Environmental Management Systems

A Framework for Planning Green Campuses

Employing environmental management systems can help institutions address campus environmental impacts by providing a structure for assessing and improving the sustainability of all facets of campus operations.

by Julian Keniry

W e know that if institutions of higher education are to guide the way toward a sustainable future, successful environmental programs must not only endure but also serve as catalysts for change throughout their institutions and communities. How do we put these noble goals into practice amidst changing student bodies and personnel, scarce resources, and other pressing priorities? One tool is found in the concept of the environmental management system (EMS). Kinsella and McCully (1999) define a management system as "the combination of steps an organization takes to manage its processes and activities" and an environmental management system as "a well-defined management structure designed to address the impacts of an organization's activities, products, and services on the environment" (p. 6).

Translated to campuses, an EMS could be described as a framework for greening all facets of the campus, from the classroom to the power plant and from the budget to the student body, while continuing to improve performance over time.

Adapting the ISO 14001 Standard for Campuses

There is no exact formula for implementing an EMS on campuses, but the International Standards Organization

Julian Keniry, director of the National Wildlife Federation's (NWF's) Youth and Campus Programs, is a cofounder of NWF's Campus Ecology Program. Since 1989, she has lectured to campus and other audiences across the United States and abroad on sustainability in higher education. She wrote *Ecodemia: Campus Environmental Stewardship at the Turn of the 21st Century* (1995), coauthored *Green Investment, Green Return: How Practical Conservation Projects Save Millions on America's Campuses* (Eagan and Keniry 1998), and spearheaded the *State of the Campus Environment: A National Report Card on Environmental Performance and Sustainability in Higher Education* (McIntosh et al. 2001).

(ISO) has created the 14000 series of environmental standards, including a standard for environmental systems, ISO 14001, that is increasingly used in business and industry. By the end of 2001, 1,645 U.S. companies were registered to the ISO 14001 standard and 36,765 were registered worldwide (International Standards Organization 2001), with the number of companies seeking certification increasing each year. To become certified, organizations must hire a registrar who has been certified by an accreditation body approved by the ISO.

Although several campuses have consulted the ISO 14001 standard when developing green plans, according to Peggy Bagnoli, engineer and coordinator of the College and University Initiative of the U.S. Environmental Protection Agency's (EPA's) New England office, only the University of Missouri-Rolla has officially been registered to the standard to date (Bagnoli 2002). Although it can be helpful for campuses that wish to partner with businesses to register with ISO 14001, part of the reason for the low registration rate with ISO may be that campuses tend to be more decentralized than most businesses, making conforming to a uniform standard relatively more difficult and expensive.

In response to the need to address unique conditions on campuses, Bagnoli; her associates, Jean Holbrook, Marge Miranda, and Joshua Secunda; and a consulting group have developed a draft report, "Environmental Management System Guide for Colleges and Universities" (Bagnoli et al. 2001), in consultation with a number of higher education institutions nationwide. Three institutions—the University of Massachusetts Amherst, the University of New England, and the Wentworth Institute of Technology—are pilot testing this guide, which should be completed by the end of 2003 through the University of Massachusetts Lowell EMS Service Center. Matt Donahue, program director for the center, is currently recruiting an additional six to eight institutions to participate in a second pilot program.

Executive Order 13148, "Greening the Government Through Leadership in Environmental Management," requires federal agencies to implement EMSs by the end of 2005 at all applicable facilities (U.S. Environmental Protection Agency 2002). Although the EPA does not require that U.S. campuses that receive federal funding implement EMSs, according to Bagnoli, EMSs can be used as a supplemental environmental project by campuses wishing to waive or reduce fines for hazardous waste violations (Bagnoli 2002). Dozens of campuses have faced significant fines, in one case as high as $1.2 million, since

the early 1990s for hazardous materials violations under the Resource Conservation and Recovery Act.

EMS Components

Registration with ISO requires establishment of more than 16 system components, including the following:
- Establishment of environmental policy
- Identification of environmental aspects
- Compliance with legal and other requirements
- Determination of objectives and targets
- Development of an environmental management program
- Development of clear structure and responsibility
- Training, awareness, and competence
- Coordination of communication
- EMS documentation and document control
- Operational control
- Emergency preparedness and response
- Monitoring and measurement
- Nonconformance and corrective and preventive action
- Record keeping
- Assessment of the EMS (by a certified third party if registration is desired)
- Review by management of all systems (Stapleton, Glover, and Davis 2000)

Although the draft EMS guide for campuses uses the terminology and mirrors most of the components of the ISO 14001 standard, it is tailored to campus structures and incorporates case studies and checklists specific to campus operations. It divides the 16 elements into four categories: (1) policy, (2) planning, (3) implementation, and (4) review and improvement. This echoes the "plan-do-check-act" cycle that, according to Kinsella and McCully (1999), "is the foundation of all management systems" (p. 6).

Institutions without all 16 components in place cannot be registered to the ISO 14001 standard; Kinsella and McCully (1999) assert that each element is considered to be critical to the overall success of the system. Nevertheless, on decentralized campuses with few resources that do not intend to seek ISO certification, practitioners might implement detailed EMSs only for certain divisions (e.g., environmental health and safety, facilities, purchasing), while selecting only particular elements for other areas.

Moreover, the EMS can be extended to encompass activities beyond the operations of the campus. Although the ISO manual and draft EMS guide do not explicitly address curriculum or research, for example, there is no reason that components of the EMS, such as establishing objectives and targets, providing training, and conducting monitoring and measurement, could not be extended to those areas. A National Wildlife Federation (NWF) study indicates low levels of integration of environmental subject matter into disciplines ranging from education to law (McIntosh et al. 2001). One of the reasons for this may be that systems are largely not in place to manage integration, such as assessing the existing curriculum, identifying gaps and best practices, setting performance goals, and monitoring and documenting achievement in teaching and learning.

In his book, *The Nature of Design*, David W. Orr (2002) writes, "The larger design challenge is to transform a wasteful society into one that meets human needs with elegant simplicity" (p. 27). To many practitioners, the EMS may seem anything but elegant or simple. Yet campuses are complex, decentralized systems in which significantly improving environmental performance is complicated by lack of information about the full costs and impacts of activities and the lack of systems to address those impacts.

If designed well, the EMS can address these deficits and highlight alternative practices that will ultimately be simpler and more elegant.

Implementation Trends, Considerations, and Examples

Nationally, trends in implementing components of EMSs in higher education are encouraging in some areas and ripe for improvement in others. Some of these trends, as revealed in the NWF's report, *State of the Campus Environment: A National Report Card on Environmental Performance and Sustainability in Higher Education* (McIntosh et al. 2001), are discussed below. Also discussed are some of the unique considerations in implementing EMSs on campuses and ways these have been addressed, with examples.

Leadership. Existing EMS frameworks cover a variety of aspects of people organization, including delineating structure and responsibility, communications, and training. In guides to implementation for businesses (Kinsella and McCully 1999; Stapleton, Glover, and Davis 2000), it is generally assumed that the impetus for the EMS originates

from top management. We know from experience on campuses that this is very often not the case.

There is a limit to how long and how effectively staff and students can coordinate communications, volunteers, and all of the other facets of environmental responsibility without official sanction and compensation. The administrative responsibilities involved, including organizing meetings and volunteers, maintaining records, fund-raising, coordinating follow-up, and documenting results, are significant and must be sustained over many years.

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In a study on environmental management at 79 Canadian universities, Allwright and Herremans (2000) conclude that the support and oversight of a senior administrative body is more important than a set of guiding environmental principles in driving improved environmental performance. It becomes especially important on campuses, thus, where the impetus for environmental responsibility may originate at the grassroots, to cultivate leaders who can champion campus environmental responsibility and devote the resources necessary to implementing an EMS.

When seeking support for environmental projects, however, students, faculty, and staff have often found that priorities lie elsewhere, or that senior administrators are not particularly well informed about environmental issues. McIntosh et al. (2001) found that a strong majority of presidents cite inadequate staff time (69 percent), more pressing campus needs (69 percent), and inadequate funding (63 percent) as concerns in the expansion of environmental programs.

It is often necessary to identify and address the administration's questions before it is possible to proceed with implementation of an EMS. If costs are a primary concern, for example, resources such as the NWF's *Green Investment, Green Return* (Eagan and Keniry 1998) have been employed to demonstrate how campuses are saving millions of dollars through practical conservation projects, financing projects with longer payback periods through savings from projects that take less time to pay for themselves, and the myriad ways in which students have helped lower costs for environmental projects. Fostering

peer-to-peer networking opportunities is another strategy that has been employed for engaging senior officials. The Talloires Declaration and associated networking opportunities provide one such opportunity. In 1990, university presidents, chancellors, and provosts from countries throughout the world developed the Talloires Declaration, committing themselves to a 10-point plan of action to further environmental literacy and practice. Initiated by Anthony Cortese when he was the country's first "green dean" at Tufts University, the Talloires Declaration is now administered by the University Leaders for a Sustainable Future, based in Washington, D.C. With 290 current signatories from 47 countries, including 77 in the United States, the Talloires Declaration is an important vehicle for demonstrating commitment from the highest levels on the importance of social and ecological sustainability, for networking among peers, and for broadening the dialogue beyond the borders of the campus (Calder 2002).

Commitment of resources. Once commitment is secured, senior management can be essential in allocating the resources necessary to staff EMSs, finance task forces and training, implement accountability systems, and authorize many of the other necessary components. The NWF study (McIntosh et al. 2001) found that although a majority of schools (51 percent) have a recycling coordinator and close to 4 in 10 (36 percent) have an energy conservation coordinator, only a small minority (7 percent) have a green purchasing coordinator. In addition, only 6 percent of presidents and chancellors who responded to the survey report they plan to do more in employing full-time administrators to address environmental issues beyond regulatory compliance.

Equal room exists for establishing councils and task forces. Environmental task forces or working groups on campuses that have implemented them have provided an invaluable vehicle for sharing information across departments and campuses, identifying intradepartmental research and collaboration opportunities, and broadening investment and participation. For example, Michigan State University has had a sustainability task force in place since 1998. According to Terry Link, the director of Michigan State's Office of Campus Sustainability, this task force has helped foster a culture of communication on campus among facilities staff, faculty, and students and resulted in numerous collaborative projects. Michigan State's facilities staff has requested proposals, for example, from student and faculty teams for two energy audit projects on campus, with offers of $15,000 to each

winning team. To date, 18 percent of campuses have environmental task forces that include students, 6 percent have task forces that do not include students, and 64 percent do not have a formally sanctioned environmental task force or council (McIntosh et al. 2001).

One of the biggest opportunities to emerge in the NWF study is orientation and training. Although 50 percent of provosts report that their faculty receives professional development and training on environmental topics, fewer than 14 percent of campuses orient faculty, staff, or students to campus environmental policies or goals. What better way to advance environmental performance than by setting the tone when students, faculty, and staff first arrive to the campus? As environmental goals change, students and staff can be reoriented to these programs, offering an opportunity to clarify procedures, answer questions, and reinforce the value of environmental stewardship on the campus. Moreover, few campuses report evaluating staff and faculty environmental performance or instituting other accountability mechanisms. Only 8 percent of campuses hold campus units accountable for environmental performance through incentives or penalties, for example, and even fewer (4 percent) formally evaluate or recognize how the faculty has integrated environmental topics into the curriculum (McIntosh et al. 2001).

A compass for the process. Once the right teams of people are put in place, ISO 14001 requires establishing policy and, in the nomenclature of management systems, identifying areas, aspects, and impacts. Before doing so, it may be helpful to craft principles that help forge a common understanding of sustainability and channel activities in more sustainable directions.

In designing guiding principles, campuses have consulted a number of sources, most prominent of which is the Earth Charter, which includes 16 principles divided into four categories: (1) respect and care for the community of life; (2) ecological integrity; (3) social and economic justice; and (4) democracy, nonviolence, and peace (Earth Charter USA 2000). Campus leaders have also consulted the Coalition for Environmentally Responsible Economies (2002) principles, designed to help corporations improve environmental performance in the wake of the infamous oil spill that occurred in Prince William Sound, and a number of campuses utilize the four-system conditions of Natural Step, an environmental organization, as a guide for designing programs (Natural Step 2001).

The Penn State Indicators Report (1998) makes detailed recommendations for improvements in 10 areas guided by the following four sustainability principles recommended by its authors, a team of faculty, staff, and students:

- Respect for biota and natural processes
- Mindfulness of place
- Respect for materials
- Consideration of full costs

It may also be helpful to review work done on the campus and community level to identify sustainability indicators. In its report *1998 Indicators of Sustainable Communities*, the nonprofit community organization Sustainable Seattle (1998, p. 3) defines indicators as "bits of information that highlight what is happening in the larger system. They are small windows that provide a glimpse of the 'big picture.'" Some of the most exciting work on indicators has been done at the community level and modeled on Seattle's initiative. For example, three counties collaborated to produce *Central Texas Indicators 2000* (2000). Time spent commuting, public open spaces, mental health, diversity of employers, entrepreneurship, access to child care, and safety in the home are among the 42 indicators they selected. Penn State used the indicator model in preparing two assessments of campus environmental performance in 1998 and 2000.

Policies and measurable objectives. Policies and measurable objectives help translate principles and indicators into expectations and action. More than 4 in 10 schools (43 percent), according to the NWF study, either have a written commitment to promote environmental responsibility or have plans to develop one. The study also found that many schools have written policies covering a range of environmental concerns, from energy conservation to recycling to protecting natural habitats (McIntosh et al. 2001).

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Policies can be revised over time, delineating expectations and defining best practices and technologies. The State University of New York at Buffalo has formally adopted detailed policies, available on its Web site (www.wings.buffalo.edu/ubgreen), covering environmentally sound product procurement, campus mail, air conditioning, heating, recycling, electricity purchasing, and other topics.

According to the NWF study, many schools, while not formalizing their environmental policies in writing, do regularly set and review their environmental objectives (McIntosh et al. 2001). Schools are most likely to have written policies and review objectives for conserving energy and for the environmental performance in the design of buildings, two activities that most directly affect the financial bottom line. Sixty-four percent of institutions set goals in both areas. Colleges also are more likely to perform the highly visible task of reducing solid waste and maximizing recycling (56 percent). Other activities that receive attention from many school policy makers include protecting natural habitats (47 percent), purchasing environmentally sound goods (47 percent), reducing pollution (44 percent), conserving water (41 percent), and even making environmentally sound investments (29 percent) (McIntosh et al. 2001).

The ISO manual and draft EMS guide agree that the most useful objectives are measurable, have targets for completion, and include a reference point. In reviewing waste reduction goals listed on seven campus Web sites, I found that five listed percentage reduction goals ranging from 40–50 percent, whereas only two campuses indicated the date by which this goal would be achieved. None listed the baseline date from which the target would be measured. The other two campuses listed current waste reduction achievements but indicated no goal for improving future performance. This was just a random snapshot, but it suggests that there is room for improvement in the goal-setting process. Goals and policies can be incorporated into existing documents. Note the difference, for instance, that the amendments proposed by authors of the *Penn State Indicators Report* (1998, p. 113) would make in conveying the importance of sustainability to the overall mission of the campus (suggested changes are capitalized):

> Education. Penn State strives to create new dimensions in the lives of its students by introducing them to the collective knowledge, wisdom, and experience of human society AND THE NATURAL WORLD by encouraging them to acquire the skills and intellectual discipline to comprehend the complexities of our times....
> Research. Penn State strives to broaden human horizons by promoting scholarship, creativity and the advancement of

knowledge, thus enhancing our understanding of ourselves AND OUR PLACE in the many worlds around us. Service. Penn State strives to contribute to ECOLOGICAL, economic and societal vitality by offering informed views on critical and recurring issues, by providing opportunities for cultural and intellectual enrichment, and by contributing new ideas and new techniques...Finally, Penn State's ultimate purpose is to:...enhance the well-being of THE COMMUNITY OF LIFE LOCALLY, NATIONALLY AND GLOBALLY.

Regulatory compliance. The ISO and draft EPA frameworks concur that compliance with federal, state, local, and other applicable environmental regulations is a key component, if not a minimum standard, for campus environmental performance and the overall EMS. Generally, environmental health and safety offices on campuses are responsible for knowing which regulations apply to campus operations, for maintaining documents such as material data safety sheets on hazardous chemicals on site, and for meeting reporting requirements. However, print shops, facilities, laboratories, fleet maintenance, transportation, and parking all engage in activities that have sizeable impacts and should be aware of related regulations even if the impacts are currently too small to require reporting. Applicable federal regulations may include the following:

- Clean Air Act
- Clean Water Act
- Comprehensive Environmental Response, Compensation, and Liability Act
- Emergency Planning and Community Right-to-Know Act
- Federal Insecticide, Fungicide and Rodenticide Act
- Resource Conservation and Recovery Act
- Spill Prevention Control and Countermeasures Regulation
- Toxic Substances Control Act

As mentioned earlier, campuses have faced large fines and other serious consequences for poor management of hazardous materials. A few campuses have Superfund sites, or areas that have been significantly contaminated by leakage of hazardous materials, and are listed as a priority

for cleanup by the U.S. Environmental Protection Agency. In some instances in which communities are in danger of nonattainment or are in nonattainment for the Clean Air Act, campuses are the culprits. The cost of noncompliance, both environmentally and financially, can be significant.

Compliance with pertinent regulations, like most aspects of an environmental management system, requires coordination. One or more individuals must assess and review campus environmental impacts, know which regulations apply, ensure relevant staff members are aware of compliance requirements, provide training, fulfill reporting requirements, and maintain documents.

Monitoring and measurement. Many of the elements of a campus EMS, such as monitoring and measurement (the term used in management circles) or assessment (the term more frequently used by campus environmental groups), tie into and reinforce one another. Environmental assessments help set and meet objectives, provide a baseline for measuring change, identify priorities for environmental improvement, give people an opportunity to make suggestions, and pinpoint opportunities to cut costs. For example, with support from environmental coordinator Kurt Teichert, students conducted an assessment of campus water use at Brown University that resulted in the replacement of 750 showerheads with more water-efficient alternatives, saving $45,800 and 12.6 million gallons of water annually (Eagan and Keniry 1998). Campus assessment not only exposes areas in need of improvement but also identifies environmentally superior practices, cost savings, environmental research, course offerings, and other successful approaches already in place.

A concerted effort around Earth Day 1990 to conduct campus environmental assessments on the national level resulted in the publication of *Campus Ecology: A Guide to Assessing Environmental Quality and Creating Strategies for Change* (Smith and the Student Environmental Action Coalition 1993). Since this time, at least 270 colleges and universities in the United States and Canada have conducted environmental assessment, more than a third of which audited their schools since 1998 (Glasser and Nixon). Many schools have produced comprehensive assessments each year over several years or produced a variety of assessments on specific issues. Brown, The University of British Columbia, the University of Colorado at Boulder, the University of Vermont, and the University of Waterloo stand out for the frequency, consistency, and breadth of their assessments, which range from comprehensive studies of multiple issues

and operations to more specific assessment of landscaping practices, food issues, transportation, and carbon emissions.

ISO requires not only monitoring and measurement of environmental performance but also an assessment (or audit) of the EMS itself. If registration to ISO is sought, an auditor or group of auditors must be hired to review the system, which can take between four and eight person days (Kinsella and McCully 1999). Campuses have used a variety of approaches when conducting assessments, ranging from developing metrics and collecting and analyzing detailed data to interviewing area managers and department heads on key opportunities and barriers. Campus administrations may keep the results confidential or share them with the public. If ISO registration is not sought, students may conduct the assessments as part of their learning experience. The assessments can be conducted at various time intervals: semiannually, annually, or less frequently. If not seeking registration, campuses need not hire third-party auditors, but including assessment of the EMS into the larger assessment of environmental performance on campus, as required in ISO 14001, is a good idea. Few of the existing campus environmental audit reports include EMS components as part of the overall evaluation.

Integration into existing management systems. The ISO 14001 implementation guides and draft EMS guide for campuses acknowledge that effective environmental management systems are best integrated, wherever feasible, into existing management systems, including strategic and master plans, budget planning, performance reviews, and communications. This can save time and money and ultimately improve the outcomes of the EMS.

Campus planning professionals and those who lead academic planning processes should be consulted when identifying ways to tailor existing management systems and plans so that they incorporate the elements necessary to improve environmental performance and learning. It is particularly important to make sure the campus EMS is integrated into long-range planning processes. Professional planners can help clients understand how and when to make adjustments to master plans for land use, buildings, and infrastructure. Similar consideration can be given to academic planning.

The budget process, too, may need to be tailored to increase financial incentives for conservation and to remove barriers to innovation. Incentives include allowing departments to reinvest some or all of the savings they earn through energy efficiency and other environmental

initiatives as Dartmouth College did for the Office of Residence Life (Eagan and Keniry 1998), providing bonds or grants to finance conservation projects, or lengthening payback requirements for projects that promise significant environmental and cost savings over the long term.

Other considerations. Operational controls, document controls, corrective action, emergency response, and record keeping are among the other components required by ISO 14000. These vary in their applicability to campus functions. The events of September 11, 2001, certainly underscored the need to prepare for emergencies on campuses and highlighted the important role of an environmental management system in such considerations. On a more positive note, by encouraging documentation and record keeping, EMSs can also create "institutional memory" by helping new students and staff build upon past accomplishment and providing the campus community with a sense that individual and departmental contributions make a difference. Documenting achievement and keeping good records may even be helpful in seeking grants and other financial support.

Bringing It All Together

A centerpiece of the University of Colorado's approach to environmental management is its annual Earth Summit. Starting with an awards ceremony to recognize outstanding achievement, Colorado's environmental center coordinates a series of panels and workshops on social and environmental topics of concern to the campus community and provides a forum in which faculty, administrators, and students set goals and report on progress. The university compiles findings into an annual progress report. The awards ceremony in which faculty, staff, and students are recognized for outstanding environmental accomplishment engenders goodwill and starts the event on a positive note. Colorado's environmental center, supported largely by student fees, has sustained staffing and momentum since the early 1970s (Toor 2000). This university now has nationally recognized recycling and transportation programs and a variety of other outstanding environmental programming. Colorado's approach to advancing environmental responsibility on the campus emphasizes goals over policy, incorporates creative approaches that work particularly well within its culture, and exemplifies how campuses can apply and adapt components of an EMS to foster a whole that is greater than the some of its parts.

Conclusion

It is entirely possible for a campus to have a detailed environmental policy that is never implemented, regular communications that are not well facilitated and ultimately do not achieve outcomes, or environmental courses that fall flat with students. Lack of efficacy in implementation, however, does not negate the need for an EMS.

Many may argue that an EMS it too centered in management theory and not sufficiently reflective of natural systems to be effective. Ironically, in their book, *The Dance of Change*, Peter Senge, a well-known theorist on management innovation, and his colleagues, write, "To understand why sustaining significant change is so elusive, we need to think less like managers and more like biologists" (Senge et al. 1999, p. 6). In reality, however, at most institutions, the biologists have brought us no closer to the green campus than the managers have. If designed with this intention in mind, the EMS could help bring the biologists, managers, and others together to design approaches to living on campuses, and within our larger communities, that bring natural and human systems into better balance. ▓

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