, and to ecoAmerica for your University Presidents Climate Commitment campaign.

Speaking of campaigns, let's also hear it for that Yale drop-out Billy Parish and his merry band of student organizers at Campus Climate Challenge. Here's what Billy reported to me the other day:

> "The Campus Climate Challenge has about 340 student groups registered with the campaign and working on these issues. We also have 45 full-time dedicated field staff supporting student groups. The movement is bigger than ever, we finally have a real field presence, we're building strong state networks, doing a lot of training and leadership development, more policies are passed every week. We're working closely with some higher educational associations and in many cases are working closely with campus administrators, faculty and staff to make these changes. Virtually every youth organization we approach for partnership is interested, so the opportunities for expanding the movement and redefining outside of a narrower environmental frame are big."

And our colleges and universities are responding:

- At least 250 campuses have sustainability coordinators or directors or offices of sustainability; and twice that many have institution-wide sustainability or environmental committees.
- Almost a dozen are purchasing 100 percent clean energy.
- At least 60 institutions are purchasing clean electricity.

- 91 have solar panels on campuses and 33 have wind turbines.
- At least 40 institutions have adopted green building policies.

So what are some reasonable climate goals for U.S. colleges and universities? I would urge this consortium and others to get behind a two-step process:

1. First, at a minimum all colleges and universities should do at least what Yale has done—commit to reducing emissions to 10 percent below 1990 by 2020. That starts everybody down the right path.
2. Then for the second step we should all commit to going climate neutral—to zero net emissions. With California already having a goal of 80 percent below 1990 by 2050, zero emissions from colleges and universities represents the kind of leadership we should be giving.

An in-between step of great importance is university sponsorship of an increasing number of climate neutral events, buildings, and operations. I'm particularly proud that our new home for our school—the Kroon Building—will be climate neutral. The building itself will require less than a third of the normal energy use, and our remaining energy needs are mostly for electricity, which we plan to find from renewable resources like wind.

And speaking of leadership, hats off to my friend David Hales and the College of the Atlantic for their commitment to going climate neutral. And thanks to Dan Worth at the National Association of Environmental Law Societies for their work to put this goal on the map.

We must think big and be bold, because what we do, the leadership we give, can make a huge difference. And as the Stern report, just released in the UK earlier this week makes plain, the stakes could not be higher.

I want to close by putting our actions in a broader context. In my book, *Red Sky at Morning*, I developed the concept of green jazz—all the bottom up, improvisational, unscripted actions that people and institutions can take—without waiting on Washington.

The biggest threat to our environment is global climate disruption, and the greatest problem in that context is America's energy use and the policies that undergird it. So in terms of bottom-up, citizen-driven actions—green jazz—there is no riper target than the U.S. energy scene. And, indeed, the energy-climate problem provides the best example available of how decentralized initiatives and local action are beginning to address a global-scale problem. We can imagine goals being set for renewable energy use and for reductions in greenhouse gas emissions by businesses and universities, by communities and states, then by groups of states and national associations and organizations of many types, including educational institutions, all supported by worried insurers and institutional investors, and prodded on by students and other stakeholders, to the point that local actions are indeed going to scale and changing the world. This is not a distant vision: it is a process that has already begun in our country. It is a great privilege for all of us to be part of this effort, and it is wonderful to see you playing this beautiful jazz.

Strategies for Institutionalizing Sustainability on Campus

Summary by Rosi Kerr

Panelists

Julie Newman, *Director, Office of Sustainability, Yale University**
Matthew St. Clair, *Sustainability Specialist, University of California, Office of the President*

*Workshop organizer

In this session, two strategies for institutionalizing sustainability were compared and contrasted. Each presenter provided a brief overview of his/her position followed by a brief explanation of the institutional strategy that was employed. The example of the University of California initiative provided a systemic perspective, while the Yale University presentation illustrated a campus specific approach.

UNIVERSITY OF CALIFORNIA, OFFICE OF THE PRESIDENT

The UC Strategy: Committees

The University of California system is comprised of 10 campuses and more than 100 million gross square feet of building space. Collectively the UC system has a large impact on the use of natural resources throughout the state and beyond, with an aggregate enrollment of more than 200,000 students. This demography makes the UC system a perfect laboratory for experimenting with a multi-campus approach to sustainability. The UC sustainability program emerged from a feasibility study and policy that was adopted in 2003. The position of Sustainability Specialist for the UC system was created and placed in the system-wide Office of the President. The Sustainability Specialist is responsible for overseeing the development of and providing support to sustainability activities at each of the UC institutions.

The strategy of the Sustainability Specialist has been to assist with the development of sustainability-themed committees across the UC system. Naming the committees, choosing the right members, situating them within the appropriate office, and determining the appropriate meeting frequency all have significant impacts on the effectiveness of each committee. The Specialist must think strategically about all of these questions. The role of students and faculty and their

respective positions on the committee also are important to consider. Students, for example, add enormous energy but within a short time frame and, often, with limited effectiveness because student involvement sometimes makes faculty and staff feel correspondingly less likely to take a committee seriously. In the UC system, each campus determines its own set of sustainability priorities. The Committee at UC Berkeley, for example, has focused on Sustainability Awards, a Green Development Fund, a Campus Sustainability Assessment and an alumni network.

Assessments

Assessments of current impacts and identifying potential opportunities have been an important starting place for improving sustainability on the various UC campuses. At UC Berkeley, a graduate student led the effort and undergraduates provided the workforce. This enabled a very thorough and comprehensive review. In contrast, UC Santa Barbara hired a consultant to develop a Sustainability Master Plan and to train members of the community to be "Sustainability Change Agents" using the Natural Step system. This has resulted in very ambitious goals for this campus. Other UC campuses are planning to complete related campus sustainability assessments within the year.

Developing Offices of Sustainability

Each campus is taking steps towards developing what may eventually become an Office of Sustainability. The reporting lines for each of these offices will vary from campus to campus. This is a critical question and crucial to the success and desired impacts of the office. The temptation seems to be to place this position within the facilities department, though ideally they should not be situated there because it could potentially limit their effectiveness outside of operational responsibilities. UC Santa Barbara has three people working on sustainability (facilities, procurement and education) with the eventual goal of shifting the office from facilities to a higher level, possibly the provost's Office. Other UC campuses [Los Angeles, Berkeley, Riverside, San Francisco and San Diego] are in the process of establishing a sustainability manager or director position for their university.

Finding Tipping Points, Sharing Information and Using Existing Resources

The current sustainability specialist views his role as that of a change agent or catalyst. To make the most of his time, he searches for tipping points where a little push from him goes a long way. He seeks to empower, legitimize and support the efforts of sustainability activities on each of the UC campuses. He uses email, a website, the American Association of Sustainability in Higher Education bulletin, lectures and classes as his media. He also mentors student activists and has frequent conference calls with faculty and staff. He works to make connections between people and to be a repository of information that is useful to others. One example is bringing together the right people to create standard documents and contracts for green building projects. Another is developing training programs to share institutional knowledge and disseminate information.

A UC Sustainability Conference was established as a way to increase communication and exchange between the campuses. This annual event brings together stakeholders from the entire UC system and other California universities to celebrate and learn from the progress that is being made. The conference attracts more participants each year and adds breadth and depth to the campus dialogue.

Sustainability Policy Achievements

What are the results of the UC system efforts? The UC sustainability efforts are having a noticeable impact on support structures that reverberate outside of the university system. The UC capital building program, for example, will spend $8 billion on construction alone. Other accomplishments include:

1. A System-wide Sustainability Steering Committee

The steering committee includes representatives at the vice chancellor level from all ten campuses plus faculty experts and state government representatives. This committee helps coordinate sustainability efforts across the system and gets reports from 6 topical system wide working groups (Sustainable Transportation, Climate Change, Sustainable Operations, Sustainable Purchasing, Green Building for Renovations, and Sustainable Food Systems)

2. An Updated Climate Policy

The policy is consistent with the state of California climate and energy policy. In addition to near- and medium-term goals for emission reductions by 2014 and 2020, the policy sets an ultimate vision of becoming "climate neutral" as soon as possible.

3. New Policy Initiatives
    - A sustainable operations policy using LEED for Existing Buildings
    - Extending green building policy requirements to renovation projects
    - A waste reduction policy
    - A comprehensive purchasing policy
    - A sustainable food systems policy is still about one year out

The new policy initiatives have had considerable impact. In just three years the culture in the UC system has changed drastically. Stakeholders are more involved and sustainability is increasingly institutionalized. And, while there is still a long way to go, the pace is picking up.

PROGRESS TOWARDS SUSTAINABILITY AT YALE

Yale's Office of Sustainability, which reports jointly to the Office of Facilities and the Office of the Provost, was created to generate increased momentum and facilitate the process of developing and implementing best sustainability practices at Yale. New

energy was added to the community's historical grassroots sustainability efforts and to the University's early formal mechanisms, such as the Provost's Advisory Committee on Environmental Management. In 2004 Yale strengthened its commitment by creating the position of Sustainability Director and, through her efforts, the Office of Sustainability. The initial role of the office was to:

- Engage students, faculty, and staff in gaining understanding of current patterns and consequences of behaviors;
- Encourage creative dialogue to explore desirable sustainable characteristics and the means to achieve them;
- Incorporate sustainability principles into operational functions and educational framework in order to influence actions from the local to the global level.

Integrating sustainability into a University requires process. There are a range of complex issues sustainability engages – including moral and ethical ones – that often require community debate and resolution.

Setting the Course

The Sustainability Director must learn to understand and be conversant in the culture of the university. The Sustainability Director must identify where the key leverage points and decision-makers are and how change, more broadly, happens within the institution. Questions that shape this discussion include: What is the culture of the university and how does it evolve? How can it become more sustainable? At Yale, dialogue on sustainability has evolved from resistance to broad-based acceptance and engagement.

In an effort to understand, analyze and make recommendations on how to create sustainable systems at Yale, four campus-wide Sustainability Committees were convened – Energy Task Force, Integrated Waste Management Committee, Transportation Policy Committee and Marketing and Communication Committee. In year two a Sustainable Design and Construction Committee was created. A vice-presidential level administrator was invited to chair each committee and this, it turns out, has been the secret of the success of these committees. These committees reflect only the initial priority areas. Future committees will tackle additional campus challenges such as water, land management, and procurement.

How Will the Results be Achieved?

Not all of the work and decision-making that produces results occurs inside the Office of Sustainability. Part of the job is highlighting successes that are already occurring and bringing people together to share information. Partnering with academics and helping existing groups find resources is also an important piece of the puzzle. One of the most critical skills of a sustainability director is the ability to recognize and influence how decisions are made. Figuring out how the institution

makes decisions enables one to tip that process from one that reinforces the status quo to one that seeks designs that offer innovative solutions. Some of the key strategies include:

- Engaging stakeholders in the solution, as opposed to the problem.
- Recognizing the difference between an individual's concern and an institutional endorsement.
- Developing language that institutionalizes the changes that are sought. For example, instead of "increased cost" develop a language of "institutional investment."

At Yale, the Office of Sustainability is still working on bringing the pieces together and creating bridges between areas of the institution that might bring opportunities for increased sustainability.

Yale is now positioned to build upon and maintain momentum for a comprehensive and strategic approach to becoming a sustainable campus. In an effort to determine if Yale is advancing within the context of the sustainability strategy, a comprehensive set of metrics were developed. These metrics are now systematically being collected on an annual basis in an effort to track progress and potentially benchmark Yale with peer institutions, particularly those in the northeast region of the United States. The primary challenge facing the analysis of these metrics, is determining how to interpret the data and in turn, provide a set of short and long-term targets for the campus. The systematized collection of this data also provides an opportunity to determine and potentially influence causal relationships.

For a comprehensive list of Yale's sustainability efforts go to: www.yale.edu/sustainability.

Building a Business Model for a Climate Neutral Campus

Summary by David Gottesman

Panelists

Leith Sharp, *Director, Green Campus Initiative, Harvard University** *Workshop organizer
Robert Pratt, *Senior Vice-President, Henry P. Kendall Foundation*

THE UNIVERSITY: A GOOD PLATFORM FOR MODELING SUSTAINABILITY

Rob Pratt opened the session by explaining why university campuses are ideal platforms for energy efficiency and alternative energy initiatives: they are large energy users, boast mobilized administrators and students, maintain stable finances (endowments) and have consistent thermal and AC loads.

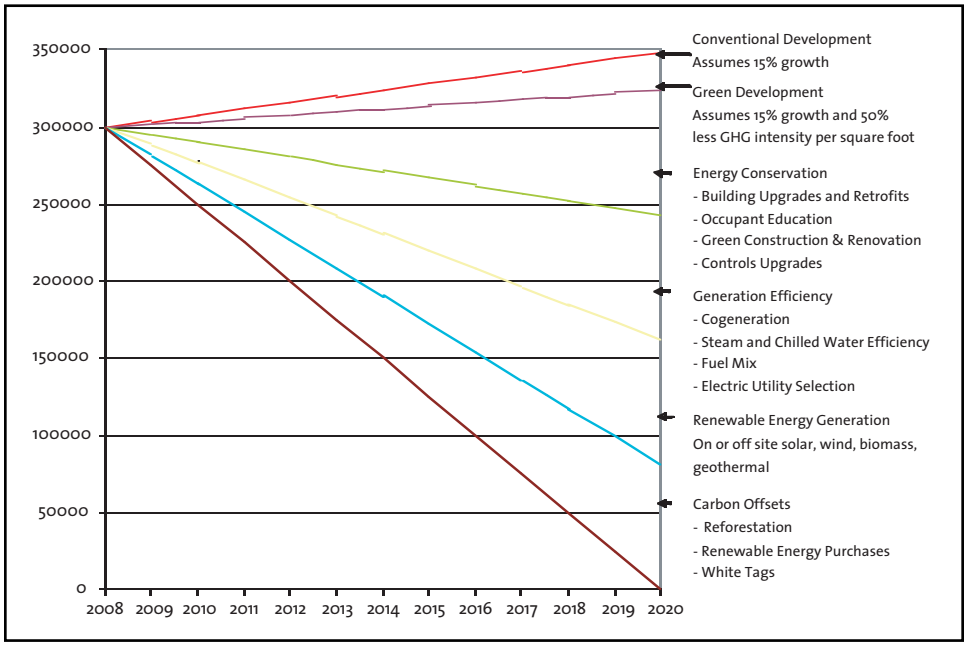
Universities' three main options for reducing energy use include energy efficiency implementation, improving distributed generation and shifting peak load. Campuses can pursue energy efficiency by installing new lighting technologies, a vastly underutilized approach; improving distributed generation by taking advantage of renewable energy, which becomes cheaper by the day, and by installing combined heat and power systems (co-generation); and shifting peak load by employing demand response techniques like rescheduling large loads to off-peak hours.

Pratt next explained some of the numerous mechanisms currently available for funding energy efficiency and renewable energy programs. The states of Massachusetts, Connecticut and Rhode Island have clean energy funds, for example. In some regions, Sun Edison offers customers a "Solar Power and Service Agreement," which is based on local photovoltaic tax rebates and other incentives. Of notable importance is the forward capacity market, a $5 billion program of Independent System Operators (ISO) New England. This arrangement creates a ratepayer fee structure to pay electricity generators to address capacity concerns, which allows entities like campuses to act as aggregators in the market.

HARVARD'S BUSINESS MODEL FOR SUSTAINABILITY

Leith Sharp introduced her presentation on a business model for a cost neutral and climate neutral campus by explaining that Harvard's GHG emissions have increased by 45 percent since 1990, due mostly to expansion. This problem is further compounded by the university's plan to grow an *additional* 50 – 60 percent in the coming years. To resolve this pressing issue, Sharp proposed a six-pronged solution comprised of energy conservation, improved generation efficiency, renewable energy, carbon offsets, green construction/development and organizational change.

Figure 1 Methods for reaching campus climate neutrality (in metric tons of CO_2 Equivalent)



Energy Conservation

Energy conservation can reduce existing building energy consumption by 30 – 50 percent and may be attained by several means. Harvard's green renovations meet or exceed LEED standards by diverting waste, employing daylight and occupant-sensing fluorescent lighting, using icynene foam for insulation, employing bamboo flooring, and so on.

Additionally, the use of low VOC adhesives and sealants improves the indoor environment and therefore occupant productivity. The university has been able to carry out these green renovations at no added cost. The secret behind this achievement has been to build the in-house capacity to transfer project lessons and innovations from one project to the next, so that design processes are streamlined for optimal results and cost-effectiveness. Overall, green renovations result in energy reductions of 20 – 40 percent and translate to a payback in 0-10 years (the payback is

even sooner if one includes the number of sick days employees do not take because of improved air quality). These savings can be captured and invested in renewable energy.

Upgrades are another important element of energy conservation. The Harvard Green Campus Loan Fund, a $12 million source of interest-free capital, has been used for many facility upgrades with paybacks in fewer than five years. The fund itself is a viable and sustainable investment, since its average return on investments has been 35 percent – a performance better than even that of Harvard's celebrated endowment. Sharp argued that current accounting systems sabotage good business practices because they focus only on acquisition costs and do not provide rewards for savings over the lifetime of a product or project. Instead, life cycle costing should be evaluated in purchasing decisions. For example, debts to Harvard's Green Campus Loan Fund can be repaid by the savings derived from the increased efficiency of the electricity, water and heating systems that the loan has financed.

Control systems and continuous commissioning can also reduce utility consumption by 15 - 45 percent. Dormitory rooms in Harvard Business School have been outfitted with occupancy sensors that are integrated with the building management systems, which allows for individual fan coil unit setback (i.e., the system turns off when no one is in the room). This project saves about $25,000 annually. Large-scale savings can also come from control-driven changes in laboratories, as these facilities tend to be some of the largest energy users on campus.

Lastly, occupant education programs at Harvard can generate reductions in utility consumption by five to ten percent (for electricity, the savings are as high as 20percent). Residential Green Living initiatives consist of one paid student for every 200 – 400 residents to educate their peers about alternative behaviors to reduce personal impacts. Over the course of a year, these efforts cost $250,000 but save over $400,000.

Improved Generation Efficiency

Cogeneration and geothermal power have proved effective on the Harvard campus. The Business School's Shad Hall, for example, is heated with the waste heat from electricity production, at a savings of approximately $70,000 per annum. Investing in this technology resulted in a simple payback of only 2.7 years.

The proper sizing of utility systems is another target. Conventional systems are sized for 100 percent of the peak load plus a "safety factor" of an additional 20 - 30 percent as well as a "start up factor" of another 20 - 50 percent. These oversized mechanical plants can be avoided by sizing facilities properly, which saves 10 to 50 percent in energy costs.

In the realm of improved generation efficiency, it is also worth mentioning efforts at streamlining distribution and optimizing metering and billing.

All the initiatives discussed up to this point save money for institutions. These funds can be invested in the following areas in order to achieve climate neutrality without any net fiscal impact.

Renewable Energy

The price of renewable energy, including wind, photovoltaics (PV), geothermal, solar thermal and biomass, has decreased substantially in the last 25 years. It is expected that prices will continue to fall in the coming decade. Therefore, even though it will cost money to invest in these energy sources, that amount is continuously decreasing.

Carbon Offsets

As effective as the aforementioned programs have been and will continue to be, given the current growth plans of most universities, it will be impossible to achieve carbon neutrality without purchasing carbon offsets. Popular options include renewable energy certificates, white tags and reforestation. In 2006, Harvard purchased 22,000 MWh of renewable energy certificates, which represented seven percent of the campus' electricity load.

Green Construction/Development

This aspect can either cost or save money, depending on the particulars of the project. For example, the master plan for a green expansion of Harvard's campus calls for LEED-certified buildings, the use of renewable energy and increased generation efficiency, among other approaches. If successful, this project will result in 80 percent fewer GHG emissions than a conventional campus produces.

Organizational Change

Sharp acknowledged that grassroots efforts by Harvard's building managers, facilities staff and project managers have been able to provide the confidence and capacity needed to form a base for green campus initiatives and that the university's top level leadership – its President, Provost, Deans and VP's – has used its authority to legitimize and prioritize green projects. She argued, however, that those in upper middle management, including second level deans, associate VP's, CFO's and COO's, are the most difficult to reach. Moreover, since they are the ones who control the university's capital approval systems as well as its Finance and Accounting divisions, a green business model must appeal to these gatekeepers who can "make or break" such initiatives. To that end, it is important to demonstrate the financial benefits associated with campus sustainability.

The Harvard Green Campus Initiative costs $1.3 million annually, but saves the university $6 million each year. It functions much like a consulting agency: 20 percent of its funding comes from central administration, while the remaining 80 percent comes from direct fees for service agreements paid by university clients (e.g. – Harvard Real Estate Services, Harvard Law School, Harvard Business School). All of these customers have enjoyed paybacks within five years.

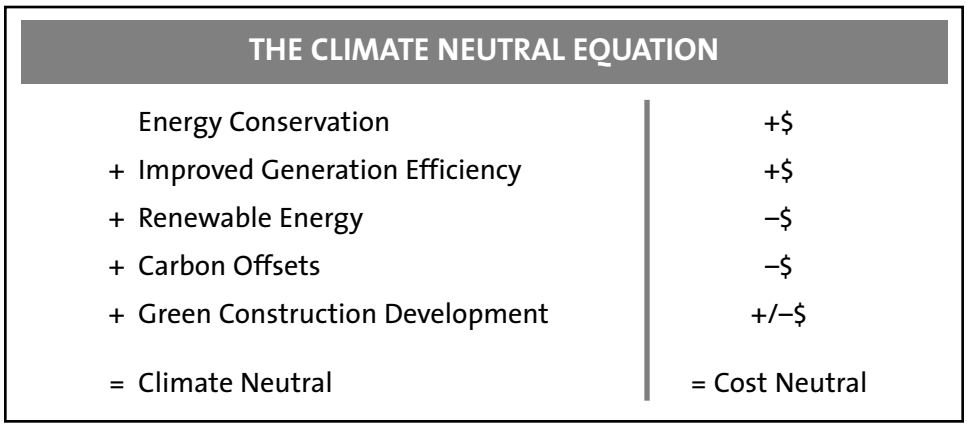
Sharp also called for building- or school-level pilots in order to prove the value of conservation savings as a funding source for renewable energy; leveraging other universities' initiatives; instituting life cycle costing across campus; institutionalizing financial connections between capital, operating, utility systems costs, renewable energy investments and carbon offsets; and institutionalizing performance and

investment requirements for buildings, generation and distribution systems, and investing these savings into renewable energy development and carbon offsets.

Discussion

Regarding alternatives to green loan funds, Sharp commented that the loan fund is a transitional strategy. Long term efforts must incorporate life cycle costing, as only this method will reveal the true cost of a purchase. She reiterated that the "separation between building and operating is costing us a lot of money!" Pratt indicated that a new source of financing was available in New England through ISO-NE's $5 billion Forward Capacity Market (FCM) program. Intended to insure that the region does not run out of power, $1 billion per year in incentives are provided both for new generation as well as demand-side management solutions. Because the FCM can make available new money for efficiency, it allows for innovative financing techniques to increase the leverage and reach of energy efficiency implementation.

Figure 2 Climate Neutrality Balance Sheet



One participant expressed concern about the cost neutral approach, claiming that some people feel that "what doesn't cost anything isn't worth anything." Sharp agreed that there might be some potential for skepticism of cost-free solutions, but maintained that at Harvard, it has been necessary to propose "highly rational business oriented arguments." Even if the university is willing to pay for green initiatives that lack sound financial models, her office gains more credibility by offering a fiscally advantageous proposal.

The topic turned to the level of scrutiny with which green proposals and purported savings are often met on campuses. Sharp explained that "a disproportionate amount of scrutiny lands on us. We are in-house and when we offer a calculation we really do get scrutinized; our data are good as a result." Her office's energy models provide a clear cost differentiation; what is not included in their audits, however, is how green projects have affected management in cost-saving ways. Hence, she claimed, her figures are conservative.

Concerning actual project supervision, Sharp lamented that departments planning new buildings or renovations did not always contact her office early enough in their project development stages. Until this kind of coordination becomes mandatory, her office will continue fostering relationships with Harvard's schools and departments to learn about and attempt to influence their plans.

Sustainability Indicators Working Session

Summary by Meleah Houseknecht and Sarah Percy

Panelists
Gioia Thompson, *Environmental Coordinator, University of Vermont**
Sarah Hammond Creighton, *Director of Sustainability and Manager, Tufts Climate Initiative, Tufts University*

*Workshop organizer

Both Gioia Thompson and Sarah Creighton participate in the NECSC Sustainability Indicators Workgroup, which has been developing a set of indicators to compare energy and waste data for six institutions of higher learning. In addition, Thompson's recommendations are based upon her experience in producing *Tracking UVM*, a report on environmental indicators for the University of Vermont from 1990-2000. The workshop focused on:

1. the types of sustainability indicators that can be collected for educational institutions;
2. the value in collecting these indicators;
3. the advantages and disadvantages of normalizing data;
4. the most efficient methods for collecting and disseminating it to a wider community.

The primary purpose of the NECSC Sustainability Indicators Workgroup has been to explore what the universal difficulties are in collecting and analyzing the data necessary to track a campus's waste and energy consumption. The workgroup's initial analysis focused on comparing data from the years 1990, 2000, and 2004. The findings of the group were that the data collection process is time-intensive and often overwhelming. The appropriate contact for collecting data is often unclear and it is difficult to choose among the large variety of data types available from campus offices. Furthermore, there is the question of how and when to normalize data such that it can be compared between very different types of institutions. While normalizing on a per student (per capita) and a per square foot basis did produce some illustrative results, these types of comparisons often resulted in more questions

than answers about each campus's true sustainability. Despite the frustrations associated with this process, both speakers agreed that the tracking of particular indicators is essential for addressing the most important environmental impacts associated with campuses. The major categories of impacts identified by Thompson and Creighton are GHG emissions/energy use, solid waste and recycling, and water use. The remainder of this summary outlines recommendations related to the collection and use of campus sustainability indicators.

TYPES OF INDICATORS COLLECTED

The extent of collection and the types of indicators collected varies greatly from campus to campus. While some schools monitor their electricity use with real time monitors, others keep minimal records of where and when energy consumption takes place. Many of the metrics measured by environmental or sustainability offices at the schools present in the working session are shown in Box 1 below. There are also several metrics measured by other campus offices that could be useful in the development of sustainability indicators, shown in Box 2 below. The lists are not all-inclusive.

Box 1 Indicators Collected by Campus Sustainability Offices and Facilities Management

- Energy consumption
- GHG emissions
- Electricity use
- Recycling and solid waste generation rates (total lbs and percent recycled)
- Generation of food scraps from dining halls
- Paper use
- Storm water management
- Percent of power co-generated
- Total quantity of hazardous waste generated
- Amount or percentage of organic wastes composted
- Total campus water use / steam and chilled water use
- Passenger trips on campus shuttles / transit system use

Box 2 Indicators Collected by Non-Environmental Offices across Campus

- Diversity
- Full-time equivalent student and faculty counts
- Human relations information (e.g. turnover rates)
- Transit data
- Research dollars
- Institutional publications
- Investment/profit
- Water quality
- Amount of new construction and renovation
- Alumni data
- Legislative information
- Safety
- Purchasing
- Liability violations
- Attitudes on campus

The participants in the working session agreed that collection of sustainability data is tedious and time consuming. Given the high demands on the time and budget of campus sustainability offices, it was suggested that campuses start by measuring only those actions that have the greatest impact on the environment. In order of priority, these include activities that result in greenhouse gas (GHG) emissions/energy use, generation of solid waste and recycling, and water use.

UTILITY OF COLLECTING INDICATORS

While it may require great time and effort to collect campus sustainability indicators, the metrics do serve many purposes. Some of these uses, suggested by participants in the working session, are listed in the text box below. The collection of campus sustainability indicators is, first and foremost, essential to the process of decreasing the environmental impacts of a university's management decisions. The process also helps set up a system of environmental accountability. Sustainability indicators can also be extremely useful in helping to focus a sustainability office's limited time and money. To this end, Creighton suggested tracking every potential environmental project by the estimated cost, time involved, educational potential, and likely impact. Those projects which are expected to yield the greatest decrease in environmental impact for the least amount of time and money should be pursued.

Box 3 Uses for Sustainability Indicators

- Track trends and progress
- Inform management decisions
- Compete with rival schools
- Create student incentives
- Achieve compliance
- Fulfill LEED certification requirements
- Create a baseline and benchmark
- Pursue operational efficiency
- Support environmental policy and decisions
- Preserve institutional memory
- Educate

ADVANTAGES AND DISADVANTAGES OF NORMALIZING THE DATA

Because of the vast differences in size, mission, budget, and culture between institutions of higher learning, sustainability indicators must be normalized if meaningful comparisons are to be made. Such comparisons can provide insights into the differences in environmental impact caused by various uses of space and operational decisions. For example, the indicators collected by the NECSC Indicators Workgroup brought attention to the fact that more intensive uses of space led to greater energy efficiency. This in turn highlights the potential for improved scheduling and intensified space management to greatly enhance an institution's overall efficiency. Running multiple labs in the same room and scheduling classes for Fridays, early mornings, and evenings can reduce the pressure to build more classroom and lab space. However, it was noted that these types of changes would require not only a change in operations, but a culture shift as well.

As one workshop participant noted, another advantage to normalizing and comparing data between institutions is the power of intercampus rivalry. In addition to the leverage this generates with administrators, this rivalry is a particularly effective tool for getting the entire school community involved.

The NECSC Sustainability Indicators Workgroup used the following statistics to normalize their data:

- number of full time-equivalent (FTE) students
- number of gross square feet in campus buildings
- size of endowment

While there are advantages to normalizing data for the sake of comparison, there are disadvantages as well. Normalized data can mask meaningful differences in

overall resource consumption. For instance, two buildings may be equally energy efficient *per square foot*, but if one uses less space to accommodate the same use it will consume less energy overall. In addition, when an institution is growing, energy efficiency per square foot can improve, even while net emissions are increasing.

Normalization of data can also facilitate comparison between two non-comparable entities. For example, the *per student* energy consumption of a research university will tend to be large compared to a small college, not because of differences in energy performance among similar buildings, but because research labs tend to be more energy intensive than classrooms and because a greater proportion of the university population is made up of staff, rather than students. In addition, different institutions can measure the same data differently. The NECSC Sustainability Indicators Workgroup found that even within a single university there may be many ways to measure the number of FTE students; different schools disclose different information related to the size of the endowment; and even energy consumption can be calculated differently depending on how much power is generated on campus and for what purpose.

While these challenges do not negate the value of normalizing sustainability data, they do point us towards the need to be careful in the presentation of these numbers. First, it is crucial to be clear about what is and is not included in the calculations—to state assumptions. Ultimately, part of the goal is to create a common language and to increasingly standardize the data available and the systems used to calculate normalized sustainability indicators. For now, while normalized data can help point towards areas where the institution is weak compared to other institutions, it is most useful as an internal tool, and should only be used to compare similar institutions.

EFFICIENT METHODS FOR COLLECTING AND DISSEMINATING THE DATA TO A WIDER COMMUNITY

Given that gathering data takes up the valuable time of operations managers, sustainability coordinators and students, environmental offices must be careful not to gather more data than they have time to analyze or data for which there is not a clear use. The following are a few good rules of thumb for collecting data related to sustainability indicators:

1. Always know the purpose of data before investing time in measurement or collection.
2. Student projects often generate good data, but also require supervisory time, so projects should be screened carefully for those with maximum impact and requiring minimum supervision.
3. Given limited time and resources, it is important to focus on the areas that have the greatest environmental and economic impact. For example, it is often easier—and students are more eager—to collect information on kWh consumed by dorms than by research buildings, but research labs generally consume far more energy per square foot.

Thompson and Creighton suggested that sustainability coordinators tap into their school's Institutional Research Group, because this group of trained statisticians is already collecting much of the data relevant to campus sustainability and already has the skills needed to properly analyze this data. Creighton requested that Tufts' GHG emission data be included in the Institutional Research Factbook. As a result, the calculation of GHG emissions has been institutionalized beyond the sustainability office and the estimates produced are viewed as more credible and made more accessible to a wider audience. Ideally, when sustainability metrics are adopted by an institution's administration they become a public relations tool and are seen as adding value to the college or university overall, giving the sustainability coordinator further leverage. This was certainly Thompson's experience when she published UVM's 2002 sustainability report—the President saw it as an important enough PR piece to send it to the Trustees, and the Provost is now interested in making UVM "a leading Environmental University."

FINAL RECOMMENDATIONS

Thompson and Creighton ended the session with a reminder that, while normalized data have their place, we should not lose sight of the importance of measuring and reporting net emissions, which ultimately determine our level of overall impact. Emissions reduction goals set by campuses should be related to net impacts and, where appropriate, should be made consistent with national and regional goals.

One of the key challenges for campus sustainability officers is balancing a focus on operational change and goals setting with the need to shift campus culture through student empowerment and education. Essential to this balance is maintaining a focus, even when working with students, on the changes which will have the greatest impact (which will not always correlate with the statistics having the biggest "wow factor"). One important way to do this is to emphasize, through the strategic use of specific metrics, the uses of resources (such as the global atmosphere) that matter most.

USEFUL TOOLS FOR COLLECTING SUSTAINABILITY METRICS

- Clean Air-Cool Planet's Carbon Calculator can be downloaded at: http://www.cleanair-coolplanet.org/toolkit/content/view/43/124/
- EPA's Energy Star program offers a benchmarking tool for buildings: http://www.energystar.gov/index.cfm?c=spp_res.pt_spps_automated_benchmarking
- The Campus Consortium of Environmental Excellence offers many resources, including a *College and University Sector Self-Tracking Tool* and several comprehensive reports. For the tool go to: http://www.c2e2.org/cgi-admin/navigate.cgi

Tools for Smart Growth and Sustainable Campus Development

Summary by Michael Davies

Panelists
Richard Miller, *Director of Environmental Policy, University of Connecticut*
Michael Dietz, *University of Connecticut*

During this workshop, Rich Miller illustrated recent smart growth, sustainable development (SD) and low impact design (LID) initiatives at the University of Connecticut (UConn) and Mike Dietz focused on LID practices related to stormwater management and water quality.

SUSTAINABILITY STRATEGIES AT THE UNIVERSITY OF CONNECTICUT

UConn has pursued sustainable development for a number of reasons. Most importantly, the University is in the middle of a $2.3 billion capital improvement program designed to enhance and rebuild the campuses in order to attract and retain the most qualified students and faculty. Since the implementation of this program, known as UConn 2000, and now 21st Century UConn, the UConn applicant pool has in fact increased along with other metrics, such as average test scores and diversity of incoming students. For example, UConn now admits more than 100 high school valedictorians and salutatorians each year, and is consistently ranked as the top public university in New England. Prospective applicants are beginning to demand smart campus growth initiatives. Schools with programs in place will differentiate themselves in the marketplace.

UConn's main campus is located in Storrs, within the rural northeastern Connecticut town of Mansfield. The university owns 4,000 acres in Mansfield, including its 886-acre Agricultural/East Campus. As an important first planning step for ensuring sustainable growth, UConn's Office of Environmental Policy led a multi-stakeholder process to update UConn's East Campus Master Plan. For the first time, this effort analyzed not just development opportunities but also conservation goals for important, GIS-mapped, natural, historic, recreational and cultural resources.

Another critical organizational first step toward a more sustainable campus was getting stakeholder support for the various initiatives being proposed. UConn created the "Environmental Policy Advisory Council" (EPAC) that included representatives of the various school departments and committees. The advantage of an inclusive council is the greater ease with which points of contention may be identified, decision makers engaged, and solutions proposed and implemented. Of paramount importance was the need to get the president's office both involved and supportive of the changes being made.

EPAC adopted an Environmental Policy Statement reaffirming UConn's commitment to sustainability, focusing on the following areas:

- Environmental performance
- Responsible management and growth
- Outreach
- Academics
- Teamwork

UCONN'S ENVIRONMENTAL IMPACT EVALUATION PROCESS

As a state facility, UConn is required to perform an Environmental Impact Evaluation (EIE – the CT version of an EIS as required under NEPA) for all larger capital projects. The EIE serves as an effective "big picture" planning tool and requires public hearings at both preliminary and later stages of a process that typically takes at least nine months to complete. Thus, the EIE is a valuable tool for analysis and dialogue on a wide range of potential environmental impacts and any proposed mitigation strategies.

SUSTAINABLE DESIGN

UConn has commissioned its first LEED building, the first LEED athletic complex in the NCAA. The university is also pursuing LEED certification and/or sustainable design goals for several other construction projects. In an effort to formalize green design initiatives on campus, UConn is one of only a handful of universities nationwide to have developed its own campus sustainable design guidelines (SDGs). All new construction on the campus must comply with these guidelines. The SDGs have helped:

- signal a paradigm shift on the part of the university;
- present identifiable standards that can be measured;
- engage the community;
- acknowledge success;
- demonstrate commitment;
- facilitate benchmarking.

SDGs from other universities and organizations were considered in the development of UConn's own guidelines. Institutions whose SDGs were reviewed included Stanford University, University of Buffalo, University of Minnesota, and the Heinz Foundation.

One debate that has been addressed at UConn is whether or not to mandate the use of the LEED process as the mechanism for implementing green design in buildings. The positive aspects of using the LEED system are that it provides the design team with clear objectives and standards. As such, it is a good instrument to focus design. It is also a well known program (a label, for all intents) that serves as an advertisement of the university's commitment to sustainability in new buildings. LEED's third-party verification process also enhances the credibility of the project.

The problems and concerns with LEED include the high cost premium of the certification process, especially professional fees incurred for documentation and assessment of design options. This inevitably forces trade-offs with respect to features that might address programmatic needs. Because of the time and cost involved with this process, LEED is often poorly suited to smaller projects. Having a campus specific set of SDGs can help fill the gap that may occur if LEED is not used on a small project. And lastly, LEED is often inconsistent with the value-engineering (VE) process. During VE, many design elements that have a high premium are substituted for lower cost (but often higher life-cycle cost) alternatives.

SUSTAINABILITY INITIATIVES TO DATE

Among the initiatives implemented at UConn are the following:

1. The new athletic facility is the first of its kind to be LEED rated.
2. A "UConn Green Campus Fund" provides an alternative for alumni, staff and other donors who choose to direct contributions toward sustainability efforts – in less than a year since its creation, the fund has raised about $10,000 for sustainability initiatives on campus.
3. The design of a new gateway road into UConn's undeveloped North Campus includes a vernal pool crossing extension to accommodate migratory patterns of amphibian populations.
4. A 64-acre environmental education park was created on land adjacent to UConn's capped landfill.
5. A Campus Bicycle Plan will guide more bicycle-friendly development around a network of trails and shared roadways and will ensure more amenities to promote biking as a viable campus transportation alternative.

At the LEED athletic facility, used sneakers were collected for recycling from students and faculty in order to demonstrate how the sneakers' tread is re-used in the synthetic turf. The Green Campus Fund consists largely of alumni contributions and will be expanded to encourage more faculty and staff contributions. At the capped

landfill, landscape architecture students designed the new preservation area resulting from the EPA- and DEP-approved closure plan. For the bicycle plan, the key considerations were connectivity of the routes, proper signage, removing bikers from pedestrian walkways, and providing storage racks at key destination points. The idea was not only to provide bicycling facilities but also to foster a bicycling culture.

STUDENT AND FACULTY INVOLVEMENT

An essential element to the success of the sustainability program was getting students and faculty involved. The new 300-member EcoHusky Student Group, whose logo is a green paw print logo (a metaphor for a diminishing ecological footprint), is a student group established to focus on campus sustainability. The group performs student outreach, takes trips to relevant facilities, and holds regular meetings and lectures to increase knowledge. Equally important is getting senior faculty, staff, and administration to both buy in and support the effort. UConn has established an "Environmental Leadership Award" that is given periodically to deserving recipients in several distinct categories.

NON-POINT SOURCE WASTEWATER MANAGEMENT

UConn has spent a great deal of effort in addressing non-point source wastewater discharges. Michael Dietz presented innovations at UConn designed to reduce water volume following rain events. Additional information can be seen at UConn's Nonpoint Education for Municipal Officials (NEMO) website (http://nemo.uconn.edu/tools/publications.htm). Some of the technologies employed were as follows:

1. swales
2. buffers
3. vegetated strips
4. rain gardens
5. porous pavements
6. green roofs
7. rain barrels

The unifying theme amongst these ideas was to increase infiltration and/or decrease volume of water directed to the sewer system in a manner that is also aesthetically pleasing.

QUESTIONS AND ANSWERS

Q: How can you prevent oils and contaminants from non-point sources infiltrating into groundwater?

A: Research has shown that concentrations of most pollutants in stormwater are low, so groundwater contamination is usually not an issue.

Q: To whom does the Office of Facilities (i.e. Miller's group) report?

A: The Office of Facilities reports to UConn's Chief Operating Officer, who in turn reports to the President. Miller noted the importance of reporting directly to the top administrative personnel as an essential means of achieving implementation.

Q: What was the receptiveness of contractors to SDGs?

A: Contractors were not resistant to the new guidelines. The key issues were having pre-construction meetings that clearly laid out expectations and requirements to the contractors. The key to keeping contractors happy in this regard was avoiding change orders.

Sustaining Environmental Justice on and Around the Campus

Summary by Lisa Fernandez

Panelists
Vernice Miller-Travis, *Executive Director, Groundwork USA*
Mark Mitchell, M.D., *President and Founder, Connecticut Coalition for Environmental Justice*
Colleen Murphy-Dunning, *Director, New Haven Urban Resources Initiative*

Moderator
Eliezer (Lee) Cruz, *Senior Philanthropic Officer, Community Foundation for Greater New Haven**

*Workshop organizer

This workshop explored the concept of environmental justice as a framework for understanding the role of colleges and universities as civic leaders in the towns where they reside. How "just" is sustainability in higher education today? What kind of burdens are there to mitigate, and responsibilities are there to share, between town and gown? The workshop began with a national perspective on these challenging issues informed by the case of Columbia University, then tackled Connecticut themes, and finally honed in on some examples of how Yale University is addressing environmental stewardship in its host city of New Haven.

UNIVERSITIES AS PARTNERS IN THEIR COMMUNITIES: CHALLENGES AND OPPORTUNITIES AT COLUMBIA

Vernice Miller-Travis spoke of her experience as an entering freshman at Barnard College and Columbia University in 1977, and how much it pained her to learn about the University's complete disconnect from the surrounding Harlem neighborhood where she had grown up. Columbia had created what Miller-Travis termed a "fictional community" called "Morningside Heights," constructed by the university as a separate entity from the surrounding Harlem community in which the university was located. Making the very rich history and resources of Harlem invisible to the university constituency created a tense relationship between Columbia and the local community. Miller-Travis emphasized the need for universities to engage with the local community as partners, not as places to avoid and wall the campus off from.

The environmental dimension of the relationship between town and gown often develops over the issue of sprawl or "university creep." Universities tend to want to develop and grow, and Columbia is no exception. In 1988, Miller-Travis co-founded a community-based environmental justice group – West Harlem Environmental Action – to advocate against the siting of multiple facilities in her community that were adversely affecting the quality of life of the residents. A perverse result of the group's eighteen years of success in making West Harlem a less polluted community is that Columbia is now planning to build a new campus "smack in the middle" of the West Harlem community. The new campus would occupy more square footage than the World Trade Center occupied in lower Manhattan.

Sustainable development cannot occur as long as there is poverty and massive inequality between the university and the surrounding town. It is incumbent upon the university to squarely address the equity issues along with traditional environmental considerations. While the problems are difficult, universities should not feel immobilized. There are a variety of ways to build partnerships that will improve the quality of life for town and gown. These include joint efforts in the following areas:

- addressing the development and preservation of green space;
- reclaiming community Brownfield sites;
- requiring students to engage in local service learning projects as a graduation requirement;
- urban reforestation and green space creation;
- urban agriculture and sustainable local food supply;
- sustainable and green design of low and moderate income housing;
- reducing solid and hazardous waste outputs of the university;
- mentoring neighborhood youth in environmental studies and environmental careers;
- providing incentives for faculty and staff to live in communities adjacent to campus (such as the program at Clark University in Worchester, MA).

Finally, for any campus sustainability effort to ultimately be successful, the inclusion of racial, social and economic justice as fundamental components of these efforts is paramount.

A VIEW FROM CONNECTICUT

Like Columbia and Morningside Heights, the University of Connecticut (UConn) created a name (Storrs) for its main campus location. However, there is no town in the state by that name. Mansfield is the local town, although this is not commonly known or acknowledged. Making the "town" disappear seems to be a habit that dies hard with universities, which so often wield far more power and resources than the municipalities that host them. This is one impetus driving the field of environmental

justice, which aims to overcome the disproportionate burden of environmental impacts poor populations bear.

Dr. Mitchell founded the Connecticut Coalition for Environmental Justice in 1998. Currently, offices are located in Hartford, New Haven and Bridgeport. Demographically, the state is 78 percent white, with 9 percent Latino, 9 percent black and about 3 percent Asian. It boasts the highest average income in the country. This state-wide picture contrasts greatly with that of Connecticut's cities, which are majority populations of color and have among the very lowest income averages in U.S. cities with populations over 100,000. The geographic correlation of point source air pollution emissions and minority population is almost perfect in Connecticut. Some of the results of this pattern are that asthma rates are 50 percent higher in urban schools; deaths from asthma are six times the average for young black males; and 84 percent of lead poisoned children in Connecticut are Black or Latino.

The major environmental justice issues in Connecticut are:

- **Air pollution** – 40 percent of air pollution originates outside CT's borders;
- **Diesel exhaust** – this fuel produces air toxins that contribute to lung diseases and cancer;
- **Waste disposal facility siting** – landfills and incinerators are disproportionately sited in low-income communities of color;
- **Lack of regulatory protections** – CT has no law mandating the equal distribution of pollution sites.

Environmental justice issues on college campuses specifically encompass the following areas:

- **Electric power plant fuels and siting** – tend to be on the periphery of universities, disproportionately affecting surrounding populations instead of university-affiliated ones;
- **Campus sprawl**, including parking; private ownership and operation of diesel bus systems; and an overall lack of connection to public transit systems. The latter situation isolates students, adding to the impression that the university is not part of the local municipality and making it more difficult for students to enjoy urban life.
- **Waste management and the toxicity of waste** – 82 percent of trash in CT is burned and so is a significant amount of sewage sludge. Emissions contain toxins that everyone breathes. Campuses also produce a significant amount of food waste that could potentially be locally composted or even donated to charity but is not for lack of management systems in place to do so.

College campuses can be models for implementing sustainable solutions. Below are some specific suggestions for how.

Campuses can switch to cleaner and renewable fuels and fuel cells to meet energy needs; and when building new construction, aim for the most energy efficient green

designs. In terms of sprawl, making campuses more walkable and supporting public transit connections to campus will help reduce the need for parking, which is a visual and security blight on towns. Diesel buses can be retrofitted for more efficient fuels and greater efficiency. On the waste front, beyond the three "Rs" (reduce, reuse, recycle), engaging with the waste trail and understanding where it goes can help raise awareness and motivate faculty, staff and students to waste less. Instituting and enforcing safe disposal practices (e.g., incinerating autoclaved medical wastes) can also reduce the toxicity of trash that is incinerated.

Echoing Miller-Travis, Mitchell called for universities to exploit their raison d'etre aims in teaching and research to advance environmental justice. Engage students with service learning programs and community internships with neighborhood groups. Promote research and teaching of safer alternatives to toxic products and processes. Finally, Mitchell called on universities to support research and to document and publish on environmental justice issues.

RESPONSIVE PROGRAMS AT THE COMMUNITY SCALE: EXAMPLES FROM YALE

Colleen Murphy-Dunning asked: Do we embrace town-gown relations as part of a strategy to institutionalize university sustainability efforts, or just a public relations strategy? Finding common ground between campus and city can result in mutually-beneficial outcomes. How can rethinking relationships between university students, staff and faculty and local populations of the cities we all call home create opportunities? Through a university/public-private partnership, a Yale School of Forestry & Environmental Studies (F&ES) program creates a clinical learning opportunity for students, which supports the natural resources goals/interests of the New Haven community.

In the City of New Haven, environmental burdens are often the direct result of poverty. Vacant lots and abandoned, boarded-up homes create their own disproportionate burden on neighborhoods at a very local scale. Vacant houses often have peeling lead paint that falls into the soil. Children may play there because that is the only place to do so on their block. A fundamental question is, where do environmental factors fit within the hierarchy of needs in a poor community?

The Yale School of Forestry & Environmental Studies has established a service learning program that meets the needs of students driven by degree requirements, and simultaneously addresses environmental justice issues. In a mutual learning pathway, students train community residents with skills to replant and maintain urban forests, while local residents provide students with models for meeting social as well as ecological community needs.

The goals of the Community Greenspace program are to help environmentally rehabilitate an area, to promote local stewardship and to build community. To accomplish these goals, the program partners with community groups, neighborhood institutions and public agencies. Site selection is driven by neighborhood residents' interests and concerns. The chosen site may be a streetscape,

a park, a vacant lot, or public housing. Often, the significant sites are places of environmental burdens.

The program focuses its efforts in "empowerment zones," a federal designation of poverty pinpointing neighborhoods that have a majority of residents by census tract whose incomes fall below the poverty line. It is no surprise that these neighborhoods also contain the greatest share of vacant buildings and lots. Since these are a major eyesore for people in the community, they tend to be their priority focus of rehabilitation efforts. Yale's Greenspace program has helped local groups rehabilitate several such areas in various parts of the city. These community-managed open spaces are resident-initiated and responsive to community concerns. They continue to be beautiful spots many years after initial rehabilitation. Their sustainability is testament to the importance of the partnership model and instilling stewardship responsibilities in both town and gown.

Engaging Students in Sustainable Behavior

Summary by Katherine Gasner

Panelists
Caroline Howe, *Yale College '07**
Daniel Worth, *National Association of Environmental Law Societies (NAELS)*
Emily Biesecker, *Yale College '08*

*Workshop organizer

This workshop featured three young speakers, all involved in establishing that college students are essential to progress around the climate change issue. The participants learned why students are so important in achieving progress toward sustainability and examined examples of student action.

A NATION-WIDE PROGRAM TO INVOLVE STUDENTS IN ADVANCING SUSTAINABILITY ON CAMPUS

Dan Worth began the workshop by discussing the importance of involving future generations in sustainable initiatives on campuses nationwide. He stressed that the young generation of today has the responsibility to initiate action against climate change, and he proceeded to share some strategies to achieve such progress. First, he highlighted the importance of taking advantage of universities as centers of research and student body energy for sustainability programs. He explained how universities are especially unique, having unmatched enthusiasm from the student body alongside generous resources for education and implementation.

Worth outlined three components of this generation's mission:

1. Reduce greenhouse gas emissions by 70-90 percent within the next 45 years;
2. Lead a modern industrial revolution, which would entail reconstructing the power and transportation sectors;
3. Overcome political differences to achieve the first two goals.

For the achievement of the first goal, Worth pointed to NAELS' initiative entitled "Campus Climate Neutral." The goals of this nation-wide project are to generate

research for sustainable solutions, to support and institutionalize ongoing climate and sustainable initiatives, and to educate and prepare the next generation of leaders. Campus Climate Neutral has three stages: first, in-depth research and assessment of the university's policies and current infrastructure; second, expansion of this research into other disciplines, including students specializing in policy, law, financing, business, design, and engineering; and third, expanding this assessment and research regimen to the surrounding city and country. To pursue these stages, Campus Climate Neutral encourages colleges and universities to offer classes for credit that require students to pursue sustainable initiatives. This gives students the right incentives to engage in sustainability work and creates an ever-evolving, but institutionalized program.

One example of a Campus Climate Neutral project already underway is at the University of California, Santa Barbara. This project began with extensive research and involved UCSB decision makers. By the spring of 2006, the "UCSB Campus Climate Neutral Action Plan" was published. Accomplishments included the establishment of a Green Fund, the development of a policy matrix describing different costs and impacts of greenhouse gas emission strategies, the collaboration of many university leaders, and the involvement of the Santa Barbara mayors in planning future city projects. With this example, Worth showed that students and university leaders can be effective in establishing a sustainability program and broadening its circle of influence through the involvement of government leaders in their host cities.

Worth then turned to the new generation's second mission, to create a modern Industrial Revolution. Here, he described his faith in young people's determination and innovation to revolutionize the transportation and power sectors. Again, he stressed that all disciplines must be involved to create the industrial change necessary for action against climate change; climate change is a field that appeals to all disciplines.

Lastly, Worth spoke of the need to bridge the political divide. Civility in discussions about climate, no matter the audience, is necessary. He also advised that preconceived notions of who is an ally or an enemy would impede progress. In addition, he recommended that preaching about problems should be avoided in the future; instead, he urged frank discussion of the possible solutions. Worth ended by restating his faith in the young generation to make a difference and lead the movement against climate change.

YALE'S STUDENT TASKFORCE FOR ENVIRONMENTAL PARTNERSHIP (STEP)

Emily Biesecker, who is deeply engaged in environmental activity on the Yale campus, began by describing the Student Taskforce for Environmental Partnership. STEP was launched in 2004 with a grant from Yale's "Green Fund," a pool of money dedicated to supporting sustainability initiatives on campus. The organization consists of student employees from each residential college. These employees are responsible for

student outreach throughout the year, educating fellow undergraduates about the sustainable initiatives throughout campus and facilitating sustainable practices for everyday implementation. The STEP members work closely with the administration, frequently collaborating with the Office of Sustainability, the Sterling Power Plant, and the Recycling Office. Biesecker then highlighted some of the most recent STEP projects, which included a compact fluorescent light exchange campaign, a school-wide clothing swap, a technoscrap recycling initiative, and a heat reduction campaign.

Biesecker went on to address student involvement in Yale's greenhouse gas emission reduction campaign. With help from STEP, New Haven Action, and the Yale Student Environmental Coalition (YSEC), students were able to educate the undergraduate population about the GHG reduction goals of the university. The campaign collected over 2000 signatures on a Clean Energy Pledge and thus got approval to lower the heat in each residential college by two degrees.

Biesecker concluded her remarks by describing the Yale Student Enrironmental Coalition (YSEC). Founded in 1986, YSEC has served as a hub for the environmental activity on campus, pursuing a wide range of activities from hosting the Climate Conference in 2005 to campaigning for more recycled paper in Yale's daily operations.

TEACHING SUSTAINABILITY ON CAMPUS

The last speaker, Caroline Howe, addressed the importance of integrating environmental education into the academics of the university. She described different avenues of engagement: through the curriculum, research opportunities, international interaction, and education through action or service learning.

Howe began by illustrating how environmental issues have been a central focus in a number of classes and clubs on campus. Howe featured "Engineers without Borders" which successfully pursued a water quality and disinfection project in Cameroon and Honduras. Another example she gave was the Yale Engineering Design Team, which has devoted its energies to building a bio-diesel fueled bus and a solar-powered boat.

Howe also spoke of how Yale's Sustainable Food Program has offered a unique educational opportunity for everyone on campus. Beginning as a student initiative with support from the Green Fund, the Sustainable Food Program has become an institutionalized and valued part of campus life. Today, classes are offered and participation at the Yale Farm is encouraged.

In conclusion, Howe described how Yale encourages a great deal of research and involvement outside of campus. Through summer grants, such as the Environmental Studies Fellowship, many students each year are able to extend their studies and their impact outside of Yale.

DISCUSSION

In the discussion following the presentations, many participants got involved. One participant asked how the older generations fit into all of this activism and change. The panelists established that it is very important that older generations, whether teachers or administrators, not underestimate the energy and potential of students. They also agreed that communication must occur between generations about resources and valuable networks in order to sustain progress and momentum.

Another participant, representing the University of California Berkeley, wrapped up the workshop nicely. He expressed an appreciation for his student's ability to stubbornly persist with campaigns and challenge the administration. He acknowledged that this is a very important part of the process toward sustainable progress. The fact that students "won't let you say no" is actually an essential part of sustainable activism. He also noted that collaboration between the students and administration is crucial. While administrative support is essential in advancing student involvement in environmental issues, students are important resources for the administration as well in pursuing sustainable campaigns themselves and observing what actually happens on the ground level throughout campus.

Does the Faculty Care? Engaging Faculty Across Campus on Sustainability Issues

Summary by Lisa Fernandez

Panelists
Kim Marsella, *Environmental Studies Program & Department of Geosciences, Skidmore College**
Sandra Wachholz, *Professor, Environmental and Gender Studies, University of Southern Maine*
Jack Byrne, *Coordinator, Sustainability Programs, Middlebury College*

*Workshop organizer

How can faculty best become engaged in making their professional home, the college campus, sustainable? This workshop identified successful approaches to involving faculty, particular those outside of environmental studies programs.

WRI, CST: ACRONYMS FOR CHANGE AT SKIDMORE COLLEGE

Kim Marsella opened with an overview of Skidmore: a small liberal arts college with 2300 students and 650 acres. Skidmore is located in upstate New York, inside the Adirondack Preserve. Its north woods location is recognized as rich and diverse. Compared to peer institutions, Skidmore's endowment is relatively small. Although it is changing, campus culture is not currently focused on sustainability issues. Thus there is not a formal sustainability office or coordinator. Efforts in the sustainability arena have been ad-hoc in nature and led by students and/or faculty.

Sustainability efforts have been organized through three programs: the environmental studies program, the Campus Environment Committee (CEC), and the student-run Environmental Action Coalition (EAC). As a result, sustainability action has been dominated by a small core group that does not change much. These actors acknowledge the need for change, to build broad-based support for sustainability in the curriculum and on campus and to include more voices.

To invite this engagement, the CEC sponsored scholarly debates on sustainability issues and asked faculty that had not participated in campus environmental fora to participate. A high-profile change was that sustainability language was inserted in one

of the "Engaged Liberal Learning" goals of Skidmore's 2005-2015 Strategic Plan. Furthermore, the CEC was formalized as an official Skidmore College committee with a mission statement and membership to include set numbers of faculty, staff and students for designated terms. The CEC reports to the President and the Institutional Planning Group.

Finally, broad involvement was invited in two key environmental initiatives on campus. The first is the Water Resources Initiative, or WRI. It brings together faculty and students with community partners to study local water issues. WRI is implemented through courses, summer and team-based research, as well as independent study. The approach is interdisciplinary and examines the natural, social and cultural influences that shape the human relationship with water. While the focus is local, international field trips place the issues in a global context.

The second initiative is the Campus Sustainability Team or CST. This is a team of faculty, facilities personnel and students to design and implement campus greening projects. Over a two-year period, the CST consists of the time of 8 paid student interns, one-third time of a facilities staff member, and 40 percent of a faculty member. The commitment releases the faculty member from teaching two courses. The goals of the CST are to increase the number and visibility of sustainability projects on campus and to heighten awareness of ecological footprint issues and resource use by everyone on campus.

GREENING THE CURRICULUM AT THE UNIVERSITY OF SOUTHERN MAINE

Dr. Wachholz introduced her talk with a quote from David Orr: "What will people need to know to live responsibly and well in a finite world?" National studies indicate that the average college graduate has very little understanding of the current environmental challenges facing the planet. Many of the facts of current climate change are undisputed; however, partly because these facts are not more widely known, the urgency of addressing them has not yet been acknowledged by the current generation of students.

One approach Wachholz takes to mainstreaming environmental issues is the "Casco Bay Project." In the fall of 2005 and 2006, 16 faculty members were asked to

1. reflect on the bearing "sustainability" has on their disciplines;
2. develop a deeper connection to "place" and each other;
3. incorporate environmental sustainability in at least one course.

The key was to foster community and connection and to signal a respect for the faculty member's time by paying them a stipend for the 2.5-day commitment to the project. The approach is based on the "Ponderosa Project" developed at the University of Arizona, which reached 4,000 students via 100 faculty teaching 40 students per course over a six year period.

Another approach is to integrate sustainability broadly into teaching via content, process, and practice. Including sustainability content has been two-pronged, via (1) interdisciplinary analysis of environmental issues and sustainability concerns; and (2) integration of the environmental aspects of a discipline into the classroom. An example is the sociology of law around the invasive plant Asiatic Bittersweet. This invasive species, like others, displaces native species, negatively affecting local ecosystems and often requiring costly mitigation. Another example is an examination of the environmental aspects of the "War Against Drugs." This would entail examining the sustainability of car patrols vs. "walking the beat" and herbicide spraying of plants grown for illegal drugs, etc.

Integrating sustainability into the teaching process emphasizes active, experiential and inquiry based learning. A key piece is the concept of place-based learning, which helps students foster a connection to their community and the environment. The Portland State University course "Academic Writing Meets Local Food Systems" is one example that takes a thematic approach to sustainability in a skill-based course. In another example, the key is service learning, which integrates community service with instruction and reflection. In this case, Front Range Community College taught an environmental law class structured around developing an organic garden with senior citizens.

Integrating sustainability into teaching practice involves learning where students are engaged with the practice of sustainable living, both in the classroom and on campus. Here, the emphasis is on using the campus as a classroom. Students are encouraged to explore the campus' ecology and sustainability and to note where changes are needed. For example, Goucher College students in an international studies course surveyed the campus looking for dripping water and then studied world consumption patterns. At the University of South Carolina students plotted lights left on at night. Finally, the classroom may be the best classroom of all: it is the first place to model sustainability by using natural resources as efficiently as possible (paper, cups, bags, lights).

SUSTAINABILITY IS PART OF MY JOB: HOW TO GET PEOPLE FROM HAPPILY UNINFORMED TO "TELL ME MORE."

Jack Byrne seconded Wachholz' view that the actions of faculty and staff are the models that "equip students to shape a future that is sustainable, or not." Historically, there was a huge buffer between human activity and nature. Now, that buffer has been squeezed to such an extent that every human activity can be considered to impact the natural world. Furthermore, there has been a significant shift in the types of constraints on human behavior. Humanity was largely "material-constrained" until relatively recently, and most human action was essentially an adaptation to scarcity. Now, humanity is what may be termed "meaning-constrained." In this context, power is based not on physical assets, but on network assets. Also, the capacity to learn is more important than the capacity to adapt, and sustainability, not scarcity, is the overriding paradigm.

Faculty engagement in sustainability at Middlebury College acknowledges this shift. The College's commitment to environmental stewardship is explicit in its mission statement. Reflecting this, Environmental Studies and Environmental Affairs are prominent and important at Middlebury. The interdisciplinary Environmental Studies Program boasts nine core faculty and 46 affiliated faculty from 18 different departments (out of a total of 223 faculty). A core course, ES 401, consists of community service projects that touch on sustainability issues from a variety of angles and disciplines.

For example, one project collaborated with Vermont Interfaith Power and Light, a new state-level chapter of a national network of religious groups addressing climate change. The primary goal of this project was to develop a "state of the state" report on how various religious institutions across the state were addressing environmental issues – were they already very active, interested in becoming active but needed support in getting started, or not active, and not interested in becoming so. The resulting report laid the foundation for Vermont Interfaith Power and Light's work planning.

The broader impact of this project was on network building and resource sharing to foster even greater activity amongst religious groups, not just on climate change, but on other issues as well. This work also fostered several other service-learning project opportunities – two related to building a statewide climate coalition of diverse stakeholders, and another project for a psychology course looking at the impact of Earth Institute courses on communities throughout the state.

Environmental Affairs is the administrative nexus of sustainability at Middlebury. Under its auspices, there are several initiatives. A design committee of faculty, staff, and students was involved from start to finish in the plans for the new LEED silver certified Hillcrest Center, an adaptive reuse of an old building. In an annual environmental retreat, the sustainability agenda is reviewed. The retreat gives faculty and staff an opportunity to bond and together commit to sustainability goals.

Yet another entity at Middlebury is the Environmental Council, consisting of faculty, staff and students appointed by the President. It is a forum to ensure that sustainability goals are integrated into policy and planning. The Council also administers an environmental grants program and collaborates with other college councils, including student government.

Middlebury's carbon reduction initiative (CRI) set out goals and strategies for minimizing the campus' climate impact in 2003. Since then, the university trustees passed a resolution establishing an initial target goal of reducing College greenhouse gas emissions by eight percent below 1990 levels by 2012, adjusted on a student (per capita) basis.

The initiative organized a conference in 2005 to examine what strategies were working. The conference involved faculty and students from Economics and Environmental Studies. CRI oversees the implementation of several ongoing projects aimed at achieving the college's carbon reduction plan. These include assessing available and emerging technologies and economic instruments that could create reductions in campus Carbon Dioxide Equivalent (CDE) emissions or enhance the rate of CDE sequestration, thereby offsetting some fraction of the college's emissions.

University-based Models for Sustainable Food Systems

Summary by David Gottesman

Panelists
Thomas Kelly, *Director, Office of Sustainability, University of New Hampshire** *Workshop organizer
Kelly Brownell, *Professor of Psychology, Epidemiology and Public Health; Director, Rudd Center for Food Policy and Obesity, Yale University*

In discussing the relationship between food and sustainability, three main points must be made. First, food is fundamental to sustainability. For a long time food has operated in the shadows of energy, LEED construction, and other physical aspects of sustainability. In reality, however, one cannot have sustainability without addressing food and agriculture. Second, food cannot be dealt with in isolation; there is a positive and necessary synergy between other aspects of sustainability and food and agriculture issues. Finally, institutional responses to food, agriculture and nutrition must be developed as part of any sustainability effort in higher education.

THE RUNAWAY INDUSTRIAL FOOD SYSTEM

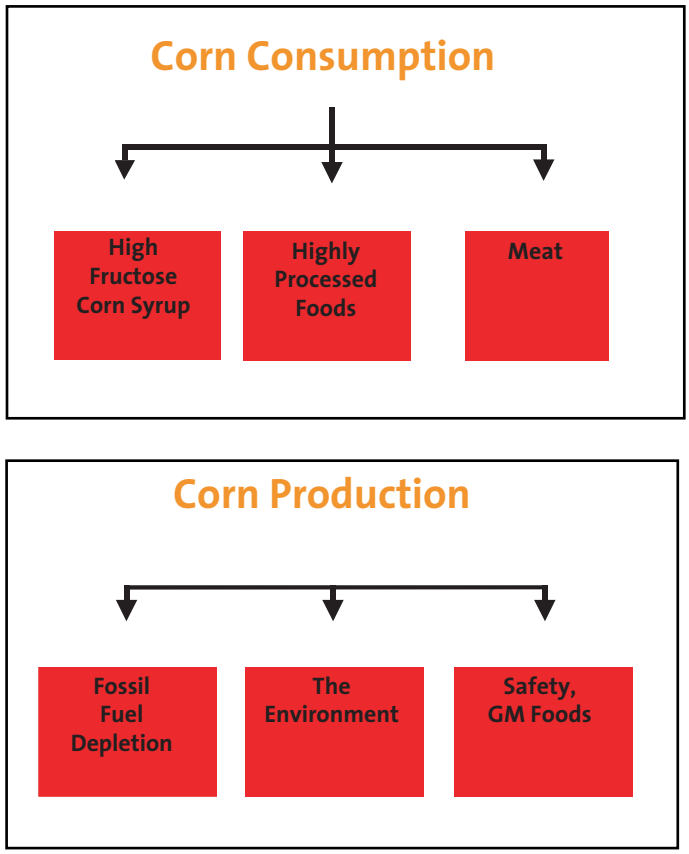
Food is a major driver of public health issues as well as the economic underpinning of the public health system. Food production clearly impacts land use and consequently carbon cycles, biogeochemical cycles and ecosystem health on both a local and global scale. Water use patterns are also driven by food production. These water-food relationships have bred tensions around the world that will continue to grow as the resource becomes scarcer. As agriculture becomes more mechanized and energy-intensive, food production becomes an energy sink as well.

In the U.S., food production receives an enormous amount of public funding, including $248.6 billion in the 2002 Farm Bill. By most accounts, these public funds are not well spent, leading to tremendous inefficiency, corruption and ill health throughout the food system. Wastefulness in U.S. agricultural trade and subsidies impacts international food markets and often negatively affects developing countries by disrupting local and regional food systems and by undermining the economic viability of agricultural enterprises.

Finally, food is central to culture: it gives people a sense of place, an experience of cultural diversity, and an identity. A runaway food system that continually seeks to consolidate and homogenize global markets undermines the diversity of agriculture, food enterprises, and cuisine and therefore culture and sovereignty.

Another negative consequence of the runaway food system is an unprecedented increase in the transportation and energy consumption involved in the global food system. The increasing average distance food travels from farm to fork must be stemmed through comprehensive approaches that begin to build a more sustainable food system.

Figure 1 The health and environmental effects of subsidized corn production in the U.S.



There is a growing disconnect between food consumption and food production in the U.S. One contributing factor is that American culture itself is transforming from a participant effort, or what Slow Food founder Carlo Petrini refers to as "co-producer," to a consumer-based interaction. Consumers are concerned with price and convenience, and the industrial food system appears to be providing a cheap and plentiful food supply. However, the ecological, economic and public health impacts of this runaway food system have reached critical proportions, including both a domestic

and global obesity pandemic that scientists have characterized as a global catastrophe on par with climate change. Our industrial agribusiness production system is a major driver of unsustainability and a declining quality of life. To have a truly sustainable food system the role of "participant citizens" needs to be redeveloped.

The figure below shows how highly-subsidized industrial monocultures of corn supply the food system to create demand that results in ecological, economic, and nutritional damage on a national and global scale.

CAMPUS-LEVEL APPROACHES TO MAKING FOOD PRODUCTION MORE SUSTAINABLE

The approach developed by the Office of Sustainability at the University of New Hampshire (UNH) to this cultural re-development is centered around health and integrity as first principles of sustainability. Initiatives are organized around four central systems and four core functions. The four systems are the climate system, ecosystems, food systems, and cultural systems. The four functions are curriculum, operations, research and engagement, referred to by the acronym CORE. It is imperative to sustain health and integrity within and across each of these systems. In the university setting, the focus is often only on the structural and operational aspects of these systems. To bring this down to the ground, curriculum, operations, research and engagement must all be addressed in an integrated fashion. The heart and soul of the university – the students and the learning – must be the focus of the real transformation.

The experience at Yale suggests that one of the best strategies for achieving this transformation is to pursue partnerships with scientists. Approaching a scientist and asking him/her to investigate a particular aspect of the link between food production and consumption is a valuable means of disseminating this message, since these experts have credibility in both their fields and in society at large. While this kind of relationship may seem implausible at first, there are a couple of guidelines that should be followed to ensure their effectiveness. First, we should look for partnerships with graduate students who have the expertise and drive to get involved in a project. Beyond infusing enthusiasm and vigor into the study, graduate students can be employed for relatively little money, which helps answer the eternal question of funding. Second, it is essential to frame the issue at hand within the broader context of society and sustainability for maximum impact. For example, instead of developing a project to investigate a general trend, the project should be framed as an evaluation of a positive intervention.

The University of New Hampshire can provide a number of examples of institutional methods for creating a sustainable food system through its "Food and Society Initiative," which began in 1999. At the outset, UNH went through a four-year series of listening exercises that enabled it to connect with various constituencies in the community. At the beginning, the initiative met with internal resistance, but over time the group was able to certify 30 acres of university land as organic. An organic garden club and organic farming course soon followed, with 100 students in each. The organic garden club now sells food to the dining halls, stocks an on-campus farmers

market, and donates food to local food kitchens. UNH now has more than 300 acres of certified organic farm land, with more in transition.

The dining system at UNH has also made efforts to embrace the sustainable food efforts, hosting local harvest dinners each year. At these events farmers from the community come to share their products and experiences. These dinners provide valuable interaction between the community and the students.

Another successful UNH initiative has been the "farm to school" program, which was started to try to bring local apples to New Hampshire schools. This came about at a time when local apple orchards were failing while area schools bought apples from Washington State. Due to the farm to school program, 260 schools in New Hampshire now buy local apples and the program is expanding to other crops. In addition, this program has helped to get teachers thinking about the cafeteria as another learning environment.

Additional projects ongoing at UNH include the first organic dairy research farm at a land grant university in the country, a strategic planning process for New Hampshire food security, collaboration with the Northeast Sustainable Agriculture Working Group, and plans for a new undergraduate dual major in EcoGastronomy that is part of a collaboration with Slow Food International. The dual major in EcoGastronomy is designed to integrate sustainable agriculture, food entrepreneurship, and nutrition through interdisciplinary, experiential, and international teaching, experience, and learning.

THE BOTTOM LINE: ENSURING SUFFICIENT LAND FOR SUSTAINABLE FARMING

Underlying the challenges and lessons described above are some concrete factors which must be considered while designing sustainable food systems. Of particular concern is farm land loss, which poses a direct threat to the agricultural farm base needed for local organic farming. For older farmers, the profit to be gained from selling their land for residential construction often proves all too persuasive. To counteract this financial incentive, measures must be taken to facilitate land transfers to the next generation of farmers. Such a provision would allow sustainable food systems to continue their mission of providing communities with locally-grown agriculture, educating students about environmentally-responsible farming, and working to temper the runaway industrial food system.

Best Practices in Green Purchasing Services

Summary by Matthew Eckelman

Panelists
Chantal Line Carpentier, *Head, Environment, Economy and Trade Program, Commission for Environmental Cooperation*
John Turenne, *President, Sustainable Food Systems, LLC*
Corinna Lowe, *Green Mountain College '07*

Moderator
Jacob Park, *Assistant Professor of Business and Public Policy, Green Mountain College** *Workshop Organizer

Professor Park launched the session by calling on the workshop participants to consider three overarching questions as the discussion proceeded:

1. In order to have effective green purchasing programs, what do we need to know about purchasing in general?
2. What are the challenges, opportunities, and trends specific to green purchasing?
3. How do we as practitioners begin to operationalize green purchasing initiatives?

THE NORTH AMERICAN GREEN PURCHASING INITIATIVE

Chantal Line Carpentier described the work of her organization, the Commission for Environmental Cooperation (CEC) and the North American Green Purchasing Initiative (NAGPI). NAGPI was negotiated by the three NAFTA countries and began operation in 2002.

In terms of purchasing, the most important thing to realize is that governments are responsible for the consumption of about 30 percent of global GDP in terms of products and services – a huge percentage. Green purchasing initiatives have proliferated, but there is much duplication and no emerging standards thus far. The hope of NAGPI was to act as an umbrella organization to allow for exchange of best practices and general information. They have developed an online tool called ECO S.A.T. (Self-Assessment Tool), which can be used by different types of organizations to

assess quantitatively their own green purchasing programs. A limited number of universities have joined NAGPI and Dr. Carpentier encouraged attendants to review the website (www.cec.org/nagpi) and possibly join.

GREEN PURCHASING ON CAMPUS

Professor Park spoke more specifically about the role of green purchasing in campus sustainability programs. There are a number of benefits that universities gain from pursuing green purchasing: economic benefits, good public relations, and competitive advantage through innovation, which is perhaps the most important but least concrete. Martin Akel and Associates completed a study recently entitled "Institutions of Higher Education: A Study of Facilities and Environmental Considerations" that surveyed 470 colleges and universities in the United States on their environmental programs. Some of the most important results include:

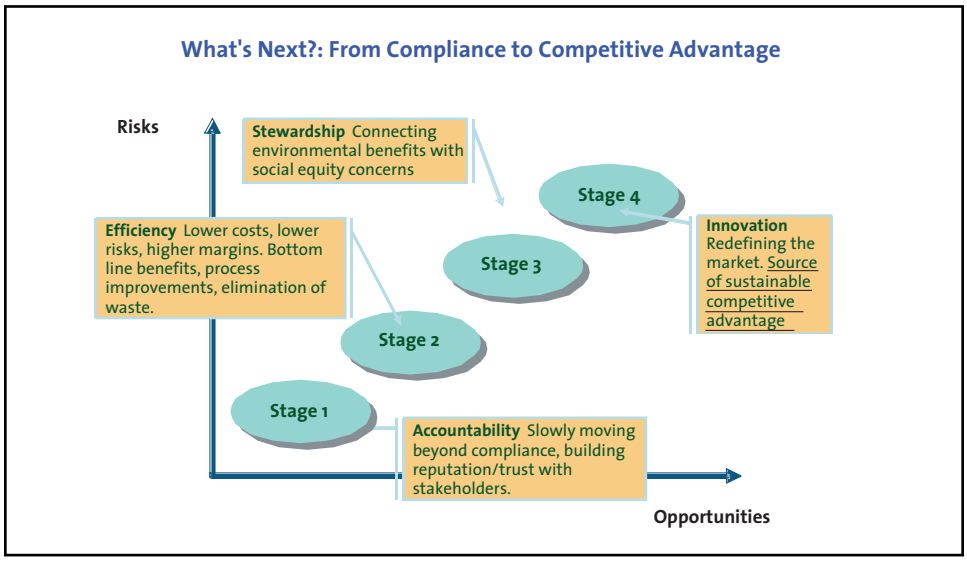
- Two-thirds of those surveyed want some sort of green purchasing program.
- 90 percent are incorporating sustainability considerations into new projects.
- 90 percent are examining and trying to reduce their use of consumable products.
- Three-quarters are considering LEED certification.

With these high numbers, any educational institution that is ignoring environmental considerations in its purchasing will be seen as behind the ball. Sustainability programs have become mainstream very quickly over the past few years, and many previously "green" initiatives are now considered to be normal operating procedure.

Some successful programs include Cornell's sustainable computing initiative, in which almost 95 percent of computers discarded by the university departments are reused. Cornell purchases only those computers and peripherals that have Energy Star or Electronic Product Environmental Assessment Tool (EPEAT) certification. Both Florida State University and the University of Pennsylvania have excellent green energy programs, encouraging energy efficiency, conservation, and purchasing of green power. Many universities are now buying "sustainable food," which is usually locally-grown organic produce.

Figure 1 depicts a series of steps that programs can take toward the end goal of sustainable purchasing. In their early stages, green purchasing programs at educational institutions can move from accountability and compliance activity to achieving real benefits through increased efficiency. Later, as these programs mature, they can assume a stewardship role by reflecting a college or university's responsibility to social equity issues. Eventually, green purchasing programs can become a source of competitive advantage, incorporating academic aspects into their programs. The risks (and changes required of purchasing departments) increase as green purchasing programs move through these stages, but so do opportunities for improved savings, efficiency, reputation, morale, and most importantly, teaching and learning.

Figure 1 Green Purchasing Hierarchy



PROCURING FOOD SUSTAINABLY ON CAMPUS

Looking at a specific group of products, namely food, Mr. Turenne, a professional chef, discussed his experience with the Yale Sustainable Food Project and with other educational institutions. In examining sustainable food systems, one must realize that good food is not just about the bottom line. Sourcing food has consequences for social systems, the local economy, and nutrition. In order to elucidate this point, Mr. Turenne offered a snack of pears, cheese, and honey, all produced within 20 miles of Yale. He then led the group through a visualization exercise, describing how farmers and animals in our community produced the food, encouraging the group to savor the flavor and the history of the food. It was delicious! During the exercise he said, "I want you to understand the story behind what's on your tongue."

Mr. Turenne sees sustainable food as that produced by small to midsize farmers who are committed to the vitality of the land and their workers, sourced as locally as possible, and prepared in ways that respect quality and freshness. This last point is often overlooked and is perhaps the most important to him as a professional chef.

In Mr. Turenne's experience, sustainable food initiatives tend to arise from student demand or from a top-down decision made by administrations. At Yale, the impetus came from celebrity chef Alice Waters, whose daughter studied there as an undergraduate. Initiatives that are begun through a combination of students, administration, and outside interests (such as parents or local farmers) will have the greatest chance of success.

The benefits of a sustainable food system are many. First, locally sourced food does not have to be transported very far, which conserves fuel resources. The average meal in the United States travels 1500 miles from the farm to the table! Buying sustainable

food helps support the local economy and is generally unprocessed, making scraps ideal for composting. Most importantly, though, sustainable food is fresh, nutritious, and satisfying to the people who eat it. Mr. Turenne closed his presentation with a quote by Fred Kirschenmann, a leader in the sustainable agriculture movement:

> Human health cannot be maintained apart from eating healthy, nutritious food . . . which can also not be achieved apart from maintaining healthy soil, clean water, and healthy plants and animals.

FIVE FARMS IN FIVE DAYS

Ms. Lowe worked with Mr. Turenne on a sustainable food project at Green Mountain College, where she is an undergraduate. She presented to the group the story of the project, "5 farms in 5 days". The project grew out of a class at Green Mountain College and was funded by the Student Campus Greening Fund, a student-run organization supported by student activity fees. The goals of the project were to:

- increase awareness of food sustainability issues;
- demonstrate student support for local food;
- contribute to the local economy.

After consultation with the food services vendor, other students, faculty, and Mr. Turenne, a menu was created that featured the food of one local farm for each of five days during one week. The meals were widely publicized on campus. In order to ease the burden of a new menu on the food services vendor, Ms. Lowe and other students managed all of the food purchasing and participated in some of the prep work in the kitchens. Student feedback was quite positive, with many going back for seconds and asking whether sustainable food would be a permanent option at the college.

Future projects should incorporate some of the lessons learned from the project, which Ms. Lowe calls "the five legs of a sustainability dining table."

1. It is necessary to source food from farms with enough volume. One farm ran out of produce at a critical time, which caused some problems for the project.
2. Brokers or "food foragers" are extremely helpful in sourcing food among small producers, as well as building relationships with many parties. Food can be ordered from the broker, who can then aggregate produce from various sources.
3. It is helpful to have a flexible menu in order to adapt to any last-minute problems that may occur.
4. Trained prep assistance relieves some of the extra burden of work from a new menu on the food services vendor, and was particularly helpful in this case in building support for the project.

5. Campus community support, in the form of student groups, faculty, and staff buy-in.

Professor Park closed the session with the hope (and prediction) that green or sustainable purchasing will eventually become mainstream, so that it will lose its qualifier and simply become institutionalized as an integral aspect of purchasing.

College-Community Environmental Sustainability Initiatives: Local and State Partnerships in Pennsylvania

Summary by Sara Smiley Smith and Meleah Houseknecht

Richard Bowden, *Professor, Department of Environmental Science, Allegheny College; Director, Ecotourism Program and Forest Sustainability Program, Allegheny Center for Economic and Environmental Development; Chair, Pennsylvania Consortium for Interdisciplinary Environmental Policy Executive Committee** *Workshop organizer

The Center for Economic and Environmental Development at Allegheny College has initiated successful partnerships with the surrounding community of Meadville, Pennsylvania. In a similar spirit, the government of the state has worked to initiate environmental partnerships with and among colleges and universities throughout Pennsylvania. This discussion highlighted these programs, both in Meadville and statewide.

COMMUNITY CONTEXT

Located in northwest Pennsylvania halfway between Chicago and New York, Allegheny College is a small private liberal arts school with approximately 2,000 undergraduate students. Its host community of Meadville is known as the birthplace of the modern American zipper industry, Channellock Pliers, and a wide variety of natural resource based industries including forestry, dairy farming, and agriculture. During the 1970s and early 1980s Meadville suffered from inflation and resulting unemployment. Today the economic situation is not much better, with a median personal income of approximately $10,000. From 1979 to 1997, Meadville experienced de-population and a 15 percent decline in household income. Currently 50 percent of the housing stock is rental property and energy expenditure is estimated to be 20 percent of personal income. Overall, 25 percent of the population has not graduated from high school and 89 percent has no college education. Many previously vibrant

industries have now gone, with some leaving unpleasant reminders of their time in Meadville, such as brownfields.

Despite this bleak picture, there are signs of recovery and progressive thinking. The primary brownfield left in Meadville has been redeveloped and currently houses small start-up companies that employ all together 600-800 people. The downtown theater that had fallen into disrepair has been refurbished and is sparking more downtown attention. In addition, the projects that Allegheny College students and faculty are undertaking in partnership with the community are beginning to make noticeable impacts.

THE CENTER FOR ECONOMIC AND ENVIRONMENTAL DEVELOPMENT

The road to meaningful partnerships between Allegheny College and Meadville began when professors at the College started looking for ways to teach sustainability. To unite around this common goal, professors formed an umbrella institution known as the Center for Economic and Environmental Development or CEED. Now over ten years old, CEED is designed to engage college students, faculty and the greater community in innovative approaches to sustainability. Despite (or perhaps because of) the socioeconomic stresses on the town, Meadville was the perfect location for CEED to take root, given its resemblance to so many small towns around the country. The Heinz Family Endowments funded CEED for the first five years. Currently, funding is being sought by each project through individual grants.

CEED focuses on providing environmental education for people of all ages and abilities. It also strives to encourage environmental stewardship within the town of Meadville by promoting the notion that sustainability is a good way to do business. In addition, it supports economic revitalization that takes into account economically sustainable business practices. In all of its efforts, CEED has focused on what it calls the "K through CEO" approach. The idea is that if work were focused on educating only the young, it would take a long time to see results. Instead, attacking problems at all levels of experience creates both a top down and a bottom up approach, more effectively including all members of the community.

CEED currently operates about a dozen projects. The Arts and Environment Initiative is a highly successful project that began as a partnership between the Pennsylvania Department of Public Works and CEED. Through this project, road signs transformed into sculpture have beautified a fence in town. This and other recycled art projects have become a source of pride for both the college and the greater community.

Figure 1 **"Read Between the Signs," a roadside mural made out of recycled highway signs – an Art & the Environment Initiative, Center for Economic and Environmental Development, Allegheny College and Meadville, Pennsylvania.**

Another CEED project focuses on improving environmental education in local schools. CEED was able to identify two major challenges facing local teachers in conducting environmental education: a lack of knowledge about teaching techniques specific to environmental education, and financial difficulties in getting supplies. To address these needs, college students combined supplies and lesson plans (on riparian zones, aquatic insects, and groundwater) in large plastic totes that were distributed to teachers. In return, the students were able to use data collected by the teachers for their own analyses.

CEED has also been working to promote and enhance Meadville's growing ecotourism sector. They started by working with a number of visitors bureaus around the region to get a better understanding of what ecotourism resources are currently available. The next step has been helping to develop travel packages for bicycle tours, farm tours, and other excursions that highlight the value of the natural landscape while attracting visitors through the convenience of the options. Given the area's natural resource-based community, there are many opportunities for community involvement.

Another CEED project was the Commonwealth Community Energy Project. It began about ten years ago with the discovery that 54 percent of housing in Meadville was rental property with very poor insulation. CEED began working to convince local building owners that they could charge more rent and invest the money in building improvements that would reduce the energy costs that occupants had to pay. At the same time, occupants were educated about the potential savings that come with improved insulation. By working with builders, renters, and homeowners and utilizing a revolving loan program, this project has been successful in improving the energy efficiency of many Meadville homes. MCEP was so successful that the program is now administered through the Pennsylvania Environmental Council, a statewide environmental organization.

Yet another project was undertaken by an economics professor at Allegheny who initiated a roundtable discussion on pollution prevention strategies with many of the area's small business owners. Many tool and die groups are also involved, including Pittsburgh Paint and Glass, which has facilities in the area. The roundtable discusses solvent waste disposal, energy expenditure challenges, and ways to address other environmental impacts. It serves as a forum for sharing ideas and voicing concerns.

Additional work at CEED has focused on environmental writing, environmental justice issues, and local farm products. Much good progress has been made through current projects; however, CEED aspires to do even more. Ironically, CEED's sustainability efforts within the community have begun to have an even greater impact than those undertaken on the campus itself.

Perhaps CEED's greatest contribution to sustainability on campus has been in its ability to engage students. When students see that there is a purpose to the assignments they receive, they tend to get excited. They can go downtown and see the results of their work, and they receive support and valuable lessons from local professionals. The region has become a living laboratory that shows that sustainability can work.

CEED's efforts have provided very valuable lessons for future efforts. First, it is important to get all possible partners involved in a project from the start, including the leadership of the educational institution involved. When designing a program it is also important to note that the tremendous value of first-hand experience held by local professionals cannot be overlooked. In addition, to avoid conflict, all participants should be kept informed to prevent people from feeling threatened by proposed changes. It is important to be aware that there are many hidden flaws and challenges in even the most carefully thought-out plans. This can be particularly difficult for students to accept, since it is not consistent with traditional academic structures. Students have to learn to expect delays in their projects and to be aware of the boundaries in terms of scope that must be faced.

STATEWIDE COLLABORATION

The Pennsylvania Consortium for Interdisciplinary Environmental Policy (PCIEP) came into existence under the guidance of Don Brown of the Department of Environmental Protection (DEP). The central problem he faced was that the state DEP was limited in its ability to conduct the research needed to effectively develop and evaluate environmental policies. In the state of Pennsylvania there are over 200 institutions of higher learning with tremendous research capacity – thus a natural pairing was conceived. Over the past decade both students and faculty have become increasingly involved in environmental policy-relevant research for the DEP. PCIEP links the research needs of decision makers with the expertise of institutions of higher learning to enrich the policymaking process.

One of the PCIEP initiatives worth highlighting is an analysis of wind energy in the state. This research evolved into a school-based cooperative wind power purchasing agreement that now includes 37 schools in the state. Another project has

focused on solar power and recently culminated in a solar workshop. State-inspired projects have also included research on the impacts of development, greenhouse gas inventories, greening operations and training sessions for campus communities, and an environmental health road map.

Educational institutions participating in these state-guided efforts have developed a healthy level of competition. This has helped to drive innovation and inspired collaboration. Events have been held to share ideas and to encourage student involvement.

Working in this partnership has not been without challenges, however. One problem has been the ever-changing political arena, which slows the progress of projects. Another challenge has been the compartmentalization of state organizations, which can make interdisciplinary work difficult. However, this also highlights the importance of partnerships like the PCIEP that can cross bureaucratic boundaries and challenge conventional wisdom in environmental policymaking.

Building a Credible Carbon Offsets Portfolio

Summary by David Gottesman

Panelists
James Heath, *Principal and Head of Origination, EcoSecurities Group PLC*
Katherine Hamilton, *Carbon Manager, Katoomba Group's Ecosystem Marketplace*
Derek Murrow, *Director of Policy Analysis, Environment Northeast*

Moderator
Bradford Gentry, *Senior Research Scholar, Yale School of Forestry & Environmental Services, and Co-Director, Center for Business and the Environment at Yale**

*Workshop organizer

Bradford Gentry opened the workshop by addressing the variability in prices that Yale encountered when it was shopping for renewable energy credits (RECs). What does it mean if one REC is priced at $38 per ton of CO_2 equivalent while another one goes for $10/ton of CO_2 equivalent, for example? Gentry suggested that the wide variety of green technologies available may account for this disparity, which begs the question of which ones are the best investments, the most effective or the most credible. He also underscored the importance of selecting RECs that address the goals of a particular institution in offsetting its carbon emissions.

DEVISING A CARBON OFFSETS PROGRAM

Jim Heath described EcoSecurities' role in the post-Kyoto Protocol era. The firm sources, develops and trades carbon credits worldwide. Its current portfolio includes 17 technologies in 26 countries. Internationally, EcoSecurities employs a dual-pronged approach: clean development mechanisms (CDMs), which are certified emissions reductions in developing countries that trade for between 6 and 16 euros, and joint implementation, which consists of emission reduction units that are less advanced than CDMs, but trade for 5 or 6 euros.

Among EcoSecurities' most notable projects are methane capture in a Brazilian landfill, small scale hydropower generation in China and Latin America, and biomass use in Asia. In its wastewater treatment projects, the firm employs anaerobic digesters that harvest methane from agricultural wastewater streams. The methane-rich biogas

produced is sold back to the factory or facility as fuel, which is used to produce electricity in place of fossil fuel. Overall, this process reduces a plant's energy consumption and subsequent CO_2 emissions, all the while mitigating the plant's methane production.

Heath went on to discuss the considerations investors must keep in mind in building offset portfolios. The first point is strategy: there must be a concerted effort to first reduce emissions and then offset what remains; ignoring this first step is counter to the spirit of the Kyoto Protocol. Second, price is a key factor. Third, the sustainability of the project must be considered, particularly in the context of local definitions. Fourth is additionality – does this project exceed the "business as usual" method? Would it have been built without Emission Reductions (ER) investment? Fifth, and last, is longevity: for how long will the project last?

Figure 1 Methane capture at a Brazilian landfill

The discussion commenced with a question about purchasing ERs: is it a one-time purchase or does it entail annual investment? Heath responded that the financing of a particular ER would depend on the details of that project. For example, installing the aforementioned wastewater treatment system requires a one-time capital investment, whereas operating monitoring equipment requires a longer term commitment. When the topic turned to ER structure and reporting, Heath explained that since EcoSecurities has a variety of technologies in many countries, an ER can be tailored to an institution's specific needs; the same applies to reporting. Lastly, in response to a question about the credibility of non-for-profit vs. for-profit firms, Heath asserted that EcoSecurities is a for-profit firm that creates and trades ERs to meet compliance markets.

GREENHOUSE GAS OFFSETS: NORTHEAST U.S. REGULATORY FRAMEWORKS AND QUALITY ISSUES

Derek Murrow presented on the criteria his firm uses in assessing offsets. He started by defining an offset as "an off-system emissions reduction project" and explained that it is easier to provide an offset in a voluntary market than in a regulatory market, as doing so in the latter often depends on irregularly-defined boundaries. For example, because of the regulatory system, the Northeast Regional Greenhouse Gas Initiative (RGGI) offsets must be outside the northeast electric sector. Murrow then delineated his five offset criteria:

> First, a project must be real in that it "must be able to quantify an actual and measurable reduction in emissions."
>
> Second, offset projects "must be additional or surplus to reductions in emissions that would occur under business as usual activities." Since it is difficult to prove that a given emissions reduction project would not have been undertaken if not for the offsets funding, RGGI requires a baseline performance standard. Generally, "most projects and programs use a project-specific review and development of a baseline."
>
> Third, an offset project must be verifiable. This means that adequate measurement and documentation are necessary so that independent auditors can judge a project's eligibility and performance.
>
> Fourth, the permanence of an offset project must be guaranteed. As such, emissions reductions "must not be capable of being reversed at some future point in time." This requirement lends itself well to direct emissions reduction projects, such as combustion efficiency and offsetting the use of fossil fuels. However, proving that sequestered carbon – in biomass or soils, for example – will remain sequestered presents a challenge that could be addressed by conservation easements or insurance policies.
>
> Finally, enforceability is of great importance. If states are not able to enforce compliance, they must be able to require the offset credit to be returned.

STRATEGIES FOR CONDUCTING A CARBON-NEUTRAL EVENT

Kate Hamilton spoke about her experience building the carbon offset portfolio for the Yale School of Forestry & Environmental Studies' 2006 graduation. The portfolio, which "compensated for the emissions from electricity and travel of family and friends" at the graduation included offsets from renewable energy credits, native forestry planting projects in the Mississippi River Valley, and off-grid solar projects in Nigeria. Before researching portfolio options, it is necessary to determine the type of activity to be offset (which calls for an emissions calculation) as well as decision criteria and stakeholder interests, and the values of the organization purchasing offsets. Echoing Murrow, Hamilton spoke about the range of options and lack of

transparency organizations face when comparing offset projects in the voluntary market, particularly with respect to project type, size, certification, and environmental and social co-benefits. She also noted the benefits and challenges of utilizing a portfolio approach to manage risks and balance organizational values.

DISCUSSION

While the session focused primarily on offsetting carbon emissions, participants also discussed reducing emissions by curtailing consumption, particularly as universities expand and require more energy. Before any new building is constructed, a life cycle assessment should be undertaken to see if the new space is necessary or if existing facilities could be creatively employed to offer extra space. Specifically, the timing of classes and labs might be streamlined to avoid the need for a new science lab. If it is found that a new building is required, it should be constructed according to LEED standards.

Some universities, particularly those without the benefit of lofty endowments, will likely encounter difficulties in funding their carbon offset projects. Participants offered a few solutions to this problem. First, since many donors like to contribute to specific university initiatives, institutions can solicit donations for their offsets. Furthermore, the financial strength of investments in alternative energy can be used to both attract and generate capital. Second, universities in the Northeast U.S. can take advantage of the relative cleanliness of the area's energy grid to maximize the impact of their investments in offsets. One-third of the region's power comes from nuclear energy, another third from natural gas and the balance from hydropower and (to a lesser extent) coal. Offsets from these sources are relatively lucrative and can be sold to regions where offsets are less expensive. This pricing differential can be used to sell one REC that derives from the Northeast's clean technologies and purchase a larger number of cheaper RECs that are based on cheaper renewable energy technologies elsewhere. In this way, universities in the Northeast region can help drive the cheapest carbon sequestration possible.

At the same time, one must be careful to approach the offset-trading market with the goal of reducing overall emissions, not financial gain. For example, one participant commented that in Germany, the number of coal power plants has increased in recent years because those plants get the cheapest offsets available by offsetting one of the dirtiest technologies. Concerning business models, another participant argued that carbon dioxide is beginning to be classified as a waste or inefficiency, which is equated to a loss of profit. As more businesses adopt this model, it will become easier to reduce CO_2 emissions.

Measurement Equals Management! Conducting a Greenhouse Gas Inventory

Summary by Sara Smiley Smith

Panelists
Jennifer Schroeder, *Program Officer, Clean Air-Cool Planet** *Workshop organizer
Ryan Levinson, *Research Analyst, World Resources Institute*

Clean Air-Cool Planet is a northeast U.S.-based non-profit organization working to find and promote global warming solutions. The clientele of Clean Air-Cool Planet includes corporations, campuses, and communities. The campus program employs the same methods as the other programs, engaging partners in a 5-step process of greenhouse gas management. In developing a greenhouse gas (GHG) strategy, it is very important to have a group of individuals involved in the planning process that is representative of the group that will be responsible for implementing the plan. In some cases this means working with a committee that already exists, while in others it requires the development of a new team of people. Taking the time to assemble a multi-stakeholder group will result in a much more productive process.

After establishing a team of partners, institutions need to create an entity-wide list of GHG emissions, also known as a GHG inventory. This inventory should include the sources of emissions, the activities that cause emissions, and their quantities. This is the first step in a more comprehensive carbon management strategy and operates as a management tool.

The World Resources Institute (WRI) is a non-governmental research and policy organization based in Washington, DC that deals with the issue of global warming from many angles. WRI collaborates with the Europe-based World Business Council for Sustainable Development (WBCSD) on a multi-stakeholder partnership called the GHG Protocol Initiative, which works to develop international standards for GHG reporting and accounting.

DEVELOPING UNIFORM ACCOUNTING STANDARDS FOR GHG EMISSIONS

It is often easiest to describe the concept of GHG accounting from a financial accounting perspective. Consider GAAP (Generally Accepted Accounting Principles) – these international accounting principles enable financial comparisons between different firms throughout the world. The same need for comparability exists to account for GHG emissions. In 1998, WRI and WBCSD brought together hundreds of representatives from business, government, and environmental groups around the globe to establish GHG accounting and reporting standards. The result of this several-year consensus-building process led to the creation of the GHG Protocol Corporate Accounting and Reporting Standard. This tool is now used by hundreds of companies and climate change programs worldwide and is widely regarded as the international standard for corporate GHG accounting and reporting.

There are two general approaches for GHG accounting. One approach is "'entity"' accounting which includes corporate accounting. Entity accounting examines a firm or organization's GHG emissions during a specific time frame (usually one year) and measures increases or decreases in its emissions by comparing current year emissions to the emissions of a historical "base year." A university developing a university-wide GHG inventory would follow entity level accounting procedures. A second approach is "'project"' accounting which looks at the GHG impact of a single GHG mitigation project. One example of this might be the installation of a solar field. For these project level evaluations, there is no historical base year emission comparison. Project accounting measures emission reductions based on a hypothetical "baseline scenario" of what emissions would have occurred had the GHG mitigation project not been implemented.

In the United States there are a number of voluntary programs for private firms interested in entity GHG reporting. For example, the federal-level Environmental Protection Agency administers the Climate Leaders program; the Eastern Climate Registry is being developed by NESCAUM,[1] and California has the California Climate Action Registry. WRI works closely with these groups to try to ensure accounting continuity across registries. On the international level, the International Organization for Standardization (ISO) recently adopted GHG Protocol entity accounting standards. All of these efforts help move the world closer to a global standard for GHG emissions accounting.

[1] NESCAUM is the Clean Air Association of the Northeast States

Similar efforts toward standardization are underway in the public sector, which faces unique challenges in institutional structure. Beginning in 2001, Clean Air-Cool Planet partnered with a graduate student at the University of New Hampshire to create their Campus Carbon Calculator tool to calculate the GHG emissions of that campus. This suite of Excel spreadsheets was purposefully designed to be highly accessible and user-friendly so that it could be of use to any campus. It has been revised through extensive stakeholder processes five times as of late 2006 to accord with the standardization of best GHG accounting practices being promoted by the GHG Protocol. The Campus Carbon Calculator has become a means for collecting

standardized data between institutions and has been used at more than 200 universities.

The benefits of having one GHG accounting standard go beyond comparability. Uniform accounting can help to facilitate a global carbon market because it provides the consistent data needed. It also alleviates much of the fear and confusion surrounding the issue.

To improve data collection and to increase the number of public and private groups interested in conducting an inventory, methods for simplifying measurement and reporting must be sought. If, for example, a company has to report its emissions differently to regulatory agencies and other GHG programs, it is likely they will choose not to participate due to the huge burden of time and effort.

One of the challenges in using similar accounting principles between the public and private sector has to do with the scope of the analysis done. Often private companies focus on entity-wide assessments based on ownership or control of company operations while public entities such as cities or towns look at entity emissions based on geography. For example, a company might assess their GHG emissions based on their resource use in a single factory. The town that the company is situated in might also include those emissions in its inventory because it is a firm within the municipal boundaries. This sort of double counting could hinder future carbon trading systems if a standardized approach is not adopted.

Conducting GHG inventories can have positive impacts on a company or institution's public identity. Not only does an inventory provide ideas for reducing waste, but it can spur overall attention to solving inefficiencies and enhancing institutional transparency and responsibility. At the University of New Hampshire, for example, after a few years of tracking emissions they were able to publicize a 5 percent reduction. This earned the university popular press coverage as well as attention from alumni and trustees. Many other institutions around the country have found similar successes. Some of these inventories are online for public use.

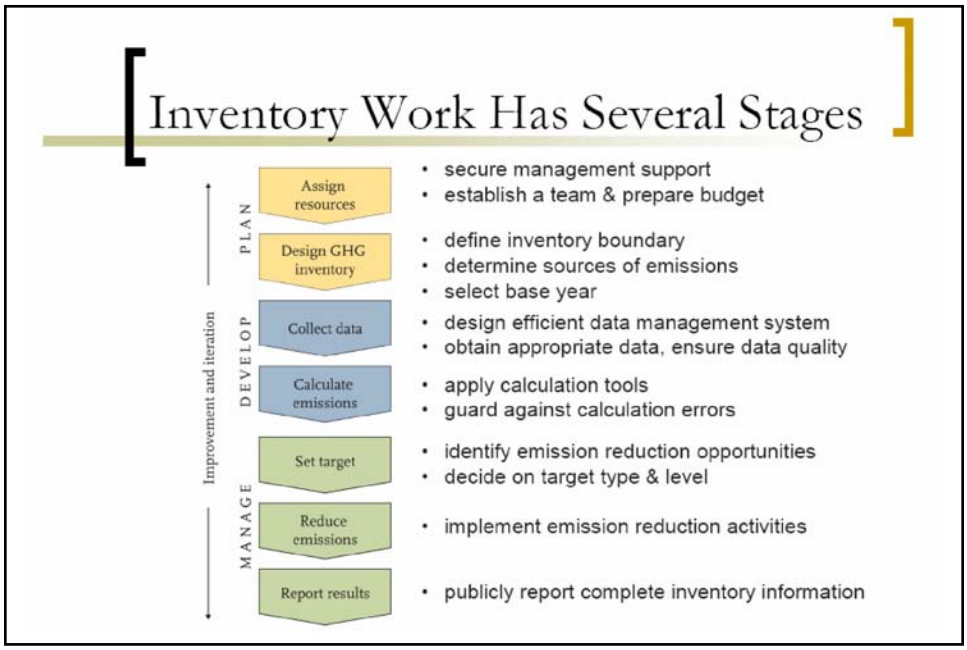
CONDUCTING A GHG INVENTORY

The five principles of GHG inventories include: accuracy, consistency, relevance, completeness, and transparency. In creating a GHG management plan there are three main steps: planning the inventory; collecting and analyzing the data, including reporting the results in a GHG inventory report; and developing emissions management strategies based on those results. In planning for an inventory it is imperative that the senior level management be committed to the process. For larger organizations, it can be difficult for one person to do an inventory on their own; input from facilities managers and others will be necessary.

The technical aspects of creating an inventory must be considered before undertaking the process. The key issues are establishing boundaries and deciding which facilities and which emissions sources will be included. Having a vision ahead of time about how the tool will be used can help in establishing a strong plan. It is important to have continuity in the team that conducts the analysis because of the

complexity and the number of assumptions involved. In some companies, interns do the analysis, which can make it more difficult to replicate efforts subsequently.

Figure 1 Steps in a greenhouse gas emissions inventory



Establishing boundaries and figuring out what types of emissions to include are the first challenges that must be faced. There are two major types of emissions. Direct emissions are from sources that are owned or controlled by the institution, such as a smokestack. Indirect emissions are emissions that result from activity by the reporting entity, but occur from sources owned or controlled by another entity, such as emissions associated with electricity use in a building. Often these boundaries are described as scopes. Scope 1 includes only direct emissions, Scope 2 includes electricity-focused indirect emissions. All other indirect emissions are Scope 3. Scope 3 emissions are considered optional to report because they are very difficult to account for (example: emissions produced when the product sold by the firm is built).

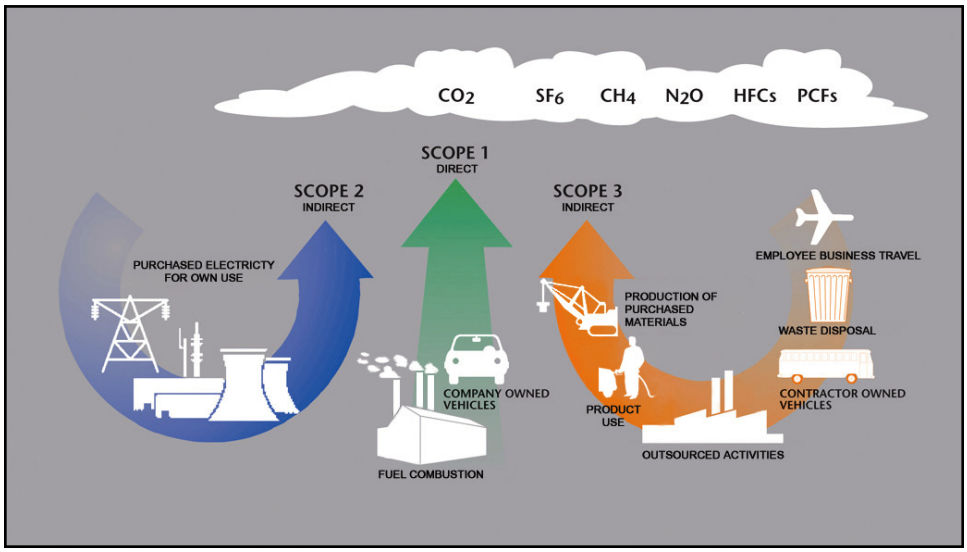
The new campus calculator provides for a similar approach to categorizing emissions at colleges and universities. It enables these institutions to prioritize emissions that can be readily calculated while prompting them to try to capture Scope 3 emissions. One example of Scope 3 emissions at a university would be commuter travel and waste disposal.

Establishing a base year for entity-level accounting is critical for setting goals for the future. This can be one specific year or it can be the average of emissions over a number of years to account for random variables such as weather that affect campus energy use. The standard, however, is just taking a single year. It is important to

choose a year for which strong data exist. Avoid the common temptation to try to create data for 1990 just to agree with the Seattle Mayor's agreement to meet Kyoto targets. It is best to get a reliable baseline, especially when too many indefensible assumptions would have to go into the 1990 number.

On a college campus, data would need to be collected from the following: fuel use in campus power plants and boilers; the campus vehicle fleet; electricity and steam purchases; transportation, including faculty and student commutes; air travel for faculty and perhaps campus wide; and sports teams travel. Regarding indirect emissions, every institution may need to make judgment calls to determine what data makes the most sense to collect. The best strategy is to obtain whatever data is known to be accurate, and then establish systems to determine how to get the data that is missing. It seems that much of the work in doing an inventory is determining how to obtain the data.

Figure 2 Categorizing greenhouse gas emissions into scopes



Appropriate and Practical: Setting Greenhouse Gas Reduction Targets on Campus

Summary by Matthew Eckelman

Panelists
John Bollier, *Associate Vice President for Facilities Operations, Yale University*
Jennifer Schroeder, *Program Officer, Clean Air-Cool Planet*

Moderator
Steven Lanou, *Deputy Director, Sustainability Program, Massachusetts Institute of Technology (MIT)**

*Workshop organizer

The major challenge in setting any type of environmental goal involves finding the balance between what is appropriate in terms of the urgency of the issue and what can be practically accomplished. The session was meant to be a forum for sharing stories from institutions that are at different stages of setting greenhouse gas (GHG) reduction targets.

MIT's Approach to "Walking the Talk" on Climate Change Considerations

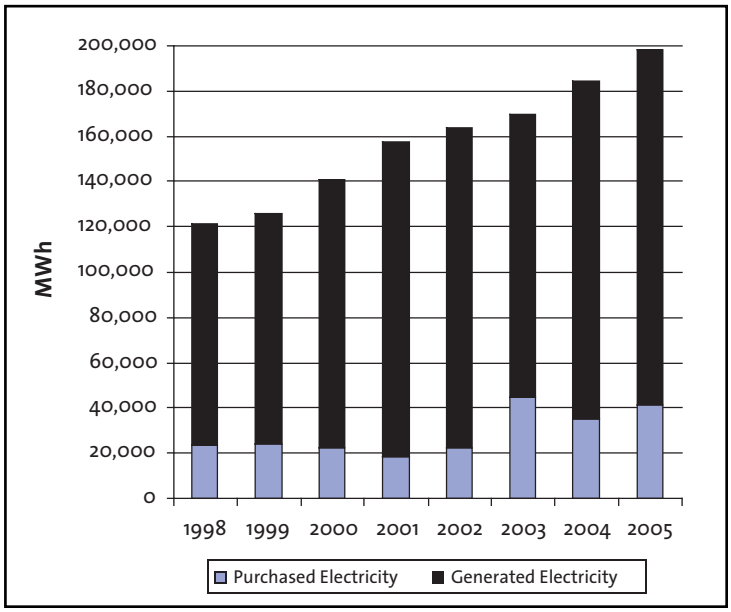
MIT has had an unusual experience in building consensus for a GHG reduction target. In the early 2000s, different environmental programs at MIT – pollution prevention, waste minimization, hazardous chemicals handling – were all independent and operated by different groups. Now the programs are somewhat more integrated, but the issue of climate change overshadows everything else. There are a number of possible drivers that might lead to energy use and GHG reduction targets: response to student activism or regional initiatives, peer pressure from other educational institutions, or considering a reduction target as a part of the core mission or as a leadership opportunity. However, at that time, no impetus existed for the administration to put forward a target.

As a major center of climate and energy research, many members of the faculty and the administration felt that MIT was doing its part in dealing with the climate

issue. Campus operation initiatives to reduce greenhouse gas emissions were seen by some as secondary when compared to the academic work being done. A GHG management plan was seen by some as being outside of the core MIT mission. This perspective led previous MIT administrations to not directly engage with a number of regional climate initiatives.

Dr. Susan Hockfield, MIT's new president, is very focused on energy issues and research. Under her leadership, MIT has set up an Energy Research Council (ERC), which is now guiding the development of a number of academic and institutional projects at MIT. Mr. Lanou and others worked with the ERC to write a White Paper about MIT's institutional opportunities for reducing GHG emissions, which it was hoped would lead to the recommendation and implementation of a GHG reduction goal. The research process for the White Paper was extremely fast – the team had only three weeks to initially complete it. The crux of the paper was an energy inventory and energy use projection out to 2020, which was based on the earlier work of a graduate student in cooperation with the Cambridge Climate Protection Program.

Figure 1 MIT's Cambridge Campus Electricity Use



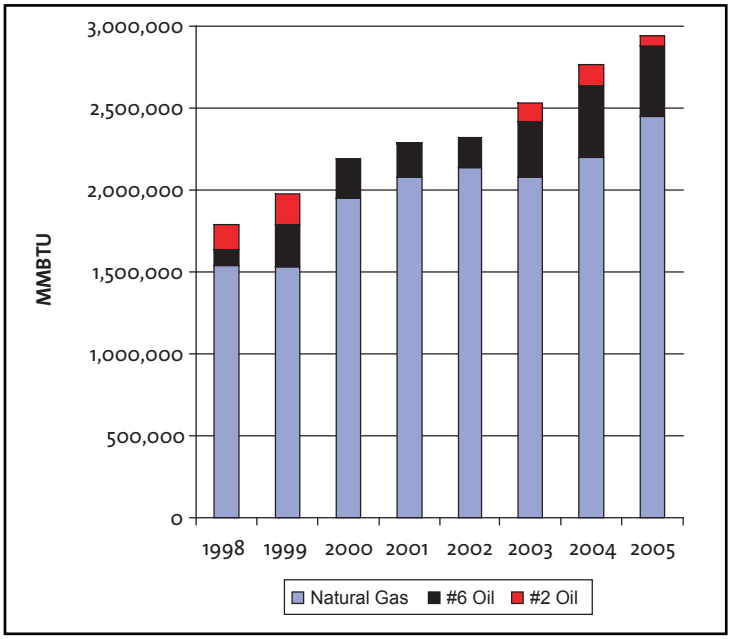
Source: MIT

The team brainstormed interventions to reduce energy use and improve efficiency, and engaged students and faculty. This was important in fulfilling the academic mission of the institution and generated many good suggestions as well. The main areas for energy savings were:

- Expanding the cogeneration plant;
- Conservation, including transportation;

- LEED certification for all new buildings;
- Buying renewable energy certificates (RECs).

Figure 2 MIT's Cambridge Campus Utility Fossil Fuel Use



Source: MIT

Some in educational institutions have philosophical objections to buying RECs – thinking money would be better spent on research and local initiatives. However, Mr. Lanou disagrees, saying that buying RECs in addition to taking all the possible actions on campus is the only way to meet aggressive reduction goals, and that universities should "walk the talk". One recommendation to the MIT administration does not include the purchase of RECs and is therefore advocating a less aggressive goal of reducing GHG emissions to 2005 levels by 2015 instead of 1990 levels, but Mr. Lanou feels that setting the goal is an important step. The issue of RECs can always be revisited in the future. He feels that the current program has a high chance of success, since it is paired with academic initiatives and has broad interest within MIT. In the future, however, he would like to see more input from the larger community on campus, in Cambridge and Metropolitan Boston.

YALE UNIVERSITY'S EXPERIENCE

Mr. Bollier began by noting the forces that were pushing him personally to take action on energy use and GHG emissions. These mainly took the form of student demands and even protests. Mr. Bollier had spent 14 years as an architect for the university and so had some understanding of the politics involved. The project started to gain

momentum with the hiring of Yale's Sustainability Director in 2004. With the formation of advisory committees for different sustainability issues on campus, serious research on campus energy use began, including a GHG inventory performed by students and faculty at the School of Forestry & Environmental Studies (available at www.yale.edu/environment/publications). The committee spent one year preparing its recommendations to the administration. At that time, Mr. Bollier gave a presentation to President Levin and the Provost. The main recommendation was the ambitious goal of reducing GHG emissions to 10 percent below 1990 levels by 2020. Given the current levels, this meant a 43 percent reduction in the university's emissions. Mr. Bollier commented that it is difficult to predict with confidence what the energy demands of the university will be in 15 years, so that there was a leap of faith involved in Yale's adoption of the goal. He commented, "If you want to be a leader, there's going to be an element of risk."

The initiatives for reducing energy use focused on technology implementation and behavior change. As with MIT, the single most effective energy use reduction strategy was an expansion of the cogeneration plant. To increase the participation of students, the Student Taskforce for Environmental Partnership (STEP) at Yale was set up to conduct outreach and environmental education in Yale's undergraduate colleges. The colleges competed with one another in reducing energy use, resulting in a 10 percent reduction in the first year of the program. Students ceased being adversarial to the university administration once they were made integral to the project and rewarded for reducing their own energy use.

Although the university is investing in RECs, it is much easier to interest the administration in conservation efforts. Mr. Bollier noted, "Conservation saves money, renewables cost money." While students concentrated on demand-side efforts, Mr. Bollier worked with the Yale Power Plant to mandate stricter temperature regimes for heating and cooling of the university's buildings, resulting in significant energy savings. In order to track all of these changes, Yale operates a large metering system (both thermal and electric) and produces quarterly energy consumption reports.

In the end, Mr. Bollier wanted to push for a GHG reduction goal that was high but achievable, had an appropriate duration, and would serve as a standard that could be adopted by other institutions.

HELPING INSTITUTIONS GET TO CARBON NEUTRALITY

Taking the discussion one step further, Ms. Schroeder discussed Clean-Air Cool Planet's goal of promoting carbon neutrality as an institutional goal. Clean-Air Cool Planet is a New Hampshire-based non-profit that partners with communities, institutions, and other non-profits in reducing GHG emissions. It has developed a number of web-based tools for calculating emissions that are in widespread use. Climate change is a global long-term issue, and Ms. Schroeder and her organization are focused on understanding how to involve institutional stakeholders from all sectors. In order to maximize the effectiveness of these partnerships and to build

credibility, it is necessary for third-party advocacy groups like Clean Air-Cool Planet to understand the prevailing economics of energy use, as well as the local politics.

Figure 3 Wind Turbine at Hull High School, Massachusetts

On the question of practicality, carbon neutrality offers a number of benefits: improvement of overall efficiency, reduction of risk, energy security, opportunities for education, and the important driver of "customer satisfaction." There is an enormous research effort underway in developing energy technology, and universities are heavily involved in that effort. Through their work with educational institutions, Clean Air-Cool Planet has developed a hierarchy for GHG emissions reduction:

1. Conservation
2. Technology
3. Renewables
4. Offsets

Collaboration is a large part of making these reduction strategies work. Clean Air-Cool Planet has found that involving the academic community of an educational institution is crucial to the success of an on-campus program, as it plays to the core mission of education. Colleges and universities are being subjected to peer pressure, which is an important driver, as no one wants to be seen as behind the times. The American College President Climate Commitment is one national program that offers a standard for educational institutions. Student groups also exert pressure, through such groups as Campus Climate Challenge or the student chapters of the National Association of Environmental Law Societies (see summary of "Engaging

Students" workshop in this report).

Ms. Schroeder ended the session with an important reminder, a quote from David Hales of the College of the Atlantic: "If higher education is not relevant for solving global warming, then higher education is not relevant."

QUESTIONS AND ANSWERS

Q: *It's relatively easy to calculate how many RECs would be appropriate for offsets, but how do you calculate the possible energy use reductions from conservation?*

A: For any system that hasn't been optimized, a good rule of thumb is that you can get 15 percent improvement. (Bollier)

Q: *How can we make a goal without a monitoring system already in place?*

A: One can look just at the financial inputs for gas, diesel, fuel oil, etc. and calculate the amount of GHG emissions that would arise from their combustion (Bollier). It is helpful to start these efforts with a GHG inventory – this is an excellent educational opportunity for a student (Lanou). In the process of doing such an inventory, you will meet many of the parties you will need to build consensus toward an actual reduction goal (Schroeder).

Q: *How do you finance energy conservation projects? Do you reinvest the savings?*

A: Previously, conservation projects only occurred when utilities had a budget surplus. At MIT, a revolving loan fund is needed to fund projects that have attractive payback periods. But it is difficult to incentivize department-level investments as in most cases, departments do not pay utility bills directly and so have no financial incentive to conserve. (Lanou)

At Yale, the funding came right out of the capital operations budget. Most of this was for the cogeneration expansion project. But it is difficult to persuade everyone that money should be used in this way. Many people argue that schools should concentrate on providing facilities for education and ask, "Are we in the power business or the education business?" (Bollier & Lanou)

Q: *It sounds like cogeneration is a great option, but it is still based on burning fossil fuels. This just doesn't feel like a good option when we're talking about sustainability. All the students want to see renewables on our campuses – could you also consider biomass?*

A: Given the strict targets that universities are facing, it is important to consider all the options available. It happens that cogeneration facilities give the most energy conservation for the least cost. (Bollier)

Energy and Climate Change: Risk and Opportunity

Summary by Jason Rauch

Panelists
Sarah Hammond Creighton, *Director of Campus Sustainability, Tufts University** *Workshop organizer
William Leahy, *COO, Institute for Sustainable Energy, Eastern Connecticut State University*

THE SITUATION AT TUFTS UNIVERSITY

Sarah Hammond Creighton outlined Tufts University's commitment to meet the Kyoto Protocol and participate in the Chicago Climate Exchange. Climate change is a worthy goal as the actions taken to achieve greenhouse gas reduction have far-reaching impacts. Planning for adaptation to climate change is essential too. Actions to take on climate change incorporate facilities, health services, food services, emergency planning, and investments.

Sustainability, energy, and climate change issues are also related to security issues. Tufts lost grid power for two weeks over a summer, which turned an emergency into a crisis. This event raised awareness of energy security issues, and the benefits of distributed power generation.

Campus and facility planning should take into account the issues of climate change. Future increase in cooling demands due to increased average temperatures necessitates designing air conditioning into new buildings. The increased precipitation due to climate change has implications for water management techniques. These and other factors associated with climate change affect how life-cycle costs are estimated.

Financial planning also incorporates issues of energy and climate change, as it associates with investment risk. Fuel prices can fluctuate widely, increasing the vulnerability and risk of energy costs. Using renewable energy and distributed power generation enhance the energy security of the university and therefore should be taken into account when calculating life-cycle costs of switching to those strategies.

In addition to adaptation, mitigation is critical to dealing with climate change. The Kyoto Protocol commitment is to reduce greenhouse gas emissions 7 percent below 1990 levels by 2012. New buildings need to be designed better, retrofit of old buildings

is a challenge that must be faced, and procurement of fuels both on and offsite needs to be addressed. Though transportation is an issue, it only accounts for 7 percent of Tufts' greenhouse gas emissions, so it is not the central focus of Tufts' approach to achieving sustainability. Buildings are a much higher priority.

On the green building front, Tufts has built a demonstration photovoltaic system and a solar thermal hot water system. For existing buildings, temperature regulation has been improved with more sophisticated heating and cooling controls. Water use has been reduced 20 percent below 1990 levels through innovations in toilets, faucets, showers, and irrigation. Lighting, a "low hanging fruit," has been changed campus-wide, including in the president's office, to fluorescents. Occupancy sensors, including vending misers, have also been used for energy reduction. Steam traps have been installed. These measures have been implemented on a larger scale in a new LEED silver-certified residence hall at Tufts.

Steam traps, though providing a big reduction in energy use, highlight the issue of faculty and student participation in sustainability operations. Users often have very good ideas, but sometimes there is a disconnect between ideas and practical operations. No one has come in requesting steam traps, but the idea of photovoltaics often comes up.

Energy contracts are a big risk to the university. Does the university want the lowest price or the greatest stability? Of course, the administration states they want both, but this is not a trivial question. Price stability lowers the risk, but is often more costly. At Tufts, the electricity supply is contracted out from TransCanada through December 2010. Tufts decided to go with this particular supplier because about 80 percent of the electricity was provided by hydropower, which provides price stability because it comes at a fixed cost. This purchase has also helped Tufts approach its greenhouse gas reduction target.

In terms of student awareness and activism, students passed by 80 percent a referendum to raise student fees so the university could purchase green power. Behavior modification for power savings has been successful via Tufts' "Do it in the Dark" competition. New employees and students receive an informational brochure about what they can do about climate change and energy efficiency.

ENERGY CONSERVATION EFFORTS AT EASTERN CONNECTICUT STATE UNIVERSITY

The Connecticut legislature issued 38 recommendations for reducing greenhouse gases, one of which was the Green Campus Initiative. This was a challenge to universities in the state to achieve renewable energy targets. Eastern Connecticut State responded by distilling the opportunities for energy reduction/renewable energy use to 12 categories.

Buying green power helps, but Eastern Connecticut State has also adopted energy conservation approaches: a photovoltaic system tied to a LED lighting system; and a geothermal heating and cooling system.

New construction utilizes LEED energy performance codes that are tied to the latest version of ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers) and the International Energy Conservation Code (IECC). Whenever these codes are updated, so are the new construction guidelines. Natural lighting in new construction has been utilized as well.

In order to upgrade old buildings, the first task is to assess their energy use needs. The old adage "you can't manage what you don't measure" holds true. Metering, life-cycle analyses, and building surveys are all critical. For example, after an energy survey of a building on campus, its heating system was retrofitted with a ground-source heat pump. With just this one upgrade, the building's performance score jumped from an Energy Star score of 30 to 80.

A campus inventory of baseline information is key. Once this information on energy use and costs is collected, these metrics can be benchmarked against others. In this benchmarking, it is important to use a metric people understand. Miles per gallon is easily understood, Btu's per square foot less so. As such, for buildings without submetering, Bill Leahy and his group developed a walk-through survey to rate a building's energy use. Each aspect of the building's energy consumption is scored. The scores are added up, and the sum score can be compared to other buildings to identify which buildings are most in need of improvement. This intra-university comparison of buildings provides an easy metric to quickly assess which buildings have the greatest potential for improvement and which are already energy efficient. This is helpful when working with limited budgets for building improvement.

Figure 1 Walkthrough Scoring System

Evaluate Major Energy Consuming System

- Lighting & Lighting Controls
- Building Envelope
- Building Systems and Controls

Scoring

1. Inefficient / Quick Payback / Retrofit
2. Inefficient / Capital Project / Renovation
3. Neutral Position or application does not apply
4. Relatively Efficient / Diminishing Return
5. State of the Art / Very Efficient

It is also important to keep abreast of the latest technology. For example, only four years after it was constructed, a building required a lighting upgrade. The new lights, T5 lamps, use half the energy of the four year-old T8 lamps.

DISCUSSION

Fuel Contracts

Tufts commits to 18-month contracts on heating fuels. Now Tufts is trying to address how to link the bill to a hedge for stability. In contrast, the University of Vermont is purchasing fuels on the market rather than locking in a contract because it has saved money relative to other institutions in the area.

What is the end goal? Is the goal price stability or a gamble for the lowest price? This illustrates the need to broaden the scope of the end goal. Universities are credit worthy customers, so they can get a good deal if they look around. But before purchasing energy, the universities have to know what they want. The way in which energy is purchased has changed in the past decade, so the role of sustainability directors is not to be experts, but to know how to ask the right questions.

Condensate Meters and Steam Traps

Installing steam traps increases the level of metered condensate. Condensate metering is often used to assess the cost of steam, so the cost for the steam increases just by installing the steam traps. Alternate meters exist (steam flow meters), but are more costly and would require capital investment to change over. Tufts actually contracted out to a company to install steam traps.

Complete thermal submetering has good benefits. Serious consideration should be given to installing meters in any new construction project.

One caveat is that meters require a step-up in operations capacity to read and inspect them. At Tufts, a window was left open over the weekend of a large snowstorm. The snowstorm caused $700,000-$800,000 in damage. Metering, coupled with monitoring alarms, can save money.

Life-Cycle Cost Analysis

The issues of energy, risk, and climate influence many assumptions. What are the factors that go into a LCA? For instance, what are the assumptions of the future cost of fuel, and what are the costs of risk and the savings of reliability?

We need to put enough data in front of decision makers so that they can make good decisions. The energy and finance people need to have a better dialogue. And when performing an LCA analysis, performing a scenario analysis of high and low projections would be useful.

Financing

Linking energy and finance also relates to hedging the operating budget. At Tufts, Creighton's group tries to bring a specific financial instrument to the table when proposing an idea or making a decision. But it is difficult to decide how to take certain actions if you don't know what the financial strategy is.

Climate neutrality is an emerging market. For instance, Sterling Planet is a company that deals in renewable energy credits (RECs) and carbon credits.

This example points out the opportunity energy savings and renewable energy can play in a funding opportunity for the university. If you change the conversation in this way, from one of environmental stewardship to that of bringing in income to the university, you influence who comes to the table (e.g. this brings in the finance people). The market of RECs and carbon credits provide a way to reach carbon neutrality efficiently.

In Connecticut, the Renewable Portfolio Standard provides an entity with the opportunity to sell energy efficiency. However, if you bank the credits for energy efficiency, you give up the opportunity to sell the RECs.

It is critical to try to take a more comprehensive approach to sustainability instead of tackling one project at a time. This will bring more stakeholders to the table.

Setting the Bar High in Design and Clearing It in Construction

Summary by Caroline Howe

Panelists
Kurt Teichert, *Brown University**
Paul Stoller, *atelier ten*

*Workshop organizer

This workshop featured an in-depth discussion of methods for creating university-wide standards for design and construction and ways to achieve those goals. Teichert and Stoller created a dialogue with attendees, with everyone sharing their own experiences from a variety of backgrounds and levels of expertise.

Each panelist began by introducing themselves before splitting into groups for small discussions among the conference attendees. Kurt Teichert teaches high performance design in an environmental studies course at Brown, where he is also an active participant in the design process and in monitoring the construction process. Paul Stoller works for atelier ten, an architectural consulting firm with offices in London, New York and New Haven. He also teaches environmental design and construction at the Yale School of Architecture.

The members of the audience split into small groups of six or seven, with several minutes to introduce themselves and come up with broad ideas they hoped to focus on in the rest of the presentation.

The break-out groups focused on the following issues:

- A "true construction standard." Should LEED (Leadership in Energy and Environmental Design) be the standard used, or are there others that should be considered? When and how should these standards be applied?
- Integrating cost considerations into these design standards.
- Advancing sustainable transportation strategies.
- Curbing the tendency for campuses to expand.
- Governance considerations, including garnering support from the board of trustees or regents, and empowering a single person (a sustainability coordinator or passionate student) to effect change.

GREEN BUILDING AT BROWN

Teichert brought up other questions that he had been considering, ranging from issues of determining and testing qualifications of green architects to issues of institutionalization and how to move from one green building to a university culture of sustainable design. Teichert briefly addressed some of the dilemmas of cost, since some stakeholders bear the burden (cost of construction) while others may reap some benefits (like electricity savings), which are similar issues caused by energy conservation in general.

The program of green design at Brown attempts to incorporate sustainable design into the highest and earliest stages of design. Though Teichert admitted that standards may not hold up throughout the process (due to budgetary pressure, or insufficient discipline in the project delivery process), he emphasized that high performance standards throughout the process greatly improve a building's quality.

Brown has developed a Project Delivery Process (PDP) document that includes requirements for design charettes, life-cycle cost analysis, and a significant effort from the design teams on high performance design objectives. LEED is used as a guideline and the PDP outlines the steps and timing of making decisions regarding LEED certification objectives.

ATELIER TEN'S WORK AT YALE

Stoller said, "If there is one message that I can send to you, it would be: if you want to get a really high performance building, you just have to ask for it." He has seen administrations fail to get the buildings that they wanted because they were afraid to set high standards for their architects. From a designer's standpoint, Stoller insisted it was up to the designers to determine whether or not the goals could be met on the budget available.

The firm atelier ten is now involved with about ten Yale projects. The university has always been committed to high performance buildings, and now sustainability is a major factor in that performance. Yale's Malone Center for Biomedical Engineering received LEED gold certification, and the Chemistry Research Building is rated LEED silver. These are both atelier ten-designed buildings.

Stoller's method of creating a project relies on a highly ordered, hierarchical process. Too often, Stoller claimed, this approach is neglected. The first step in any design process is to determine the principles which dictate action in the institution. Next, the university must determine what the goals of a specific building are, such as whether it is designed to be a teaching instrument. From these goals come objectives: the ways to achieve those goals. This might include building ratios or landscaping ideas. The final product can later be measured against these benchmarks.

It is only after this that the project teams should be selecting specific strategies and testing them to see if they meet the university's goals and objectives. The technologies chosen should support these strategies. Stoller reminded participants that far too often the technologies are chosen before the strategies or even the goals are discussed.

At Harvard, six sustainability principles guide the design process:

- to demonstrate institutional practices that promote sustainability;
- to promote health, productivity and safety;
- to enhance the health of the campus ecosystem;
- to develop planning tools;
- to encourage environmental inquiry;
- to establish indicators for sustainability.

Yale's principles are even simpler. President Levin's challenge is to reduce Yale's greenhouse gas emissions to 10 percent below 1990 levels by 2020 by reducing emissions of residential colleges by 15 percent, academic buildings by 10 percent, and by greatly reducing the impact of new buildings, though no specific goal has been set.

Stoller emphasized that such goals help designers understand the university's targets broadly or for a specific project. Greenhouse gas targets may not be exactly related to energy targets, and it is important for designers to know which goals are most important to the university. He emphasized that such goals should be put in the Request for Proposal (RFP) if possible.

Stanford Business School's RFP sought not "a good or even great project, but a spectacular product that is recognized as moving the field of building academic campuses forward." Though Stanford appropriately listed the certifications they desired for the project, LEED was an alternate option and sustainable design was not mentioned at all, which Stoller believed should be incorporated into the RFP as well.

In contrast, Ithaca College decided they wanted environmental design to revolutionize their campus, so they changed everything about their design process in order to go for LEED gold and LEED platinum. They set this as their criteria for all design projects on the campus, which got some of the best architects to fly to Ithaca and apply for the project. All of the best architects want a LEED platinum building, and although they would lose money on the project, architects were impressed by Ithaca's straightforward proposal for a LEED platinum project.

Although LEED certification may not be the only qualification or the only way to express the specific goals of a project, it is a general term that can attract specific architects to the project. It can also attract a construction team that does know what the architects are talking about in the dialogue around LEED and green buildings. The bottom line is to specify as much as possible in the RFP to program for success.

One challenge is being as specific as possible in the RFP. Another is answering the common query from administration: "Will it cost more?" Stoller advised that the budget should be set in advance, allowing the design teamwork around it. Up front, recognize that the green design process will cost more because there may be more consultants on the project. Since the largest impacts on cost come from timing, supplies, and the availability of contractors, these will not be affected by whether it is green or not. He emphasized that if a school is building high quality buildings, the

cost differences with green buildings will not be significant. The dialogue about cost is shifting away from purely financial considerations about efficiency gains and towards a dialogue about greenhouse gas emissions.

Addressing the cynical adage, "the greenest building is the one that had not been built," Stoller encouraged exploring the true cost and future benefit of buildings. Sometimes older can be better. For example, some older "charismatic" buildings may be less energy intensive than new buildings. Old buildings often have no air conditioning and they have strong daylighting because they were built before consistent electric lighting was available.

PARTICIPANT QUESTIONS AND DIALOGUE

Energy Intensity

RFPs should include energy intensity targets on a level of energy use per square foot per year. Even a goal such as "30 percent less energy-intensive than traditional buildings" can control preferences, independent of existing technology that will change over time. It can allow designers more flexibility while also giving them a very high standard to reach. Energy intensity also allows for greater comparison between campuses and between other high performance buildings.

In Germany, energy intensity requirements are much stricter than in the United States. They are 50 kWh /sqm/ year, 10 percent of the energy intensity of traditional buildings. These difficult targets force designers to make innovative design decisions, while not tying them to specific technologies.

Energy intensity measurement can allow campuses to better project their emissions for a predicted amount of square foot expansion. With a set energy intensity and a projected build out, emissions predictions are much simpler and more easily defined. With more accurate predictions of a building's demand, electricity and cooling infrastructure can be more properly sized.

Brown's approach is to quantify the energy intensity of the existing building stock and to analyze the necessary changes for these structures before new buildings are constructed. This allows for funds to be partitioned more appropriately for emissions reductions.

Payback Time and Life-Cycle Cost Analysis

The problems with such analysis included increasing energy costs, inflation rates, and the present and future climate negotiations in New England and how these could affect carbon markets or energy cost. It may be useful to apply the skills of university energy strategists and business schools to payback projections.

The integrative design process relies on value engineering, which is always about cutting the budget. True value engineering must include life-cycle cost.

Site Design Issues

Stoller advised focusing on the building envelope. He said, "The envelope is where the sustainability comes in: it is where the energy comes in or goes out; it is where all the action is."

Getting buy-in from mechanical engineers is critical, since they design for a constantly comfortable building. Most engineers will not design for a building to fall outside ideal temperature parameters – they must be directed to do so by administrators. The engineers' conservatism stems from the fear of being sued. Most building lawsuits are related to HVAC systems.

Attitudes among engineers are changing, as their expertise is increasingly required to address the more nuanced and challenging issues related to green construction. For example, light is no longer strictly a question of the level of foot-candles on a work surface, but about contrast, glare, and overall room light.

Renewable Energy and Conservation

At atelier ten, renewable energy is an end-stage consideration, as the first priority is to design for efficiency and demand reduction. Another top priority is to include in early stages decisions about core materials such as concrete vs. steel. Too often these decisions are left until fairly late in the design dialogue.

In addition to energy, some participants were interested in the discussion of consumption and reuse. One mentioned that just by setting the water fixtures at a lower level, you can drop the consumption of water by 30 or even 40 percent. To be more restrictive there are other technologies, including the dual flush toilets and waterless urinals, that can reduce water consumption by 50 percent. Greywater use was considered as another option to reducing potable water consumption.

Examples at Yale

The firm atelier ten consulted on the design of the Malone Center at Yale, one of the first two sustainable buildings on campus. The process brought together architects, engineers, and consultants and asked: What is a sustainable building today? Though not every project needs this, Stoller emphasized that this can be a really helpful process for a university at this stage.

The firm is currently working on the new Kroon building for the Yale School of Forestry & Environmental Studies, which the administration hopes will be a carbon neutral building in its operation. For this building, the Facilities Office stepped into the project, committing to maintaining photo-voltaics if they were installed by the designers.

Passive solar design, integrated thermal systems, and efficient lighting and heating all brought the energy demand of the Kroon building down. Designers were considering incorporating an underground "labyrinth" for heat recovery and storage. Questions remained on how it would integrate with the HVAC system and whether Yale would be able to commit to a hundred-year payback period. Despite the length of time that the university has existed, it is still difficult to invest in building elements with such long-term financial returns. The project team chose not to install a labyrinth, and instead focused on other measures to reduce energy demand. The university has chosen to use renewable energy credits to offset any remaining emissions from electricity use. Ideally, in the future, the building will be supported by Yale's off-site renewable energy sources, such as wind from Yale's forests.

Figure 1 LEED gold-certified Malone Engineering Center at Yale

Buildings as Learning Tools

Buildings fall along an environmental curve. There is a regulatory minimum of environmental standards just above which most buildings fall. University buildings are most often farther down the curve even without intentional green design. They are in the high quality building sector because these are more than just structures, but places to build community and in which to learn.

Buildings touted as sustainable can and are used not only to bring pride to an institution, but also to teach the students who pass through it. Yet, Stoller supported downplaying the information given on the walls of a building and using other means to educate about sustainable building design. Making greenness seem simple is important for it to attain social acceptance.

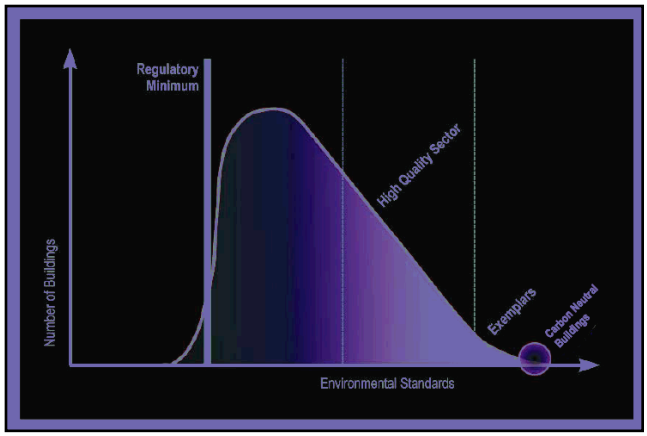
The discussion shifted towards the fact that is also important for the building to be enjoyable to be in. A building with a positive built environment will support its researchers and students in a more positive way. A sustainably-designed building can in fact draw funds by bringing top researchers into the university. Part of building a green structure is "occupant delight," the idea that people will love to be in the building and work in the building, that they'll come earlier and work later if the environment is a positive one.

Funding Sustainable Building Design

A participant described her experience trying to create a maintenance endowment in the initial fund-raising. Since some of the more complex lab buildings require personnel to maintain that building alone, the administrators were aware of the need for funds. By bringing this up early in the process, they could then later follow up with the budgeting office, saying that they hadn't gotten the funding they had requested

from the beginning. They were looking into bringing outside foundations to support the project, including the Henry P. Kendall Foundation, but were unsure how that might affect the design process.

Figure 2 Sustainability curve of buildings



Teichert answered that people in the development office are always looking for new initiatives that will animate the donor community and they need to know that green buildings are perceived as exciting.

Recycling and Sustainability: A Practical and Theoretical Pairing

Summary by Sara Smiley Smith

Panelists
Mark Lennon, *Founder and Principal, Institution Recycling Network*
Robert Gogan, *Recycling and Waste Manager, Harvard University*

Moderator
Mary Jensen, *Coordinator for Campus Sustainability and Recycling Programs, Keene State College**

*Workshop organizer

In some ways, recycling has become subjugated to sustainability on college and university campuses. The majority of funding and publicity often goes to sustainability efforts, although recycling is often the thing people think of first when they are discussing sustainability. In order to establish recycling as a key part of sustainability on all levels, we need to quantify its impacts, from greenhouse gas reductions to financial savings.

CONSTRUCTION AND DEMOLITION WASTE RECYCLING

The Institution Recycling Network (IRN) is a cooperative working primarily in New England that focuses on making recycling simpler and improving the economics of recycling. One of IRN's greatest impacts IRN has been in construction and demolition (C&D) recycling, where there is traditionally a tremendous amount of waste. C&D recycling has measurable environmental benefits and is financially beneficial in most regions of the country. Yet it remains poorly understood, particularly among contractors. Contractors often believe that recycling will ruin the budget and the schedule. In fact, recycling can easily be built into any project.

There are large and measurable greenhouse gas emissions reductions associated with C&D recycling. It is important to recognize that the earth is finite and that our processes will not be sustainable until we think of them more cyclically. Everything we extract from the earth should be considered for a number of uses before it is discarded.

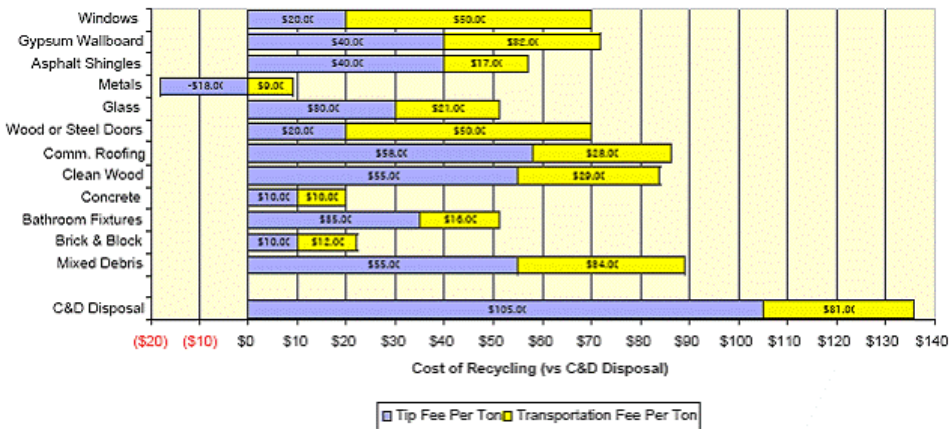
In the Northeast, the C&D debris sent to the waste stream is very recyclable due to the materials used and the construction methodology. Because of the high cost of waste disposal in the region, it is always less expensive to recycle than to throw debris away. Nearly everything that comes out of a demolition project is recyclable, including cabinets, light fixtures, metal, wall board, molding, concrete, masonry, and asphalt.

In a new construction project the majority of waste is also recyclable. Again, proper planning ahead of the project is critical to ensure that the recycling goes well. For example, if recycling is not considered from the outset, valuable materials such as asphalt or shrubs cleared from the site will be sent to a landfill rather than recycled.

Some items need special consideration for recycling. For example, treated and painted woods cannot go to traditional wood markets like mulch and boiler fuels. However, such wood can be used for some purposes, such as alternate daily cover for landfills. Any abatement that is needed, for lead or asbestos for example, must be done before recycling can begin.

One of the main challenges to including recycling in any construction project is convincing the contractors, who have established behavior patterns, to consider recycling. They often think it will cost too much to sort materials, transport them, and deal with different recyclers. In New England, it costs $100 per ton to dispose of waste at a landfill and $30 per ton to truck it there. To recycle waste as mixed debris, it costs between $110 and $120 per ton with transportation included. If a commitment is made to do source separation on site, major savings can be achieved in waste management. For example, concrete and brick can be recycled for only $20 per ton.

Figure 1 The Cost of Recycling vs. Disposal of Construction and Demolition Wastes



In the Southern U.S. these cost advantages are not always available due to lower tipping fees for waste disposal.

In order to get contractors on board, it is important that recycling be included in the specifications of the project. When contractors are asked to recycle they are being

asked to do something different, which is challenging. The reality, however, is that recycling does not mean that workers have to do more. In most construction projects it is rare that more than one type of waste is generated at a time. For example, when workers are framing there will be primarily wood waste, when workers are sheet-rocking there will be primarily dry wall waste. This eases the complexity of sorting and hauling materials away.

Contractors often have a number of complaints about recycling. One main complaint from contractors is that they don't have room on site for various recycling containers. This challenge can be overcome with adequate planning. Another complaint is that recyclers provide poor service. This is really no longer a viable complaint because many big haulers recognize the growing market and have made recycling a focus. Finding correct "request for proposal" and contract language is also a challenge for some. This information is now readily available from many sources including IRN.

In summary, the key to a successful project is early planning. This allows for everyone involved in the project to get on the same page and it also ensures that no recyclable materials are lost unnecessarily. This process is not always easy. A willingness to be flexible in order to adapt to new situations is an important pre-requisite.

LESSONS FROM HARVARD

Recycling is the gateway to sustainability. As a society we are just beginning to address the solid waste issue appropriately. The trademark of the recycling community is the mobius symbol which carries with it unspoken messages about the importance of resource reuse. The three arrows signify manufacturing, recovery, and consumption, in mimicry of natural systems where nothing is lost and materials are constantly cycled. There are indeed economic, social, and environmental benefits to recycling. We are making some progress in maintaining the cyclical potential in our current consumer world, but we still lose an unacceptable amount to landfills and other sources.

The town-gown divide is often a barrier to comprehensive recycling efforts. To overcome this, Harvard participates in Cambridge public committees and donates a large amount of reusable materials to the community such as cosmetics donated to women in shelters on Valentine's Day. This provides great media opportunities for the university and contributes to social sustainability.

It is not always enough to simply recycle – it is also important to be aware of your impact as a recycler. One potential unexpected impact of recycling is the noise associated with recycling trucks. Harvard has attempted to decrease this negative impact through the use of compressed natural gas spark ignition dump trucks to quietly and cleanly remove items.

In building a strong recycling program, colleges should harness the competitive interactions that exist between institutions. Colleges have strong rivalries and these rivalries spark innovate ways to improve recycling efforts.

Harvard has found a number of innovative ways to recycle on campus. One effort developed a waste-oil to fuel system. In this project, used canola oil is converted to fuel which is higher performing than diesel and more environmentally friendly. In another project, Harvard Habitat for Humanity worked to make the cleanout of the dorms at the end of the year profitable. In 1987 Harvard threw away 289 tons of move-out related trash. In 2006, through improved recycling and reuse efforts, this total decreased to a mere 49 tons. Salvaged items are resold at the beginning of the subsequent academic year to returning students. This effort has grown to such a level that the Harvard bookstore offered to act as a partner in reselling some of the collected items.

It is relatively straightforward to measure institutional recycling rates. This allows institutions to benchmark their progress and compare between different parts of the campus and between campuses. This comparability has led to competitions such as "The Green Cup" and "Recyclemania," which are great examples of the way competition can push new participation and ingenuity.

Recycling is the most visible demonstration of sustainability on a campus. It is difficult to convince people that you have a commitment to sustainability if you are not recycling well. It is an old concept, but we are far from good at it.

An International Exchange of Campus Sustainability Experiences

Summary by Lisa Fernandez

Panelists
Bernd Kasemir, *Novatlantis and sustainserv, inc.** *Workshop organizer
Leith Sharp, *Director, Harvard Green Campus Initiative*
Keisuke Hanaki, *Professor, Department of Urban Engineering, University of Tokyo*

Sustainable campus initiatives must adapt to the institution they strive to change, as well as to the cultural and regulatory context in which they are embedded. At the same time, there are similarities in approaches to advancing sustainability at academic institutions in different countries. Much can be gained from comparing experiences. A case study approach to sustainable campus management, initiated by 'Novatlantis – Sustainability at the ETH domain' is discussed and illustrated with experiences from Harvard, Yale, and ETH Zurich. These examples are put into a wider context with an overview of sustainable campus design and education at the University of Tokyo.

DEVELOPING INTERNATIONAL CASE STUDY COMPARISONS

As in any field, national, regional, and institutional backgrounds shape the challenges and opportunities faced with advancing sustainability on campus. Kasemir discussed a program to compare approaches at universities around the globe that lead the change on sustainability. This case study effort was launched in the context of the international Sustainable Campus Network and initiated with an experience exchange between sustainable campus initiatives at Harvard, Yale and ETH Zurich. Topics addressed include:

- Team composition and background;
- financial models employed;
- implications of the institutional framework;
- activities and lessons learned; and
- future challenges.

This is a new effort and more complete data sets as well as resulting recommendations are just emerging. Still, some elements have been identified as essential in shaping similarities and differences between sustainability approaches at the three institutions.

Yale University has a dedicated Office of Sustainability (YOS). The focus has been on developing sustainability metrics, to create benchmarks for progress against goals over time. A "Green Fund" has helped support a variety of sustainability initiatives on campus. Yale University has an overall greenhouse gas goal, committing the institution to reduce its greenhouse gas emissions to 10 percent below 1990 levels by 2020, corresponding to a reduction compared to 2005 levels of 43 percent.

In contrast, Harvard's Green Campus Initiative takes a more decentralized approach – decisions are made at the school level (e.g., business school). Instead of a grant program, Harvard administers a Green Campus Loan Fund that provides interest-free revolving loans for specific projects, such as a lighting retrofit. These loans can be paid back once the capital expense is recouped from the energy savings realized. Harvard University has committed to a set of Sustainability Principles formally adopted by its president.

At ETH Zurich, facility-related decisions are more centralized, though planning is very participative. In ETH's new "Science City," a large remodeling and extension project of a major campus area, sustainable design principles are integrated into the master planning process. Collaborative planning involves members of the ETH community, local residents, authorities, and representatives from politics and business. In addition, an international competition has been launched to solicit further input for sustainable planning at Science City.

In the ETH Domain, of which ETH Zurich is part, the goal of a "2000 Watt society" is pursued that would give all global citizens equitable access to energy while at the same time protecting the climate. A model building of one of the Domain's institutions, Eawag's "Forum Chriesbach," illustrates how this goal is implemented in practice. Through the use of innovative construction and building technologies, the building does not require conventional heating and cooling systems and is essentially carbon neutral. Water use is highly efficient due to several unique systems such as the use of rainwater for toilet flushing and separate collection of urine for nutrient recycling in agriculture.

Figure 1 The ETH Domain's carbon-neutral Forum Chriesbach building

One goal of the international Sustainable Campus Network's case studies will be to analyze institutional decision-making and its impact on the efficiency and effectiveness of sustainable construction and remodeling programs.

EFFECTIVE GREEN BUILDING DESIGN: LESSONS LEARNED AT HARVARD

There are many aspects of the Harvard Green Campus Initiative (HGCI) worth reviewing, however Sharp focused this discussion on green building design to illustrate HGCI's approach.

Between 2002 and 2006 Harvard built 16 LEED registered or certified buildings. Each building experience informed and refined the next, beginning with the design process, followed by construction, and finally evaluation. HGCI provided sustainable building support services to each project, to varying degrees. HGCI found that establishing as much staff continuity from one project to the next was crucial.

The continuity of staff involvement helped to ensure that needed conversations between different parties to the project occurred at the right times. Much legwork and face-time is required to "get to yes" with the large variety of experts signing off at different phases of a building project, including, to name just a few: consultants on zoning and codes; landscape architects; the project architect; the cost estimator; the

construction manager; as well as people in the fields of planning and permitting, facilities operations, and insurance.

Many detailed tasks must be completed at each stage of the design process. It is important to have a thorough understanding of these tasks and then contribute to managing the team that gets them done.

Figure 2 Opportunities to influence a sustainable project

Budget/Planning | Pre-Design | Conceptual Design | Schematic Design | Design Development | Construction Documents | Bidding Construction | Occupancy

schematic design

Key opportunities to influence a sustainable project during Schematic Design include optimizing the energy model to compare the baseline case with the design case, articulating specific strategies for water use reduction, daylighting, and envelope criteria. Identifying loan fund and rebate opportunities, researching materials, and reviewing life cycle costing, will aid in reducing cost. Page 2-16 of Advanced Building's Reference Guide contains a helpful Schematic Design checklist for energy efficiency.

Activity	Description	Service Provider	Tools and Resources
Energy Efficiency Strategies: Energy Model Optimization	Undertake energy model optimization by using software such as eQuest. Optimize energy loads by integrating architectural elements and downsizing mechanical systems. Use LCC when identifying potential system alternatives. Investigate various system alternatives, such as geotherma and heat enthalpy wheels. Use integrated design: consider R values of walls, U values of windows, glazing types, window shading, etc. when sizing the mechanical system.	MEP Engineer, HGCI Review	HPBR: EAc1 Model LEED Submittals Advanced Building Benchmark for High Performance Buildings eQuest and ASTM Standard E 917 for Life Cycle Costing
Energy Efficiency Strategy Development	Discuss passive strategies for load reductions, such as thermal massing, natural ventilation, and building orientation. **Envelope:** Set target R-values for walls, floors, and roof and U-values for skylights and windows. Use Advanced Buildings Benchmark and LEED for guidelines. **Lighting**: Design to optimize daylighting to reduce artificial lighting loads. Set lighting power allowances and illuminance targets for buildings zones. See Advanced Building Benchmark and ISNEA's Advanced Lighting for guidelines.	MEP, Architect	Innovation at Harvard: Mechanical, Electrical and Envelope HPBR LEED Requirements: Energy and Atmosphere Advanced Buildings Benchmark
Water-Reduction Strategy Development	Review water cost savings using EPACT as a baseline. Choose plantings to eliminate the need for a permanent irrigation systems. Consider a cistern, such as the ones used at Zero Arrow Street or 175 N. Harvard Street, to collect rainwater.	Landscape/Civil, MEP, HGCI Review	HPBR: SS and WE Model LEED Submittals Innovation at Harvard: Site
Landscape Design Strategy Development	Identify opportunities for native, drought tolerant species planting, pervious surface optimization, and stormwater management. Recommend passive building design strategies based on the orientation, daylight, and shading on the site.	Landscape Architect	HPBR: Model LEED Submittals HPBR Innovation at Harvard: Site
Loan Fund and Rebate Opportunity Identification	Identify project elements that are eligible for NSTAR rebates and /or Green Campus Loan Funds.	HGCI or other sustainability consultant	GCLF NSTAR Rebate Program
	Review LEED-specific requirements appropriate for each spec section		HGCI Model

Throughout the design process, every performance goal requires a set of tasks to be completed in the proper sequence by the right members of the team. At each of these points, it is imperative to check that sustainability standards are being met.

High quality defensible energy modeling can influence the design process and is crucial for cost-effective green building design. LEED requirements should be detailed throughout the specifications. Perhaps the most critical ingredient is to ensure that life-cycle costing is used from the beginning when calculating costs. This will prevent the process of 'value engineering' (VE) from killing the sustainable aspects of the design.

Keep track of lessons learned. Keep good records of what worked—technologies, design approaches, controls, materials, etc.—in previous projects and roll them into the current one. In this vein of the past informing the future, make all LEED submittals available for future projects to use.

Campus sustainability professionals are in a good position to enhance institutional memory and help campus development to efficiently institutionalize new innovations and commitments. In the Master Plan for Harvard's new Allston Campus, sustainability goals have been integrated throughout. Among other aims, the goal is for LEED gold certification; 22.5 percent renewable energy use; co-generation (combined heat and power); geo-thermal cooling and green roofs; and a design that is pedestrian, transit and bike-friendly.

SUSTAINABILITY IN BUILDING DESIGN AND CURRICULUM CONTENT AT THE UNIVERSITY OF TOKYO

At the University of Tokyo, which has about 28,000 students, the principal challenge is to stabilize energy consumption while at the same time allowing the campus' square footage to grow. Between 2003 and 2005, floor area increased by nine percent, and energy consumption increased by 11 percent. The main campus of Hongo committed to a 1.1 percent reduction in CO_2 emissions by 2009. Several approaches are being taken.

One means is to tighten already stringent controls on car commuting. Another more far-reaching effort is the campaign "Cool Biz and Warm Biz," to moderate the thresholds for heating and cooling to 19 degrees celcius in the winter and 28 degrees in the summer.

Figure 3 Building Envelope showing shading and ventilation for energy savings, Kashiwa Campus, University of Tokyo

The new Kashiwa Campus integrates sustainability principles. The campus is home to the School of Frontier Sciences and several research institutes. The Kashiwa campus is intended to provide a globally competitive research environment for education exchange both domestically and abroad. The goal is to contribute to society through industry-academia collaboration. The development of Kashiwa took place in consultation with local government to create an environmentally-friendly international campus. The building's design reflects its aim to be an incubator of research collaboration. It has an "S" shaped building envelope with shading and ventilation provided by louvers with state-of-the-art indoor heat and air management via a large-scale ventilation chimney.

Figure 4 Building envelope showing the louver design for energy savings – Kashiwa Campus, University of Tokyo

Kashiwa Campus houses the Institute of Environmental Studies, which was launched in 1999 and embraces five departments, 70 faculty members and 600 students. Beginning in 2004, a new degree program leading to the title of "Environmental Planner" became available. Growing out of this, a program focusing specifically on environmental design got underway in 2006. In 2007, a Master's Program in Sustainability Science will be offered for the first time. The new program provides students with a sustainability "tool-box" to help advance sustainability at the local, national, or international level. Theoretical and experiential learning are both integral to the degree.

The Movement towards Sustainable Campuses in Canada: Processes and Experiences

Summary by Lisa Fernandez

Panelists
Christopher Caners, *Sustainability Coordinator, University of Toronto Sustainability Office*
Mélanie McDonald, *Coordinator, International Forum on Applied Sustainable Development, University of Sherbrooke*
Anjali Helferty, *National Coordinator, Sustainable Campuses Project, Sierra Youth Coalition, Canada*

Moderator
Melissa Garcia Lamarca, *Sustainability Coordinator, Concordia University** *Workshop organizer

This workshop shared the experiences of two campuses in Eastern Canada, one in Ontario and one in Quebec, in becoming more sustainable. Also discussed was the unique role of a youth-led Canadian NGO, the Sierra Youth Coalition, in driving the campus sustainability movement across Canada. In the discussion, parallels and differences between campus sustainability approaches in the USA and Canada were considered.

BROAD ENGAGEMENT FOR SUSTAINABILITY AT THE UNIVERSITY OF TORONTO

The University of Toronto is Canada's largest, with 65,000 students and more than 250 buildings. It is the largest non-profit land owner in Toronto. The university has a dedicated Office of Sustainability (SO) with eight staff. Within its overall mission of creating a culture of sustainability reflected in all university operations, the immediate aim is to reduce energy consumption to curtail greenhouse gas emissions. In the medium term, the goals are to integrate energy conservation, waste reduction and campus greening in all university decisions, practices and procedures.

Many SO projects engage students and are driven by them. The SO can offer academic credit, work-study positions and part-time employment as well as volunteer opportunities. The SO is perceived as a valuable resource for sustainability research and operations on campus. The office builds alliances between faculty, staff and students; provides access to training; performs research; drives operational improvements through in-house resources, and in general harnesses student energy and enthusiasm for sustainable ends.

Many projects and initiatives are under the purview of the SO, including energy audits, curriculum review, advocacy efforts, and capital project planning support. One example is the inventory project. Inventories of electricity usage and heating are complete and ongoing for transportation, waste and water. Another initiative is a three-year, C$16 million lighting and chiller retrofit program, calculated to save 11.6 GWh and 3,100 tons GHG annually for C$1.3 million annual savings over 12 years.

"Rewire" is a major campus campaign to motivate students, staff and faculty to adopt more sustainable behaviors via: energy use reduction, particularly at peak times; heat and water conservation; Reduce, Reuse, Recycle; and, in the future, alternative transportation. Launched in 2005-2006, students pilot tested energy conservation techniques at one college. The pilot's success persuaded the SO to pick up the project. A Community-Based Social Marketing approach was taken to broaden the scope. External funding was secured and further pilot tests in a different residential college were implemented. The program was expanded to include offices and more residential settings and more than 4,000 people in 2006-2007. An evaluation of the 2006 pilot suggests that sustainability awareness has been heightened. In addition, electrical energy demand declined by 5 percent after the pilot. Other outcomes include financial savings, expanded deployment of the approach to other settings and institutions, and further community and capacity-building on campus.

In 2007-2008 the goal is to expand the program to all three campuses; develop a program specifically for common areas, classrooms and laboratories; and integrate paper reduction and reuse. In addition, Rewire will reach out to building operators and managers and examine opportunities to deploy the program more broadly beyond the university.

THE SUSTAINABILITY EXPERIENCE AT THE UNIVERSITY OF SHERBROOKE

The University of Sherbrooke, an hour east of Québec City, is less than half the size of the University of Toronto and has no dedicated sustainability office. Instead, the approach to sustainability has relied on student interest and drive, which was successful in persuading the university to form a multi-stakeholder advisory committee in 2005. Twenty-one objectives were identified in four areas: research and curriculum; communication and involvement; environment; and social and economic issues. The committee formulated an Action Plan built out of a prioritized wish list. A Sustainable Development Policy was signed in partnership with the municipality and other institutions in the city.

The biggest focus has been on sustainable transportation, including the following elements: a car-sharing system; a "U-Pass" for students to take municipal transportation for free; a bus-ticket reduction for staff; a bike-leasing service and a dedicated bike lane through campus.

Besides these sector-specific approaches, students have been very engaged with the "Sustainable Campuses Project." This involves them with campus sustainability policy and refinement of the Action Plan. In addition, the project provides tools for communicating sustainability and opportunities to include sustainability in the curriculum. The Project has also been the impetus for a dialogue process among student unions and groups on sustainability. The main challenge that has emerged is coordinating with the administration.

SIERRA YOUTH COALITION'S SUSTAINABLE CAMPUSES PROJECT IN CANADA

Sierra Youth Coalition's (SYC) mission is to "*engage* youth in Canada to become active members of their community; *educate* about the interconnectedness of all things; and *change* unsustainable systems by finding solutions so that the voices of the future are clearly heard." The Sustainable Campuses project goal is to make university and college campuses in Canada more sustainable. SYC takes a three-pronged approach to meeting the goal.

First, SYC has created a network of more than 50 member campuses via five regional coordinators and a national project committee and regional/provincial action committees. The network stays connected via an active listserv that is connected to two other college-oriented environmental action groups: the Canadian Youth Climate Coalition and Energy Action/Campus Climate Challenge.

Second, SYC sponsors an annual Sustainable Campuses National Conference to bring together campus sustainability activists from across the country and share workable solutions.

Third, SYC provides support to college campuses via its regional committees. Assessment Frameworks are shared, as are specific approaches to conducting greenhouse gas inventories. The committees also provide support for implementation of specific sustainability actions. Specific programs include the "Campus Sustainability Assessment Framework (CSAF)" and the "Campus Climate Challenge," which focuses on conducting greenhouse gas emissions inventories.

SYC has implemented a three-phase communications strategy to build a formalized process for advancing sustainability on college campuses. Phase One is targeted outreach. This includes identifying and providing support for student leaders, building student capacity and communicating with stakeholders. In Phase Two, SYC helps campus sustainability activists create general awareness and broaden outreach to create buy-in from a variety of stakeholders. CSAF and GHG inventory work are implemented, and results are shared. Phase Three, consultation, advances what are often up to this point fractured approaches to sustainability on campus into a coherent Action Plan. Here, key players are identified, feasibility studies are

conducted, and programs are implemented and reviewed. Upon completion of this three-phase cycle, the goal is that a model of sustainability action will have been honed sufficiently to repeat with refinements.

In 2006 SYC supported sustainability efforts at more than 100 colleges and universities in all the Canadian provinces. These efforts varied from helping to develop a multi-stakeholder process, to implementing CSAF, conducting GHG inventories, and encouraging the establishment of sustainability policies and positions. Results include the integration of sustainability in curricula at many campuses; conversion to a biodiesel fleet at Concordia; completed assessments at four universities, and GHG emissions reductions through conservation measures and clean energy purchases.

DISCUSSION

The discussion flowed around key differences and similarities of campus sustainability in Canada and the United States.

In Canada there has been admirable emphasis on bridging the academic-operational gap in campus sustainability efforts. It has helped that an arm's length entity, the SYC, has been often taken the preliminary lead in initiating efforts. The student-student counseling that SYC supports has been very effective. The YC plays a unique role in building student leadership in Canada.

The Canadian model of university administration has also helped the broad implementation of the sustainability agenda. The vast majority of funding to universities flows through Provincial governments, as there are virtually no private universities in Canada. Inter-university meetings of upper-echelon administration at the Vice-President level are relatively frequent. Therefore there are more opportunities for a natural cross-fertilization and communication of effective strategies.

Sustainability efforts on campuses in the United States have been driven in large part by climate change considerations and have therefore focused on GHG reduction strategies. The sustainability discourse and approach on Canadian campuses tends to take a more holistic approach, more commonly including social, economic and traditional environmental considerations in sustainability goals.

Sustainable Development in Higher Education – A Swedish Perspective

Summary by Jason Rauch

Presentation by
Nils Brandt, *Senior Lecturer and Director of Studies, Department of Industrial Ecology, School of Energy and Environmental Technology, Royal Institute of Technology (KTH), Stockholm, Sweden**

*Workshop organizer

Sweden is a small country with a population of 9 million. Sweden is presently experiencing a large influx of immigrants, with 15 percent of the population having been born outside of the country. This cultural dynamic, as well as the country's dependence on foreign trade, has important implications in the arena of sustainability.

In Sweden, all universities and colleges are state owned. Tuition is free for all students, regardless of country of origin or citizenship. On top of this, the government provides loans to Swedish students in order to pay for living expenses like room and board. The university system is presently moving towards the "Bologna Guidelines," which establish standards for the number of years at each level of education in the European Union.

The Swedish parliament enacts statutes regarding universities that control, among other things, 1) what institutions exist 2) degree requirements 3) financial and other resources and 4) how many degrees can be granted per field. The university itself handles the curriculum and educational content. But the buildings in which the university is housed are owned by a state company separate from the institution that manages the operations of these facilities.

The Swedes have a strong environmental tradition. It has always been standard practice to have a public right to nature, where natural areas, whether public or privately owned, are treated as common spaces for all to use and for all to be responsible for. This tradition has been the foundation for Sweden's strong environmental stewardship.

The first international meeting on the environment, the UN Stockholm conference in 1972, occurred in Sweden. In 1988, Sweden made a commitment to no nuclear power, and the first Green party was elected into parliament. Sweden was a force behind and first adopter of the Rio conference of 1992's Local Agenda 21, which promoted environmental behavior and education.

Though the Swedish government does not require environmental education, it is strongly emphasized. In 1985 an Act was passed encouraging the teaching of environmental stewardship in school. In 1992 the Integrated Environmental Education Studies Program, commonly called the MINT-program, was created, focusing on environmental teaching at institutions of higher education. After the 2004 Gothenburg conference on International Consultation on Education and Sustainability, the Swedish government formed a committee on "sustainable education in Sweden." The committee observed that environmental education focused too narrowly on environmental problems rather than on sustainable development. The committee suggested placing more thought into what type of graduates universities were producing. Were they prepared to lead a sustainable world? The committee also suggested that the focus on educating specialists deterred a multidisciplinary approach addressing attitudes and values. Educators, the committee concluded, lacked the necessary training, knowledge, and support for teaching sustainability broadly construed.

As a result of these identified shortcomings, the government proposed adding a clause to the Swedish Higher Education Act mandating the teaching of sustainable development at institutions of higher learning. The Act passed Parliament in December 2005. Today, the Act enjoys political consensus among all parties, both conservatives and social democrats.

For a long time Swedish students have received a comprehensive environmental education in lower school. The new clause in the Higher Education Act means that, once at university, that training is now rounded out with teaching in all three dimensions of sustainable development. This law states that: "universities will promote *sustainable development* through their *educational activities* in order to guarantee present and future generations a healthy environment, a strong economy and social welfare and justice."

This important law requires universities to promote sustainable development through sustainability education. This top-down approach has been effective for promoting ideas of sustainable development in education. Problems with the legislation stem from the fact that universities themselves were not involved in writing it. An outsider prescribing what needs to be done within the university may not understand the local circumstances well enough to provide effective recommendations.

One example of a course that has grown out of the new law at the Royal Institute of Technology (KTH)) is entitled "State and Trends." It is a student-based, student-run course that examines the values associated with sustainable development. By asking questions related to what is in fact sustainable, the class assesses the sustainability of Stockholm 50 years ago, today, and 50 years hence. This course has proved effective in empowering students to take charge of their own education.

It is hoped that Sweden's new legislated approach to sustainability education incorporates the social and economic dimension alongside the strictly environmental. While sustainability is not science, it is important to use the tools of science to achieve sustainability goals. In addition, it is essential to engage students in

the dialogue about sustainability. Bringing students to the table encourages them to take ownership for their own education. Taking a multidisciplinary approach to educating the next generation of leaders on sustainability is a positive step. This strategy will help universities reach beyond their walls to create partnerships with society at large.

DISCUSSION

Effects of the Top-Down Approach and the New Mandate

The top-down approach is pervasive in Sweden. In general, a national or municipal legislative process shapes university operations. For instance, Swedish universities differ markedly from most of their US counterparts in that the buildings on a Swedish university's campus are owned and operated by a separate state-owned corporation. As a result, Swedish university management has no say regarding the sustainability of facility operations. Though a top-down directive, the revision of the 2005 Higher Education Act leaves the specifics of curriculum development up to university management.

One listener pointed out that, in contrast, the U.S. does not have a top-down approach to sustainability. No leadership is provided for at the Federal level, but often at the State level there is leadership. The United Kingdom, also takes a top-down approach, but the result is that people expect the government to solve the problem for them, and no grass-roots work is really evident. The top-down process is slow and bureaucratic, and the students do not feel a sense of empowerment.

It is true that the system can leave students feeling disempowered. For example, students associations sent a letter to the presidents of Swedish Universities concerning sustainability issues, and no comment was received back.

Funding the new mandate has been an issue. The Swedish government has legislated for sustainable development, but money is lacking for funding green buildings and sustainable operations. The university has to pressure the state-owned company in order to improve buildings and operations.

There are few elective courses, but the number is program-dependent. The faculty is responsible for the curriculum, so the incorporation of sustainable development, relative to the core program, really depends on them.

Comparing Sweden to the United States

In terms of international perception, it is occasionally thought that having a person or group in the U.S. committed to sustainable development is a joke. This may be due to the fact that the U.S. has not joined the Kyoto protocol.

The U.S. experience suggests that education for sustainable development is perceived as irrelevant for other students outside of the environmental fields. In Sweden, consensus is building around the idea that sustainability education is important because it helps mobilize society outside of the university. Swedish society is demanding the application of sustainability in every day life, and it is the ultimate directive of universities to produce students that have the knowledge and skills to meet this demand.

Concluding Plenary: Challenges to Institutionalizing Sustainability on Campus

Summary by Katherine Gasner

Facilitator
Julie Newman, *Director, Office of Sustainability, Yale University*

The two-day conference provided nearly 200 participants many opportunities to exchange best practices in the field of campus sustainability. Dr. Newman used the occasion of the concluding plenary to reflect on the importance of returning to the fundamental goals of campus sustainable development. The document announcing the United Nations commitment to the "UN Decade of Education for Sustainable Development" reminds practitioners of the basic principles of sustainable development. The principles call for moving from vision to action on creating a better world today without sacrificing opportunities for future generations and to sharing solutions that work locally and regionally at the global level. In keeping with the UN's goals, Newman asked plenary participants to consider and discuss three questions related to the obligations of the NECSC to the many broader sustainability efforts in and beyond the region.

1. What are the responsibilities of the sustainability professionals working in higher education to dovetail their work with that of the international sustainability community?
2. How do we harness the energy of the NECSC to work with other regional fora and commitments?
3. What specific roles can or should the NECSC play in advancing the broad goals of sustainable development as articulated by the United Nations?

Subsequent to Newman's introduction, the audience broke into small groups to consider each question and report back. Below, the discussion each question generated is summarized.

RESPONSIBILITIES VIS-Á-VIS THE INTERNATIONAL SUSTAINABILITY COMMUNITY

An international perspective is essential to build on the momentum of the emerging commitment to sustainability at college campuses. Much can be gained from engaging with other institutions of higher learning around the world. Global consequences pertain to individual institutions' decisions regarding global warming and greenhouse gas emissions. Participants suggested that in addition to a strong emphasis on climate change, the NECSC ought to focus on issues of purchasing power, as universities have substantial leverage to encourage fair trade.

There are also opportunities to leverage the collaborative nature of many academic endeavors at the international scale. For example, research conducted with the participation of many different countries can be valuable; different regulations and procedures between countries allow for different types of studies, which can be especially conducive to thorough collection of data and information exchange. One way to do this would be to foster student exchanges, which by their nature would help embed the sponsoring universities in the international sustainable development conversation. Also, the consortium could focus on facilitating cooperation between similar departments of different universities throughout the world. In this vein, it would be useful to encourage the creation of a widely shared list where proposed and on-going sustainability research could be identified. This would help foster international cooperation and would also reduce duplication of studies.

THE NECSC'S RELATIONSHIP WITH OTHER REGIONAL ENTITIES

One approach would be to join forces with all New England and Eastern Canadian colleges and present a unified and consolidated front on sustainability. The New England Governors and Eastern Canadian Premiers already passed a greenhouse emission reduction strategy; thus, it was suggested that all the participating colleges in the NECSC sign on to the same goals. This way, the commitments, dates, and times involved in these objectives are not confused, and the entire region can be motivated and inspired to cultivate and maintain energy around the same goals. This way, in addition to striving to meet goals measured in percent emissions reductions, achievement could be measured along the way with percentages of participation in signing on to those goals.

Different approaches to building further expertise were also discussed. There are two types of people in the college sustainability field right now: those who are extremely knowledgeable and experienced and those who are new and excited about learning. Considering this dynamic, there is a need for a mentoring program of some sort. The NECSC could facilitate the partnership of members who are experienced in campus sustainability and those new to the field. This way the NECSC could enhance more one-on-one contact throughout the region. The move would also help establish an institutional framework for networking. Lastly, it was suggested that the NECSC establish an online database for sustainable campus projects. With a center of

foundational instructions for different sustainable endeavors, one could manipulate the project to accommodate his or her college system. In these ways, the NECSC could contribute to progress on meeting officially agreed-on sustainability goals for the region.

THE EFFECTIVENESS OF THE NECSC IN ADVANCING SUSTAINABLE DEVELOPMENT

A distinction was made between campus sustainability and the goals of larger scale sustainability. Colleges often deal with the systems aspects of sustainability, but they do not often have to confront complex issues of economics or the issues surrounding equity that are so central to the greater national and world-wide achievement of sustainability.

Questions that guide the discussion on the role of the future of NECSC are as follows: Is there a need for the consortium to take on a role in meeting international sustainability goals? Should the NECSC maintain a tight focus on the Northeast region? Keeping a tight focus on the Northeast may not exclude acknowledging the broader global mission.

The ultimate goal of the NECSC is to maintain the current high level of motivation and drive in the campus sustainability community. The value of the NECSC lies in providing a forum that allows recognition of continuing challenges and provides resources for problem solving. The NECSC is already effectively supporting the high level of enthusiasm and dedication of the growing group of campus sustainability professionals in the region. It can play a growing role in providing networking opportunities for this group and helping to expand these alliances more broadly.

International Symposium on Sustainability in Higher Education

The Pilot 2006 Environmental Performance Index and the Role of Higher Education in Advancing Sustainability Around the Globe

Summary by Jason Rauch

Daniel Esty, *Professor of Environmental Law & Policy; Director, Center for Environmental Law & Policy, Yale University*

Dan Esty has been in the environmental field for 20 years, and can attest to the fact that action on environmental policy comes in waves. The federal government is way behind today, while the business community is doing a good job, and academic institutions are out in front.

In the past, environmentalists have been too keen to say no progress has been made, only to be swiped away from importance by politicians claiming no further investment needs be made because no progress has occurred. Newt Gingrich in the Republican take-over of Congress in 1994 utilized this approach. Instead, environmentalists need to refine their statements to say both what is improving, and what is not.

An essential ingredient in defining progress is metrics. Metrics provide a clear and concise way to track progress. They are critical to develop and test theories, and provide a medium for teaching others.

THE ROLE OF THE UNIVERSITY IN ESTABLISHING METRICS

Universities and individuals need to live what they preach. We cannot be afraid to take risks, and we must be willing to fail and to admit that failure. Advocating solutions to environmental problems should be grounded in sound logic and science. We have to move from emotion and rhetoric to data and facts, and appeal to a greater audience using these data and facts. The environmental index constitutes making the business case for sustainability.

Data, metrics, and indicators track whether the money being spent is paying off. A lot of uncertainty exists in the environmental field, which makes these metrics all the more important. For instance, what is a pretty view worth? These difficult questions to answer can be made vivid with real data. The ozone hole and climate change are hard to see, but rigorous science and data have made these problems more self-evident. There is a loss of confidence in expert opinion in the environmental field. Real data can stay this loss of confidence.

Competition is a good thing, and has been one factor motivating the development of the Environmental Sustainability Index. Best practices end up being shared, and the losses and mistakes teach lessons to a broader audience. Competition also provides accountability. At Yale, for example, the undergraduate colleges have launched competitions between themselves to reduce energy use.

Information age technologies provide huge opportunities to increasing the use and efficacy of metrics. They provide efficient means to collect and manage large sets of data. And not only can environmental harms be tracked effectively, but prices can be ascribed to these harms.

THE ENVIRONMENTAL PERFORMANCE INDEX

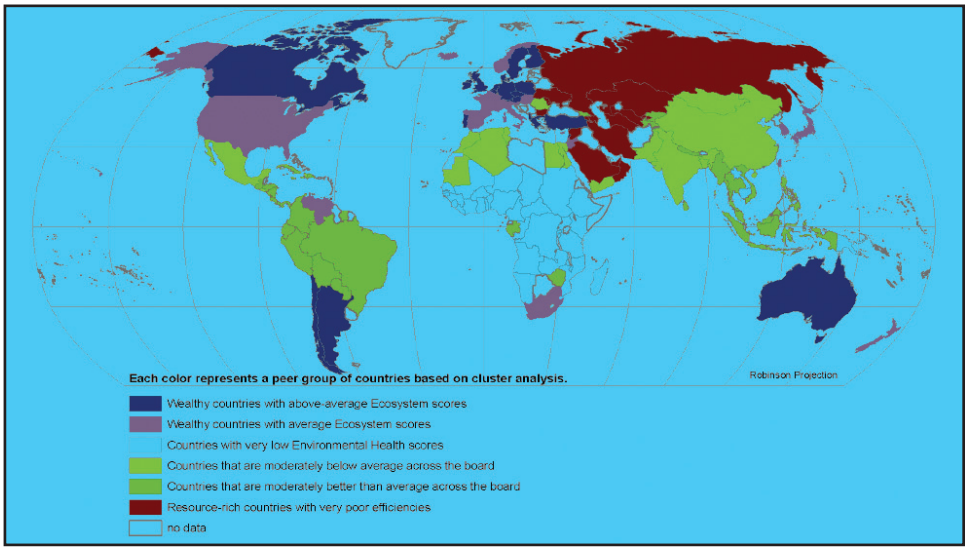
The 2006 Environmental Performance Index (EPI) was put together with these ideas of metrics in mind. The index ranks countries around the world according to environmental performance, which is calculated based upon various underlying metrics. The statistics and calculations used to produce the index have been cross-checked by others, and further critiques are welcome. The EPI is particularly aimed at environment ministers so they can ascertain how well their country is performing relative to their peer group. As such, the EPI brings a business tool into the environmental and government context.

The EPI not only provides a ranking system, but also references for governments to identify best practices. The policies utilized by leaders versus laggards can be identified and modified where and when appropriate. In addition, the calculation of the EPI identifies the data gaps in the underlying metrics. For instance, toxic exposure and wetlands protection information did not have enough global coverage for use in a comparative global ranking system.

The EPI also provides insights into how good environmental performance is achieved. The indicator of poverty, GDP, has a correlation of $.7=r^2$ with the EPI. Measures of good governance indicate that a better political and media climate also correlates with a higher EPI score.

Though the overall rankings provide context, they only exist in aggregate as a starting point. It is more important to focus on the peer group of the country under scrutiny (see Figure 1). It is not fair to compare Haiti or the Dominican Republic with Sweden, but rather Haiti and the Dominican Republic with each other, and Sweden with Norway or Finland.

Figure 1 Cluster Analysis Map



A sensitivity analysis was performed on the underlying assumptions to see what really matters in the final rankings in the index. Such an analysis provides a means to achieve accuracy of the index. It was found that the assumption that really mattered was the categorization and difference between the human and environmental dimensions. However, the separation between these two dimensions is the very area that has the highest consensus among those engaged in governance. It is good to reveal the assumptions of the analysis, because critiques are valuable and improve the model.

The take-away results of the EPI include the fact that every country has something to improve. No country performs the best in every category that is aggregated together in the index. And countries do compare themselves to their peer group. Similarly, for universities, they should identify themselves with their peer group. The EPI also indicates that it is not just wealth that dictates good environmental performance, but also good governance.

Figure 2 Implications for universities

- Metrics and benchmarking are useful decisionmaking tools.
- Data monitoring and reporting helps focus attention.
- Indicators should track core university issues.
- Peer groups (universities of the same size, similar location, etc.) provide context and benchmarking.
- Multi-stakeholder involvement (faculty, students, staff, administration, community) builds "buy in."

The EPI would do much better with better data. Dan Esty stated that it is "frankly shocking" what is not tracked. With better data, and with better and multiple methods of analyzing the data, the underlying truth can be achieved. Multiple perspectives provide this triangulation. And multiple perspectives sharpen one's own work while also getting a wider buy-in of stakeholders.

DISCUSSION

Q: *What happened to Norway to drop it from a high ranking in the Environmental Sustainability Index (ESI) to the lower ranking in the Environmental Performance Index?*

A: The ESI is a long-term perspective, while the EPI is a different analysis that focuses upon short-term performance.

Q: *The reduction of environmental performance to a one number rank may be a double edged sword. It may have the benefits you outlined, but won't it reduce investment in poor performing countries, which are countries that may need the investment the most?*

A: The EPI is not making up data. The index is only aggregating data, by adding it up, and publishing it in a new form. For instance, Belgium ranked very low relative to its peer group, and Belgium was shocked. It was a big deal to the environmental ministry. It created a dialogue, which is the intent of the EPI. It forces a conversation that can lead to better performance. And as for a deterrent to investment, it is a good thing, because the world cannot be invested in areas that have poor environmental performance.

Q: *Why a single number?*

A: We chose a single number because otherwise people do not pay attention. Once they do pay attention, they can then look at the underlying data to understand the details.

Q: *In Britain, there is a best practices competition for environmental performance in which the winners receive a prestigious national award. It has been a huge success in motivating action.*

A: I agree. I am a believer in prizes and awards, as it helps induce a good competitive spirit.

Q: *Why did you choose child mortality instead of child morbidity?*

A: Child mortality is actually the single best metric we have for the index because the data are universal. Child morbidity data are not ubiquitous. And child mortality is one of the best signals of core issues centered on environmental health.

The Role of International Alliances to Advance Sustainability Objectives on University Campuses – Plenary and Roundtable Discussion

Summary by David Gottesman and Sara Smiley Smith

SUSTAINABILITY, SUSTAINABLE DEVELOPMENT, AND CAMPUS SUSTAINABILITY: FINDING A COMMON LANGUAGE

In the plenary discussion, participants were asked to define and differentiate between sustainable development, sustainability, and campus sustainability, drawing on their experiences at their respective institutions. Sustainability practitioners need a way to define and express these concepts. This will enable them to better communicate their ideas to a broad audience as well as find common ground between institutions.

Many discussants felt that campuses are not contributing to sustainability to their fullest extent, regardless of how innovative their green campus initiatives may be, if they fail to educate and engage students. It was argued that campus life affords many opportunities to educate students about sustainability. How sustainability is integrated into curriculum, facilities operations, residential life and other aspects of the university campus will vary from institution to institution.

There was general agreement that campuses will have to change the way they think and conduct business if they are to become models of sustainability. One participant argued that universities must continue to "think globally, act locally." Another participant stressed that the opportunity to integrate sustainability requirements was ever-present during decision-making processes. Too often, another discussant observed, universities focus on one area of decision-making but ignore others when shaping campus sustainability programs, i.e. energy or waste. Therefore it is important to determine how to incorporate sustainability principles along all dimensions of university decision-making processes.

It was argued that the drivers we use to shape society – the politicians we elect, the way we structure our economy, and so on – are mechanisms by which we can affect change on the global, national, local and institutional levels. These drivers apply to sustainability, sustainable development and campus sustainability.

The discussion concluded by noting the importance of taking a step back from all of the advances being made so quickly in order to return to the overall goals of sustainable development. With these concepts solidified, participants could expand the ways in which they frame sustainability, sustainable development and campus sustainability at their respective institutions.

BEST PRACTICES FOR ADVANCING SUSTAINABILITY ON CAMPUSES WORLDWIDE

The second half of the day focused on optimizing opportunities for sustainability in five key areas of university activity: research; cross-border dialogue between the U.S. and Canadian universities; international dissemination of success stories; case study development; and international exchanges. Below, the dialogue accorded each area is synthesized.

Research Opportunities

Facilitator: Almut Beringer, Professor, University of Prince Edward Island, Canada

This group determined that universities need to track their performance in ways that go beyond metrics. Specifically, they need to consider the qualitative dimensions of their work: human systems and the development of "methodologies and research instruments for documenting and monitoring that aspect of sustainability in higher education."

The group also commented that while there is a growing wealth of presentations and articles in the field of campus sustainability, few of these employ empirical data from universities. A deeper understanding of current efforts, trends, and claims could be attained if more studies did in fact use such data.

Canada-U.S. Collaboration

Facilitator: Melissa Garcia-LaMarca, Sustainability Coordinator, Concordia University, Canada

A deeper understanding and definition of the background context for the development of a partner institution was called for before collaboration or exchange could be considered. For example, Canadian institutions of higher learning are for the most part publicly funded and governmentally controlled to a far greater degree than in the United States. Knowing the "broader cultural and social context," including how administration and funding operate, as well as "areas of academic excellence and expertise," affords a better perspective when preparing for a working partnership.

The group also discussed the most effective ways to collaborate, including tools, exchanges on certain projects, physical exchanges, and sharing resources and knowledge. Existing programs should be examined to glean lessons for best practices.

International Dissemination of Campus Sustainability Strategies

Facilitator: Leith Sharp, Director, Harvard Green Campus Initiative

Leith Sharp opened by acknowledging that the members of her group are at different points – some have information to share while others are interested in that information.

Three reasons were identified for engaging with other universities internationally:

1) If a university, regardless of location, has worked on a particular project, information drawn from that experience can be helpful in assisting other institutions working towards the same goal.

2) International universities and figures can be leveraged to influence another university's leadership in favor of campus sustainability. University administrators tend to exhibit "a different quality of listening" when a respected international figure speaks to them.

   A system by which campus leaders can "shop" for the most strategic individuals in the world related to their particular campus sustainability issues was called upon. Because these leaders are time- and resource-constrained, it is important to connect regional and national networks to other regional and national networks to increase exposure. She pointed out that video conferencing is an underused resource and also suggested international blogs and face books. For example, Yale can leverage the commitments made by President Levin and his willingness to communicate his goals with other presidents. One approach would be to determine which university presidents are interested in this effort but have not yet committed and to utilize President Levin to encourage them to move forward.

3) International engagement on sustainability is diplomatic. Because America is often isolated from what is happening with respect to sustainability globally, American higher education institutions have an opportunity to play a role in patching up ill-will and conflicts with the rest of the world. The fact that our institutions are moving forward in a green direction speaks volumes to other societies that we do have some ecologically-minded institutions.

Case Studies

Facilitator: Bernd Kasemir, Novatlantis – Sustainability at the ETH domain, Zurich, Switzerland, and sustainserv, inc.

Collaboration across universities can drastically cut learning time and save years of effort. The value of sharing case studies internationally keeps a university from reinventing the wheel on a particular campus sustainability issue. Case studies should be as specific as possible: beyond stating the final outcome (e.g. – amount of GHG reduction), they should identify the agents of change and explain how they interacted with their institutions to achieve their goals. Of particular importance is the

involvement of students on boards and committees – the incorporation of this type of social capital should be included in reports. The discussion emphasized the fact that case studies must go beyond recounting successes and also include failures. Even though this might be difficult as far as administration and donors are concerned, it is necessary if case studies are to be as useful as possible.

Private sector collaboration can be helpful because it allows campus leaders to frame issues in positive economic terms; cost-neutral initiatives, for example, are appealing to administrations. The danger, however, lies in reducing everything to corporate terms, as that limits the scope of potential efforts.

International Curriculum/Campus-Campus Exchanges

Facilitators: Tom Kelly, Director, Office of Sustainability, University of New Hampshire; Fredrik Grondahl, Professor, Industrial Ecology, Royal Institute of Technology, Sweden

The Swedish experience has been a valuable one. One initiative at the Swedish Royal Institute of Technology (KTH) has been to reach out to former Eastern bloc countries via innovative collaboration projects. One program comprises a short course for international students at a given university, after which they split up and conduct independent research on the topics discussed. Two months later, the students reconvene in another country to discuss their findings. KTH also offers a Master's program in sustainable technology. Ninety-five percent of the students hail from other countries and the courses are taught in English. Other mechanisms include "Universitas 21," a program for international exchanges and the International Association of University Research Associations, which is geared for faculty and students.

On the domestic front, the value of inter*cultural* exchange was also addressed. Tribal colleges in the U.S. have a unique outlook on sustainability that is of great value to other American universities. Additionally, urban and rural communities and colleges within the U.S. have a great deal to share with each other. Campus sustainability professionals can advance the goals of their work by encouraging such collaboration.

APPENDIX

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November 2-4, 2006
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Lisa Fernandez is the Strategic Initiatives Program Manager at the Yale School of Forestry & Environmental Studies. She coordinated the 3rd Annual NECSC Conference and International Symposium. Prior to Yale, she worked as an independent consultant in urban environmental conservation and economic development in the U.S. and Latin America, as a fellow at the World Wildlife Fund, and as a planner implementing solid waste prevention policy for the City of New York. She holds a B.A. from Princeton, an M.P.P.M. from the Yale School of Management and an M.E.S. from the Yale School of Forestry & Environmental Studies.

The Northeast Campus Sustainability Consortium (NECSC) was established in October 2004 to support the growing network of campus sustainability professionals from the Northeast U.S. and maritime Canada. The NECSC is committed to advancing the goals of education and action for sustainable development at colleges and universities in the region.

For more information go to www.yale.edu/sustainability/consortium

The Yale University Office of Sustainability is responsible for facilitating the integration of sustainability principles and practices into the operational functions and educational framework of the institution. This is manifest in the development of policies, practices and standards that lead to decisions which prioritize ecosystem health and human health in the context of economic viability.

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