9. Higher Education Goes Green

The nation's 4,216 accredited universities and colleges have tremendous potential to reduce their consumption of the world's resources. These institutions control nearly a million acres of land and operate hundreds of thousands of classroom buildings, laboratories, residence halls, foodservice facilities, retail stores, and hospitals. Many have political clout in their communities, states, and regions. Most importantly, these institutions are responsible for educating 15 million students every year, thus affording them the opportunity to mold and educate tomorrow's leaders in the ethic of sustainability.

The role of the university in environmental stewardship was first staked out 16 years ago at a conference in Talloires, France, where 22 university presidents and chancellors from around the world convened to voice their concerns about the state of the environment and to discuss the role of the world's institutions of higher education in creating a sustainable future. They left with a 10-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations, and outreach at colleges and universities.[1]

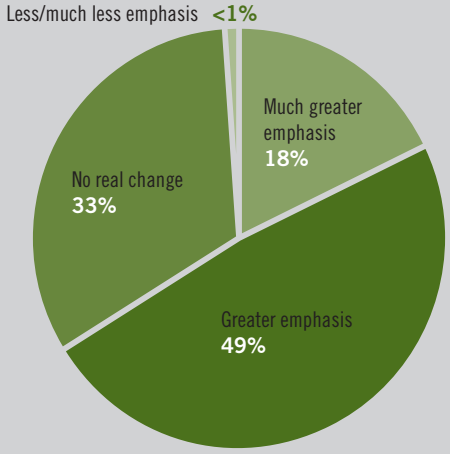
The Talloires Declaration set forth a movement toward sustainability in higher education that, after two decades, is finally inching into the mainstream. Some 325 institutions in more than 40 countries, including more than 100 U.S. colleges and universities, have signed the declaration.

In the U.S., hundreds of universities are implementing some form of sustainable practice or program. According to a survey of 472 high-level staff members at U.S. universities and colleges conducted by Martin Akel & Associates in May-June 2006, two-thirds (67%) of senior university professionals are placing greater or much greater emphasis on environmentally responsible approaches today compared to three or four years ago. More than three-quarters (78%) said they would be at least somewhat likely to consider LEED certification for future construction and renovation projects, and 85% said they take sustainability into account when specifying new products and equipment.[2]

Moreover, membership in associations such as the University Leaders for a Sustainable Future and the Association for the Advancement of Sustainability in Higher Education is at an all-time high, as is participation in campus sustainability conferences and programs like National Wildlife Federation's Campus Ecology, Society for College and University Planning's Campus Sustainability Day, and Ball State University's Greening of the Campus.

At last count, 665 institutions were actively involved in one or more of these programs, according to AASHE executive director Judy Walton. "This is just one indication of who's doing green," says Walton. "There are probably another 100 to 200 schools out there that we just haven't heard about yet."

Are you placing greater emphasis on the use of environmentally responsible/green approaches today compared to 3-4 years ago? 9.1



Source: Martin Akel & Associates, May-June 2006

The business case for green campuses

The possibility of controlling operating outlays—especially energy costs—is by far the biggest factor driving colleges and universities to initiate green campus programs.[3] There are several reasons for this. First, the vast majority of buildings on American campuses are at least 20 years old and are equipped with outdated, inefficient building systems. In addition, many schools are in the midst of aggressive expansion programs that often include energy-gobbling structures like student residences and lab facilities.

Finally, several factors—the sheer growth in student numbers, the popularity of energy-consuming tools like laptops and iPods (not to mention microwave ovens and mini-fridges), and the proliferation of the 24/7 campus lifestyle—all threaten to push up the consumption of energy and water and the generation of waste on campus.

Leaders in campus sustainability are tackling these issues head-on.

[1] *"The Talloires Declaration," October 1990. www.ulsf.org/pdf/TD.pdf*

[2] *"Institutions of Higher Education: A Study of Facilities and Environmental Considerations," Martin Akel & Associates on behalf of* University Business *magazine and E&I Purchasing Cooperative, June 2006. www.universitybusiness.com/uploaded/pdfs/hiedgreenfacilitiesstudyecnn.pdf*

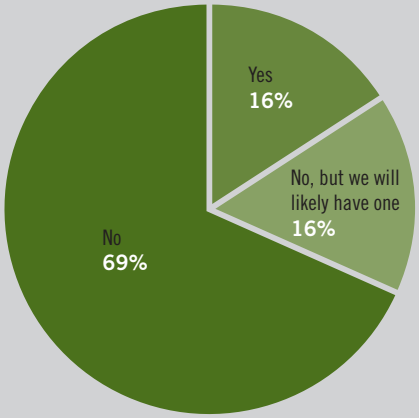
[3] *"The State of Sustainability in Higher Education: A Survey of the Boston Consortium," Architerra, Babson College, Massachusetts Institute of Technology, July 2006. www.architects.org/emplibrary/Watts_2004_summary.pdf*

For example, California State University–Chico, Colorado State University, and the University of Oregon all have managed to *reduce* overall energy or water consumption despite significant campus expansions. Water conservation measures in place at Colorado State University have helped decrease potable water use by 22% (108 million gallons) since 1990, even with an added 5,000 students and 1.4 million sf of buildings. As a result, CSU avoided having to pay in excess of $2 million for upgrades to sanitary wastewater lines on campus that were once at capacity.[4]

But environmental stewardship in academia goes well beyond controlling costs. Many in higher education see sustainability education as a natural extension of their pedagogical role. Universities are incorporating sustainability into their mission statements; some are creating programs in eco-literacy and environmental studies. Green buildings often figure prominently in these programs, serving as hands-on laboratories for experimentation in and observation of sustainable design and construction principles.

There are even those who argue that green campuses may actually help schools attract top students, faculty, and staff; this assertion, however, is not borne out by the data. In fact, of the university professionals surveyed by Martin Akel & Associates, just 12% said they use "eco-friendliness" to promote their institutions to prospective students or faculty.

Does your institution maintain an office of sustainabilty? 9.2



Source: Martin Akel & Associates, May-June 2006

How involved are the following groups in environmental concerns and initiatives on your campus? 9.3

Involvement	Very	Significant	Moderate	None
Facilities/physical plant management/staff	24%	37%	32%	7%
Administrators/managers/trustees	14%	27%	43%	15%
Faculty	5%	22%	52%	21.1
Students	8%	25%	44%	24%
Local community members	2%	7%	35%	57%

Source: Martin Akel & Associates, May-June 2006

Overcoming obstacles to sustainability

Despite signs of significant progress toward green, higher education has a long way to go. Only one in six schools (16%) maintains an office of sustainability, according to the Martin Akel survey. Moreover, colleges and universities account for just 3% of the 6,925 members of the U.S. Green Building Council. Fewer than 180 institutions have certified or even registered a building under LEED.

What is preventing the great majority of the nation's colleges and universities from greening their campuses?

The barriers to developing a sustainability initiative are many: lack of staff time or expertise; perceived complexity; institutional inertia; lack of clear policies; and the need to gain buy-in from numerous stakeholders and independent departments.

The single greatest barrier to sustainability in universities, though, is money, or the lack thereof. Leaders in the green campus movement point out that budget systems at most institutions favor new construction over renovation. Many universities also are burdened with lengthy, cumbersome financing processes. And because construction budgets are kept separate from operations and maintenance budgets, it becomes difficult to "sell" green projects that exceed the norm on the basis that they will pay off through lower O&M costs.

Despite the obstacles, institutions are finding ways to overcome these financial restrictions through alternative funding mechanisms.

Harvard University's revolving loan fund for green projects has been a huge success. More than $7.5 million has been invested in 105 energy, water, and waste conservation projects, with an average return on investment of 34% and a payback of less than four years. Sustainable projects are evaluated on a case-by-case basis; those that meet established payback (less than five years) and environmental impact criteria are funded through interest-free loans from a pool of $3 million established by the university. Loans are then paid back incrementally using the associated utility or operations savings. All principal payments are paid directly back into the loan pool to fund other projects.[5]

The revolving loan fund is not a panacea, however. Because it requires a reasonable payback period, the program is typically limited to utility-related upgrades,

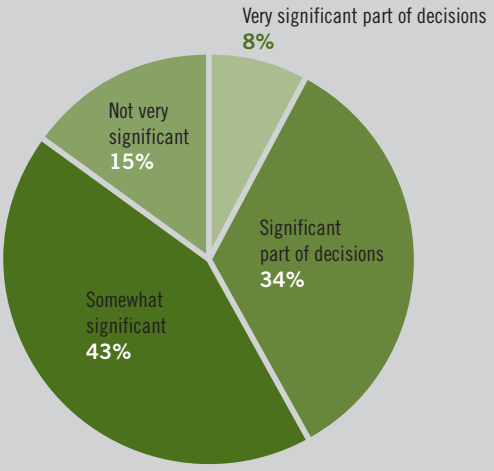
[4] *"The Hidden Economics of Campus Sustainability," John P. Morris,* Facilities Manager *magazine, May/June 2005. www.appa.org/files/FMArticles/5605FM_econ.pdf*

[5] *Harvard Green Campus Initiative, www.greencampus.harvard.edu. See also "Harvard's Leith Sharp: 'You* can *green your campus,'"* Building Design+Construction, *August 2006, p. 64. www.BDCnetwork.com/article/CA6361819.html*

such as irrigation controls or energy-efficient building systems; it may not be suitable for funding projects with long payback periods, such as large photovoltaic installations or wind power.

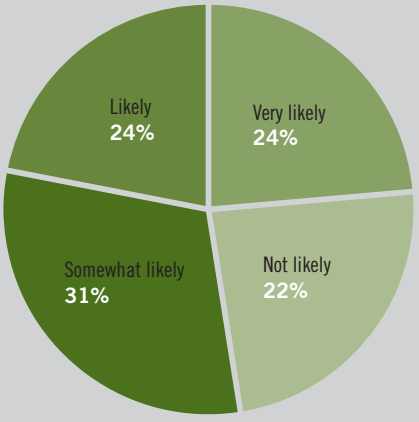
The Harvard program has become a model for other universities, including the University of Connecticut and California State University–Monterey Bay. But many schools have had to turn to more unusual means to raise the capital they need to get sustainability programs going.

To which degree do you take 'sustainability' into account when deciding upon products, equipment and systems? 9.4



Source: Martin Akel & Associates, May-June 2006

Would you consider applying for LEED certification for future construction and renovation projects? 9.5



Source: Martin Akel & Associates, May-June 2006

One fund-raising technique that is gaining popularity on campus is the student-enacted tuition hike. At UC-Santa Barbara, UC-Chico, and the University of Oregon, environmental grant programs are funded entirely through student-voted fee increases. These programs serve a dual purpose: first, they provide a steady stream of revenue (upwards of $200,000/year at some schools) to pay for green features; second, they empower student-run organizations to take charge of greening their campuses.

Student-funded grant programs have been quite successful—Oregon's April 2005 student ballot measure, for example, passed by an 80% majority—because the burden on individual students is minimal—just a few dollars per semester. In some cases, the funds were put toward highly visible or experimental initiatives that likely would have had no hope of getting through the university bureaucracy, such as green student residence competitions, solar and wind power installations, and composting systems.

Of course, student-funded programs cannot generate the kinds of dollars required to make substantial upgrades to the aging, inefficient buildings on most college campuses. Even though the long-term payoff in energy and water consumption that can be achieved simply by replacing inefficient lighting systems, chillers, boilers, pumps, and motors can be significant, such comprehensive retrofit programs can run into the tens of millions of dollars, money that most universities don't have at their immediate disposal.

To fund major retrofits, some universities are turning to *performance contracting*. This model requires little or no upfront cash from the institution. Instead, the upgrades are financed, designed, built, and managed by a third-party energy service contractor, known as an "ESCO." The ESCO puts together a fixed-sum contract with a specific payback period (up to 20 years) based on the project's scope and potential utility savings. The ESCO takes on the burden of managing the energy costs of the project and makes its money from the energy savings it achieves for the institution. Once the term of the contract has been fulfilled, the university assumes operation and maintenance of the system and accrues the utility savings directly.[6]

Although it could be argued that it would be cheaper in the long run for institutions to buy and run the systems themselves, many cash-strapped colleges and universities are turning to performance contracting as a way to get their utility systems upgraded quickly, without having to go the capital improvements route.

Other less common funding concepts that have potential include:

- Tax-exempt lease-purchase agreements. Here,

[6] *"Innovative Financing Solutions: Finding Money For Your Energy Efficiency Projects," U.S. Environmental Protection Agency, November 2004. www.energystar.gov/ia/business/COO-CFO_Paper_final.pdf*

Highlights of the LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects 9.6

Sustainable Sites

Site Selection (SS Credit 1)

Selection of a site for multiple buildings—especially one that is developed over a long period of time—will require effective site layout and planning to be sure all buildings meet the requirements.

Development Density & Community Connectivity (SS Credit 2)

Typical programmatic requirements for a campus, such as common green spaces and outdoor recreation spaces, will decrease average density. Yet they provide important functions and quality of life to a campus. Therefore, these types of required, programmed, low-density outdoor land uses can be added to the list of exceptions in LEED-NC.

Site Development—Maximize Open Space (SS Credit 5.2)

Open space does not have to be contiguous to the buildings to which it is accredited. Open space may be aggregated and set aside as a larger plot of land. The land must be in a natural state or returned to a natural state; quads and playing fields do not count toward attaining this credit.

Water Efficiency

Water Efficient Landscaping (WE Credit 1)

If there are multiple buildings in the project scope, enter aggregate data. While consistency in site boundaries is required, the initial flexibility in site boundary selection and building clustering options allows for enhanced opportunities for sharing captured or reusable water.

Innovative Wastewater Technologies (WE Credit 2)

When the site has more than one building, a weighted average of the site buildings, based on square footage, must be used to meet the requirements of the credit. Opportunities of scale may also allow more effective use of rain harvesting techniques or innovative and economical waste treatment technologies for the buildings on the site. Options include packaged biological nutrient removal systems, constructed wetlands, and high-efficiency filtration systems.

Water Use Reduction (WE Credit 3)

Because of the varying occupant numbers in some types of campus buildings (including students, staff, and visitors) an alternative method of calculating this credit may be used. Rather than basing the calculations on the number of occupants, water use may be based on the total number of each type of applicable fixture in the building and the estimated number of uses for each of these. Eyewash fountains, emergency showers, water coolers, and water fountains can be excluded from the calculation.

Energy & Atmosphere

Fundamental Commissioning of the Building Energy Systems (EA Prerequisite 1)

Each building in a project must independently meet the requirements of this prerequisite.
In the campus setting, other elements and site features associated with a building project, such as fountains, irrigation system, wheelchair lifts, "help phones," and exterior lighting systems that are not part of a building should also be considered for the commissioning process.

Fundamental Refrigeration Management (EA Prerequisite 3)

Each building in the project must meet this prerequisite. If the buildings are connected to a central chilled-water system, that system must either be CFC-free or a commitment to phasing out CFC-based refrigerants must be in place, with a firm timeline of five years from completion of the project.

Optimize Energy Performance (EA Credit 1)

Application of more-efficient combined heat and power systems and energy storage systems may be applied more effectively in the campus environment. Since the buildings are rated based upon the energy (and its cost) that crosses the building boundary, more-efficient central energy systems and thermal storage should be used as the basis of energy cost reductions in the calculation of the building's energy performance.

On-Site Renewable Energy (EA Credit 2)

A group of buildings may be evaluated on a group average, based on square footage, or each building may receive its own rating. For multiple-building submittals, campus features such as solar-powered pole lights can be applied toward this credit.

Materials & Resources

Construction Waste Management (MR Credit 2)

If there are multiple buildings in the project scope, enter aggregate data. Document salvage that occurs prior to the building's being turned over to contractors for demolition, including offering materials to academic programs on campus, such as fine arts or architectural studios.

Innovation & Design Process

Innovation in Design (ID Credit 1.1 – 1.4)

An innovation credit is warranted if activities or programs are applied to the campus as a whole, thus delivering correspondingly larger environmental benefit. Each credit should be carefully assessed and treated fairly, respective of overall site issues (e.g., pervious surfaces) versus individual building issues (e.g., roofing).

Source: USGBC

equipment and systems are leased, with payments stemming from the operations budget. At the end of the lease, the university assumes ownership of the installed systems.

- Third-party financing for renewable energy. An ESCO pays for the installation and management of photovoltaic systems, then sells the power back to the university at a long-term fixed rate (also available as a performance contract).
- Environmental "sin" taxes. Revenue for green initiatives is generated from higher fees for "environmentally detrimental" activities, such as automobile usage (higher fees for parking and vehicle stickers) and photocopying.

Creating a framework for green

While the funding shortfall is the key problem for greening-the-campus advocates, they also cite the lack of a rating system that defines what a sustainable campus is and how to achieve it, à la LEED or Energy Star or Green Globes.

In October 2005, however, the green-campus movement took a small step forward with the publication of the USGBC's application guide for campus building projects.[7] The guide analyzes the intent of each credit in LEED-NC 2.1 and 2.2 and interprets them for campus projects. The guide identifies opportunities to reduce the environmental impact across multiple buildings and their associated infrastructure. (See Figure 9.6.)

While it's a step in the right direction, the application guide was never intended to be a comprehensive benchmarking tool for universities. For one thing, most of the opportunities addressed in the document apply primarily to projects that involve constructing multiple buildings in unison or planned phases—an approach that is more common with corporate, government, and military institutions than with universities. Moreover, the guide covers only new construction: the vast majority of campuses need to put the emphasis on renovating their old buildings.

Finally, many leaders in campus sustainability would like to see a more comprehensive approach to sustainment, one that incorporates everything from facilities to curriculum to food service to community outreach. Such a system may soon be in the works.

In early October, members of the Higher Education Associations Sustainability Consortium, an industry group comprised of 13 university trade organizations, green lighted the development of a LEED-type rating system tailored specifically for university campuses.

The HEASC proposal was drafted by staff members at AASHE, which ultimately will be charged with hosting and maintaining the rating system. The proposed system includes four modules—curriculum, operations, research, and governance/institutionalization—each with a checklist of specific measures and weighted point values.

Due out in 2008, the rating system will apply to U.S. and Canadian schools. At first it will be a self-certification checklist, but it is anticipated that eventually it will permit third-party verification.

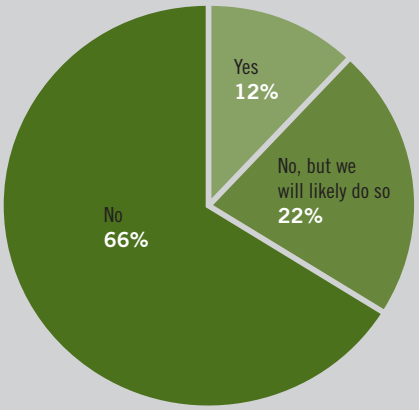
According to the HEASC, such a widely accepted rating system would:

- Help move the higher education system forward on sustainability, much as LEED has done for sustainable design of buildings.
- Provide campuses with a road map for moving in a more sustainable direction, with a common set of benchmarks and goals.
- Provide consistency over time in assessing progress toward sustainability.
- Enable meaningful comparisons across institutions.
- Provide incentives for institutions to advance sustainability in all campus sectors.

Despite overwhelming agreement to move ahead with the plan, some HEASC members have already expressed concerns about the nascent rating system: How would it evaluate an institution's commitment to social justice? How would it weigh behavioral changes among students, faculty, and staff, or measure the success of environmental curricula?

These and other issues will surely be debated vigorously before HEASC's rating system becomes accepted as the benchmark for sustainability in the university sector.

Does your institution currently use 'eco-friendly' as part of its marketing efforts to students, faculty, alumni or the local community? 9.7



Source: Martin Akel & Associates, May-June 2006

[7] *LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects, U.S. Green Building Council, October 2005. www.usgbc.org/ShowFile.aspx?DocumentID=1097*

Defining Rooftop Sustainability

In the commercial roofing industry, reflectivity has been the dominant discussion point for several years, and the Duro-Last® Cool Zone® roofing system has set the standard for single-ply roof reflectivity and the resulting energy savings. Now the term "sustainability" is receiving a lot of attention, and once again, Duro-Last is raising the bar.

What does sustainability really mean for building owners, facility managers, architects, and other specifiers? For a roofing system to be considered sustainable, it must deliver the Five E's of high-performance roofing:

- Energy – With energy costs continuing to rise, it's more important than ever to select a roof that can reduce energy use and improve a building's efficiency in any climate.
- Environment – High-performance roofing minimizes the impact on the Earth's environment throughout the roof's life, while also helping to maintain a healthy, productive environment inside the building.
- Endurance – A high-performance roof meets or exceeds performance requirements for long life: all-weather reliability; chemical, fire, and puncture resistance; and ease of maintenance and repair.
- Economics – A high-performance roof has to make economic sense, not just at the time of purchase, but also in the long run. A true economic comparison analyzes the cost of a roof throughout its life-cycle.
- Engineering – Utilizing the right materials, design, and manufacturing process is the key enabler of the other four E's, resulting in a complete, integrated roofing system that can be installed quickly and easily and performs reliably over the long run.

Sustainable roofing is one of those rare cases where there does not have to be a tradeoff between "green" and performance, or "green" and cost. Sustainable roofing systems cost less over time because they reduce energy bills, minimize environmental impact, require less maintenance, and keep the weather outside, where it belongs. Case in point: the Cool Zone roofing system is a protective, performance-enhancing umbrella that protects buildings from the elements, reduces energy requirements, enables uninterrupted facility operations, and contributes to the health and productivity of the building occupants.

When you consider the Five E's, alone and together, sustainable roofing takes on a new meaning, and one very good definition emerges: the Duro-Last Cool Zone roofing system.

To learn more about the Five E's of high performance roofing, I invite you to visit our website at http://www.duro-last.com/coolzone/. Also, feel free to contact me with questions or comments at 800-248-0280, or tholling@duro-last.com.

Thomas G. Hollingsworth
President
Duro-Last Roofing, Inc.